

**Bank's use of accounting discretion and regulatory intervention: The case of European banks' impairments on Greek Government Bonds**

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# **Bank's use of accounting discretion and regulatory intervention: The case of European banks' impairments on Greek Government Bonds**

## **Abstract**

This paper analyzes troubled banks' use of accounting discretion and its interaction with regulatory intervention in a time of financial distress. We analyze impairment losses that Europe's largest banks recognized on Greek Government Bonds (GGB) during 2011, the time during which GGB were considered impaired. Our findings reveal considerable variation in the impairment ratios across banks. Banks with larger GGB exposures, for which a full impairment would deplete a large share of regulatory capital, recognize significantly lower impairment ratios. Furthermore, we find that troubled banks delay full impairments until state aid is provided: Troubled banks recognize significantly lower impairment ratios in the quarter before they are provided with state aid, but substantially increase their impairment ratios afterwards. This pattern is consistent with the notion that troubled banks initially understate impairments to conceal the full extent of their financial difficulties from less sophisticated non-regulator outsiders (e.g., depositors and the general public), which increased regulators' ability to practice forbearance by not intervening immediately.

**JEL Classification:** G01, G21, G28, M41, M48

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## **Bank's use of accounting discretion and regulatory intervention: The case of European banks' impairments on Greek Government Bonds**

### **1. Introduction**

This paper analyzes troubled banks' use of accounting discretion and its interaction with regulatory intervention. During economic downturns, troubled banks have a strong incentive to exploit room for accounting discretion to overstate assets, and consequently, equity and regulatory capital. This may allow troubled banks to conceal their financial difficulties from outsiders, prevent or delay intervention by regulators, and ultimately enable these banks to continue operating.

There is evidence that troubled banks use accounting discretion to overstate capital, particularly during economic downturns (e.g., Shrieves & Dahl, 2003; Vyas, 2011; Huizinga & Laeven, 2012). Our study contributes to this literature by examining two research questions: Do troubled banks use accounting discretion to overstate capital when this overstatement is highly visible to outsiders? Does banks' overstatement of capital, in such a situation, serve to mislead (i) regulators or (ii) mislead non-regulator outsiders?

We analyze impairment losses that European banks recognized on Greek Government Bonds (GGB) as of June (Q2), September (Q3) and December (Q4) of 2011, the time when the Greek debt crisis intensified and GGB were impaired. Our sample includes 54 banks. Together, these 54 sample banks' GGB holdings account for nearly the entire GGB exposure held by European banks. Some of the sample banks were initially well capitalized, but held considerable exposure in GGB, so that recognizing full impairment losses on GGB would have depleted a major share of their regulatory capital (referred to as 'troubled banks' in the following). Our findings indicate that banks' GGB exposure was the major determinant for banks' financial distress and significantly predicts the amount of state aid that banks received during 2011 and 2012.

We find a large variance in the impairment ratios across banks, even though observable market prices should have effectively limited banks' room for discretion. Banks with larger GGB exposures, for which full impairment would deplete a large share of regulatory capital, recognize significantly lower impairment ratios. When trying to reconcile this variance in observable impairment ratios with the measurement requirements in International Accounting Standard (IAS) 39, it appears that banks took considerable liberty in applying the measurement requirements, especially during Q2 and Q3 2011.

Because banks' opportunistic use of accounting discretion is highly visible in our setting, this finding raises the question as to whether banks' overstatement of capital was

aimed at misleading regulators or non-regulator outsiders. There are two alternative mechanisms through which troubled banks' overstatement of capital could translate into a lower risk (or delay) of intervention by regulators (Bushman & Landsman, 2010). These two mechanisms differ in terms of which group of outsider is unable to 'see through' troubled banks' overstatement of capital.

On the one hand, regulators could be misled by bank's use of accounting discretion. If regulators are not able to see through a bank's overstatement of capital, then regulators cannot identify troubled banks and are unable to assess the full extent of their financial difficulties, which keeps regulators from intervening.

On the other hand, there exists an alternative mechanism: Regulators are able to see through this overstatement of capital, but less sophisticated outsiders, such as depositors and the general public, are misled. When depositors and the general public are unaware of banks' financial difficulties, depositors cannot exercise market discipline (i.e., by withdrawing their funds from troubled banks) and regulators feel less pressured to intervene. Hence, if banks are successful in concealing their financial difficulties from less sophisticated outsiders, then regulators' ability to practice forbearance on these banks increases (Gallemore, 2013).<sup>1</sup>

To examine whether troubled banks overstate capital to mislead regulators or to enable regulators to practice forbearance by misleading less sophisticated outsiders, we chose to investigate a setting (i) where troubled bank's opportunistic use of accounting discretion is unlikely to mislead regulators and (ii) which allows us to analyze the interaction of bank's use of accounting discretion and regulators' reaction (i.e., the provision of state aid).

Our findings illustrate that the amount of state aid provided is significantly associated with banks' GGB exposures. This indicates that state aid was provided to compensate banks for the losses associated with impairments on GGB. However, the question is whether state aid was provided after or before banks recognize full impairments on GGB. For this reason, we examine the chronological sequence of banks' GGB impairment decisions (impairment ratios) and the provision of state aid.

If troubled banks are successful in concealing the full extent of their financial difficulties from regulators by understating impairments on GGB, then we should observe that state aid is provided *after* banks recognize full impairments on GGB. This chronological sequence would suggest that regulators did not become aware of a bank's financial difficulties until the bank recognized a full impairment on GGB. Only then would the full

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<sup>1</sup> Similar to Gallemore (2013), we use the term 'regulatory forbearance' to refer to a situation where regulators decide not to close a troubled bank, but allow the bank to continue operating.

extent of the bank's financial difficulties be revealed and provoke the provision of state aid. If, however, we observe that state aid is provided *before* banks recognize full impairments on GGB, we conclude that regulators had been able to 'see through', but chose to tolerate, banks' understatement of impairments on GGB (regulatory forbearance).

Indeed, we find that troubled banks delay full impairments until state aid has been provided. More specifically, in the quarter before troubled banks are provided with state aid, their impairment ratios are significantly lower than those recognized by the remaining sample banks. After state aid has been provided, we find that troubled banks substantially increase GGB impairments (i.e., after state aid was provided troubled banks recognize comparable or even higher GGB impairments than their peers). This pattern indicates that troubled banks are willing to recognize high impairments only after state aid has been provided, because the capital that was injected by the government can absorb the associated impairment losses.

In line with this, we find that bank's GGB impairment ratio predicts the amount of state aid that the bank will subsequently receive. Banks that recognize lower impairment ratios in the respective quarter receive higher amount of state aid in subsequent quarters. This finding is consistent with the notion that regulators (governments) could identify troubled banks, and could even determine the amount of equity capital that these banks needed to catch up with the GGB impairment ratios of their peers (i.e., full impairment ratios).

Against the backdrop of our findings, it is hard to escape the conclusion that regulators were able to identify troubled banks already in the quarter when banks aimed to conceal their financial difficulties by understating impairments on GGB. However, this understatement of GGB impairment ratios might have misled less sophisticated non-regulator outsiders and enabled regulators to practice forbearance by not intervening immediately. In this situation, regulatory forbearance would have provided governments with additional time to organize the provision of state aid, which may take considerable time if the government is facing financial difficulties as well.<sup>2</sup>

Our paper is the first to analyze the measurement of an essentially homogenous financial instrument (i.e., GGB) across banks. The availability of observable market prices and the possibility that market participants detect and undo any understatement of impairment ratios should effectively limit banks' opportunistic use of accounting discretion. In light of

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<sup>2</sup> Countries that provided state aid to troubled banks and were financially constrained themselves first had to request financial assistance from EU member states until they were able to recapitalize their domestic banks. For instance, while Spain had requested financial assistance from the Eurogroup for its troubled banks already in June 2012, the funds were only provided to Spanish banks in December 2012 (ESM, 2013; Quaglia & Royo, 2014).

this unique setting, our study provides an important contribution to the literature. Our results illustrate that troubled banks considerably overstate capital and exploit accounting discretion to conceal their financial difficulties, even in a situation where it is highly visible to outsiders. Our findings further show that banks' overstatement of capital did not seem to mislead regulators. We conclude that banks' overstatement of capital, in such a setting, is rather aimed at misleading less sophisticated non-regulator outsiders.

## **2. Background and research questions**

### *2.1. Banks' use of accounting discretion to manage regulatory capital*

Previous studies document that banks which are at risk of violating capital adequacy requirements use accounting discretion to overstate assets, and consequently, equity and regulatory capital (e.g., Moyer, 1990; Beatty, Chamberlain, & Magliolo, 1995; Collins, Shackelford, & Wahlen, 1995; Kim & Kross, 1998; Shrieves & Dahl, 2003). Substantial overstatement of capital by exercising accounting discretion has also been documented for the subprime crisis. Banks (i) delayed impairments on structured credit instruments such as mortgage-backed securities (Vyas, 2011; Huizinga & Laeven, 2012), (ii) recognized lower loan loss provisions (Huizinga & Laeven, 2012), (iii) determined the fair value for a larger share of financial assets on level 3 (Glaser, Mohrman & Riepe, 2014), and (iv) reclassified financial assets out of the fair value categories into the amortized cost categories (Huizinga & Laeven, 2012; Bischof, Brüggemann, & Daske, 2014).

However, Beltratti, Spear, & Szabo (2013) analyze the aggregate impairment amounts that banks recognized between 2007 and 2009 and do not find that banks delayed impairments during this period. In particular, they show that banks' actual impairments were as timely as the impairments implied by banks' stock prices ("market-implied write-downs"). The value relevance of banks' actual impairments could be explained by the fact that banks did not overstate capital by delaying impairments. However, an alternative explanation would be that stock market participants themselves were misled by banks' delayed impairments (and consequently stock market participants reacted at the time when banks eventually recognized full impairments).

Overstatement of capital may not be fully visible to outsiders, in particular, if asset measurement is to a large extent based on banks' private information. For instance, loan portfolios are heterogeneous across banks, making it difficult to assess whether low loan write-downs reflect banks' opportunistic use of accounting discretion or a higher quality of banks' individual loan portfolios (i.e., a less risky loan portfolio).

Compared to settings used in the prior literature, GGB portfolios are essentially homogenous across banks (e.g., identical issuer and default probability) and market prices are observable. Thus, if a bank recognizes a particularly low GGB impairment ratio, outsiders can infer that this reflects banks' opportunistic use of accounting discretion and undo the associated overstatement of capital. Sophisticated outsiders (e.g., sophisticated capital market investors and regulators) are likely to detect such an overstatement of capital. On the other hand, less sophisticated (e.g., depositors and the general public) outsiders might lack the capabilities or motivation that is required to fully analyze financial statements in such detail.

Our first research question is concerned with banks' use of accounting discretion in such a setting: *Would banks use accounting discretion to overstate capital, when it is likely that sophisticated outsiders see through it?*

## 2.2. *Managing regulatory capital to avoid regulatory intervention*

'In order for earnings management [or regulatory capital management] to be successful [...] at least some users of accounting information must be either unable or unwilling to unravel completely the effects' (Fields, Lys, & Vincent, 2001). Troubled banks have an incentive to overstate regulatory capital because it may translate into a lower risk (or delay) of intervention by regulators. If troubled banks' overstatement of capital can be documented in a setting where it is highly visible, this finding would raise a second important research question: *What is the mechanism through which banks' overstatement of capital translates into a lower risk (or delay) of regulatory intervention?*

There are two alternative mechanisms that differ in terms of which group of outsiders is unable to 'see through' troubled banks' overstatement of capital. One of these groups is regulators. If troubled banks are successful in concealing their financial difficulties from regulators, then regulators will be unable to identify troubled banks and the full extent of troubled banks' financial difficulties, thereby impeding regulators' ability to intervene.

