Hedge Accounting During Times of Crises: Evidence from the European Banking Industry

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Abstract: This paper provides an in-depth analysis on financial information related to hedge accounting of European banks from 2005-2014. We investigate whether hedge accounting can be used to improve the information environment in the form of decreased information asymmetry and additional explanatory power for market values. We find hedge accounting to have the intended effect of earnings smoothing, which works as a mechanism for the improved information environment. The estimation results show that both hedge accounting quantity and quality are significantly associated with current market value of equity with the effects being even stronger during years of financial instability. The findings of this study on the relevance of hedge accounting are particularly important in view of the IASB's envisaged increased application of hedge accounting under IFRS 9.

Keywords: Hedge accounting, European banking industry, earnings volatility, information asymmetry, crisis, value relevance;

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1. Introduction

Hedge Accounting, i.e., accounting for derivatives held for hedging purposes, under IFRS (IAS 39) is known to be a complex set of specific rules, due to e.g., the burdensome effectiveness test (e.g., Althoff and Finnerty (2001), Frestad and Beisland (2015)). The accounting rule ensures that gains and losses on hedged items and hedging instruments are recognized in the same period and prevents earnings volatility that is not economically justified (IASB 2014). The use of derivatives for risk management purposes has significantly increased over the past decades (Panaretou *et al.* 2013). Hence, for many firms hedge accounting has become more challenging calling into question whether relevant and reliable financial information can still be provided.

A new set of rules for hedge accounting is proposed in IFRS 9 *Financial Instruments* issued on 24 July 2014 (effective date: 2018), which will replace the current IAS 39. The new standard is expected to induce an increase in the application of hedge accounting by relaxing some burdensome rules. The intention of the IASB is to improve the ability of investors and analysts to understand risk management activities and to assess the amounts, timing and uncertainty of future cash flows. This speaks to the feedback the standard setter received from various stakeholders. From a company's view, firms felt that IAS 39 does not allow an adequate reflection of their risk management practices. In addition, investors were demanding improved information on the risks entities face. They aim to better assess what management is doing to address those risks and gauge how effective their strategies are (IASB 2014). The new standard speaks to these concerns and provides a better link between accounting and risk management. While hedge accounting is expected to be applied by a broader range of companies (Glaum and Klöcker 2011), it is not clear ex-ante whether such information does improve the information environment at all. The present study aims to fill this gap by analyzing a European banking sample where hedge accounting is well pronounced. More specifically, we ask whether hedge

accounting can be used to improve the information environment through 1) decreased information asymmetry and 2) additional explanatory power of market values.

We utilize hand-collected information on hedge accounting under IAS 39 for the European banking industry. We use the banking industry for the following reasons. First, financial reporting is the main channel for banks to report to regulators, which is why the data should represent the real financial profit and risk situation of the bank (Scheffler 1994, p.73). Hedge accounting helps to avoid economically unjustified earnings volatility and to better reflect the real risk exposures. This is critical to banks as they face high regulatory burdens via equity quotas and are strongly influenced by regulators. Second, due to their business model banks face a high exposure to losses from various types of risks and naturally have a high demand for hedging. They usually hold huge derivative volumes. The application of hedge accounting is expected to be highly prevalent. Third, in most empirical accounting studies financial institutions are typically left out due to their particular accounting. Hence, despite the industry's large economic importance for developed countries research on the application and economic consequences of specific accounting standards under IFRS is rather scarce relatively to other industries. We focus on the financial industry to enrich the mostly anecdotal understanding on how banks actually apply hedge accounting and how that information is perceived by the market.

We further align our work to the ongoing debate about the role of accounting during the last financial crisis if it is either *messenger* or *contributor* (Magnan and Markarian 2011). Consistent with Ryan (2008) we consider the role of accounting to provide a transparent information set upon which market participants can recalibrate their valuation and risk assessment. Reduced relevance and reliability of financial information and a failure to account for risk marked the major problems during the last financial crisis. Particularly during such times of uncertainty a sound risk management paired with the proper corresponding reporting is of utmost importance. While banks have been facing more and more work with the additional risk reporting this

increase in reporting is aimed at reducing frictions and allowing identification of risk concentration (Magnan and Markarian 2011; Ryan 2008). Hedge accounting is one way to report risk management activities. We therefore base our analyses on the financial information on hedge accounting of the 89 banks of the STOXX Europe 600 Banks index from 2005-2014. Given the complexity of hedge accounting under IAS 39 there is a lack of detailed analyses on how banks actually apply the rules and what financial information they report and disclose. We thoroughly analyze the information on hedge accounting and find a highly diverse range of around 100 items across all banks. This is narrowed down to defined panels capturing information on whether a bank provides information on hedge accounting at all as well as on selected specific values such as hedge accounting ineffectiveness or notional values. We hand-collect the data for the defined panels and provide rich descriptive analyses on the hedge accounting information disclosed by the banks in our sample.

Our descriptive analyses reveal that about one third of the sample provides concrete amounts on hedge accounting while the majority of banks only disclose a rather generic application of hedge accounting. Also about one third of the sample applies fair value hedges and cash flow hedges in combination with the fair value option. The latter has been shown to be a sound alternative to hedge accounting (Fiechter 2011). We further find significant differences of reported information on hedge accounting during times of financial instability, e.g., for variables such as negative fair values or notional values. Based on the collected hedge accounting variables we construct a proxy for hedge accounting quality, which indicates if hedge accounting application is clearly stated in the corresponding relevant tables of the financial report, and hedge accounting quantity, which indicates the percentage of reported information regarding hedge accounting. We use these proxies to address the question on how hedge accounting may improve the information environment. First, we expect and find reduced information asymmetry proxied by bid-ask spreads. In particular, our results suggest a positive correlation of earnings volatility and bid-ask-spreads, which is stronger for high-quantity and

high-quality hedge accounting appliers. This is consistent with the notion that the reduced earnings volatility serves as a mechanism, which explains why hedge accounting can improve the information environment. While part of it may be argued as being an effect from hedging per se, banks in our sample applying hedge accounting show lower earnings volatility compared to other banks using hedging and/or derivatives. This suggests that hedge accounting may help in reducing information asymmetry.

Our second set of tests shows that hedge accounting information improves the information environment by adding additional explanatory power for market values. We study information related to whether and how 1) a firm applies hedge accounting and 2) provides specific information on it. We extend the analysis differentiating between times of high and low uncertainty and find the significant and positive association of hedge accounting quality and quantity to be even stronger during the global financial crisis. Our results are consistent with the general notion that during years of financial instability an increase in available information on hedge accounting is perceived positively by the market as it is one way to reduce information asymmetry.

We contribute to prior literature in several ways. Overall, our findings suggest that if banks present information on hedge accounting the market seems to deem the reported information relevant. To the best of our knowledge we are the first to study the relevance of hedge accounting under IFRS for the European banking industry. In addition, our study sheds light on the mechanism behind income smoothing through hedging activities. While it is well-known that a reduction in earnings volatility may reduce information asymmetry our results provide an explanation on the sources for the improved information environment.

While the tendency to apply hedge accounting is expected to increase under IFRS 9, preparers and auditors do not expect the accounting itself to change substantially. Our analysis based on IAS 39 data therefore serves as a cautious outlook on how hedge accounting information may also be perceived under the new standard. In addition, the incremental analysis on the relevance

of hedge accounting information for market values during crises years is important to understand what role publicly available financial information on complex accounting rules plays in times of financial instability. Our results are important to preparers, analysts and investors as well as to standard setters particularly in view of IFRS 9.

Section 2 provides information on the institutional setting, section 3 reviews prior literature and develops the hypotheses, section 4 presents the research design, section 5 describes the data and provides our descriptive analyzes, section 6 presents our estimation results and robustness tests. Section 7 concludes.

2. Institutional Background

The hedge accounting rules under IAS 39 developed over the last decade aim to provide the link between an entity's risk management strategy, the rationale for hedging, and the impact of hedging on the financial statements. These goals are even more pronounced under IFRS 9 as the new regulations were a reaction to the severe shortfalls related to risk management during the crisis. Table 1 provides an overview of the main differences on hedge accounting under IAS 39 versus IFRS 9. The table shows that a number of restrictions have been eased under IFRS 9, e.g., all financial instruments measured at fair value through profit and loss can now be designated as a hedging instrument.

[Table 1]

Under IAS 39, a number of financial instruments did not qualify as hedging instrument and consequently, hedge accounting could not be applied. Another main change relates to the testing for effectiveness. In practice, many companies have regularly complained that the two-stage procedure to test for effectiveness including both a prospective and a retrospective test plus fulfilling the effectiveness range of 80%-125% is a huge impediment to apply hedge accounting. Under IFRS 9, the effectiveness test solely contains a prospective and qualitative test with the quantitative thresholds completely being eliminated. Hence, we can expect banks

to apply more hedge accounting in the future making the findings of our study particularly interesting.

An in-depth analysis on the application of hedge accounting under IAS 39 provides valuable insights on the IASB's mission to postulate a wider application of hedge accounting under IFRS 9.[4] We do not claim that investigating hedge accounting information based on IAS 39 data can perfectly explain the application of hedge accounting under IFRS 9. However, such an analysis can identify current patterns of application, which may well contribute to understanding the IASB's intention regarding hedge accounting under IFRS 9. Further, there are no amendments to IAS 39 regarding the actual accounting rules for hedge accounting under IFRS 9. Hence, we can expect our analyses and findings to still be relevant under the new standard as the accounting as such will not change but only the number of companies applying hedge accounting is expected to increase. Since the complex regulations surrounding hedge accounting under IAS 39 has particularly impeded small companies to apply hedge accounting, the relaxation laid out in the new standard will mostly speak to these firms. As our sample comprises the largest European banks we can expect the new hedge accounting rules not to have a dramatic change on these banks' hedge accounting. For example, Lloyds claims in its annual report 2014 (p. 321):

> "*The hedge accounting requirements of IFRS 9 are more closely aligned with risk management practices and follow a more principle-based approach than IAS 39. The revised requirements are not expected to have a significant impact on the Group.*"

Results based on IAS 39 can further be used in future studies and be benchmarked against findings based on IFRS 9 data in order to empirically test whether the IASB's intentions have actually come about. In the following we therefore focus on the illustration of hedge accounting under IAS 39 and IFRS 7 as our data is based on these regulations. However, as outlined above

[4] Macro Hedging is still under work which will become especially relevant for the banking industry. DP/2014/1 and the Staff Paper AP04 (May 2015) address the accounting for dynamic risk management via a portfolio revaluation approach to macro hedging.

the paragraphs that are of interest for our study would largely be the same for IFRS 9. We briefly outline in Figure 1 how to account for the hedged item and the hedging instrument under IAS 39 and the related disclosure requirements under IFRS 7 for fair value hedges, cash flow hedges, and hedges of a net investment in a foreign operation.

[Figure 1]

Table 2 provides information on the various amendments to IAS 39 concerning hedge accounting during our sample period. As a reaction to the financial crisis a large amendment to IAS 39 was released in 2009 regarding embedded derivatives on the reclassification of financial assets. §91 on fair value hedges and §101(a) on cash flow hedges contain the main changes of the amendments to IAS 39 with regards to the discontinuity of hedge accounting and when there is not an expiration or termination of the hedging instrument.

[Table 2]

3. Prior literature and hypotheses development

Prior research is often concerned with the determinants of hedge accounting. Glaum and Klöcker (2011) study the probability of applying hedge accounting in German and Swiss non-financial corporations. Using different models, they find significant effects for the following determinants: experience with IFRS, perceived importance of reduced earnings volatility, a positive book-to-market variable (indicating that growth companies are less likely to apply hedge accounting), company size and Big 4 auditors. On the other hand, based on a sample of 100 US firms from 2001 to 2007, Hughen (2010) analyses the determinants of economic hedgers (compared to accounting hedgers). She classifies firms as accounting hedgers, economic hedgers or discontinuers based on restatements due to misapplication of hedge accounting. Her findings state a positive relation between meeting earnings targets and a management focus on accounting rather than on economic earnings. Further, Hughen reports in her summary statistics (Table 2, p.1041) that out of all firms that are classified as accounting hedgers, 61.5% are financial firms. For the sample of economic hedgers, financial firms only

represent 31.1%. It appears that stability in accounting earnings plays a superior role within the financial sector, which further motivates our sample composition. Also for the US GAAP setting and for non-financial firms only, Disatnik *et al.* (2014) study the interaction between corporate hedging and liquidity policies. They find that *industry* is a 1st-order determinant of firms' usage of cash flow derivative hedging. Melumad and Weyns (1999) show that hedge accounting leads to 1st-best hedging choices. Further, Lins *et al.* (2011) find that fair value reporting of derivatives leads to a substantial impact on the use of derivatives and hence, hedge accounting. However, since hedge accounting is well pronounced in the banking industry per se the question on the determinants of hedge accounting does not play a major role in this study. This paper can rather be embedded in the stream of literature focusing on the economic consequences of hedge accounting. In this context, one needs to distinguish studies on the economic consequences of *hedge accounting* versus *hedging*. Both streams are interrelated and linked to risk management, especially as the underlying data to be analyzed e.g., hedging derivatives may overlap. Hedging speaks to the pure underlying economic hedging activity while hedge accounting is the way to report about it complementing hedging through its informational effect. DeMarzo and Duffie (1995) provide formal evidence that hedging increases firm value through its information effect. Assuming that a firm hedges but does not report about the hedging activities in a transparent way, the firm might miss to tell the market about its risk management and to use effects on their reported earnings caused by hedge accounting (Panaretou *et al.* 2013). In this case, applying hedge accounting might help the market via its informational effect to understand and consequently value whether and how a firm manages their risks. We therefore particularly focus on the question whether hedge accounting can improve the information environment with income smoothing via hedging as the underlying mechanism.