However, even if banks' overstatement of capital during a financial crisis is visible to regulators, it may lower the risk of foreclosure by regulators, provided that the overstatement is not transparent to specific groups of non-regulator outsiders. Regulators have an incentive to practice forbearance, particularly during a financial crisis, when regulatory foreclosure might trigger spillover effects (e.g., the failure of a single bank leads to a disruption of the entire financial system), market panic and bank runs (Brown & Dinc, 2011; Gallemore, 2013). However, regulatory forbearance is unlikely if depositors are aware of banks' financial difficulties, since depositors will practice market discipline by withdrawing their funds from

banks that experience severe financial distress (Peria, Soledad, & Schmukler, 2001; Spiegel & Yamori, 2007). This will trigger the foreclosure of a troubled bank, even if regulators would be willing to practice forbearance. Hence, regulators are pressured to intervene if banks' financial difficulties are transparent to non-regulator outsiders.

Furthermore, regulatory forbearance, in such a setting, might erode regulators' reputation and market participants' trust in effective bank supervision. The third pillar of the Basel II framework is aimed at supporting market discipline to curtail regulators' ability to practice forbearance. Against this backdrop, regulators' ability to practice forbearance *increases* if troubled banks successfully conceal their financial difficulties from non-regulator outsiders by overstating capital.

The findings of Skinner (2008) indicate regulators' strong incentives to practice forbearance during economic downturns. During the Japanese banking crisis, bank regulators at the Ministry of Finance allowed Japanese banks to include deferred tax assets in their regulatory capital. As a consequence, deferred tax assets accounted for a major part of troubled banks' regulatory capital and enabled them to comply with minimum regulatory capital requirements. While this change in the regulatory treatment of deferred tax assets is consistent with banks and regulators colluding to conceal banks' financial difficulties, it is not clear whether regulators (and other outsiders) could assess which banks ultimately overstated deferred tax assets, given that its measurement is, to a large extent, based on private information and provides managers with considerable room for accounting discretion.

Huizinga & Laeven (2012) interpret the finding that banks exploited accounting discretion to overstate capital as being consistent with the notion that banks concealed their financial difficulties from non-regulator outsiders (but not from regulators) to enable regulators to practice forbearance.

However, Beatty and Liao (2014) argue that, 'While they [Huizinga & Laeven] interpret their findings as suggestive of regulatory forbearance and noncompliance with accounting rules, there are many other potential explanations for their results and they conduct no direct tests that would allow them to draw conclusions about regulatory forbearance or noncompliance with accounting rules. More research in this area is required to reconcile the difference between the theoretical predictions and the empirical findings and to rule out alternative explanations for the empirical results.'

An alternative explanation for Huizinga & Laeven (2012)'s findings is that regulators themselves were unable to see through banks' overstatement of capital. This alternative explanation cannot be ruled out, in particular, because the assets analyzed in their study are

mortgage-backed securities and loans. Banks hold heterogeneous portfolios of these financial instruments. Thus, even for regulators, it may be difficult to determine whether low write-downs (provisions) for these portfolios reflect (i) banks' opportunistic use of discretion to overstate capital or (ii) a truly higher quality of the respective portfolios.

Regulators' ability to identify troubled banks was further hindered by the complexity of the financial instrument portfolios and banks' opacity during the financial crisis (Vyas, 2011; Freixas & Laux, 2012). If troubled banks are successful in concealing the full extent of their financial difficulties from regulators, then the absence of regulatory intervention would indicate regulators' inability to identify troubled banks, rather than regulatory forbearance.

In contrast to Skinner (2008) and Huizinga & Laeven (2012), our study aims to shed light on the question of whether banks overstate capital in a situation that is associated with limited room for accounting discretion and highly visible to outsiders. In addition, we examine whether regulators were actually misled by banks' overstatement of capital in this situation.

### **3. Setting**

#### *3.1. Transparency of GGB impairment decisions*

To address our research questions, we require a setting where (i) banks' overstatement of capital by opportunistically exercising accounting discretion is likely to be highly visible, at least to regulators, and (ii) a situation that provides banks with a strong incentive to overstate assets to manage regulatory capital. The measurement of GGB by European banks in the summer of 2011 provides such a setting that is well suited to address the research questions at hand.

In June of 2011, a number of European banks held GGB to an extent that recognizing high impairment losses on GGB would have substantially depleted their equity and regulatory capital.<sup>3</sup> In this setting, these troubled banks had a strong incentive to conceal the full extent of their financial difficulties by understating GGB impairment losses (lower impairment ratios). However, it seems unlikely that sophisticated outsiders were misled by banks that considerably understated GGB impairment ratios recognized for the following reasons:

First, Angeloni and Wolff (2012) show that equity investors did not rely on banks' actual impairment ratios, but incorporated expected impairments on GGB based on banks' individual GGB exposures. A haircut on GGB had to a large extent been incorporated in

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<sup>3</sup> We discuss the extent to which troubled banks' financial difficulties were a result of GGB impairments in section 5.4.

banks' market values already during April and July of 2011, before most banks released their interim financial statements that disclosed information on actual impairments recognized on GGB during Q2. When banks released Q3 interim financial statements with information on additional impairments that were recognized during Q3, equity investors did not adjust their valuation of banks' GGB holdings. The absence of a market reaction suggests that market participants had already incorporated these additional impairments on GGB and were not misled by banks that recognize particularly low impairment ratios.

Second, the European Banking Authority (EBA) disclosed data on European banks' GGB exposures, including maturity and measurement categories as of 30 December 2010 and 30 September of 2011. The EBA used this data to conduct the 2011 stress test and capital exercise. For the purpose of these tests, the EBA determined banks' regulatory capital shortfall on the basis of uniform pro-forma impairment ratios on GGB (EBA, 2011a; EBA, 2011b), and thus, independently of banks' actual impairment ratios.<sup>4</sup> National regulators could have assessed banks' financial condition based on the results of the EBA's stress test and capital exercise. In addition, regulators could have used the available information on banks' GGB exposure to recast banks' regulatory capital on the basis of uniform pro-forma impairment ratios (instead of actual impairment ratios). Compared to equity investors, regulators even had an informational advantage with respect to the information that banks provided for the stress test. Hence, regulators must be considered at least equally well-equipped to assess banks' true financial condition (see Berger, Davies, & Flannery, 2000). Overall, it appears unlikely that troubled banks could conceal their financial weaknesses from regulators by understating impairments on GGB.

Nevertheless, banks had an incentive to use discretion to overstate capital, provided that this allows them to conceal their financial difficulties from depositors and the general public, thereby enabling regulators to practice forbearance. Regulator's ability to practice forbearance decreases if depositors are aware of banks' financial difficulties and withdraw their funds from banks that experience severe financial distress (Peria, Soledad, & Schmukler, 2001; Spiegel & Yamori, 2007). In European countries where governments faced severe financial difficulties, even insured depositors are likely to be concerned about governments' willingness and ability to compensate depositors for any losses that occur in the case of a bank's insolvency (Flannery, 1998). Consequently, it were particularly the banks from the troubled PIICGS countries (i.e., Portugal, Italy, Ireland, Cyprus, Greece and Spain)

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<sup>4</sup> For instance, during the capital exercise, banks' capital shortfall was calculated based on GGB impairment ratios implied by market prices.

that had high incentives to conceal their financial difficulties from depositors and the general public in order to avoid bank runs.

### 3.2. *Interaction of banks' GGB impairments and regulatory intervention*

In early 2011 banks may have understated impairments on GGB in the hope that the financial difficulties of Greece would ease and market values for GGB would recover. However, the financial difficulties that were triggered by GGB impairments did not resolve. During March and April of 2012, banks had to exchange their GGB, thereby realizing the associated losses, as part of the Greek debt restructuring (Zettelmeyer, Trebesch & Gulati, 2013). Banks' financial difficulties that were triggered by impairments on GGB could not be concealed thereafter. Hence, these banks needed to either be liquidated or supported with state aid.

From our sample of 54 banks (see section 4), 16 banks were provided with state aid in the form of equity recapitalization during 2011 or 2012. It may take some time for regulators to support the bank with the necessary state aid after regulators (and governments) recognize the full extent of banks' financial difficulties. In the case of the European sovereign debt crisis, the time-lag is likely to be even longer for those countries that were financially constrained themselves and initially needed financial support from other EU member countries to be able to support their banks.<sup>5</sup>

We examine whether state aid is provided *before* or *after* these troubled banks recognize full impairments on GGB, given that the timing of state aid will indicate when regulators' (and governments') ability to identify troubled banks. If troubled banks are able to mislead regulators by understating impairments on GGB, then regulators will only become aware of banks' financial difficulties after banks have recognized full impairments on GGB. In this case, state aid can only be provided *after* banks disclosed their financial difficulties by recognizing a full impairment. In contrast, state aid that is provided *before* troubled banks recognize full impairments on GGB would indicate that regulators (and governments) were aware of banks' financial difficulties, even at the time when banks understated impairments on GGB. In this case, troubled banks' opportunistic use of accounting discretion would likely be aimed at (i) concealing banks' financial difficulties from non-regulator outsiders and (ii) delaying full impairments until state aid could be provided and absorb the losses associated with full impairments on GGB.

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<sup>5</sup> From the 16 sample banks that were recapitalized during 2011 and 2012, eleven banks were domiciled in one of the troubled PIIGS countries.

### *3.3. Measurement of GGB in accordance with IAS 39 in 2011*

#### *Step 1: Objective evidence that GGB are impaired*

GGB have to be assigned to one of IAS 39's four measurement categories for financial assets upon initial recognition. Financial assets assigned to the "fair value through profit or loss" (FVTPL) or "available for sale" (AFS) categories are measured at fair value (FV), while financial assets in the "held-to-maturity" (HTM) or "loans and receivables" (LAR) category are measured at amortized cost (AC). The bank's initial choice of measurement category has consequences for quantifying any subsequent impairment loss. Also, depending on the measurement concept (fair value vs. AC) there are different rooms for discretion that can be used for managing or manipulating earnings.

IAS 39 uses a two-step incurred loss impairment model. In the first step, at each reporting date banks had to assess whether there is 'objective evidence' (i.e., a triggering event) that GGB are impaired (IAS 39.58).

One triggering event is 'significant financial difficulty of the issuer' (IAS 39.59(a)). In June 2011, Greece's debt level exceeded 160 percent of GDP. Also, market interest rates for GGB with a maturity of 10 years had increased to 16.69 percent, reflecting Greece's severe difficulties in raising funds in the capital markets. Greece had to rely on the rescue package of the Eurozone countries and the IMF in order to meet its financial obligations and to avoid insolvency. On 21 July 2011, the European heads of state and government convened at an EU summit to adopt a second rescue package in the amount of € 109 bn (Council of the European Union, 2011). Under this package, private bondholders were requested to 'voluntarily' waive a portion of their claims by surrendering existing bonds in exchange for new bonds, which involved forfeiting 21% of their claims ('haircut'). This so-called private-sector involvement 1 (PSI 1) was limited to GGB with maturities until 2020. The outcome of the EU summit on 21 July 2011 and the conditions of PSI 1, including a 'haircut', can be considered an additional triggering event (IAS 39.59(d)) by 30 June 2011.

After June 2011, Greece's financial situation deteriorated further. PSI 1 had not yet been implemented, when in October 2011 the European heads of state agreed that private bondholders would be requested to waive 50%, instead of 21%, of their claims (Council of the European Union, 2011). The detailed conditions of this new bond exchange offer (PSI 2) were to be adopted by the end of 2011. On 21 February 2012, Greece announced that the PSI would finally be implemented and disclosed the detailed conditions of the bond exchange offer. As of 24 February 2012, private bondholders could exchange their existing GGB, and in return receive (i) new GGB with a considerably lower face value plus (ii) additional

‘sweeteners’ (e.g., a short-term note issued and secured by the European Financial Stability Facility, etc.). Depending on the maturity of the old bonds, this bond exchange implies haircuts in a range between 50 and 75 percent (Canuto, Pinto, & Prasad, 2012; Zettelmeyer, Trebesch, & Gulati, 2013). Market prices for GGB had incorporated a haircut on GGB exceeding 65 percent already by December 2011. Thus, market prices were largely unaffected by the announcement of the bond exchange offer in February 2012 (Zettelmeyer, Trebesch, & Gulati, 2013).

Overall, as for the interim financial statements as of 30 June 2011, there is strong evidence that GGB had to be considered “impaired”. Since Greece’s financial situation deteriorated further, the same conclusion must be drawn for the subsequent quarters in 2011.

#### *Step 2: Determining the impairment ratio*

GGB assigned to the available for sale (AFS) category are measured at fair value. To determine the appropriate level within the fair value measurement hierarchy, the bank needs to evaluate whether the market in which GGB are traded is active. If the market is active, then market prices have to be used as the best estimate of fair value, providing no room for discretion. Based on two reference GGB with maturities of 3 and 30 years, market-implied impairment ratios ranged from 43% to 55% (Q2), 47% to 54% (Q3) and 66% to 72% (Q4).<sup>6</sup>

In order to avoid recognizing these high impairment ratios, banks would need to argue that the market is not active, which would then allow them to determine fair value on level 2 or 3. On both levels, banks would use a discounted cash flow (DCF) valuation technique to determine fair value. For determining fair value on level 2 the risk premium included in the discount rate would be observed in the market, which again would limit the room for discretion and would lead to similar impairment ratios as under level 1. Level 3 provides banks with the greatest room for discretion and would thus be clearly preferable to banks which aim to overstate reported capital given the larger room for discretion.

For GGB assigned to the HTM/LAR instruments (AC categories) banks were required to determine the *recoverable amount*, by discounting the future cash flows expected from the GGB with the original effective interest rate.

Given that the PSI schemes were publicly known on the interim reporting dates, the details of those schemes would have had to be considered in estimating the future cash flows (see also ESMA, 2011). Based on the proposed PSI bond exchange schemes, the impairment loss would correspond to the difference between the fair value of the new bond and the

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<sup>6</sup> See Figure 1. Market prices for reference GGB are obtained from the National Bank of Greece.

carrying amount of the old bond.<sup>7</sup> The new bond would have had to be measured at fair value upon initial recognition, i.e., at the time the old bond was derecognized. Since the cash flows of the new bonds were fixed under the PSI 1 scheme, the only missing parameter for determining fair value upon initial measurement of the new bonds was the discount rate. The fair value measurement guidance in IAS 39 requires the use of a current market interest rate (IAS 39.48A i.c.w. IAS 39.AG69 ff.). On 21 July 2011, GGB market interest rates with a remaining maturity of approx. 15 (30) years (i.e., the same maturities as the bonds to be received under PSI 1) were 14.17 percent (11.07 percent). Consequently, any impairment in as of 30 June 2011 had to considerably exceed the *21 percent* haircut stipulated under PSI 1 (which was based on a discount rate of only 9 percent).

As of 30 September 2011 and 31 December 2011 the impairment ratios recognized on AC instruments should considerably exceed those recognized on 30 June 2011, given that PSI 2 and the eventual bond exchange would be associated with haircuts of at least *50 percent* (instead of the 21 percent proposed under PSI 1).

If banks assumed that (i) PSI would not be implemented or (ii) the bank would not participate, the cash flows expected from GGB would have to be estimated independently of the PSI schemes. In this case, AC impairment ratios would be determined based on the probability of Greek's default and the recovery rate in case of default. Under this scenario, impairment ratios based on observable market inputs would even exceed the impairment ratios that would be determined when including the PSI parameters.<sup>8</sup>

## 4. Sample and research design

### 4.1. Sample

Table 1 illustrates our sample selection process.

[insert Table 1 here]

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<sup>7</sup> Based on IAS 39.14(a), a bond exchange under the PSI schemes would have resulted in the derecognition of the old bond and initial recognition of the new bond. See IFRS Interpretation Committee (2012), p. 4 f. The IFRS Interpretations Committee also noted that making use of the guidance in IAS 39.40 in accordance with IAS 8.11 would yield the same solution.

<sup>8</sup> Considering the most recent sovereign default of Argentina, which involved a haircut of approximately 74 percent (Sturzenegger and Zettelmeyer, 2011), and given that PSI 1 and PSI 2 involved haircuts of 21 and 50 percent, respectively, recovery rates substantially exceeding 21 percent would have been considered reasonable. If an issuer's debt instruments are publicly traded, the default probability can be derived from current credit default swap (CDS) prices. As this approach is based on market data, it should take precedence over other approaches in accordance with IAS 39 and IFRS 13. Based on the prices of five-year CDS referencing the state of Greece and assuming a recovery rate of 50 percent, annual default probabilities of 32.04 percent (30 June 2011), 57.05 percent (30 September 2011) and 82.15 (31 December 2011) can be determined.

We use Europe's 150 largest banks (measured by total assets in 2010, according to the Thomson Reuters Datastream). Furthermore, we add banks that are not among Europe's largest 150, but are deemed by the EBA to have 'systemic relevance' to the European financial system (i.e., those 91 banks that were included in the EBA's 2011 stress test). From this combined sample, we remove banks that (i) are consolidated by a bank already included in the sample or (ii) do not publish IFRS financial statements. The result is a sample of 148 banks.

Out of the 148 banks, we are able to include 54 banks (121 bank-quarter observations) in our baseline analysis, given that those banks (i) had GGB exposure and (ii) provided the necessary disclosures to calculate all of the variables that are included in our regression analyses. In fact, it appears that most banks with a large exposure provide the necessary GGB-related disclosures in all of the analyzed periods, while banks with a relatively small exposure tend to provide these disclosures only during Q4 (or Q2 and Q4).<sup>9</sup> This observation is in line with Fiechter and Zhou (2016), who provide evidence that banks increase their disclosures to a larger degree, if they are more strongly affected by the Greek sovereign debt crisis. It appears that these banks aimed to alleviate the more pronounced cost-of-capital shock during the Greek sovereign debt crisis by increasing the level of disclosures.

In all analyses that include country-fixed effect our sample size slightly decreases, because we exclude singleton observations (i.e., countries for which only one bank-quarter observation would be included in our analysis). Based on the reported values as of 30 June 2011 our sample banks hold an aggregate GGB exposure of € 84 billion, and thereby, account for over 90% of global bank's exposure to GGB.<sup>10</sup> Therefore, our sample includes nearly all European banks with GGB exposure, and the major portion the global GGB exposure held by banks.

## *4.2. Research Design*

### *4.2.1 Dependent variables*

We seek to analyze the extent to which banks recognized a 'full' impairment or refrained from recognizing a 'full' impairment on their GGB exposure. To compute our variables, we

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<sup>9</sup> This pattern is in line with the principle that financial instrument-related disclosures are 'scalable' (IFRS 7, par. B3).

<sup>10</sup> UBS Wealth Management Research used several sources to identify European banks' exposure to GGB in 2011 and reported an aggregate value of € 82.5 bn (UBS Wealth Management Research, 2011, p. 20). Because the aggregate exposure of our sample banks is close to this amount, we have reason to believe that we have included almost all European banks with GGB exposure in our analysis. An alternative source of data on the GGB exposure of non-European banks is the Bank for International Settlements (BIS). As of June 2011, according to the BIS, the exposure to GGB of banks outside of Europe was only 6% (BIS, 2011).

first calculate the bank's earnings and regulatory capital quota before any impairment recognized on GGB. In a second step, we calculate a 'full' *pro-forma impairment* based on the individual bank's actual exposure (nominal value of GGB) multiplied by a full *pro-forma impairment ratio*:

$$\begin{aligned} \text{full impairment}_{Q2 (Q3; Q4)} &= \text{AFS\_exposure}_{Q2 (Q3; Q4)} * \text{full pro-forma impairment ratio\_AFS}_{Q2 (Q3; Q4)} \\ &+ \text{AC\_exposure}_{Q2 (Q3; Q4)} * \text{full pro-forma impairment ratio\_AC}_{Q2 (Q3; Q4)} \end{aligned}$$

To determine this *full pro-forma impairment ratio*, we use the highest impairment ratio observable in our sample (distinguishing between the AC and AFS measurement categories).<sup>11</sup> This ratio acts as a proxy for a maximum impairment ratio and reflects an upper limit of impairments in accordance with IAS 39. As a robustness check, we re-run all of our analyses by using the 90th percentile impairment ratios observable in our sample, as well as by using the impairment ratios implied by the market price of the reference GGB with a remaining maturity of 5 years (see section 5.6) and obtain similar results.

We use *cumulative impairment ratios*. Banks' impairment choices for Q3 and Q4 are dependent on the impairments already recognized in Q2. For instance, a bank would need to recognize a low (high) additional impairment during Q4, if it recognized comparably high (low) impairments during the two preceding quarters. Thus, the *additional* impairment that banks recognized within a specific quarter cannot be benchmarked with impairments implied by market prices or PSI. The additional impairment is consequently less meaningful than the *cumulative* impairment ratio, which is calculated based on all of the GGB impairments that have been recognized *by* the end of the respective measurement period (i.e., the level to which GGB are 'written down' at the end of the respective quarter).

Our dependent variable measures the *PERCENTAGE OF FULL IMPAIRMENT* that the individual bank actually realized. To calculate this variable, we divide the actual *IMPAIRMENT RATIO* recognized by the full *pro-forma impairment ratio*. In a first step, we determine the *IMPAIRMENT RATIO* (defined as the percentage of the nominal value of GGB written off by the individual bank by the end of the respective quarter) for each measurement category.<sup>12</sup> However, if the *carrying* amount of GGB (before any GGB impairment) differs from the respective *nominal* value, the *IMPAIRMENT RATIO* could be biased.

<sup>11</sup> We consider the different impairment requirements for the AFS and AC categories. Depending on the measurement category and the reporting date, the determined 'full' impairment ratios are as follows: AFS<sub>Q2</sub>: 56.25%, AFS<sub>Q3</sub>: 67.31%, AFS<sub>Q4</sub>: 83.33%, AC<sub>Q2</sub>: 51.40%, AC<sub>Q3</sub>: 65.60%, AC<sub>Q4</sub>: 80.00%.

<sup>12</sup> During Q2 (Q3; Q4) there were two (zero; two) banks that disclosed considerably different GGB impairment ratios for their banking and insurance division. In these cases, we used the impairment ratios specific to the banking division.

To minimize this potential bias, we use the following approach to calculate the ratio: If the bank publishes an *IMPAIRMENT RATIO*, we use this figure;<sup>13</sup> if not, we calculate the *IMPAIRMENT RATIO* by dividing the carrying amount after the impairment by the nominal value of GGB. Only if neither the impairment ratio nor the carrying amounts after the impairment are disclosed do we calculate the *IMPAIRMENT RATIO* by dividing the absolute value of the impairment by the nominal value of GGB.