Evidence of the impact of hedging on firm value is mixed and presents various channels through which hedging influences firm value (Disatnik *et al.* 2014). For example, Jin and Jorion (2006)

do not find hedging to influence the market value of a firm. In a different vein, Smith and Stulz (1985) find hedging to limit the deadweight losses of bankruptcy while Froot *et al.* (1993) show that hedging reduces the costs of underinvestment. With regards to hedge accounting, Panaretou *et al.* (2013) analyze the impact of hedge accounting on corporate risk management and find an increase in the transparency of derivative disclosures and a positive impact of hedge accounting on forecast accuracy. Disatnik *et al.* (2014) show a significant positive effect of cash flow hedging on firm value. The analysis of related prior research shows that most studies on hedge accounting focus on non-financial firms and/or the US setting. Our study based on IFRS data of European banks is hence an important contribution to the existing research stream.

In this study, we focus on information asymmetry as well as value relevance[5], i.e., the explanatory power of contemporaneous hedge accounting information for stock prices to analyze the impact of hedge accounting on banks' information environment. Since investors' valuation of free cash flows and cost of capital is partly based on the availability of accounting information, a link between the latter and stock prices can be assumed (Kothari and Shanken 2003). Evidence on market pricing is mixed regarding the general relevance of accounting information for market values (e.g., Barth *et al.* (2001)[6]) as well as whether value relevance has declined over time or not (e.g., Lev and Zarowin (1999)).[7] Regarding value relevance and derivative disclosures, Venkatachalam (1996) finds fair value estimates for derivatives under SFAS 119 to explain cross-sectional variation in bank share prices and to have incremental explanatory power over and above notional amounts of derivatives. Panaretou *et al.* (2013) focus on forecast relevance and call for future research on the effects of changes in hedge accounting on firm valuation. Focusing on forecast accuracy, Chang *et al.* (2015) find analysts' misjudgments caused by the accounting complexity of derivative instruments and current

[5] In the spirit of the seminal papers of Beaver (1968) and Ball and Brown (1968).
[6] For a critical discussion on the relevance of value relevance studies see Holthausen and Watts (2001).
7 For further studies on the change in value relevance over time see Core *et al.* (2003), Lo and Lys (2000), Collins *et al.* (1997), and Francis and Schipper (1999).

earnings forecast being less accurate. Also Campbell *et al.* (2015) find analysts' forecasts to suffer from complex rules. Both studies encourage analyzing derivative reporting and its disclosures.

We base our study on a simple discounted cash flow valuation framework for the value of equity and assume, that properties of firm-specific information risk affect cost of equity and are priced by the investors (Francis *et al.* 2004). Poor-quality reports (i.e., higher firm-specific information risk) impair the coordination between a firm and their investors by increasing their impreciseness of valuation estimates (Beisland 2009). The disclosure of hedge accounting appears still quite discretionary (Bischof 2009). We therefore expect for banks that provide hedge accounting-related information of larger quantity and/or quality to experience a decrease in information asymmetry. Investors are in a better position to estimate the value of the bank due to enhanced insights on the banks' hedging behavior and risk management strategy. Hence, contrary to economic hedging per se only hedge accounting allows to potentially enrich the information environment. Panaretou *et al.* (2013) find the implementation of hedge accounting under IAS 39 to reduce asymmetric information faced by derivative users (DeMarzo and Duffie 1995). We extend their study and hypothesize:

> ***Hypothesis 1:*** *High-quantity and/or high-quality hedge accounting reporting is negatively associated with information asymmetry.*

While for standard setters hedge accounting is inextricably linked to *risk management*, analysts and banks view hedge accounting more as an *income smoothing* tool with the hedging of risks not being directly linked to hedge accounting. Anecdotal evidence suggests that in the banking industry the latter is mainly used to smooth artificial earnings volatility via the separate accounting for the underlying hedged item and hedging instrument. We consider income smoothing through hedging as the mechanism, which can explain *why* hedge accounting may decrease information asymmetry consistent with H1. This implies that banks applying hedge

accounting are expected to have lower earnings volatility compared to banks not applying hedge accounting.

Regarding our second hypothesis, we analyze the reported financial information and disclosure on hedge accounting in the European banking industry. The information environment may be improved via hedge accounting if the information on the latter is deemed relevant by the market. Pierce (2015) analyses non-financial firms in the S&P 500 and shows that firms significantly decrease earnings volatility via hedge accounting. He further finds a positive association of hedge accounting with firm value. Disclosure studies are typically concerned about the cost of capital: Botosan (1997) finds greater disclosure to be related with lower cost of equity capital but only for the machinery industry and as long as firms' analyst following is low. Focusing on the Swiss environment but therein different industries, Hail (2002) shows a negative association between disclosure quality and cost of equity capital. Based on the valuation framework of our study, investors will demand a higher risk premium leading to higher cost of equity and a reduced firm value. Based on these considerations we expect high-quality reports to be valued by the market, i.e. in the presence of a high-quality report, we expect investors to value the comprised risk of disclosures. To the extent that hedge accounting indicates effective hedges and signals effective risk management strategies to the investors, we can expect hedge accounting to be positively valued by the market. Depending on the underlying disclosed item of hedge accounting, the association with market value may be positive or negative. We focus on a set of different hedge accounting information (Disatnik *et al.* 2014) and hypothesize:

> ***Hypothesis 2:*** *Hedge accounting information is associated with current market values of equity.*

There is ample evidence on the link between derivatives and risk management (e.g., Zhang (2009)) and why firms hedge (Bodnar and Gebhardt 1999; Gamba and Triantis 2014; Guay 1999; Petersen and Thiagarajan 2000). However, little is known on how the link between derivatives and risk management may differ during times of financial instability. Magnan and

Markarian (2011) focus on the period 2007-2010 and show that during these years of financial turmoil, accounting was not able to address neither the increased uncertainty nor the excessive risk-taking by bankers. Hence, during times of crises, estimating a bank's value becomes more complex in general as market activity is substantially different compared to non-crisis times. Therefore information on the risk management strategy embedded in hedge accounting information becomes particularly important during periods of high market uncertainty to appropriately assess the amounts, timing, and uncertainty of future cash flows. Our sample period comprises the last global financial crisis (2008-2009) as well as the Euro crisis (2011-2013). This natural setting allows us to analyze hedge accounting information during times of crises compared to more stable periods. To the extent that greater disclosure on hedge accounting is positively associated with market values one can assume such additional information on company's risk management to be even more relevant if the market environment becomes less stable. We therefore hypothesize:

> ***Hypothesis 3:*** *The association of hedge accounting information with current market values of equity are larger during times of crises.*

4. Research design

In a first step, we provide rich descriptive analyses on the reported hedge accounting information under IAS 39 showing large cross-sectional variety consistent with the choices and great discretion in applying the standard.

To address the mechanism of income smoothing inherent in hedging activities we analyze the five-year rolling earnings volatilities per different subsamples of banks. We expect banks applying hedge accounting to have the lowest earnings volatility compared to other banks using hedging and/or derivatives. In addition, we test for the informational effect of hedge accounting. We split the sample of banks applying hedge accounting along the median (mean) of the quantity (quality) of hedge accounting application. An increase in hedge accounting application might help to reduce information asymmetry through its informational effect, and also reduce

earnings volatility through its actual accounting effect. Both, earnings volatility and information asymmetry are therefore expected to be negatively correlated with hedge accounting. We measure information asymmetry using bid-ask-spread (following e.g., Panaretou *et al.* (2013)) with lower spreads indicating lower information asymmetry. Consistent with H1, assuming hedge accounting disclosures to be informative, the correlation of earnings volatility $\sigma_{earnings_{it}}$ and bid-ask-spreads $px_{bid-ask-spread_{it}}$ is then expected to be positive, particularly for high-quantity and high-quality hedge accounting appliers.

Concerning H2 on the improved information environment via additional explanatory power for market values we estimate an Ohlson-type (1995) regression model based on the subsample of hedge accounting appliers. We adopt the model and add components of "other information" capturing information beyond the financial statement, see equation (1). Further, we use adjusted earnings and book values and test the "earnings and book value" components related to hedge accounting separately, see equation (2). Finally, to address the incremental effect during years of financial instability and uncertainty (H3) we estimate each independent variable in the interaction with the crises years 2008 and 2009 for the global financial crisis and 2011, 2012 and 2013 for the Euro crisis. This set up allows us to point on differences during times of financial stability and uncertainty. We estimate

$$MV_{it+3m} = \beta_0 + \beta_1 E_{it} + \beta_2 BV_{it} + \theta' otherinfo + \delta' controls + \varepsilon_{it} \quad (1)$$

$$MV_{it+3m} = \beta_0 + \beta_1 E\_ad_{it} + \beta_2 BV\_ad_{it} + \theta' adjustments + \delta' controls + \varepsilon_{it}, \quad (2)$$

with individual banks i, time in years t, and θ' and δ' as coefficient vectors to the corresponding variable vectors $otherinfo$ or $adjustments$ and $controls$. MV_{it+3m} is the market value of equity three months after fiscal year-end of each bank, E_{it} is earnings at the end of the fiscal year, E_ad_{it} is E_{it} but adjusted for hedge accounting net income HA_NI_{it} (hedge accounting earnings component), BV_{it} is the book value of equity at the end of the fiscal year adjusted for E_{it}, BV_ad_{it} is BV_{it} but adjusted for the net cash flow hedge reserve $CFHR\_N_{it}$ (hedge accounting equity component), all deflated by total assets. We expect a positive sign for both

earnings and book value (see e.g., Collins *et al.* (1997)). In equation (2), the hedge accounting adjustments to earnings and book value, i.e., HA_NI_{it} and $CFHR\_N_{it}$, are separately captured in the variable vector $adjustments$. We do not predict a specific direction for both variables.

The variable vector $otherinfo$ includes the variables hedge accounting quality HA_Qual_{it} which equals 1 if hedge accounting application is clearly stated in the corresponding relevant tables of the financial report, 0 otherwise of bank i in time t, hedge accounting quantity HA_Quant_{it} which is the percentage of reported hedge accounting information, i.e., the extent to which banks provide financial information related to hedge accounting in the notes of the consolidated financial statements of bank i in time t with values between 0 and 1, as well as the specific hedge accounting variables FV_P_{it}, FV_N_{it}, and NV_{it}, all deflated by total assets. We use FV_P_{it} as the sum of the positive fair values, FV_N_{it} as the sum of the negative fair values, and NV_{it} as the sum of the notional values of hedge accounting. Assuming an informational effect of hedge accounting, we predict a positive sign for HA_Qual_{it} and HA_Quant_{it}: a clear statement of applying hedge accounting with the corresponding tables and a high-quantity of reported items is expected to be perceived positively by the market. We further predict a positive sign for FV_P_{it} since a positive fair value is the positive replacement value and therewith the intrinsic value of a derivative. For the same reasoning, we expect a negative sign for the regression coefficient of FV_N_{it}. Regarding NV_{it} we do not predict a specific direction.

Each single component of the variable vectors $adjustments$ and $otherinfo$ is further estimated in an interaction term with a crisis dummy. We test two crisis periods and apply $crisis\_gfc_t$, which equals 1 for the main years of the global financial crisis 2008 and 2009, and $crisis\_euro_t$, which equals 1 for the main years of the Euro crisis 2011, 2012, 2013, both capturing the incremental effect of the reported information regarding hedge accounting which is valued by market participants during years of financial turmoil. Since times of crises come with difficult market conditions, we expect a negative association of $crisis\_gfc_t$ and

$crisis\_euro_t$ with the market value of equity. We expect the interaction terms to be positive for the variables HA_Qual_{it}, HA_Quant_{it} consistent with the notion that the market should react positively to high-quantity and high-quality information during times of crises. We expect a positive (negative) interaction coefficient for FV_P_{it} (FV_N_{it}) due to the characteristic of the underlying replacement values. We do not predict a direction for the interaction with NV_{it}, HA_NI_{it}, $CFHR\_N_{it}$. With this incremental analysis we aim to better understand the role of accounting disclosures related to hedge accounting in the presence of financial turmoil.

The variable vector $controls$ is the same for both models and includes bank-level specific controls. $SIZE_{it}$ is bank size measured by the natural logarithm of total assets (e.g., Delis and Kouretas (2011), Fiordelisi *et al.* (2011)). The larger a bank, the more sensitive the reaction to market conditions (Niu 2012; Saunders *et al.* 1990). Since our sample period spans years of crises and hence, difficult market conditions, we predict a negative association of $SIZE_{it}$ and the market value of equity. EXP_{it} is a proxy for each bank's securities' exposure calculated by the total of investment securities, deflated by total assets. We follow e.g., Pathan (2009) and include the capitalization structure CAP_{it} to account for the strong influence of capital structure on a bank's market value. The variable is the combined risk-adjusted capital ratio of Tier I and Tier II capital. We predict a positive sign for the regression coefficient of CAP_{it} since market participants should positively value a strong capital base. The fair value option FVO_{it} is at the core of Fiechter (2011) who finds this to be a more effective tool to reduce earnings volatility than hedge accounting in accordance with IAS 39. We use the dummy of fair value option application as an additional control variable. The last bank-specific control is non-performing assets NPA_{it}, deflated by total assets. We use the variable as a proxy of risk as the ratio of non-performing loans to total loans is a widely used bank risk-taking variable (e.g., Agoraki *et al.* (2009), Houston *et al.* (2010)). We expect a negative association of non-performing assets and the market value of equity due to their signaling effect on risk. We provide a detailed description of all variables in appendix A2.

5. Data

5.1. Sample selection and data sources

Our sample follows the composition of the STOXX Europe 600 Banks index[8], the leading index for the European banking industry. We recalculate the composition per quarter between 2005-Q1 and 2014-Q4, which results in our core sample of 89 banks from 18 different European countries. These are the banks that have been included between 2005-Q1 and 2014-Q4 in the index. We start our sample period in 2005 as it is the year of mandatory adoption of IFRS in the European Union. Data on the index composition is collected from STOXX Research Database (covering 2010-2014) and Bloomberg (covering 2005-2010). We use fundamentals and market values from 2005 to 2014 retrieved from Compustat Global Fundamentals Annual and Securities Daily, recalculate all values to EUR million (using exchange-rates retrieved from European Central Bank) and conduct different data cleaning steps. For stock data, we choose the primary issue per bank. We merge derivative and hedging data retrieved from Capital IQ (contents available are receivables from derivatives, long term and current, liabilities from derivatives, long term and current, and hedging activity (mainly interest rate swap liabilities)) and bid-ask-spreads retrieved from Bloomberg.

Out of this sample of 89 banks, we select the banks which have been steadily included over all 40 quarters resulting in 32 banks of 12 different European countries. For these banks, we download the consolidated financial statements of 2005-2014 and hand-collect financial information related to hedge accounting from the reported notes. As hedge accounting disclosures appear highly discretionary, we started to collect all information related to hedge accounting for the entire sample of 89 banks in 2014. We expect a more reliable understanding of the availability of hedge accounting variables than if only using the 32 sample banks. This

[8] The STOXX Europe 600 is composed based on the free float market capitalization (without sector classification as criteria), i.e., the number of companies included per quarter depends on the size of the companies in terms of market capitalization. We filter all components for the subsector 8355, which is the sector for banks to retrieve the quarterly composition of the STOXX Europe 600 Banks index.

collection results in around 100 different variables which we clustered and reduced into the following panels[9]: Panel A of dummy variables regarding the application of hedge accounting, Panel B of income statement related information (IS), Panel C of balance sheet related information (BS), Panel D of equity related information (E), and Panel E of notional values (NV) with detailed descriptive data in Table 3. We end up with 21[10] hand-collected data items each assigned to one of the five panels. We find increasing data coverage from 2005 to 2014 and a structural break in both the reporting and disclosure between 2008 and 2009. This is in line with the amendments to IAS 39 (see Table 2). While balance sheet related information shows the highest coverage over the years, data coverage varies quite substantially in case of notional values (delta of the minimal and maximal values of around 35%). We observe the lowest data coverage for the income statement related information.

Due to our sample selection process related to the hand-collected hedge accounting items (32 banks), we face a size and survivorship bias. We accept this bias for the following reasons: (1) since our sample is influenced by a number of mergers and acquisitions, by that we ensure that we count bank figures only once (i.e., either before the merger as one separate bank or after the merger as part of the new bank) due to the free float market capitalization criteria of the index composition.[11] (2) Data cannot be retrieved for all items of the whole sample as the European banking industry was highly influenced by the global financial crisis and data availability is limited. (3) Since the 32 banks comprise the largest and most relevant banks capturing the major

[9] Due to the high heterogeneity of the data, following categories and information on hedge accounting are left out in this analysis: shareholders' equity positions, specific valuation reserves, interest rate related positions, interest income positions, deferred tax assets and liabilities, maturity reports (i.e., when the group's hedged cash flows are expected to occur and when they will affect income), fair value hierarchy, details on loans and single instruments, Basel II/III detailed positions with hedge accounting.

[10] Note that some of the 21 variables (denoted with *) comprise aggregated information. E.g., $I/E\_FVH\_dummy_{it}$* comprises the information of income of fair value hedges (I_FVH_{it}) and expenses of fair value hedges (E_FVH_{it}).

[11] As the time period of 2005 to 2014 is highly influenced by the financial crisis and strong market conditions in banking, we address M&A issues with our sample selection as follows: As the index is a free float market capitalization based index, the components are only in the index if their market capitalization is among the 600 largest European companies. If a company is merged with another, it will therefore naturally be dropped out of the index. We only use the components, which are part of the index in each quarter of the 10 years.

part of the total market capitalization of the index[12], we expect our sample to be a representative group of European banks. (4) Further, we ensure a homogeneous approach of hedge accounting application among our sample of large banks. Large banks use a portfolio approach to identify a hedging instrument out of a pool of many instruments which effectively (within 80-125%) hedges the underlying item. The larger the bank, the higher the probability that effective matches are identified. Therefore, a sample comprising smaller and larger banks would mix different approaches of hedge accounting application and bias our results.

5.2. Descriptive Analyses

We conduct a range of descriptive analyses and provide an overview on the application of hedge accounting for the European banking industry.

In a first step, we identify whether and how hedge accounting under IAS 39 is mentioned in the banks' annual reports. We use three dummy variables: (1) *HA_D* which equals 1 if hedge accounting is simply mentioned, (2) *HA_D_all* which equals 1 if the bank clearly states its application of hedge accounting, and (3) we use our proxy for hedge accounting quality HA_Qual_{it}. We find that the majority of banks with 42.19% present a rather generic application of hedge accounting not disclosing specific hedge accounting tables. However, 35.94% of the banks do disclose specific amounts on hedge accounting in corresponding hedge accounting tables. Only 10.63% mention hedge accounting without any further specifications.

In addition, we analyze the information on the different hedge accounting types and the fair value option, a sound alternative to hedge accounting (Fiechter 2011). We use four dummy variables all related to IAS 39: (1) *FVH_D* which equals 1 if a bank applies fair value hedges, (2) *CFH_D* which equals 1 if a bank applies cash flow hedges, (3) *NIH_D* which equals 1 if a bank applies net investment hedges, and (4) *FVO* which equals 1 if a bank applies the fair value option. We find that the largest group of banks with 27.19% applies fair value hedges and cash

[12] See https://www.stoxx.com/download/indices/factsheets/SX7GR.pdf (Sep 04 2016).

flow hedges in combination with the fair value option. Secondly, 25.94% of banks apply all four options. The third largest group with 15% comprises banks, which apply fair value hedges and cash flow hedges only. 12.19% of banks apply all three hedge accounting types but not the fair value option. All other combinations are below 5%.

Figure 2 shows the cross-section means of the cash flow hedge reserve, the sum of notional values across hedge accounting types and the sum of the negative and positive fair values across hedge accounting types.

[Figure 2]

The graph depicts an increase in negative fair values of hedge accounting constantly over the whole period with a steeper slope during the financial crisis and the Euro crisis. Positive fair values steadily increase, however, slower compared to negative ones. For notional values, we find a substantial break during 2008-2009, indicating different levels of market activity during years of financial instability. The cash flow hedge reserve is negative during the financial crisis and recovering afterwards during the Euro crisis. For all variables, we find differences in the data patterns during the financial and Euro crisis that may indicate different market activities.

We further analyze selected hedge accounting variables regarding their frequency and amount for each year of our sample period 2005-2014.

[Figure 3]

For the years during the global financial crisis and the Euro crisis (left panel of Figure 3) we find higher reported ineffectiveness as well as a higher negative cash flow hedge reserve, deflated by total assets (right panel of Figure 3). This indicates that the valuation reserves parked in equity turned negative during the crises (particularly during 2008 and 2013) which is in line with the negative market environment. In addition, total income and expenses increased during the crises years (not graphed) and show a pattern similar to ineffectiveness which is again in line with our expectations. We can further see that the ineffectiveness of fair value hedges is more substantial compared to that of cash flow hedges and net investment hedges.

Figure 4 presents details on the three hedge accounting types fair value hedges, cash flow hedges and hedges of a net investment in a foreign operation.

[Figure 4]

The left panel shows the development of the application of each hedge accounting type over the sample years. It clearly presents that fair value hedges are most commonly used, followed by cash flow hedges and net investment hedges. From the first global financial crisis year of 2008 onwards we start observing a steep increase in the fair values of fair value hedges (right panel). That increase is larger compared to the other two types with a peak during the Euro crisis. In 2008, positive fair values of fair value hedges start to exceed the negative ones despite the Euro crisis year of 2013 where negative fair values slightly exceed the positive fair values of fair value hedges.

We provide more details on our proxy HA_Quant_{it} to measure the quantity of reported hedge accounting information in Table 3.

[Table 3]

HA_Quant_{it} is based on the 21 variables of different disclosed items on hedge accounting.[13] Incorporating variables of all five panels, we ensure to cover the most relevant areas of hedge accounting variables disclosed by banks. For our specific sample of 32 banks we have 307 to 309 observations.[14] Most disclosed information refers to balance sheet related information with 82.74% for single fair values (positive and negative) for the three hedge accounting types. Up to 90% of banks disclose at least the positive and negative sum of hedge accounting fair values. Concerning the different types of hedge accounting, we again find most of the disclosed

[13] Comprising several variables into one as outlined in footnote 10 allows us only using vectors, which are not a linear combination of other variables based on an analysis of the correlation matrix (in order to avoid the singularity of the matrix). For example, the disclosure of positive fair values of fair value hedges is perfectly correlated with the disclosure of negative fair values of fair value hedges as well as with the disclosed fair values of other hedge accounting types.

[14] We have two observations more (i.e., 309) on the general hedge accounting application dummy since we can retrieve that information from the pro-forma consolidated statements of the two banks "Unione di Banche Italiane" and "Intesa San Paolo", which were both influenced by mergers in 2006. For more specific variables, the observations are not available for 2006 resulting in missing observations in 2005 and 2006 for this two banks "Unione di Banche Italiane" and "Intesa San Paolo".

information for fair value hedges. Hence, the fractions of fair value hedges mostly exceed the others. A closer look into the disclosure standards of IFRS 7 (§§21B-24F) concerning hedge accounting reveals which item is disclosed voluntarily or mandatorily. For each accounting type different disclosure requirements exist as stated in IFRS 7, §§ 21B-24F. IFRS 7, §22A-22C state how to outline a description on the *risk management strategy* for each hedge, e.g., by describing the hedging instruments with their fair values including an explanation on how they are used and the nature of hedged risk. Specifics on cash flow hedge disclosures are stated in §23A-23F (*the amount, timing and uncertainty of future cash flows*) of IFRS 7 while §24A-24F (*the effects of hedge accounting on financial position and performance*) address the ineffectiveness and gain or loss disclosures for all hedge accounting types. The last column of Table 3 displays which disclosures are voluntary or mandatory. We find e.g., income statement related items (Panel B) not often being reported but generally required to be disclosed. Further, presentation of fair value information is mandatory and consequently mostly disclosed by banks. The bottom line of the table indicates that on average across all banks and time, 57.19% of the items are disclosed in a bank's notes to the financial statements. Over time, HA_Quant_{it} indicates a steep increase in the general level of reported hedge accounting information (not graphed). These various descriptive analyses draw a rich picture on what financial information related to hedge accounting European banks report under IAS 39.

Results related to our first hypothesis on the expected decreasing effect of hedge accounting on information asymmetry are summarized in Table 4.