To calculate the *IMPAIRMENT RATIO* for the AC categories, we use the mean of the *IMPAIRMENT RATIOS* for the LAR and HTM measurement categories weighted by the individual exposures in the respective categories expressed in nominal values.<sup>14</sup>

In a second step, we calculate the *PERCENTAGE OF FULL IMPAIRMENT* by dividing the actual *IMPAIRMENT RATIO* by the full pro-forma impairment ratio, separately for the AC and AFS categories, thereby considering the different impairment requirements for both measurement categories.<sup>15</sup> If the bank has exposure in both categories, we calculate the mean of its two *PERCENTAGES OF FULL IMPAIRMENT* weighted by the full impairment specific to each of the two categories. Therefore, our dependent variable can take on values in the interval [0; 1], where ‘1’ indicates that the bank recognized 100% of the full pro-forma impairment ratio.

We additionally tabulate the results of our main analyses based on the *IMPAIRMENT RATIOS* specific to each quarter and the measurement category, as our dependent variable, instead of using the *PERCENTAGE OF FULL IMPAIRMENT* and obtain qualitatively similar results (Table 6).

#### 4.2.2. Independent variables

In our setting, we focus on banks’ incentives to manage regulatory capital and on the interaction of bank’s impairment ratios and the timing of state aid.

To assess the bank’s regulatory capital before GGB impairments, we use the variable *CORE TIER 1 QUOTA*, defined as the bank’s core tier one capital ratio, as of 31 December 2010. We obtain the relative and absolute values of the core tier one capital for 35 sample banks from the EBA’s 2011 EU-wide stress test disclosure. For the remaining banks, we

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<sup>13</sup> Three banks stated that during Q2, they impaired GGB classified as AFS until the carrying amount equaled the respective observable market values. Given that these banks did not disclose a specific impairment ratio, we assume that their impairment ratio equals the median of the remaining banks, which determined the fair value for all of their AFS assets on Level 1 or Level 2 (42.24%).

<sup>14</sup> For one bank, we must use the carrying amounts after impairment for weighing the relative impairment ratios for the LAR and HTM categories.

<sup>15</sup> Three banks disclosed information regarding the impairment quotas recognised and the GGB exposure on an aggregate level, but not sub-classified by measurement categories. Therefore, we assume that they classified 50% of their total exposure as AFS and assigned the remaining 50% to the AC categories (HTM/LAR).

obtain core tier one capital (and *CORE\_TIER1\_QUOTA*) from the banks' regulatory disclosure reports or their annual reports.<sup>16</sup>

We further control for the relative amount of bank's GGB exposure, given that banks have a higher incentive to manage impairments on GGB, if their GGB exposure constitutes a large fraction of the bank's assets. We calculate *GGB\_EXPOSURE*, as the nominal GGB amount held by the bank in the respective quarter, divided by its total assets as of 31 December 2010.

Because a strong enforcement system could decrease firm's incentive or ability to manage impairment ratios, we control for the level of the countries' regulatory quality. We use the regulatory quality index, which measures "perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development" (Kaufmann, Kraay & Mastruzzi, 2008). We expect that banks recognize higher GGB impairment ratios if they are located in countries with a higher regulatory quality.

Furthermore, we identify banks for which recognizing a full impairment on GGB would not have severe consequences on income, and thus, on regulatory capital (variable *MEET*). For this purpose, we focus on banks that would have been able to meet the prior period's earnings, even if they had recognized a full impairment. We re-add the impairment actually recognized in cumulative net income, as of 30 June 2011 (30 September 2011; 31 December 2011), and then subtract the full impairment  $Q_2$  ( $Q_3$ ;  $Q_4$ ) loss. If this *pro-forma net income* exceeds the net income of the prior year's period, *MEET* takes the value '1'; '0' otherwise.

We further aim to examine the interaction between banks' impairment decisions and the timing of state aid. We analyze the timing of the provision of state aid to infer the date at which governments and regulators have (at the latest) become aware of the full extent of banks' financial difficulties.

We use the variable *STATE\_AID* to capture the amount of state aid that was provided to the respective bank during 2011 and 2012, standardized by the bank's total assets as of 31 December 2010. State aid can be provided in the form of recapitalization measures, guarantees, asset relief interventions or liquidity measures. Recapitalization measures are defined as government injections of equity capital. For two reasons, our *STATE\_AID* variables capture recapitalization measures only: First, given that GGB impairments deplete the bank's equity capital, EU member countries who specifically aim to compensate banks for GGB

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<sup>16</sup> In two cases, the bank did not disclose the core tier 1 capital, so we used the tier 1 capital as a proxy for this amount.

impairment losses will chose recapitalization measures. Second, due to their direct impact on reported equity, recapitalization measures can be more easily identified by reading sample banks' annual report (compared to guarantees, asset relief interventions, and liquidity measures).

We are especially interested in whether banks recognize full GGB impairment ratios after or before they are provided with state aid. For this reason, we construct two state aid variables, which capture the amount and the timing of state aid provision: *STATE\_AID\_RECEIVED* captures the amount of state aid that the bank received *before* the date on which the respective quarterly (annual) report was released, divided by the bank's total assets as of 31 December 2010. *STATE\_AID\_TO\_BE\_RECEIVED* captures the amount of state aid that the respective bank received *after* this date, standardized by the bank's total assets as of 31 December 2010.

The following example illustrates the coding of these variables for a Q3 bank-quarter observation. If a bank disclosed its cumulative Q3 impairment ratio in its quarterly report released on 28 October 2011, *STATE\_AID\_RECEIVED* would capture the amount of state aid received before this date, while *STATE\_AID\_TO\_BE\_RECEIVED* would capture state aid received after this date. If banks recognize full impairments only after state aid has been received, then we would predict a positive association between GGB impairment ratios in the respective quarter and *STATE\_AID\_RECEIVED* (and a negative association between GGB impairment ratios and *STATE\_AID\_TO\_BE\_RECEIVED*).

State aid that EU member countries provided to individual banks was subject to approval by the European Commission and needed to be in compliance with the state aid rules of the Treaty on the Functioning of the European Union (Articles 107–109 of the TFEU). To collect the recapitalization amount and the date on which the recapitalization had been provided to a sample bank, we analyze (i) each of the EU Commission's decisions on state aid cases involving at least one sample bank, and (ii) sample banks' annual reports, as of 31 December 2011 and 31 December 2012.

In five cases, shortly before the bank released its 2011 annual financial statement, the respective government provided a written commitment to recapitalize the troubled bank (in each of these cases, the respective recapitalization was provided within the next month). This commitment indicates that the government had been aware of the full extent of the bank's financial difficulties already on the commitment date, even though the financial statements had not been released yet, and that the government was willing to support the bank with state

aid. Thus, in these five cases, we used the date of the written commitment as the relevant date for the provision of state aid.

In total, 16 out of the 54 sample banks were recapitalized during 2011 and 2012 with the majority of the banks being incorporated in the troubled PICGS countries (i.e., Portugal, Ireland, Cyprus, Greece and Spain) (see Table 2).

[insert Table 2 here]

The nominal values of GGB are hand-collected from the banks' IFRS interim and annual reports.<sup>17</sup> Quarterly net income data for 2010 and 2011 is obtained for 33 sample banks from Bloomberg Datastream (item 132740). Net income data for the remaining 21 banks are hand-collected from the banks' financial statements.

#### 4.2.3. Control variables

The impairment recognized on individual GGB may also depend on the characteristics of each particular bond. Assuming that most GGB are likely to be plain-vanilla bonds, the bond's major characteristic that may influence the impairment is its maturity. Thus, we control for the *AVERAGE MATURITY* of each bank's GGB portfolio in all of our models.

We obtain data on the *AVERAGE MATURITY* of each bank's GGB portfolio, as of 31 December 2011 from the EBA's publicly available capital exercise results for 35 banks. For twelve sample banks, the EBA does provide data on the *AVERAGE MATURITY* of the bank's GGB portfolio as of 31 December 2011, but as of 31 December 2010, which is why use this information for these twelve banks. For two additional banks, detailed disclosures in the banks' financial statements allow us to calculate the *AVERAGE MATURITY*. For the five remaining banks, it is impossible to obtain data that would allow for calculating the *AVERAGE MATURITY*. To avoid decreasing the sample size, we assume the *AVERAGE MATURITY* of these banks' GGB portfolios to equal the mean of all banks for which maturities were disclosed by the EBA.<sup>18</sup> In addition, we control for banks' *SIZE*, defined as the natural log of the bank's total assets as of 31 December 2010.

#### 4.2.4. Model

For our main analyses, we estimate the following OLS model:

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<sup>17</sup> If a bank did not publish nominal values sub-classified by measurement category, but published carrying amounts 'before impairments' on GGB, we use the carrying amount before impairment instead. This was the case for eleven banks in Q2, six banks in Q3 and seventeen banks in Q4.

<sup>18</sup> The EBA disclosed maturities of GGB as of 31 December 2011 for 45 banks. The mean of the average GGB portfolio maturities of these 45 banks is 5.275 years.

*PERCENTAGE\_OF\_FULL IMPAIRMENT (AFS/AC\_IMPAIRMENT\_RATIO)*

$$\begin{aligned}
 &= \\
 &\beta_1 \text{ STATE\_AID\_RECEIVED} + \beta_2 \text{ STATE\_AID\_TO\_BE\_RECEIVED} + \quad \left. \vphantom{\beta_1} \right\} \text{ Interaction with State Aid} \\
 &\beta_3 \text{ CORE\_TIER1\_QUOTA} + \beta_4 \text{ GGB\_EXPOSURE} + \quad \left. \vphantom{\beta_3} \right\} \text{ Incentive to manage regulatory capital} \\
 &\beta_5 \text{ MEET} + \beta_6 \text{ REGULATORY\_QUALITY} + \beta_7 \text{ AVERAGE\_MATURITY} + \quad \left. \vphantom{\beta_5} \right\} \text{ Controls} \\
 &\beta_8 \text{ Size} + \gamma \text{ QUARTER-FIXED EFFECTS} + \delta \text{ COUNTRY-FIXED EFFECTS} + \quad \left. \vphantom{\beta_8} \right\} \text{ Robust standard errors, cluster by} \\
 &\varepsilon \quad \left. \vphantom{\varepsilon} \right\} \text{ banks.}
 \end{aligned}$$

We pool banks' Q2, Q3 and Q4 observations and include quarter-fixed effects to control for time-trends in banks' cumulative impairment ratios. In order to control for the potential dependency of bank-specific impairments within a country (e.g., a national 'consensus' regarding the impairment ratios) we include country-fixed effects in most of our analyses. In all analyses that include country-fixed effect, we need to exclude singleton observations (i.e., countries for which only one bank-quarter observation would be included in our analysis), because including those observations would lead to an overstatement of the statistical significance of our coefficient estimates (Correia, 2015). Furthermore, we use robust standard errors (clustered by banks) in all our analyses.

## 5. Empirical analysis and results

### 5.1. Descriptive statistics

Table 3 presents summary data on the 54 banks (121 observations) that are included in our analysis, of which 41 (32;48) are related to Q2 (Q3;Q4) observations. The distribution of the GGB exposure across banks is highly skewed with more than 50% of the total GGB exposure being held by 25% of the sample banks.

[insert Table 3 here]

The majority of the GGB exposure (76.1%) was classified in the AC categories as either HTM or LAR (untabulated). During 2011, seven sample banks reclassified GGB from the AFS category to one of the AC categories. Banks that classify a higher proportion of their GGB exposure in the AC categories (i) have a substantially higher GGB exposure and (ii) considerably lower net income before impairments on GGB (untabulated).<sup>19</sup> As discussed in sections 3.3 and 5.2, impairment ratios on GGB classified as HTM or LAR will generally be lower than on GGB classified as AFS. In this light, one motivation for classifying (the major

<sup>19</sup> We find that on average banks that classify more than (less than) 50% of their GGB exposure in the AC categories have a GGB exposure that accounts for 6.2% (0.3%) of their total assets. On average a bank's 2011 net income before GGB impairments standardized by total assets as of 31 December 2010 amounts to -0.01% (1.26%) for the banks that classify more than (less than) 50% of their GGB exposure in the AC categories.

part of) GGB exposure as HTM or LAR could be the ability to exploit these different accounting requirements for the two measurement concepts in order to alleviate the adverse consequences of GGB impairments on income and capital.

### *5.2. Analysis of the variance in impairment ratios recognized on GGB*

Figure 1 illustrates sample banks' cumulative impairment ratios as of 30 June (Q2), 30 September (Q3) and 31 December 2011 (Q4), separately for the available-for-sale (AFS) category and the amortized cost categories (i.e., HTM and LAR). Figure 1 additionally plots the impairment ratios implied by the market prices of two reference GGB with remaining maturities of three and 30 years.

[insert Figure 1 here]

There is considerable variation in the impairment ratios across banks. During Q2 and Q3, a substantial number of banks recognized impairment ratios far below the median impairment ratio and the impairment ratio implied by the observable market prices for the two reference GGB. In the following, we try to reconcile banks' impairment decisions with the measurement requirements in IAS 39 separately for the three quarters: Q2, Q3 and Q4.

#### *Banks' impairment ratios as of 30 June 2011*

From the 41 sample banks, 39 banks recognized impairments on GGB, while two banks (i.e., Banco BPI and Banca Carige) considered GGB not to be impaired at all.

With respect to the AC categories, eleven banks recognized impairment ratios that were within, or close to, the range between 21% (impairment ratio implied by the haircut as proposed under PSI 1) and 55% (impairment ratio implied the market price of the reference GGB with a remaining maturity of 30 years). However, the remaining twelve banks recognized particularly low impairments ratios on their AC instruments (less than 16%). These banks did not consider GGB with a maturity after 2020 to be impaired. This is remarkable, because IAS 39's impairment indicators only refer to the issuer, not to the characteristics of the instrument (ESMA, 2011). Furthermore, two banks distinguished between those GGB classified as HTM and LAR and did not consider the latter to be impaired, which appears to be irreconcilable to IAS 39's impairment requirements, which do not distinguish between the two categories.

With respect to the AFS instruments, the observed variance in the impairment ratios across banks was even higher, although market prices should limit the associated room for management discretion. One of the assumptions underlying low AFS impairment ratios was

that a number of banks did not recognize any impairment losses on GGB that mature after 2020. In addition, eight banks regarded the market for GGB as inactive and thus determined fair value on level 3. There is considerable doubt about whether this assumption was supportable. The chairpersons of the International Accounting Standards Board (IASB) and the European Securities and Markets Authority (ESMA) commented on this issue and put forward arguments in favor of determining level 1 or level 2 fair values (ESMA, 2011; IASB, 2011). In addition, the majority of banks were able to determine level 1 (or in rare cases, level 2) fair values, which suggests that the market was active. However, if the market is active, then market prices may not be dismissed in favor of level 3 fair values.

Of the eight banks that use a valuation technique to determine fair value on level 3, seven recognized impairment ratios of approximately 21% of GGB's nominal value. This impairment ratio corresponds to the proposed haircut under PSI 1, but is much lower than the median of the impairment ratios (42.2%) of those banks that considered the market to be active and consequently determined fair value on level 1 or level 2. The high correlation among the market condition (active/inactive), the corresponding level of the fair value hierarchy, and the resulting impairment ratios strongly suggest that banks *purposely* considered the market inactive, because this allowed them to recognize lower impairment ratios.

#### *Banks' impairment ratios as of 30 September 2011*

As of 30 September 2011, the impairment ratio implied by the haircut under PSI 2 (50%) was comparable to the ratios implied by the reference bonds' market prices (47%–54%).

The haircut under PSI 2, as well as market prices, suggested similar impairment ratios, and hence, should have effectively limited banks' room for accounting discretion. However, compared to Q2 we find an even larger variance of impairment ratios during Q3. It appears that some banks with low impairment ratios in Q2 opted for Q3 impairment ratios that exceed 40% of the GGB nominal value and allowed these banks to catch up with their peers and recognize impairment ratios that are consistent with market prices and PSI 2. In contrast, eight banks recognized considerably lower impairment ratios in a range between 0 and 24 percent. These banks were either still not considering GGB with maturities after 2020 to be impaired or they did not recognize any additional impairments during Q3, arguing that the high degree of uncertainty surrounding PSI 2 made assessing impairment losses

‘impracticable’<sup>20</sup>. One may find it difficult to reconcile this practice to IAS 39, given that the further deterioration of Greece’s creditworthiness, declining market values and a greater haircut proposed under PSI 2 should translate into additional impairments during Q3.

#### *Banks’ impairment ratios as of 31 December 2011*

Given that 96.9 percent of all eligible outstanding GGB were actually exchanged under the PSI, we have reason to believe that virtually all sample banks participated in the bond exchange during March and April 2012. With one exception, all sample banks released their annual financial statements after 21 February 2012. Consequently, banks were aware of the final bond exchange conditions that would involve haircuts between 50% and 75% (see section 3.3.). Any associated impairment loss would have to be recognized at the latest on the day when the bank exchanged its GGB. Thus, banks had smaller room for discretion to refrain from recognizing the impairment ratios of at least 50 percent in their annual financial statements as of 31 December 2011. Indeed, we find the variance in impairment ratios to be much lower during Q4 (see Figure 1).

#### *5.3. Interaction of banks’ impairment ratios and state aid*

Table 4 depicts banks’ mean GGB impairment ratios, sub-classified by selected variables of interest.

[insert Table 4 here]

Banks for which a full impairment would not have a considerable negative effect on their income or capital (*MEET=1*) tend to recognize higher impairment ratios. Furthermore, banks impairment ratios are negatively associated with the amount of GGB held by the respective bank and the amount of state aid that the bank received. It appears that banks recognise substantially lower impairment ratios, the more state aid they *will receive* in the subsequent quarter(s) (*STATE\_AID\_TO\_BE\_RECEIVED*). In contrast, this negative association between the amount of state aid and GGB impairment ratios is not observable if conditioned on the amount of state aid that banks *already received* until the respective quarter (*STATE\_AID\_RECEIVED*).

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<sup>20</sup> For example, the National Bank of Greece, 2011, p. 15 argues: ‘The terms of the new bonds to be offered in this exchange programme (tenor, interest rate, applicable law, credit enhancement), as well as which bonds will be eligible for exchange, have not been defined yet. Therefore, the uncertainties surrounding all the details of the new assistance package prevent both the determination of the appropriate accounting treatment (i.e., whether the treatment of the continuing relationship adopted on 30 June 2011 is appropriate or a different treatment, for example de-recognition of the existing bonds, should be adopted) and the reliable estimate of the impact on the estimated future cash flows for impairment calculation purposes.’

In our main analyses, we examine the determinants of bank's GGB impairment ratios and separately present the results that are obtained by using *PERCENTAGE OF FULL IMPAIRMENT* (Table 5) or the impairment ratios specific to the AFS and AC measurement categories (Table 6) as our dependent variable. Across all analyses, we find that compared to the second quarter, banks recognize higher *PERCENTAGES OF FULL IMPAIRMENT* (AFS/AC impairment ratios) in the third and fourth quarter (indicated by the positive coefficients of the indicator variables *3RD\_QUARTER* and *4TH\_QUARTER*). This is in line with our descriptive results (Table 3), which indicate that, on average, banks are less likely to refrain from recognizing full impairment ratios in the third and especially in the fourth quarter.

Our baseline analysis (column 1 of Table 5) further indicates that banks recognize higher impairment ratios (i) if a full impairment would not have a considerable adverse effect on their income or capital (proxied by *MEET*), (ii) if their regulatory capital ratio before GGB impairments is higher (*CORE\_TIER1\_QUOTA*) and (iii) if they are based in a country with a higher regulatory quality index (*REGULATORY\_QUALITY*). In contrast, banks with a high GGB exposure recognize particularly low impairment ratios (*GGB\_EXPOSURE*). In fact, these banks have a strong incentive to refrain from recognizing full impairments on GGB, which would severely deplete their regulatory capital. This finding indicates that, even in this transparent setting, troubled banks use accounting discretion to conceal their financial difficulties by overstating capital.

[insert Table 5 here]

[insert Table 6 here]

When we control for the amount of state aid received, we find that banks recognize lower impairment ratios if they will receive higher amounts state aid in subsequent quarters. After including country-fixed effects (columns 3-5) our results indicate the following pattern: Troubled banks recognize lower GGB impairments ratios in the quarter *before* they are provided with state aid (*STATE\_AID\_TO\_BE\_RECEIVED*). However, after these banks are provided with state aid, they significantly increase impairment ratios recognized on GGB (*STATE\_AID\_RECEIVED*). This pattern is also observable (i) if we exclude the variable *GGB\_EXPOSURE* (which is highly correlated with *STATE\_AID\_TO\_BE\_RECEIVED*; Pearson: 0.57), (ii) if we include the two state aid variables separately or (iii) if we focus on the impairment ratios specific to the AFS and AC measurement categories as our dependent variable (Table 6). The results for the state aid variables are somewhat weaker when using the AFS/AC impairment ratio as our dependent variable (Table 6). However, the coefficients of the state

aid variables have the predicted signs across all analyses (columns 1 until 6) and are significant in six out of eight cases.

Troubled banks appear to delay high impairments on GGB until state aid is provided. Subsequent to the provision of state aid, these banks recognize significantly higher impairment ratios and the associated losses are absorbed by the additional equity that was injected by the respective government. However, there are two alternative interpretations for this pattern, which depend on the underlying reason that triggered governments to provide the respective banks with state aid. On the one hand, governments could have provided banks with state aid in order to compensate banks with high GGB exposures for the substantial regulatory capital depletion that would result from recognizing full impairments. In this case, the pattern that banks delay high impairments on GGB until state aid is provided would indicate that regulators were able to identify troubled banks and see through their understatement of GGB impairments. On the other hand, governments could provide banks with state aid to compensate banks for losses that are *unrelated* to their GGB exposure. In this case, the pattern that banks recognize full impairments on GGB only after state aid was provided could simply reflect that troubled banks ‘clean the deck’ after state aid has been provided. However, it would not allow drawing any conclusion about regulator’s ability to see through troubled banks’ understatement of GGB impairment ratios.

#### *5.4. Underlying reasons for the provision of state aid*

We analyze whether governments provide state aid in order to compensate banks for the losses associated with GGB impairments or for losses that are unrelated to bank’s GGB exposure. If state aid is provided to compensate banks for losses that are unrelated to the bank’s GGB exposure (e.g., loan loss provisions/write-downs, legal penalties, etc.) these losses would be reflected in the bank’s net income 2011 (before GGB impairments). For this reason, we test whether the amount of state aid that sample banks received during 2011 and 2012 was associated with (i) bank’s GGB exposure<sup>21</sup> or (ii) bank’s net income 2011 (change in net income 2011 vs. 2010) before any impairments on GGB.