[Table 4]

In Panel A of Table 4, we compare different subsamples of banks with/without the application of derivatives, with/without the application of hedging, and with/without the application of hedge accounting. Our subsamples are constructed as follows: banks applying *derivatives* are coded 1 in case we get non-zero values for the Capital IQ derivatives variables (excluding derivative trading assets), banks applying *hedging* are coded 1 in case we get non-zero values

for the Capital IQ hedging activity variable, and banks applying *hedge accounting* are coded 1 if they are part of our sample with hand-collected information on hedge accounting.[15] Consistent with our expectations we find banks applying hedge accounting to have the lowest mean earnings volatility ($\bar{\sigma}^{HA}_{earnings}$=0.0025877) compared to other banks using hedging and/or derivatives: $\bar{\sigma}^{deriv}_{earnings} > \bar{\sigma}^{hedg}_{earnings} > \bar{\sigma}^{HA}_{earnings}$. This result is consistent with the notion that banks use hedge accounting primarily to smooth income. The finding is further in line with Lins *et al.* (2011) regarding the importance of hedge accounting to reduce earnings volatility.

In Panel B of Table 4, we address our first hypothesis on information asymmetry. We find support for the expected positive correlation of earnings volatility and bid-ask-spreads ($\rho\left(\sigma_{earnings_{it}}, px_{bid-ask-spread_{it}}\right)$ = 0.0786), particularly for high-quantity (ρ = 0.0.1735**) and high-quality (ρ = 0.2377**) hedge accounting appliers. In line with our prediction, an increase in hedge accounting application and quality seems to reduce information asymmetry through its informational effect supporting the findings of Panaretou *et al.* (2013). We therefore reject the null of H1 and conclude that hedge accounting might contain an underlying informational effect.

Table 5 displays descriptive statistics of the variables related to H2 (non-deflated).

[Table 5]

We observe a high standard deviation across all variables. The smallest sample size is 190 observations (for notional values) compared to the full sample of 320 observations. Minimum earnings are negative with around EUR (10,232) million, as is the cash flow hedge reserve with around EUR (1,805) million. The capital ratio varies between 8.5% and 25.6% with a mean of 14.32%. The maximum value of negative fair values are much larger compared to the maximum value of positive fair values of hedge accounting (around 70%). In Table 6, we display the correlation matrix providing Spearman and Pearson correlations (deflated values).

[15] We acknowledge that our subsamples might be prone to a selection bias and are highly dependent on the data input of Capital IQ. However, it is a first approach given the limited data availability in this area.

[Table 6]

HA_Quant_{it} and HA_Qual_{it} are positively correlated ($\rho_{Spearman}$= 0.2931, $\rho_{Pearson}$ = 0.3443). However, some differences still appear to remain regarding the application of hedge accounting of high-quantity and/or high-quality banks. The negative correlation of $SIZE_{it}$and BV_{it} and/or MV_{it+3m} may be due to our variables construction and deflation. Non-performing assets and negative fair values are positively correlated ($\rho_{Spearman}$= 0.4849, $\rho_{Pearson}$ = 0.3292) speaking to the negative market environments during the sample period. In general, the descriptive statistics and correlations are largely in line with our expectations.

6. Results and Robustness

We estimate equation (1) related to "other information" and equation (2) related to "earnings and book value" adjustments each for the global financial crisis and the Euro crisis, resulting in four main tables of results: Table 7 (Table 8) presents the market value regressions of equation (1) related to "other information" components and the global financial crisis (Euro crisis), Table 9 (Table 10) presents the market value regressions of equation (2) related to "earnings and book value" components and the global financial crisis (Euro crisis).

Across all models, the adjusted R^2 is around 70% to 75% signaling that our models explain the major part of the market value of equity. E_{it} and BV_{it} or E_ad_{it} and BV_ad_{it}, respectively, are throughout positive and highly significant consistent with a large body of prior literature (e.g., Wang *et al.* (2005)).

Related to the analysis of other information components during the global financial crisis in Table 7, we find mostly supportive estimates regarding our second hypothesis that *hedge accounting information is associated with current market values of equity* as well as strong support for our third hypothesis that *the associations with current market values of equity are larger during times of crises*.

[Table 7]

In model (1) we test the value relevance of HA_Qual_{it}. We find a significant positive association of hedge accounting quality with the market value of equity (0.0113, p-value<0.01), which is even stronger during the global financial crisis (0.0253, p-value<0.05). As tested in model (2), we find similar results for our hedge accounting quantity proxy $HA_{Quant_{it}}$ (0.0416 and 0.0443 for the crisis interaction term, p-value<0.01). Both variables indicate that market participants positively value high-quantity and high-quality reported hedge accounting information (H2). This effect is even more pronounced during times of crises (H3).

In model (3) we go straight to specific hedge accounting information and analyze the association of market values with fair values (positive FV_P_{it} and negative FV_N_{it} ones) and notional values NV_{it} of hedge accounting. Regarding H2, we do not find a significant influence of hedge accounting fair values on the market value of equity over the whole sample. However, we find significant coefficients for the global financial crisis years consistent with H3. In line with our expectations, during crisis years positive fair values are positively valued (5.671, p-value<0.01) while negative fair values (-2.378, p-value<0.01) and notional values (-0.0768, p-value<0.01) appear to be negatively valued by market participants. Note that for notional values NV_{it}, the association with market value of equity is negative and significant also during stable years (-0.0173, p-value<0.01). With this strong result on notional values we find support for Wang *et al.* (2005) and the relevance of notional values. Venkatachalam (1996) also documents a negative association between notional values of derivatives and bank equity values for the US market under SFAS 119. Results related to the analysis of other information components during the Euro crisis are presented in Table 8.

[Table 8]

We find HA_Qual_{it}, HA_Quant_{it} to be positively, and NV_{it} to be negatively associated with market values, both in line with our expectations. However, we do not find significant estimates for the incremental effect of these variables during the Euro crisis as opposed to the significant results for the global financial crisis. Negative fair values are negatively and incrementally

valued during the Euro crisis, but valued positively for the whole sample period. This indicates that there might be an underlying pattern in our data due to our sample period including both crises periods. The results in Table 7 and Table 8 suggest that hedge accounting quality and hedge accounting quantity are incrementally valued during the global financial crisis, but to a lesser extent during the Euro crisis.

Our results for earnings and book value components related to hedge accounting are presented in Table 9.

[Table 9]

We find neither significant results for the cash flow hedge reserve $CFHR\_N_{it}$ nor for hedge accounting net income HA_NI_{it}, and further neither for the whole sample nor for the incremental effect with the global financial crisis. Campbell *et al.* (2015) suggest that analysts do not correctly incorporate unrealized cash flow hedging gains and losses into their earnings forecasts. To the extent that the market is mainly influenced by investors who base their decisions on analysts' forecasts, our findings are in line with Campbell *et al.* (2015). Contrary to our analysis for the global financial crisis, the results for the earnings and book value components related to hedge accounting are stronger for the Euro crisis (Table 10).

[Table 10]

We find a significantly negative association of $CFHR\_N_{it}$ and market value of equity for the whole sample and a significantly positive incremental effect during the period of the Euro crisis. This result may be explained by the highly positive values of $CFHR\_N_{it}$ in 2011 and 2012 before its negative development in 2013 (see Figure 2). A positive $CFHR\_N_{it}$ seems to be positively valued during times of the Euro crisis. In summary, results related to "earnings and book value" components appear slightly weaker than the variables on hedge accounting quality and hedge accounting quantity regarding their associations with market values of equity. We further detect different dynamics depending on the specific crisis period.

Across all models our control variables remain consistent. Our bank size control $SIZE_{it}$ is significantly negative. This result follows our prediction that larger bank size comes with higher sensitivity to market conditions. The capitalization structure CAP_{it} is significantly positive across all models in line with our expectations. As CAP_{it} is the combined Tier I and Tier II capital ratio, the coefficient additionally comprises the influence of regulation on the market value of equity. The association of the fair value option FVO_{it} is negative and highly significant, indicating that both, hedge accounting and the fair value option appear to influence the market value of equity but in opposing directions. This result points towards an underlying pattern between hedge accounting and the fair value option. Our findings are opposed to Fiechter (2011) who finds the fair value option to be more effective compared to hedge accounting.

In summary, we find support for our third research question about the association between reported financial information related to hedge accounting under IAS 39 and the market value of equity. The positive association of high-quality and high-quantity hedge accounting reporting supports Hughen (2010) who finds for the banking industry a majority of banks to be accounting rather than economic hedgers. Information related to hedge accounting which is reported beyond the financial statements (i.e., "other information" components) appears to be more strongly valued by the market compared to "earnings and book value" components. During years of financial instability, the positive valuation of high-quality and high-quantity hedge accounting reporting is even stronger as additional information on the risk management strategy may become particularly useful for investors and analysts to reduce information asymmetry.

We test the robustness of our results with various test specifications. Testing the validity of the econometric model, we use clustered standard errors following Petersen (2008) instead of robust standard errors allowing for intragroup correlation, i.e., observations are independent across groups (clusters) but not necessarily within groups. We group by the GVKEY identifier of the individual banks. Our results remain robust with lower but still significant t-statistics in

some models. We further use a random effects estimator for our panel regression using both robust and clustered standard error specifications. We identify the random effects model to be appropriate using the Hausman test (Wooldridge 2010). $HA\_Qual_{it}, HA\_Quant_{it}, NV_{it}$ remain significant across all models. We further test the square and cube values ($SIZE\_sq_{it}, SIZE\_cube_{it}$) of $SIZE_{it}$ in one model to detect a potential bias in the results due to non-linearity in bank size (Jin *et al.* 2013). The nonlinearity estimates suggest that we do not suffer from a nonlinearity size bias in this setting. Additionally, we estimate all models without a constant to address potential multicollinearity issues with the year dummies. The estimates remain stable and the results hold, but adjusted R^2 is even higher compared to the base case regressions including the constant.

Testing the validity of the economic model, we conduct subsample regressions per hedge accounting type to elaborate more on the differences across the three types. With our descriptive statistics being dominated by fair value hedges, we find comparable results across various association studies estimated per hedge accounting type. Fair value hedges seem to be the type most strongly valued by market participants. Further, as the incremental effect with the global financial crisis and the Euro crisis is crucial to our setting, we alter the crisis dummies and enlarge (shorten) the period of the global financial crisis (Euro crisis) comprised by the dummy. Altering the dummies leads to no significant incremental crises effects which supports our rational of the importance of hedge accounting information particularly in times of uncertainty and financial instability. Additionally, we control for the short-term lending rate calculated by the 3month EURIBOR annual average in percent. We follow the findings of Delis and Kouretas (2011), Agoraki *et al.* (2009), and Fiordelisi *et al.* (2011) supporting a positive relation between bank risk-taking and short-term lending rates. Based on the general positive relation between risk and return, we cautiously expect a positive association to the market value of equity. We find support of our prediction and our main results remain stable, however, we experience a high variance inflation factor for EURIBOR. Finally, we alter HA_Quant_{it} as it is at the core

of our analyses and refine the variable by controlling for the economic information underlying the hedging activity which hedge accounting reports about. To differentiate between the proportions of reported economic hedging activity and hedge accounting activity, we regress HA_Quant_{it} on determinants of hedging, and use the residuals as the estimated hedge accounting quantity for our association models.[16] As banks may decide not to report information due to economic or accounting hedging reasons, the original HA_Quant_{it} may include potentially hidden signaling effects. This endogeneity could occur as economic and accounting hedging information are represented in HA_Quant_{it} which can be interpreted as a measure of both, hedging affinity and disclosure quality. The refined quantity instead represents the reported information related to accounting hedgers. Our results remain stable estimating equation (1) and (2) for both crises with the refined HA_Quant_{it}.

7. Conclusion

In this study, we analyze reported financial information regarding hedge accounting and how this may improve the information environment. Using a sample of banks of the STOXX Europe 600 Banks index from 2005 to 2014, we first provide rich descriptive statistics to understand the underlying data and second provide empirical evidence for 1) decreased information asymmetry and 2) a significant association of different hedge accounting information with market value of equity. The sample period further allows us to address crisis effects related to the reported information of hedge accounting, particularly analyzing both the global financial crisis (2008, 2009) and the Euro crisis (2011, 2012, 2013).

In our descriptive analyses, we find hedge accounting to be applied in different combinations by banks. Fair value hedges dominate the other two types of hedge accounting concerning both application and volumes. Of our sample, about 40% apply hedge accounting but do not clearly state the application with specific figures consistent with cross-sectional variance related to the

[16] Specified hedging determinants variables, the applied panel data model, an alternative dynamic panel data model, model specifications, as well as estimation results using the refined HA_Quant_{it} are available upon request.

quality of hedge accounting information. With regards to the quantity of hedge accounting information, we observe a steep increase in the general level of reported hedge accounting information over time.

Our main analysis on the mechanism behind the income smoothing through hedging activities suggests, that banks applying hedge accounting have lower earnings volatility compared to banks not applying hedge accounting. Further, we find lower information asymmetry to come with high-quantity and/or high-quality hedge accounting reporting in line with the expected informational effect of hedge accounting. Finally, our association studies on hedge accounting information and market values are based on an Ohlson-type regression model. Results reveal that hedge accounting quantity and quality is positively valued, even more during the global financial crisis but not during the Euro crisis. Further, such "other information" components are incrementally valued during the global financial crisis and partly during the Euro crisis. Concerning "earnings and book value" components, we only find the cash flow hedge reserve as book value component to be incrementally valued during the Euro crisis.