Looking at the descriptive statistics we find that from recapitalized banks’ aggregate net income decline (2011 vs. 2010) 77.5% was attributable to the impairment losses that these

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<sup>21</sup> *GGB\_EXPOSURE* captures the bank’s nominal GGB exposure as of 31 December 2011, divided by its total assets as of 31 December 2010. If we do not have information on banks’ GGB exposure as of 31 December 2011, we use the nominal GGB exposure as of 30 June 2011. This is the case for six banks (these six banks are not included with their Q4 observations in our main analyses).

banks recognized on GGB (untabulated), which indicates that these banks would not face severe net income declines if they had no GGB exposure.

[insert Table 7 here]

We examine the determinants for the amount of state aid that banks received during 2011 and 2012 (Table 7). Banks that are deemed to be systemically relevant (*STRESSTESTBANK*) tend to receive larger amounts of state aid, while banks with a stronger capitalization (before GGB impairments) are provided with less state aid (*CORE\_TIER1\_QUOTA*). However, the main findings of Table 7 illustrate that bank's *GGB EXPOSURE* appears to be the main driver for the provision of state aid. Once we control for bank's *GGB EXPOSURE*, the  $R^2$  of the model increases substantially and the bank's net income (change in net income) 2011 before GGB impairments is not significantly associated with the amount of state aid that banks receive. In contrast, the amount of state aid received is significantly increasing in a bank's GGB exposure. This result remains robust after controlling for country-fixed effects and indicates that state aid was primarily provided to compensate banks for the losses associated with GGB impairments.

##### *5.5. Do impairment ratios predict the amount of state aid that banks received*

Our results suggest (i) that state aid was provided to compensate troubled banks for the losses associated with GGB impairments and (ii) that troubled banks understate GGB impairment ratios until state aid has been provided. If regulators could see through this understatement of GGB impairment ratios and provided banks with the necessary amount of state aid that would allow the bank to recognize a full impairment on GGB, then we should observe that a bank's GGB impairment ratio predicts the amount of state aid that the respective bank will subsequently receive.

For instance, suppose a bank recognizes a GGB impairment of EUR 1,000m (absolute amount) and that this would reflect only 25% of the *PERCENTAGE\_OF\_FULL\_IMPAIRMENT*. The bank is not willing to recognize a higher impairment because it would lead to a violation of regulatory capital requirements. In this case, the bank would need additional equity in an amount of EUR 3,000m in order to be able to recognize a full impairment. In fact, the lower the *PERCENTAGE\_OF\_FULL\_IMPAIRMENT*, the more state aid does the government need to provide in order to enable the bank to recognize a full impairment.

In the analyses underlying Table 8 we explore what determines the amount of state aid that banks would receive in the subsequent quarters (in contrast, Table 7 was based on the amount of state received during the entire period between 2011 and 2012). Our results (Table

8) suggest that compared to the third quarter banks receive significantly higher amounts of state aid in the subsequent quarters (positive coefficient of indicator variable *3RD\_QUARTER* (*4TH\_QUARTER*) indicates that banks received higher amounts of state aid after the 3rd (4th) quarter). Furthermore, banks tend to receive higher amounts of state aid if they are deemed to be systemically relevant (i.e., banks that were included in the EBA's 2011 stress test) and located in a country with a lower regulatory quality.

However, the best predictor for the amount of state aid to be received in subsequent quarters is the bank's GGB impairment ratio recognized in the current quarter (*PERC\_OF\_FULL\_IMP*). In fact, banks with a particularly low GGB impairment ratio in the current quarter receive higher amounts of state aids in subsequent quarters. When we interact the bank's GGB impairment ratio with its GGB exposure (column 4), we find that banks with a low GGB impairment ratio, receive higher amounts of state aid if their GGB exposure is larger. This is plausible, given that the impairment amount to be recognized in subsequent quarters is a function of both (i) the current GGB impairment ratio and (ii) the size of the GGB exposure.

We further find that the impairment ratio recognized on GGB classified as AC significantly predicts the amount of state aid to be received (column 6), while the AFS impairment ratio is not significantly associated with subsequent provision of state aid (column 5). This seems plausible given that banks with a relatively large GGB exposure tend to assign GGB to the AC categories. In fact, 76.1% of the aggregate nominal GGB exposure across banks is held in the AC categories and seven banks disclose that they reclassified GGB from the AFS to the LAR or HTM category during 2011 (see section 5.1).

[insert Table 8 here]

Taken together, our findings indicate the following associations: First, we find that during 2011 and 2012, especially banks with high GGB exposures were recapitalized by their respective government. Second, these troubled banks delay high impairments on GGB until state aid is provided. Third, we find that banks with lower GGB impairment ratios received higher amounts of state aid in subsequent quarters (the provided state aid would absorb the additional impairment ratios that these banks were required to recognize in the subsequent quarter(s)).

Against the backdrop of these findings, it is hard to believe that regulators (and governments) were misled by troubled banks' understatement of GGB impairments. Instead, our findings indicate that they were able to assess banks' financial difficulties and provided state aid in an amount that allowed banks to recognize full GGB impairments in the

subsequent quarter(s). In this light, our findings are in line with the notion that troubled banks recognized low impairments on GGB in order to conceal the full extent of their financial difficulties from non-regulator outsiders, such as depositors and the general public. This increased regulators' ability to practice forbearance and might have provided governments with additional time to organize the provision of state aids.

### *5.6. Sensitivity analyses*

#### *Alternative calculation of the full pro-forma impairment ratio*

In our main analyses (Tables 5–8), we use the *highest* impairment ratio observable in our sample to calculate the full pro-forma impairment that is used, inter alia, to calculate our dependent variable (*PERCENTAGE OF FULL IMPAIRMENT*). To ensure that our main results are not biased by the high impairment ratios of banks that may have aimed at *overstating* impairments, we re-run our analyses using the 90th percentile of impairment ratios observable in our sample, as well as by using the impairment ratios implied by the market price of the reference GGB with a remaining maturity of 5 years. The results remain qualitatively unchanged. Our results appear to be fairly robust to changes in the full impairment ratio, given that it only serves as a benchmark and will not change the rank order of banks with respect to the *PERCENTAGE OF FULL IMPAIRMENT*.

Furthermore, our results remain robust when we use the banks' actual impairment ratio with respect to the total GGB exposure as our dependent variable (i.e., using the mean of the AC and AFS impairment ratio instead of using *PERCENTAGE OF FULL IMPAIRMENT*).

#### *Quarterly cross-sectional analyses*

As a robustness test, we individually analyze banks' impairment decision in Q2, Q3 and Q4 by running three separate quarterly regressions. The results of these analyses reveal that banks recognize significantly lower GGB impairment ratios during Q2 and Q3 if they received higher amounts of state aid during Q4. In Q4, the GGB impairment ratios of recapitalized banks are not significantly lower than those of their peers, which indicates that these banks increased their impairment ratios substantially after they were provided with state aid.

#### *Exclusion of particularly high or low impairment ratios*

In order to examine whether our results are biased by banks that recognize extremely low or extremely high impairment ratios, we exclude observations for which the *PERCENTAGE\_OF\_FULL IMPAIRMENT* is not within the 5%-95% interval of observable

*PERCENTAGES\_OF\_FULL\_IMPAIRMENT*. Our results remain robust to the exclusion of these observations.

### 5.7. Limitations

Our study is subject to a number of limitations. First, while our findings are consistent with the notion that banks' use of accounting discretion was aimed at enabling regulators to practice forbearance, our conclusions are based on associations and we are not able to identify casual effects or directly observe the motives underlying regulators' (governments') actions. Thus, there may be alternative explanations and our data does not allow completely ruling out such alternative explanations.

Second, our dependent variable could be biased if the carrying amount of a bank's GGB (before any impairment) differs from its nominal value (e.g., because the bank acquired its GGB at transaction prices that differed from the nominal value). In such cases, the *IMPAIRMENT RATIOS* and the *PERCENTAGES OF FULL IMPAIRMENT* (our dependent variables) could be biased either upwards or downwards. However, there can be no such bias for most of our sample banks, due to the way in which this variable is calculated (see section 4.2.1). There are only seven (six; seven) banks for which we had to calculate the dependent variable by dividing the absolute value of the impairment by the nominal value/carrying amount before the impairment of GGB in Q2 (Q3; Q4).<sup>22</sup> Thus, we cannot rule out a potential bias of the *IMPAIRMENT RATIOS* for these seven (six; seven) banks.

Third, our analysis is based on the assumption that GGB portfolios across sample banks are homogenous, and thus, impairment ratios in accordance with IAS 39 should not vary considerably across banks. This implies that the types of GGB held by sample banks have broadly similar characteristics and that the variance of observed impairment ratios would not be driven by different portfolio characteristics. We control for the average maturity of the GGB exposure, which is the major characteristic likely to cause (non-discretionary) heterogeneity in the impairment ratios. Nevertheless, we acknowledge that the types of GGB held by sample banks may not be fully identical.

## 6. Conclusion

This paper addressed two primary research questions. First, we examined whether banks used accounting discretion to overstate assets, and consequently, regulatory capital and equity, in a setting where this form of regulatory capital management was highly visible to outsiders.

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<sup>22</sup> Again, we used carrying amounts before impairment in those cases where banks did not provide the nominal value of their GGB exposure (see footnote 14).

Second, we analyzed whether troubled banks' use of accounting discretion during the European sovereign debt crisis served to mislead regulators or was aimed at enabling them to practice forbearance.

We find a large variance in the impairment ratios across banks, even though the observable market prices and the haircuts proposed under the private sector involvement (PSI) should have effectively limited banks' room for discretion. Troubled banks took considerable liberty in applying the measurement requirements in IAS 39, especially before the provision of state aid, and recognize significantly lower impairment ratios if a full impairment would have depleted a major share of their regulatory capital and equity. It is unlikely that this use of accounting discretion served to mislead regulators.

In line with this result, we find that regulators identified troubled banks and provided these banks with state aid *before* they recognized full impairments on GGB. This pattern is consistent with the notion of banks concealing their financial difficulties from less sophisticated non-regulator outsiders to impede their ability to practice market discipline and to allow regulators to exercise forbearance until state aid is provided.

Our findings have important implications for policymakers, accounting standard-setters and academics. All of these groups engaged in extensive debates regarding the question of the extent to which accounting standards (e.g., fair value accounting) and insufficient capital adequacy ratios (e.g., those stipulated under Basel II) caused or exacerbated the financial crisis. However, our findings illustrate that the effectiveness of accounting standards, accounting-based capital adequacy ratios and market discipline is questionable if the *incentives of regulators and banks are aligned*. In a scenario where this is the case, banks might be encouraged to exploit (transgress) room for accounting discretion to circumvent capital adequacy requirements and to impede the ability of non-regulator outsiders to practice market discipline. Future research could examine whether troubled banks refrain from opportunistically overstating assets and show stronger compliance with accounting standards in situations where regulators' incentive/ability to practice forbearance is low.

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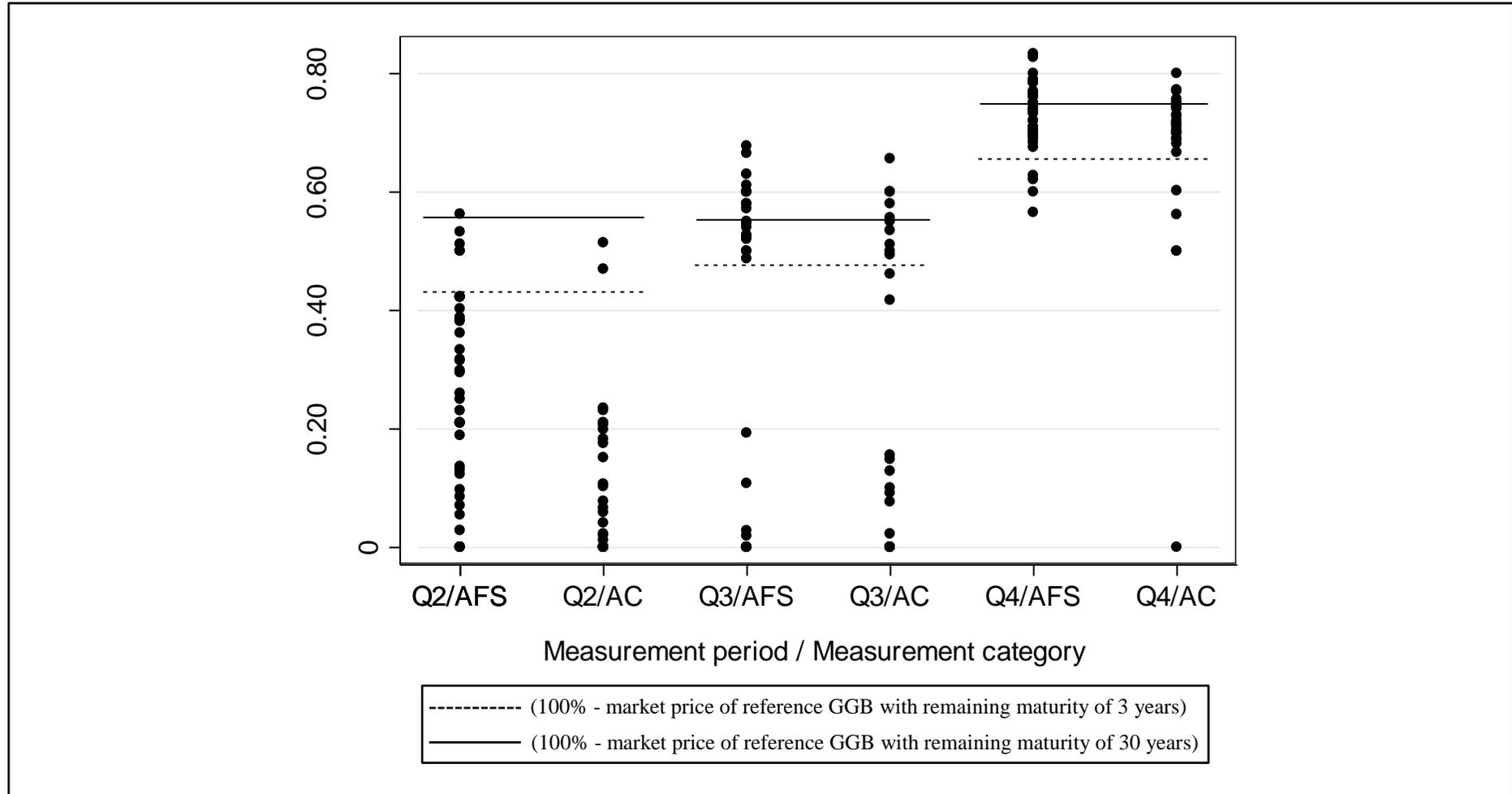
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**Figure 1:** Banks' cumulative impairment ratios recognized on GGB (in % of GGB nominal value)



The figure illustrates the cumulative impairment ratios that sample banks recognized on GGB, across measurement periods and quarters. The solid line indicates the impairment ratio implied by the market price of a reference GGB with a remaining maturity of 3 years (July 2011: 0.43; October 2011: 0.47; January 2012: 0.66). The dashed line indicates the impairment ratio implied by the market price of a reference GGB with a remaining maturity of 30 years (July 2011: 0.55; October 2011: 0.54; January 2012: 0.72). Market prices for reference GGB are obtained from the National Bank of Greece (see National Bank of Greece, 2014).

**Table 1:** Sample selection

<b>Panel A: Sample selection process</b>		
=	<b>Banks included in the EBA's 2011 EU-wide stress test</b>	<b>91</b>
+	Largest 150 European banks by total assets in 2010	150
-	Thereof: Banks that were included in the EBA's 2011 EU-wide stress test	52
-	Thereof: Banks that are consolidated by a bank already included in the sample	32
-	Thereof: Banks that do not provide IFRS financial statements	9
=	<b>Banks analyzed</b>	<b>148</b>
-	Banks without GGB exposure or for which we are not able to calculate the required variables to be included in our analyses	94
=	<b>Banks included in baseline analyses</b>	<b>54</b>
	Thereof: Banks included with 2nd quarter observations	41
	Thereof: Banks included with 3rd quarter observations	32
	Thereof: Banks included with 4th quarter observations	48
=	<b>Bank-quarter observations included in baseline analyses</b>	<b>121</b>
-	Singleton observations (countries for which only one bank-quarter observation would be included in our analysis)	2
=	<b>Bank-quarter observations included in analyses with country-fixed effects</b>	<b>119</b>
<b>Panel B: Sample distribution across countries</b>		
<b>Country of Origin</b>		
	Germany	12
	Italy	8
	Greece	7
	France	5
	Portugal	4
	Cyprus	3
	Netherlands	3
	UK	2
	Belgium	2
	Austria	2
	Spain	2
	Luxembourg	1
	Ireland	1
	Slovenia	1
	Switzerland	1
	<b>Total</b>	<b>54</b>

**Table 2:** Recapitalization measures that sample banks received by the respective state during 2011 and 2012

Country	Number of sample banks recapitalized during 2011 and 2012	Aggregate recapitalization amount in €m
Greece	6	27,377
Spain	1	17,959
Ireland	1	12,700
Portugal	3	6,150
Belgium / France / Luxembourg*	1	5,500
Germany	1	2,599
Cyprus	1	1,800
Slovenia	1	633
Austria	1	250
France	0	0
Italy	0	0
Luxembourg	0	0
Netherlands	0	0
Switzerland	0	0
United Kingdom	0	0
<b>Total</b>	<b>16</b>	<b>74,967</b>

Recapitalization measures are defined as government injections of equity capital. In order to collect the recapitalization amount and the date on as to which recapitalization had been provided to a sample bank, we analyze (i) each of the EU Commission's decisions on state aid cases involving at least one sample bank and (ii) sample banks' annual reports as of 31 December 2011 and 31 December 2012.

\* Belgium, France and Luxembourg each contributed to the recapitalization of Dexia.

**Table 3:** Descriptive statistics

	<b>n</b>	<b>Mean</b>	<b>Std. deviation</b>	<b>Min</b>	<b>25%</b>	<b>50%</b>	<b>75%</b>	<b>Max</b>
Absolute GGB exposure (€m)	121	1,893	3,230	4	130	503	2,087	14,750
Absolute GGB exposure (Q2) (€m)	41	2,051	3,365	36	165	494	2,259	14,692
Absolute GGB exposure (Q3) (€m)	32	2,369	3,613	36	163	682	2,996	14,155
Absolute GGB exposure (Q4) (€m)	48	1,440	2,831	4	81	330	1,168	14,750
Relative GGB exposure (% of total assets 2010)	121	2.66%	6.21%	0.01%	0.05%	0.17%	0.73%	36.30%
Relative GGB exposure (% of core tier one capital 2010)	121	33.55%	77.77%	0.06%	1.64%	3.30%	13.20%	437.19%
Percentage of Full Impairment	121	66.69%	29.95%	0.00%	44.44%	80.67%	88.89%	100.00%
Percentage of Full Impairment (Q2)	41	45.33%	27.70%	0.00%	20.76%	42.90%	68.21%	100.00%
Percentage of Full Impairment (Q3)	32	66.19%	31.86%	0.00%	45.46%	78.77%	88.57%	100.00%
Percentage of Full Impairment (Q4)	48	85.26%	14.77%	0.00%	84.45%	88.21%	91.11%	100.00%
State Aid (% of total assets)	54	1.51%	2.99%	0.00%	0.00%	0.00%	1.14%	12.26%
Core Tier One Capital Ratio (31 Dec 2010) (in % of risk-weighted-assets)	54	8.97%	2.88%	3.71%	6.91%	8.41%	10.53%	18.50%
Total Assets (31 December 2011) (€bn)	54	396.77	548.11	2.60	45.66	147.46	384.14	2,001.65
Regulatory Quality	54	1.28	0.32	0.81	0.95	1.25	1.46	1.91
Average Maturity in years	54	5.71	3.53	0.13	3.48	5.28	7.50	14.89

**Table 4:** Percentages of Full Impairment and AFS/AC Impairment ratios, sub-classified by selected variables

Conditioning Variable	Threshold	Mean Impairment Ratios					
		n	PERCENTAGE_ OF_FULL IMPAIRMENT	n	AFS_ IMPAIRMENT_ RATIO	n	AC_ IMPAIRMENT_ RATIO
GGB_EXPOSURE	≤ 0.10%	42	78.46%	35	55.96%	12	57.24%
	> 0.10% & ≤ 0.37%	38	68.32%	32	49.84%	22	42.11%
	> 0.37%	41	53.12%	33	41.82%	36	37.15%
MEET	YES	34	76.98%	31	52.70%	7	41.62%
	NO	87	62.66%	69	47.83%	63	42.21%
SIZE	≤ 76bn	40	53.24%	32	39.24%	27	36.24%
	> 76bn & ≤ 375bn	42	72.81%	32	54.22%	23	45.57%
	> 375bn	39	73.89%	36	53.96%	20	46.21%
STATE_AID	0.00%	87	74.87%	72	54.59%	42	50.20%
	> 0.00% & ≤ 4.40%	16	54.20%	13	42.61%	12	34.36%
	> 4.40%	18	38.26%	15	29.93%	16	26.88%
STATE_AID_RECEIVED	0.00%	108	66.58%	89	49.18%	63	41.17%
	> 0.00% & ≤ 3.67%	7	60.73%	6	43.69%	3	29.06%
	> 3.67%	6	75.54%	5	58.78%	4	67.50%
STATE_AID_TO_BE_RECEIVED	0.00%	91	74.79%	76	54.67%	43	50.75%
	> 0.00% & ≤ 3.29%	16	62.65%	13	44.12%	13	46.24%
	> 3.29%	14	18.63%	11	18.64%	14	11.94%

Appendix A provides variable definitions.

**Table 5:** Multivariate results – Dependent Variable: Percentage of Full Impairment

	(1) Baseline	(2) Incl. StateAid	(3) Country FE	(4) Country FE	(5) Country FE
STATE_AID_RECEIVED		0.588 (0.445)	3.062** (2.581)	4.314*** (3.728)	
STATE_AID_TO_BE_RECEIVED		-3.076** (-2.446)	-2.427** (-2.167)		-3.480*** (-3.082)
MEET	0.101** (2.129)	0.084* (1.852)	0.069 (1.369)	0.064 (1.278)	0.058 (1.134)
CORE_TIER1_QUOTA	1.688*** (2.891)	1.702** (2.384)	1.980* (1.904)	1.568 (1.502)	0.953 (0.828)
GGB_EXPOSURE	-1.536*** (-4.880)	-1.090*** (-2.679)	-1.270*** (-4.294)		
REGULATORY_QUALITY	0.148** (2.108)	0.100 (1.340)			
AVERAGE_MATURITY	0.007 (1.211)	0.004 (0.761)	-0.002 (-0.426)	-0.001 (-0.128)	-0.001 (-0.207)
SIZE	0.010 (0.844)	0.010 (0.923)	0.009 (0.502)	0.004 (0.204)	0.014 (0.816)
3RD_QUARTER	0.237*** (5.059)	0.236*** (5.202)	0.230*** (4.773)	0.230*** (4.812)	0.228*** (4.757)
4TH_QUARTER	0.405*** (9.118)	0.393*** (8.903)	0.397*** (8.316)	0.417*** (8.851)	0.419*** (9.251)
Constant	-0.042 (-0.217)	0.059 (0.289)			
COUNTRY FE	NO	NO	YES	YES	YES
Adj. R <sup>2</sup>	0.559	0.595	0.631	0.594	0.613
F-statistic	50.35	22.68	25.89	21.86	17.25
Firms	54	54	52	52	52
n	121	121	119	119	119

This table presents the coefficients for five OLS regressions. The dependent variable (*PERCENTAGE\_OF\_FULL\_IMPAIRMENT*) is the impairment ratio that the bank recognized on its GGB exposure in the respective quarter standardized by the highest impairment ratio observable across sample banks in the respective quarter. T-statistics in parentheses are based on robust standard errors clustered by banks. Appendix A provides variable definitions.