In summary, to the best of our knowledge this study is the first one analyzing hedge accounting information provided by European banks in great depth. Our results show that hedge accounting improves the information environment observable in decreased information asymmetry and additional explanatory power of hedge accounting information for market values, particularly during times of financial instability. The reduced earnings volatility thereby can be considered as a mechanism to explain these economic consequences.

Our results are important to analysts, investors and banks as well as to standard setters regarding IFRS 9. After 2018 and the effectiveness date of IFRS 9, our study on hedge accounting under IAS 39 is still relevant as the principles concerning "Ineffectiveness" and "Accounting" will just marginally change from IAS 39 to IFRS 9. As our results are specifically derived for the European banking industry they are therefore limited to be interpreted for other industries.

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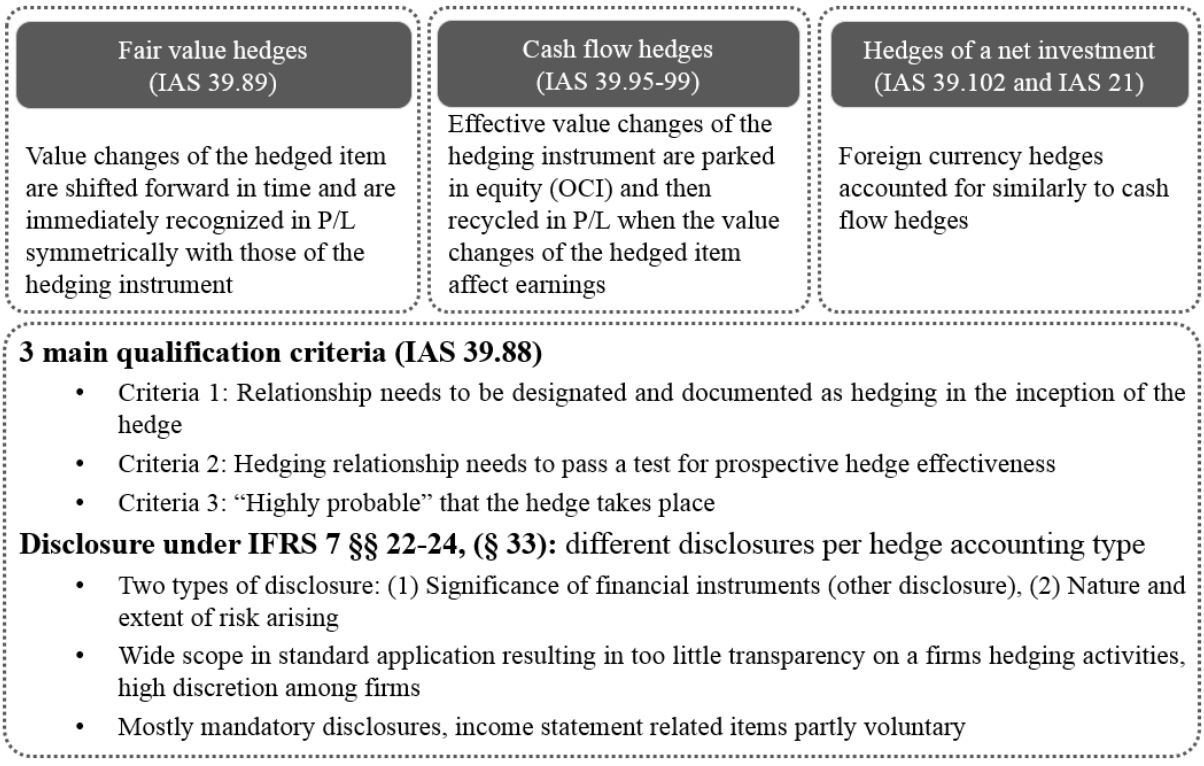
Table 1: IAS 39 vs. IFRS 9

	IAS 39	IFRS 9
Hedged Items	• Some restrictions; Designation non-financial items in its entirety for all risks or for foreign currency risks • No designation of derivatives	• Hedging of a risk component of financial and nonfinancial items • Designation of aggregated exposure that is a combination of derivative and non-derivative financial instrument is allowed
Hedging Instruments	• Some restrictions regarding allowed hedging instrument for a hedge relationship	• Easing of some restrictions; all financial instruments measured at fair value through profit or loss can be designated
Effectiveness Testing	• Two stage procedure: prospective and retrospective effectiveness testing • Effectiveness range: 80% - 125% • De-designation if out of effectiveness range	• Solely prospective effectiveness testing • Omission of quantitative limits • Rebalancing if hedge relationship ceases to meet hedge effectiveness relating hedge ratio

Note: This table gives an overview of some relevant changes from IAS 39 to IFRS 9 concerning hedge accounting, specifically on the hedged items, the hedging instruments and the effectiveness testing.

Figure 1: Institutional setting



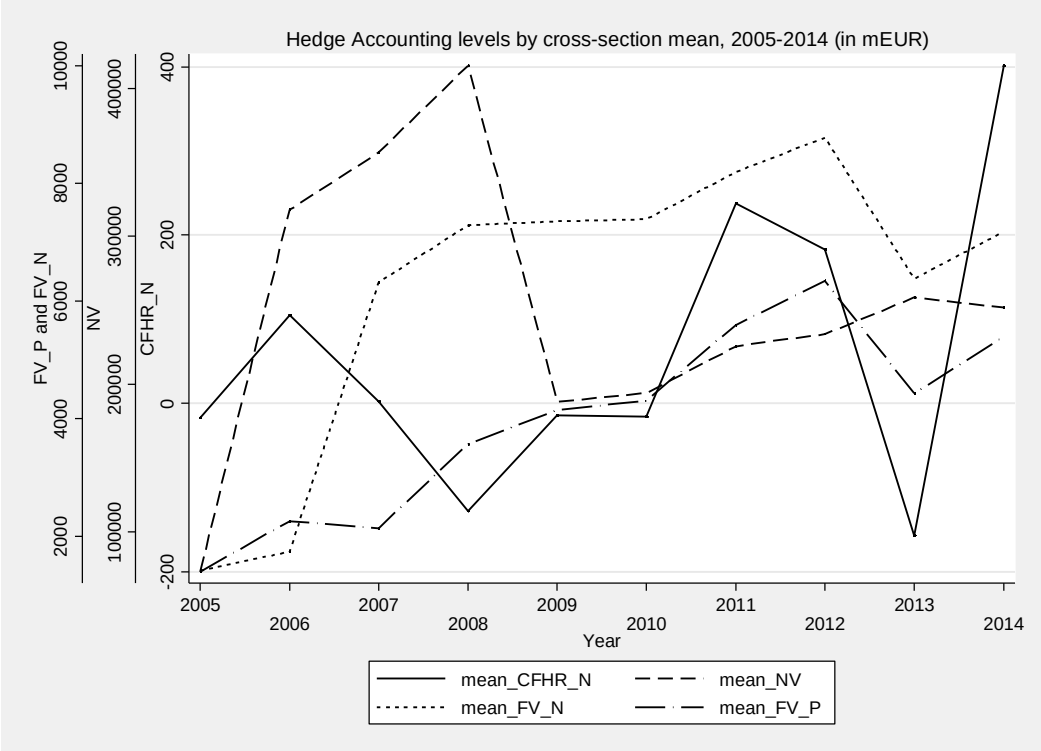
Note: This figure shows the accounting rules of the three hedge accounting types and the corresponding disclosure. Further, all instruments need to qualify three criteria to enable hedge accounting application under IAS 39.

Table 2: Amendments to IAS 39, 2005 – 2014

	Effective standard (Date of included changes)	Amendments to IAS 39 concerning hedge accounting
2005	**1 Jan 05:** IAS 39 (04)	
2006		
2007		
2008		**May 08:** Annual improvements to IFRSs **Jul 08:** Amendment to IAS 39 for eligible hedged items
2009	**1 Jan 09:** IAS 39 (May 08) **1 Jul 09:** IAS 39 (Jul 08, Mar 09)	**Mar 09:** Amendment to IAS 39 for embedded derivatives on reclassifications of financial assets **Apr 09:** Annual improvements to IFRSs
2010	**1 Jan 10:** IAS 39 (Apr 09)	
2011		
2012		
2013		**Jun 13:** Amended by novation of derivatives and continuation of hedge accounting
2014	**1 Jan 14:** IAS 39 (Jun 13)	

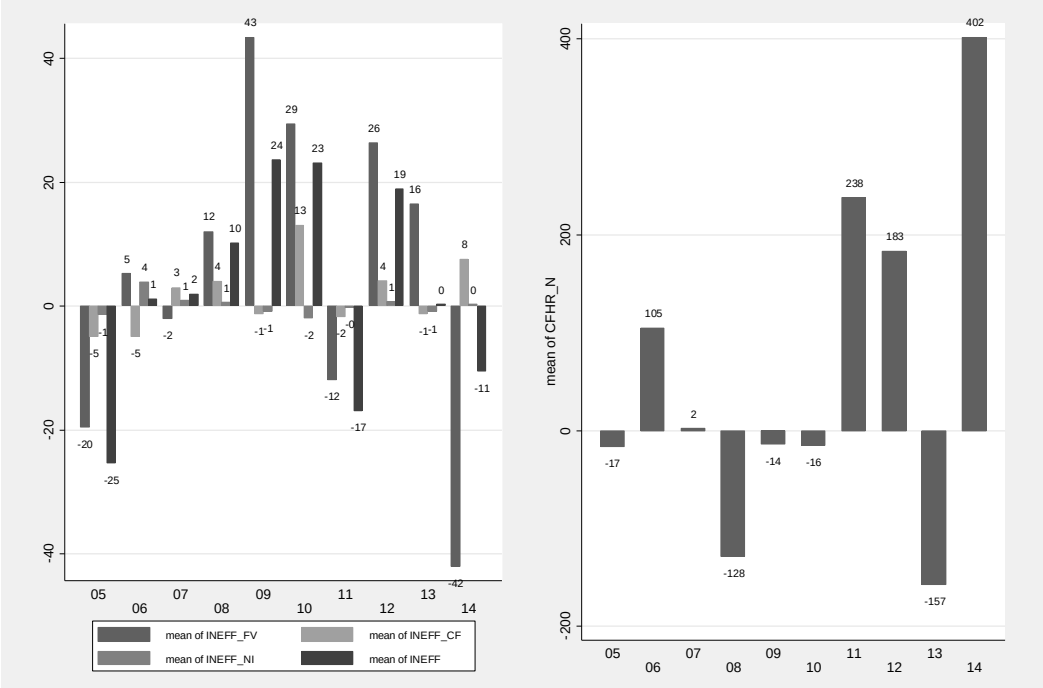
Note: This table shows all amendments to IAS 39 from 2005 to 2014 which are related to hedge accounting.

Figure 2: Hedge accounting levels of NV_{it}, $CFHR\_N_{it}$, FV_N_{it}, FV_P_{it} by cross-section



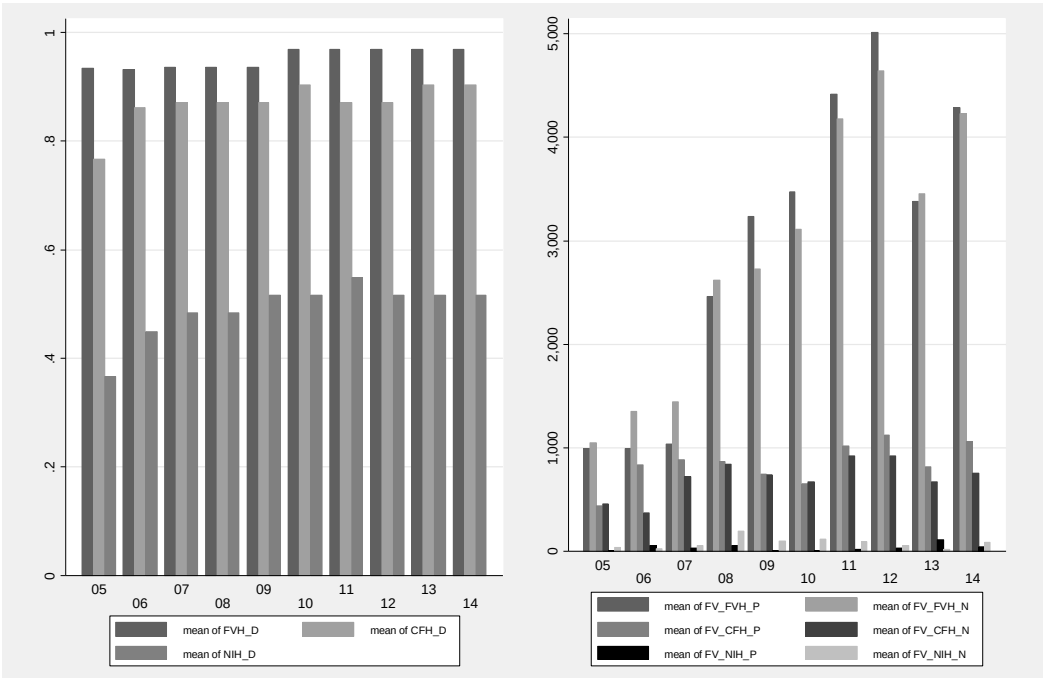
Note: This plot shows the development of the cross-section mean values of NV_{it}, $CFHR\_N_{it}$, FV_N_{it}, FV_P_{it} from 2005 to 2014.

Figure 3: Frequencies of cross-section means of hedge accounting ineffectiveness variables and the cash flow hedge reserve



Note: The left-hand panel shows the cross-section means of the hedge accounting ineffectiveness variables $INEFF\_FV_{it}$, $INEFF\_CF_{it}$, $INEFF\_NI_{it}$, and $INEFF_{it}$ from 2005 to 2014. The right-hand panel presents the cross-section mean of the cash flow hedge reserve $CFHR\_N_{it}$ from 2005 to 2014.

Figure 4: Frequencies of cross-section means of hedge accounting types and the corresponding fair values



Note: The left-hand panel shows the application of the hedge accounting types by the cross-section mean of the corresponding hedge accounting dummy for fair value hedges FVH_D_{it}, cash flow hedges CFH_D_{it}, and net investment hedges NIH_D_{it} from 2005 to 2014. The right-hand panel shows the cross-section means by year of the positive and negative fair values for each hedge accounting type cross-section mean.

Table 3: Summary Statistics of the components of hedge accounting quantity HA_Quant_{it}

	Variable	*count*	*mean*	*sd*	*sum*	*fraction*	*min*	*max*	*M/V*
Panel A. Application related variables									
1	HA_D_{it}	309	0.926	0.263	286	92.56	0	1	M, 21A-D
2	$HA\_D\_all_{it}$	307	0.847	0.361	260	84.14	0	1	M, 21A-D
3	HA_Qual_{it}	307	0.375	0.485	115	37.46	0	1	M, 21A-D
4	FVH_D_{it}	307	0.951	0.216	292	95.11	0	1	M, 21A-D
5	CFH_D_{it}	307	0.870	0.337	267	86.97	0	1	M, 21A-D
6	NIH_D_{it}	307	0.492	0.501	151	49.19	0	1	M, 21A-D
7	FVO_{it}	307	0.622	0.486	191	62.21	0	1	M
Panel B. Income Statement related variables									
8	$INEFF\_FV\_dummy_{it}$	307	0.212	0.410	68	22.15	0	1	M, 24C(a, i)
9	$INEFF\_CF\_dummy_{it}$	307	0.300	0.459	96	31.27	0	1	M, 24B(b, ii)
10	$INEFF\_NI\_dummy_{it}$	307	0.188	0.391	60	19.54	0	1	M, 24B(b, ii)
11	$INEFF\_dummy_{it}$	307	0.375	0.485	120	39.09	0	1	V
12	$I/E\_FVH\_dummy_{it}$*	307	0.512	0.501	164	53.42	0	1	V
13	$I/E\_CFH\_dummy_{it}$*	307	0.375	0.485	120	39.09	0	1	V
14	$I/E\_NIH\_dummy_{it}$*	307	0.344	0.476	110	35.83	0	1	V
15	TI/TE_dummy_{it}*	307	0.606	0.489	194	63.19	0	1	V
16	$HA\_NI\_dummy_{it}$	307	0.719	0.450	230	74.92	0	1	V
Panel C. Balance Sheet related variables									
17	$FV\_types\_dummy_{it}$*	307	0.794	0.405	254	82.74	0	1	M, 24A(a)
18	$FV\_all\_dummy_{it}$*	307	0.859	0.348	275	89.58	0	1	M, 24A(a)
Panel D. Equity related variables									
19	$CFHR\_N\_dummy_{it}$	307	0.784	0.412	251	81.76	0	1	M, 24B(b,ii/iii)
Panel E. Notional Values variables									
20	$NV\_types\_dummy_{it}$*	307	0.494	0.501	158	51.47	0	1	M, 24A(d)
21	$NV\_all\_dummy_{it}$	307	0.594	0.492	190	61.89	0	1	M, 24A(d)
Panel F. Hedge Accounting Quantity									
=	HA_Quant_{it}	320	0.573	0.227	183	57.19	0	1	n/a
	N	**320**							

Note: This table shows the summary statistics for the items included in our hedge accounting quantity proxy HA_Quant_{it}. The panels are panel A for the general hedge accounting application, panel B for income statement related disclosures, panel C for balance sheet related disclosures concerning assets and liabilities, panel D for equity related disclosures, and panel E for disclosed notional values. The dummy variables in this table are based on the variables of the list in the appendix A1. We count 1 if the hedge accounting variables in levels are not empty, 0 otherwise. We summarize perfectly correlated level variables to one dummy which is marked with an asterisk. Therefore, $I/E\_FVH\_dummy_{it}$* comprises the information of I_FVH_{it} and E_FVH_{it}, $I/E\_CFH\_dummy_{it}$* comprises the information of I_CFH_{it} and E_CFH_{it}, $I/E\_NIH\_dummy_{it}$* comprises the information of I_NIH_{it} and E_NIH_{it}, TI/TE_dummy_{it}* comprises the information of TI_{it} and TE_{it}, $FV\_types\_dummy_{it}$* comprises the information of $FV\_FVH\_P_{it}$, $FV\_FVH\_N_{it}$, $FV\_CFH\_P_{it}$, $FV\_CFH\_N_{it}$, $FV\_NIH\_P_{it}$ and $FV\_NIH\_N_{it}$, $FV\_all\_dummy_{it}$* comprises the information of FV_P_{it} and FV_N_{it}, and $NV\_types\_dummy_{it}$* comprises the information of NV_FVH_{it}, NV_CFH_{it}, and NV_NIH_{it}.

For each item, we provide the number of non-empty variables, the mean and standard deviation, the cross-section mean sum of the variable indicating how often we count a disclosed value (absolute) and the fraction of it, i.e., the percentage of reported information compared to the total of the variable count (data coverage per dummy), the minimum and maximum value as well as whether the variable is mandatorily ("M") or voluntarily ("V") disclosed under IFRS 7 with the corresponding paragraphs.

Table 4: Hedge accounting and earnings volatility smoothing

Panel A. Smoothing earnings volatility

	Banks without …			Banks with …	
	$\bar{\sigma}_{earnings}$	N		$\bar{\sigma}_{earnings}$	N
… derivatives	0.0532663	68	>	0.0067546	645
… hedging	0.0367653	120	>	0.0060151	593
… hedge accounting	0.0161881	451	>	0.0025877	262

➔ $\bar{\sigma}_{earnings}^{deriv} > \bar{\sigma}_{earnings}^{hedg} > \bar{\sigma}_{earnings}^{HA}$

Panel B. Decreasing information asymmetry

	$\rho(\sigma_{earnings_{it}}, px_{bid-ask-spread_{it}}) = 0.0786$		
(1) HA_Quant_{it}	Upper Median 0.1735**	>	Lower Median -0.0580
(2) HA_Qual_{it}	Upper Mean 0.2377**	>	Lower Mean -0.0889
(3) HA_Quant_{it} & HA_Qual_{it}	Upper Mean 0.2129*	>	Lower Mean -0.0342

Note: This table presents descriptive statistics related to hedge accounting earnings volatility and information asymmetry from 2005 to 2014.

Panel A depicts pairwise mean earnings volatility (five-year rolling window) comparisons for the full sample of banks (89 banks) per subsample of banks with/without the application of derivatives, with/without the application of hedging, and with/without the application of hedge accounting. *N* shows the number of observations per subsample comparison. We expect banks applying hedge accounting to have the lowest mean earnings volatility compared to other banks using hedging and/or derivatives.

Panel B presents a correlation analysis of bid ask spreads $px_{bid-ask-spread_{it}}$ and earnings volatility $\sigma_{earnings_{it}}$ for banks applying hedge accounting (32 banks). We correlate $px_{bid-ask-spread_{it}}$ and $\sigma_{earnings_{it}}$ over the whole panel as well as for different subsamples. We split the sample into an upper and lower part (1) along the median in case of the continuous variable HA_Quant_{it}, (2) along the mean in case of the dichotomous variable HA_Qual_{it}, and (3) along the joint upper half of HA_Quant_{it} and HA_Qual_{it} as calculated for each in (1) and (2). The correlation of earnings volatility and bid-ask-spreads is expected to be positive as lower $px_{bid-ask-spread_{it}}$ indicate lower information asymmetry and hedge accounting application comes with lower earnings volatility. With hedge accounting as one possibility to reduce information asymmetry, we particularly expect a positive correlation in the upper part subsamples indicating high-quantity and high-quality hedge accounting application to positively moderate the theoretical link between $px_{bid-ask-spread_{it}}$ and $\sigma_{earnings_{it}}$. Statistical significance is indicated by * if p < 0.10, ** if p < 0.05, *** if p < 0.01.

Table 5: Summary statistics of main regression variables, 2005 – 2014

variable	count	mean	std. dev.	min	max
MV_{it+3m}	320	29712.208	28225.629	1295.500	151599.453
E_{it}	309	1677.438	3236.857	-10232.000	11920.273
E_ad_{it}	221	1555.534	3006.181	-10226.758	12157.313
BV_{it}	309	26794.394	22901.465	998.739	91366.961
BV_ad_{it}	244	29217.073	24442.555	1002.533	90361.445
HA_Qual_{it}	307	0.375	0.485	0.000	1.000
HA_Quant_{it}	320	0.573	0.227	0.000	1.000
FV_P_{it}	275	4066.672	5477.467	0.000	33146.000
FV_N_{it}	275	6417.931	16929.169	0.000	114112.195
NV_{it}	190	246857.312	481766.750	0.000	3560620.000
HA_NI_{it}	320	-11.137	348.161	-1549.000	1475.000
$CFHR\_N_{it}$	320	54.014	542.578	-1805.774	2881.599
$crisis\_gfc_t$	320	0.200	0.401	0.000	1.000
$crisis\_euro_t$	320	0.300	0.459	0.000	1.000
$SIZE_{it}$	320	12.954	1.075	9.849	14.519
EXP_{it}	320	72770.687	77775.849	3.966	339820.000
CAP_{it}	189	14.318	3.520	8.500	25.600
FVO_{it}	307	0.622	0.486	0.000	1.000
NPA_{it}	263	16002.041	22958.294	0.000	86817.000
$total\_assets_{it}$	320	678228.517	591700.030	18943.735	2020349.000
N	**320**				

Note: We provide summary statistics for the variables presented in appendix A2 together with total assets for the years 2005 to 2014 for the 32 banks used in the regression analyses.

MV_{it+3m} is the market value of equity three month after fiscal year end of each bank, E_{it} is earnings at the end of the fiscal year, E_ad_{it} is earnings at the end of the fiscal year adjusted for HA_NI_{it}, BV_{it} is the book value of equity adjusted for E_{it}, BV_ad_{it} is the book value of equity adjusted for E_{it} and $CFHR\_N_{it}$. HA_Qual_{it} is 1 if a bank clearly states the application of hedge accounting together with the relevant tables, HA_Quant_{it} is the extent to which banks provide financial information related to hedge accounting in the notes of the consolidated financial statements with values between 0 and 1, FV_P_{it} is the sum of the positive fair values, FV_N_{it} is the sum of the negative fair values, NV_{it} is the sum of the notional values of hedge accounting, $HA_NI_{it}$is net income over all hedge accounting types, $CFHR\_N_{it}$ is the net cash flow hedge reserve, $crisis\_gfc_t$ is a dummy variable which equals 1 in the main years of the global financial crisis for the years 2008 and 2009, $crisis\_euro_t$ is a dummy variable which equals 1 in the main years of the Euro crisis for the years 2011, 2012 and 2013, $SIZE_{it}$ is bank size measured by the natural logarithm of total assets, EXP_{it} is a proxy for each bank's securities exposure calculated by the total of investment securities, CAP_{it} is the capitalization structure calculated as the combined risk-adjusted capital ratio of Tier I and Tier II, FVO_{it} is 1 if the fair value option is applied, and NPA_{it} is non-performing assets. $total\_assets_{it}$ is total assets per bank i and year t.

We use the unscaled values and provide the number of non-empty variables, the mean, the standard deviation and the minimum and maximum value.