**Table 6:** Multivariate results – Dependent variable: AFS/AC Impairment Ratio

	(1) AFS	(2) AFS	(3) AFS	(4) AC	(5) AC	(6) AC
STATE_AID_RECEIVED	2.822** (2.057)	2.854** (2.235)		0.691 (0.729)	1.522* (1.828)	
STATE_AID_TO_BE_RECEIVED	-0.434 (-0.597)		-1.208* (-1.945)	-1.818** (-2.110)		-2.175** (-2.516)
MEET	0.014 (0.446)	0.013 (0.442)	0.008 (0.268)	0.059 (0.793)	0.064 (0.873)	0.062 (0.809)
CORE_TIER1_QUOTA	1.335** (2.400)	1.195* (1.843)	0.638 (1.022)	1.189 (1.445)	0.827 (0.964)	0.514 (0.510)
GGB_EXPOSURE	-0.511 (-1.643)			-0.782*** (-3.470)		
AVERAGE_MATURITY	-0.002 (-0.537)	-0.001 (-0.390)	-0.002 (-0.525)	0.003 (0.973)	0.005 (1.194)	0.003 (0.926)
SIZE	0.007 (0.541)	0.007 (0.553)	0.010 (0.824)	-0.004 (-0.247)	-0.007 (-0.396)	0.001 (0.065)
3RD_QUARTER	0.198*** (5.573)	0.201*** (5.744)	0.198*** (5.560)	0.256*** (4.673)	0.256*** (4.828)	0.258*** (4.872)
4TH_QUARTER	0.427*** (13.716)	0.435*** (14.623)	0.442*** (15.148)	0.531*** (14.977)	0.554*** (18.233)	0.550*** (18.257)
COUNTRY FE	YES	YES	YES	YES	YES	YES
Adj. R <sup>2</sup>	0.759	0.759	0.754	0.796	0.763	0.789
F-statistic	44.05	41.67	43.47	72.97	63.53	66.74
Firms	44	44	44	33	33	33
n	100	100	100	70	70	70

This table presents the coefficients for six OLS regressions. The dependent variable is the impairment ratio that the respective bank recognized on GGB classified as AFS (*AFS\_IMPAIRMENT\_RATIO*) or classified as HTM or/and LAR (*AC\_IMPAIRMENT\_RATIO*). T-statistics in parentheses are based on robust standard errors clustered by banks. Appendix A provides variable definitions.

**Table 7:** Multivariate results – Determinants of State Aid

	(1) Baseline	(2) Baseline	(3) GGB_EXPOSURE	(4) GGB_EXPOSURE	(5) Country FE	(6) Country FE
GGB_EXPOSURE			0.528*** (7.197)	0.528*** (7.190)	0.822*** (4.378)	0.821*** (4.382)
NET_INC_2011_CHG_BEFORE_IMP	-0.007* (-1.775)		-0.005 (-1.367)		0.001 (0.168)	
NET_INC_2011_BEFORE_IMP		-0.006* (-1.908)		-0.004 (-1.512)		0.001 (0.207)
CORE_TIER1_QUOTA	-0.129 (-0.791)	-0.131 (-0.799)	-0.285** (-2.140)	-0.287** (-2.129)	-0.029 (-0.189)	-0.028 (-0.187)
STRESSTESTBANK	0.028** (2.474)	0.028** (2.433)	0.016 (1.635)	0.016 (1.592)	-0.001 (-0.127)	-0.001 (-0.126)
SIZE	-0.008** (-2.157)	-0.008** (-2.168)	-0.003 (-0.940)	-0.003 (-0.949)	0.002 (0.475)	0.002 (0.480)
Constant	0.095** (2.312)	0.096** (2.337)	0.057 (1.481)	0.058 (1.502)		
COUNTRY FE	NO	NO	NO	NO	YES	YES
Adj. R <sup>2</sup>	0.132	0.134	0.459	0.460	0.585	0.585
F-statistic	3.121	3.006	25.31	24.15	5.401	5.403
Firms	54	54	54	54	49	49
n	54	54	54	54	49	49

This table presents the coefficients for three OLS regressions. T-statistics in parentheses are based on robust standard errors clustered by banks. The dependent variable is the amount of state aid (i.e., recapitalization amount) that the respective banks received during 2011 and 2012, divided by its total assets as of 31 December 2010 (*STATE\_AID*). *GGB\_EXPOSURE* is the nominal value of bank's GGB exposure as of 31 December 2011, divided by its total assets as of 31 December 2010. *NET\_INC\_CHG\_BEFORE\_IMP* is the bank's net income 2011 (before any impairments on GGB) after subtracting the bank's net income 2010, standardized by the bank's total assets 2010. *NET\_INC\_BEFORE\_IMP* is the bank's net income 2011 (before any impairments on GGB), standardized by the bank's total assets 2010.

**Table 8:** Multivariate results – Prediction of state aid received in subsequent quarter(s)

	(1)	(2)	(3)	(4)	(5)	(6)
	Baseline	QUARTER FE	COUNTRY FE	COUNTRY FE	COUNTRY FE	COUNTRY FE
PERC_OF_FULL_IMP	-0.022*** (-3.118)	-0.033*** (-3.747)	-0.027*** (-3.103)	-0.021** (-2.412)		
PERC_OF_FULL_IMP × GGB_EXPOSURE				-0.252* (-1.860)		
AFS_IMP_RATIO					-0.023 (-1.389)	
AC_IMP_RATIO						-0.062*** (-3.375)
GGB_EXPOSURE	0.073 (0.802)	0.064 (0.707)	0.026 (0.311)	0.045 (0.455)	0.096 (0.844)	-0.022 (-0.199)
NET_INC_CHG_BEFORE_IMP	-0.000 (-0.017)	-0.000 (-0.119)	0.004 (1.554)	0.004 (1.393)	0.004 (1.633)	0.008 (0.811)
CORE_TIER1_QUOTA	0.023 (0.228)	0.041 (0.390)	-0.001 (-0.004)	-0.000 (-0.003)	-0.024 (-0.142)	0.041 (0.131)
SIZE	-0.003 (-1.272)	-0.002 (-1.238)	0.002 (0.864)	0.002 (0.871)	0.003 (0.983)	0.000 (0.015)
STRESSTESTBANK	0.022*** (2.692)	0.021*** (2.720)	0.004 (0.504)	0.004 (0.492)	0.000 (0.052)	0.013 (0.840)
REGULATORY_QUALITY	-0.019** (-2.457)	-0.015** (-2.101)				
3RD_QUARTER		0.007*** (3.172)	0.007*** (2.929)	0.005** (2.246)	0.005 (0.965)	0.016*** (3.324)
4TH_QUARTER		0.010** (2.355)	0.005 (1.476)	0.005 (1.497)	0.005 (0.609)	0.025** (2.117)
Constant	0.058** (2.337)	0.051** (2.250)				
COUNTRY FE	NO	NO	YES	YES	YES	YES
Adj. R <sup>2</sup>	0.424	0.436	0.507	0.520	0.449	0.479
F-statistic	3.500	3.447	1.861	3.341	0.860	3.445
Firms	54	54	52	52	44	33
n	121	121	119	119	100	70

This table presents the coefficients for six OLS regressions. T-statistics in parentheses are based on robust standard errors clustered by banks. The dependent variable is the amount of state aid received after the respective quarter, divided by total assets 2010 (*STATE\_AID\_TO\_BE\_RECEIVED*). Appendix A provides variable definitions.

**Appendix A: Variable Definitions**

<i>PERCENTAGE_OF_FULL_IMPAIRMENT</i> =	Bank's actual impairment ratio as of the respective quarter (30 June 2011; 30 September or 31 December 2011), divided by the full pro-forma impairment ratio as of the respective quarter. The <i>PERCENTAGE OF FULL IMPAIRMENT</i> is separately calculated for the AFS and AC categories. If the bank has exposure in both categories, we calculate the mean of both <i>PERCENTAGES OF FULL IMPAIRMENT</i> , weighted by the full impairment specific to each category.
<i>CORE_TIER1_QUOTA</i> =	Bank's core tier one capital ratio as of 31 December 2010.
<i>MEET</i> =	'1' if the bank's cumulative net income as of the respective quarter, after re-adding the actual impairment recognized on GGB until the respective quarter and after subtracting the full impairment, exceeds the net income for the same period in the previous year; otherwise <i>MEET</i> is coded with '0'.
<i>GGB_EXPOSURE</i> =	Nominal value of GGB held by the respective bank in the respective quarter, standardized by the bank's total assets as of 31 December 2010.
<i>STRESSTESTBANK</i> =	'1' if the bank was included in the EBA's 2011 EU-wide stress test; otherwise the variable is coded '0'.
<i>STATE_AID</i> =	Recapitalization amount (i.e., injection of equity capital) that the government of the respective country provided to the respective bank in 2011 and 2012, standardized by the bank's total assets as of 31 December 2010.
<i>STATE_AID_RECEIVED</i> =	Recapitalization amount (i.e., injection of equity capital) that the government of the respective country provided (or committed to provide) to the respective bank <i>before</i> the release of the respective quarterly (annual report).
<i>STATE_AID_TO_BE_RECEIVED</i> =	Recapitalization amount (i.e., injection of equity capital) that the government of the respective country provided (or committed to provide) to the respective bank <i>after</i> the release of the respective quarterly (annual report).
<i>AVERAGE_MATURITY</i> =	Average maturity of the bank's GGB portfolio as of 31 December 2011.
<i>REGULATORY_QUALITY</i> =	Regulatory quality index (2008), which measures "perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development" (Kaufmann, Kraay & Mastruzzi, 2008).
<i>NET_INC_BEFORE_IMP</i> =	The bank's cumulative net income as of the respective measurement date (before impairments on GGB), standardized by bank's total assets 2010.
<i>NET_INC_CHG_BEFORE_IMP</i> =	The bank's cumulative net income as of the respective measurement date (before impairments on GGB) after subtracting the bank's net income of the same period in the previous year, standardized by bank's total assets 2010.

<i>3RD(4TH) QUARTER</i> =	Indicator variable that is coded with '1' for bank-quarter observations as of 30 September 2011 (31 December 2011).
<i>SIZE</i> =	Natural log of the bank's total assets as of 31 December 2010.
<i>FULL_PRO-FORMA_IMPAIRMENT_RATIO</i> =	Highest empirically observable impairment ratio for the respective quarter. For each quarter (i.e., 30 June 2011, 30 September 2011 and 31 December 2011), the ratio is separately determined for the AFS and AC categories.
<i>FULL_IMPAIRMENT</i> =	Sum of the bank's AFS exposure as of the respective quarter, multiplied by the full pro-forma impairment ratio AFS as of the respective quarter and the bank's AC exposure as of the respective quarter, multiplied by the full pro-forma impairment ratio as of the respective quarter.