Table 6: Correlation matrix

	MV_{it+3m}	E_{it}	BV_{it}	HA_Qual_{it}	HA_Quant_{it}	FV_P_{it}	FV_N_{it}	NV_{it}	HA_NI_{it}	$CFHR\_N_{it}$	$crisis\_gfc_t$	$crisis\_euro_t$	$SIZE_{it}$	EXP_{it}	CAP_{it}	FVO_{it}	NPA_{it}
MV_{it+3m}	**1**	**0.6823**	**0.3029**	**0.2978**	-0.0343	0.0327	**-0.3378**	-0.1378	-0.038	0.1065	0.0024	**-0.2594**	**-0.2627**	0.0004	**0.253**	-0.1678	**-0.2549**
E_{it}	**0.5784**	**1**	-0.1315	0.189	-0.0056	-0.0616	**-0.4277**	-0.1659	-0.0759	0.0645	0.0453	**-0.2749**	0.0221	-0.1949	0.0768	-0.1797	**-0.4459**
BV_{it}	**0.3781**	-0.12	**1**	0.0063	**-0.2161**	**0.2651**	**0.2864**	0.1137	-0.0283	-0.0287	-0.0954	0.0799	**-0.6329**	0.0538	0.0543	0.1283	**0.3527**
HA_Qual_{it}	**0.2569**	0.0009	-0.0403	**1**	**0.2931**	**-0.3271**	**-0.2044**	**-0.4304**	-0.0807	0.03	-0.1053	0.0502	0.0795	-0.0314	**0.2937**	**-0.1989**	-0.0091
HA_Quant_{it}	0.0818	0.0669	**-0.2168**	**0.3443**	**1**	-0.0809	-0.0269	0.0441	-0.1298	-0.1211	-0.0311	0.0293	0.1369	0.0772	0.1354	0.3445	-0.173
FV_P_{it}	0.0672	0.0658	**0.2765**	**-0.3376**	-0.0753	1	0.3735	0.5363	0.0393	-0.0752	0.0882	0.0613	**-0.2529**	0.107	-0.0043	0.0698	-0.108
FV_N_{it}	-0.05	**-0.2336**	**0.2427**	-0.1906	-0.0693	**0.4378**	**1**	**0.4456**	0.1558	-0.1854	0.1716	-0.0134	-0.0802	0.1511	**-0.2973**	-0.0536	**0.4849**
NV_{it}	-0.188	-0.0488	-0.033	**-0.3713**	0.0756	**0.4427**	**0.3287**	**1**	**0.2351**	-0.0872	0.1216	-0.0145	0.1017	-0.0524	-0.1173	0.0162	0.1668
HA_NI_{it}	0.0439	-0.037	0.1829	0.0375	-0.0581	0.1269	0.0251	0.1366	**1**	0.1879	-0.0382	0.0531	0.093	-0.1361	0.0012	-0.0349	0.1827
$CFHR\_N_{it}$	0.0495	-0.0001	-0.0471	-0.0429	-0.0482	-0.056	-0.0993	-0.092	0.0235	**1**	-0.1633	0.0193	0.1149	-0.189	0.1017	-0.0374	0.0083
$crisis\_gfc_t$	0.0597	0.1181	-0.0876	-0.1053	0.0347	0.1089	**0.214**	0.1711	**-0.235**	-0.1068	**1**	**-0.3707**	0.0524	-0.062	**-0.3463**	-0.0507	-0.1287
$crisis\_euro_t$	**-0.2908**	**-0.2427**	0.0427	0.0502	-0.0302	0.0139	-0.0743	-0.0183	0.1117	-0.0115	**-0.3707**	**1**	-0.0661	0.0179	0.1826	-0.0161	0.0689
$SIZE_{it}$	**-0.2872**	0.0562	**-0.6184**	0.0819	**0.2489**	**-0.2668**	-0.1153	0.1684	0.0269	0.1126	0.0545	-0.0855	**1**	-0.0726	-0.0511	-0.1459	-0.0173
EXP_{it}	-0.0263	-0.0569	0.0342	-0.0422	0.0284	0.1067	0.0399	-0.0809	-0.1581	-0.1926	-0.0798	0.0471	-0.1698	**1**	**0.2045**	0.0007	0.1642
CAP_{it}	**0.2821**	0.1209	0.0114	**0.2802**	0.1549	0.0224	**-0.2176**	-0.0599	0.1098	0.1617	**-0.3178**	0.0603	-0.0332	0.1277	**1**	0.1748	-0.091
FVO_{it}	-0.1031	-0.1379	0.1696	**-0.1989**	**0.2884**	0.0931	0.0443	-0.037	0.101	-0.0492	-0.0507	-0.0161	-0.1604	0.0597	0.1324	**1**	-0.104
NPA_{it}	**-0.2269**	**-0.6487**	**0.3226**	0.0825	-0.189	-0.163	**0.3292**	-0.0214	0.0799	0.0202	-0.1522	0.0916	-0.1646	0.0775	-0.0925	-0.0599	**1**

Note: The table shows Pearson's correlation coefficients (Spearman's rank correlations) below (above) the diagonal. Bold coefficients show a p-value of ≤ 0.05. MV_{it+3m} is the market value of equity three month after fiscal year end of each bank, E_{it} is earnings at the end of the fiscal year, BV_{it} is the book value of equity adjusted for E_{it}, all deflated by total assets. HA_Qual_{it} is 1 if a bank clearly states the application of hedge accounting together with the relevant tables, and HA_Quant_{it} is the extent to which banks provide financial information related to hedge accounting in the notes of the consolidated financial statements with values between 0 and 1. FV_P_{it} is the sum of the positive fair values, FV_N_{it} is the sum of the negative fair values, NV_{it} is the sum of the notional values of hedge accounting, $HA_NI_{it}$is net income over all hedge accounting types, $CFHR\_N_{it}$ is the net cash flow hedge reserve, all deflated by total assets. $crisis\_gfc_t$ is a dummy variable which equals 1 in the main years of the global financial crisis for the years 2008 and 2009, $crisis\_euro_t$ is a dummy variable which equals 1 in the main years of the Euro crisis for the years 2011, 2012 and 2013. $SIZE_{it}$ is bank size measured by the natural logarithm of total assets, EXP_{it} is a proxy for each bank's securities exposure calculated by the total of investment securities deflated by total assets, CAP_{it} is the capitalization structure calculated as the combined risk-adjusted capital ratio of Tier I and Tier II, FVO_{it} is 1 if the fair value option is applied, and NPA_{it} is non-performing assets deflated by total assets.

Table 7: Value regression, "other information" components, global financial crisis

	Predicted sign	(1) MV_{it+3m}	(2) MV_{it+3m}	(3) MV_{it+3m}
E_{it}	+	2.729***	2.478***	2.022***
		(0.000)	(0.000)	(0.000)
BV_{it}	+	0.711***	0.707***	0.757***
		(0.000)	(0.000)	(0.000)
HA_Qual_{it}	+	0.0113***		
		(0.001)		
HA_Quant_{it}	+		0.0416***	
			(0.000)	
FV_P_{it}	+			-0.303
				(0.463)
FV_N_{it}	-			0.673
				(0.154)
NV_{it}	?			-0.0173***
				(0.003)
$crisis\_gfc_t$	-	-0.0322**	-0.0593***	-0.0311
		(0.039)	(0.000)	(0.277)
$crisis\_gfc_t \times HA\_Qual_{it}$	+	0.0253**		
		(0.041)		
$crisis\_gfc_t \times HA\_Quant_{it}$	+		0.0443**	
			(0.037)	
$crisis\_gfc_t \times FV\_P_{it}$	+			5.671***
				(0.001)
$crisis\_gfc_t \times FV\_N_{it}$	-			-2.378***
				(0.004)
$crisis\_gfc_t \times NV_{it}$	?			-0.0768***
				(0.000)
$SIZE_{it}$	-	-0.00557***	-0.00637***	-0.00329*
		(0.001)	(0.000)	(0.088)
EXP_{it}	?	0.0101	-0.0236	-0.0373
		(0.653)	(0.255)	(0.207)
CAP_{it}	+	0.00142**	0.00194***	0.00286***
		(0.036)	(0.001)	(0.000)
FVO_{it}	?	-0.00860***	-0.0166***	-0.0162***
		(0.004)	(0.000)	(0.000)
NPA_{it}	-	0.0146	-0.00141	-0.0833
		(0.756)	(0.976)	(0.172)
Constant		0.104***	0.101***	0.0764**
		(0.001)	(0.001)	(0.038)
N		142	142	101
Adjust. R sq.		0.726	0.746	0.745
Estimation model		ols	ols	ols
Std. Error		robust	robust	robust
Year Dummies		included	included	included
Joint Significance		p-value < 0.01	p-value < 0.01	p-value < 0.01*

Note: This table presents estimation results of the equation (1) model $MV_{it+3m} = \beta_0 + \beta_1 E_{it} + \beta_2 BV_{it} + \theta' otherinfo + \delta' controls + \varepsilon_{it}$ with other information comprising HA_Qual_{it}, HA_Quant_{it}, FV_P_{it}, FV_N_{it}, and NV_{it} in component-wise iterations per estimated model (1) – (3). Each single component is tested in an interaction term with the global financial crisis dummy (2008, 2009) $crisis\_gfc_t$. We control for $SIZE_{it}$, EXP_{it}, CAP_{it}, FVO_{it}, and NPA_{it}. Variables are as defined in Appendix A2. All variables are winsorized at the 1st and 99th percentile. Variables in levels are deflated by total assets. P-values are reported in parentheses with statistical significance indicated by * if p < 0.10, ** if p < 0.05, *** if p < 0.01. Joint significance shows the test results on variables and their crisis interaction of being jointly different from 0. In model (3), the asterisk indicates joint significance for all components. Variance inflation factors are all below 10 (critical value) despite crisis and year dummies and the crisis interactions.

Table 8: Value regression, "other information" components, Euro crisis

	Predicted sign	(1) MV_{it+3m}	(2) MV_{it+3m}	(3) MV_{it+3m}
E_{it}	+	2.752***	2.486***	1.701***
		(0.000)	(0.000)	(0.000)
BV_{it}	+	0.697***	0.679***	0.704***
		(0.000)	(0.000)	(0.000)
HA_Qual_{it}	+	0.0175***		
		(0.001)		
HA_Quant_{it}	+		0.0563***	
			(0.000)	
FV_P_{it}	+			0.285
				(0.666)
FV_N_{it}	-			1.000**
				(0.032)
NV_{it}	?			-0.0217*
				(0.056)
$crisis\_euro_t$	-	-0.0389***	-0.0368**	-0.0309*
		(0.001)	(0.018)	(0.083)
$crisis\_euro_t \times HA\_Qual_{it}$	+	-0.00839		
		(0.171)		
$crisis\_euro_t \times HA\_Quant_{it}$	+		-0.0193	
			(0.124)	
$crisis\_euro_t \times FV\_P_{it}$	+			-0.643
				(0.366)
$crisis\_euro_t \times FV\_N_{it}$	-			-1.213**
				(0.034)
$crisis\_euro_t \times NV_{it}$	?			0.00381
				(0.767)
$SIZE_{it}$	-	-0.00579***	-0.00680***	-0.00289
		(0.001)	(0.000)	(0.107)
EXP_{it}	?	0.0103	-0.0259	-0.0376
		(0.644)	(0.204)	(0.192)
CAP_{it}	+	0.00147**	0.00186***	0.00277***
		(0.030)	(0.001)	(0.000)
FVO_{it}	?	-0.00890***	-0.0168***	-0.0167***
		(0.003)	(0.000)	(0.000)
NPA_{it}	-	0.0163	-0.000227	-0.0731
		(0.734)	(0.996)	(0.159)
Constant		0.105***	0.102***	0.0758**
		(0.001)	(0.001)	(0.031)
N		142	142	101
Adjust. R sq.		0.722	0.744	0.752
Estimation model		ols	ols	ols
Std. Error		robust	robust	robust
Year Dummies		included	included	included
Joint Significance		p-value < 0.05	p-value < 0.01	p-value < 0.01*

Note: This table presents estimation results of the equation (1) model $MV_{it+3m} = \beta_0 + \beta_1 E_{it} + \beta_2 BV_{it} + \theta' otherinfo + \delta' controls + \varepsilon_{it}$ with other information comprising HA_Qual_{it}, HA_Quant_{it}, FV_P_{it}, FV_N_{it}, and NV_{it} in component-wise iterations per estimated model (1) – (3). Each single component is tested in an interaction term with the Euro crisis dummy (2011, 2012, 2013) $crisis\_euro_t$. We control for $SIZE_{it}$, EXP_{it}, CAP_{it}, FVO_{it}, and NPA_{it}. Variables are as defined in Appendix A2. All variables are winsorized at the 1st and 99th percentile. Variables in levels are deflated by total assets. P-values are reported in parentheses with statistical significance indicated by * if p < 0.10, ** if p < 0.05, *** if p < 0.01. Joint significance shows the test results on variables and their crisis interaction of being jointly different from 0. In model (3), the asterisk indicates joint significance for NV_{it} at the 0.01 level, but not for the fair value components FV_P_{it} and FV_N_{it}. Variance inflation factors are all below 10 (critical value) despite crisis and year dummies and the crisis interactions.

Table 9: Value regression, "earnings and book value" components, global financial crisis

	Predicted sign	(1) MV_{it+3m}	(2) MV_{it+3m}	(3) MV_{it+3m}
E_{it}	+	2.694***		
		(0.000)		
BV_{it}	+		0.746***	
			(0.000)	
E_ad_{it}	+		2.284***	2.103***
			(0.000)	(0.000)
HA_NI_{it}	?		1.937	3.102
			(0.475)	(0.293)
BV_ad_{it}	+	0.630***		0.703***
		(0.000)		(0.000)
$CFHR\_N_{it}$	?	1.687		-1.212
		(0.399)		(0.560)
$crisis\_gfc_t$	-	-0.0534***	-0.0400***	-0.0479***
		(0.000)	(0.009)	(0.006)
$crisis\_gfc_t \times HA\_NI_{it}$	?		-0.281	0.209
			(0.953)	(0.970)
$crisis\_gfc_t \times CFHR\_N_{it}$	?	-7.758		-1.354
		(0.165)		(0.810)
$SIZE_{it}$	-	-0.00600***	-0.00430**	-0.00518***
		(0.001)	(0.021)	(0.008)
EXP_{it}	?	-0.00898	-0.0348	-0.0512*
		(0.723)	(0.192)	(0.062)
CAP_{it}	+	0.00241***	0.00253***	0.00287***
		(0.001)	(0.000)	(0.000)
FVO_{it}	?	-0.0109***	-0.0144***	-0.0181***
		(0.002)	(0.000)	(0.000)
NPA_{it}	-	0.0306	-0.00646	-0.0192
		(0.532)	(0.912)	(0.752)
Constant		0.127***	0.105***	0.123***
		(0.000)	(0.003)	(0.001)
N		130	117	108
Adjust. R sq.		0.703	0.726	0.728
Estimation model		ols	ols	ols
Std. Error		robust	robust	robust
Year Dummies		included	included	included
Joint Significance		p-value > 0.1	p-value > 0.1	p-value > 0.1*

Note: This table presents estimation results of the equation (2) model $MV_{it+3m} = \beta_0 + \beta_1 E\_ad_{it} + \beta_2 BV\_ad_{it} + \theta' adjustments + \delta' controls + \varepsilon_{it}$ with adjustments comprising the hedge accounting earnings component HA_NI_{it} and the hedge accounting book value component $CFHR\_N_{it}$ in component-wise iterations per estimated model (1) – (3). Each single component is tested in an interaction term with the global financial crisis dummy (2008, 2009) $crisis\_gfc_t$. We control for $SIZE_{it}$, EXP_{it}, CAP_{it}, FVO_{it}, and NPA_{it}. Variables are as defined in Appendix A2. All variables are winsorized at the 1st and 99th percentile. Variables in levels are deflated by total assets. P-values are reported in parentheses with statistical significance indicated by * if p < 0.10, ** if p < 0.05, *** if p < 0.01. Joint significance shows the test results on variables and their crisis interaction of being jointly different from 0. In model (3), the asterisk indicates that none of the components is jointly significant. Variance inflation factors are all below 10 (critical value) despite crisis and year dummies and the crisis interactions.

Table 10: Value regression, "earnings and book value" components, Euro crisis

	Predicted sign	(1) MV_{it+3m}	(2) MV_{it+3m}	(3) MV_{it+3m}
E_{it}	+	2.500***		
		(0.000)		
BV_{it}	+		0.747***	
			(0.000)	
E_ad_{it}	+		2.285***	1.955***
			(0.000)	(0.000)
HA_NI_{it}	?		1.487	4.028
			(0.628)	(0.274)
BV_ad_{it}	+	0.637***		0.704***
		(0.000)		(0.000)
$CFHR\_N_{it}$	?	-3.163*		-3.653**
		(0.060)		(0.031)
$crisis\_euro_t$	-	-0.0634***	-0.0627***	-0.0667***
		(0.000)	(0.000)	(0.000)
$crisis\_euro_t \times HA\_NI_{it}$	?		0.693	-1.253
			(0.861)	(0.779)
$crisis\_euro_t \times CFHR\_N_{it}$	?	7.316***		7.421**
		(0.005)		(0.049)
$SIZE_{it}$	-	-0.00618***	-0.00428**	-0.00535***
		(0.000)	(0.020)	(0.006)
EXP_{it}	?	-0.0230	-0.0350	-0.0586**
		(0.350)	(0.186)	(0.027)
CAP_{it}	+	0.00263***	0.00253***	0.00305***
		(0.000)	(0.000)	(0.000)
FVO_{it}	?	-0.0125***	-0.0144***	-0.0200***
		(0.000)	(0.000)	(0.000)
NPA_{it}	-	0.00550	-0.00664	-0.0327
		(0.911)	(0.910)	(0.598)
Constant		0.131***	0.105***	0.127***
		(0.000)	(0.003)	(0.001)
N		130	117	108
Adjust. R sq.		0.711	0.726	0.736
Estimation model		ols	ols	ols
Std. Error		robust	robust	robust
Year Dummies		included	included	included
Joint Significance		p-value < 0.05	p-value > 0.1	p-value > 0.1*

Note: This table presents estimation results of the equation (2) model $MV_{it+3m} = \beta_0 + \beta_1 E\_ad_{it} + \beta_2 BV\_ad_{it} + \theta' adjustments + \delta' controls + \varepsilon_{it}$ with adjustments comprising the hedge accounting earnings component HA_NI_{it} and the hedge accounting book value component $CFHR\_N_{it}$ in component-wise iterations per estimated model (1) – (3). Each single component is tested in an interaction term with the Euro crisis dummy (2011, 2012, 2013) $crisis\_euro_t$. We control for $SIZE_{it}$, EXP_{it}, CAP_{it}, FVO_{it}, and NPA_{it}. Variables are as defined in Appendix A2. All variables are winsorized at the 1st and 99th percentile. Variables in levels are deflated by total assets. P-values are reported in parentheses with statistical significance indicated by * if p < 0.10, ** if p < 0.05, *** if p < 0.01. Joint significance shows the test results on variables and their crisis interaction of being jointly different from 0. In model (3), the asterisk indicates that none of the components is jointly significant. Variance inflation factors are all below 10 (critical value) despite crisis and year dummies and the crisis interactions.

Appendix

A1: List of hedge accounting variables (set of disclosed items to measure HA_Quant_{it})

Variable	Explanation
HA_D_{it}	Dummy variable which equals 1 if hedge accounting application of bank i in time t is generally mentioned in the financial report, 0 otherwise
$HA\_D\_all_{it}$	Dummy variable which equals 1 if hedge accounting application of bank i in time t is clearly stated as generally applied in the financial report, 0 otherwise
HA_Qual_{it}	Dummy variable which equals 1 if hedge accounting application of bank i in time t is clearly stated in the corresponding relevant tables of the financial report, 0 otherwise
FVH_D_{it}	Dummy variable which equals 1 if fair value hedges under IAS 39 of bank i in time t are applied, 0 otherwise
CFH_D_{it}	Dummy variable which equals 1 if cash flow hedges under IAS 39 of bank i in time t are applied, 0 otherwise
NIH_D_{it}	Dummy variable which equals 1 if net investment hedges under IAS 39 of bank i in time t are applied, 0 otherwise
FVO_{it}	Dummy variable which equals 1 if the fair value option under IAS 39 of bank i in time t is applied, 0 otherwise
$INEFF\_FV\_dummy_{it}$	Dummy variable which equals 1 if ineffectiveness concerning fair value hedges of bank i in time t is disclosed, 0 otherwise
$INEFF\_CF\_dummy_{it}$	Dummy variable which equals 1 if ineffectiveness concerning cash flow hedges of bank i in time t is disclosed, 0 otherwise
$INEFF\_NI\_dummy_{it}$	Dummy variable which equals 1 if ineffectiveness concerning net investment hedges of bank i in time t is disclosed, 0 otherwise
$INEFF\_dummy_{it}$	Dummy variable which equals 1 if total ineffectiveness over all hedge accounting types of bank i in time t is disclosed, 0 otherwise
$I/E\_FVH\_dummy_{it}$*	Dummy variable which equals 1 if income/expenses of fair value hedges of bank i in time t (often based on item 90 A1 A2 A3 for income and item 90 B1 B2 B3 for expenses) is disclosed, 0 otherwise
$I/E\_CFH\_dummy_{it}$*	Dummy variable which equals 1 if income/expenses of cash flow hedges of bank i in time t (often based on item 90 A4 for income and item 90 B4 for expenses) is disclosed, 0 otherwise
$I/E\_NIH\_dummy_{it}$*	Dummy variable which equals 1 if income/expenses of net investment hedges of bank i in time t (often based on item 90 A5 for income and item 90 B5 for expenses) is disclosed, 0 otherwise
TI/TE_dummy_{it}*	Dummy variable which equals 1 if total income/total expenses over all hedge accounting types of bank i in time t is disclosed,0 otherwise
$HA\_NI\_dummy_{it}$	Dummy variable which equals 1 if net income over all hedge accounting types of bank i in time t (also gain/ loss or fair value adjustment in hedge accounting) is disclosed, 0 otherwise
$FV\_types\_dummy_{it}$*	Dummy variable which equals 1 if positive (often item 80) and negative (often item 60) fair values of fair value hedges, cash flow hedges, and net investment hedges of bank i in time t are disclosed, 0 otherwise
$FV\_all\_dummy_{it}$*	Dummy variable which equals 1 if the sum of the positive/negative fair values over all hedge accounting types of bank i in time t is disclosed, 0 otherwise
$CFHR\_N\_dummy_{it}$	Dummy variable which equals 1 if net cash flow hedge reserve of bank i in time t is disclosed, 0 otherwise
$NV\_types\_dummy_{it}$*	Dummy variable which equals 1 if the sum of positive and negative notional values of fair value hedges, cash flow hedges, and net investment hedges of bank i in time t (often item 80 plus 60) is disclosed, 0 otherwise
$NV\_all\_dummy_{it}$	Dummy variable which equals 1 if the sum of positive and negative notional values over all hedge accounting types of bank i in time t is disclosed, 0 otherwise

Note: This table presents variables descriptions of disclosed hedge accounting items to measure HA_Quant_{it}. The following variables marked with an asterisk comprise aggregated information on hand-collected hedge accounting variables in levels: $I/E\_FVH\_dummy_{it}$* comprises information of I_FVH_{it} and E_FVH_{it}, $I/E\_CFH\_dummy_{it}$* of I_CFH_{it} and E_CFH_{it}, $I/E\_NIH\_dummy_{it}$* of I_NIH_{it} and E_NIH_{it}, TI/TE_dummy_{it}* of TI_{it} and TE_{it}, $FV\_types\_dummy_{it}$* of $FV\_FVH\_P_{it}$, $FV\_FVH\_N_{it}$, $FV\_CFH\_P_{it}$, $FV\_CFH\_N_{it}$, $FV\_NIH\_P_{it}$ and $FV\_NIH\_N_{it}$, $FV\_all\_dummy_{it}$* of FV_P_{it} and FV_N_{it}, and $NV\_types\_dummy_{it}$* of NV_FVH_{it}, NV_CFH_{it}, and NV_NIH_{it}.

A2: List of variables used in the regression analyses

Variable	Description
MV_{it+3m}	Market value of equity three month after fiscal year end of bank i in time t with market value of equity calculated as adjusted closing stock price [prccd/ajexdi] times adjusted outstanding number of shares [(cshoc/1000000)*ajexdi], deflated by total assets
E_{it}	Earnings at fiscal year-end of bank i in time t with earnings calculated as consolidated net income (loss) [nicon], deflated by total assets
E_ad_{it}	Earnings at fiscal year-end adjusted for HA_NI_{it} of bank i in time t with earnings calculated as consolidated net income (loss) [nicon], deflated by total assets
BV_{it}	Book value of equity adjusted for E_{it} of bank i in time t with book value of equity calculated at common/ordinary total equity [ceq], deflated by total assets
BV_ad_{it}	Book value of equity adjusted for E_{it} and $CFHR\_N_{it}$ of bank i in time t with book value of equity calculated at common/ordinary total equity [ceq], deflated by total assets
HA_Qual_{it}	Hedge accounting quality which equals 1 if hedge accounting application is clearly stated in the corresponding relevant tables of the financial report, 0 otherwise of bank i in time t
HA_Quant_{it}	Hedge accounting quantity which is the extent to which banks provide financial information related to hedge accounting in the notes of the consolidated financial statements of bank i in time t with values between 0 and 1
FV_P_{it}	Sum of the positive fair values over all hedge accounting types of bank i in time t, deflated by total assets
FV_N_{it}	Sum of the negative fair values over all hedge accounting types of bank i in time t, deflated by total assets
NV_{it}	Sum of positive and negative notional values over all hedge accounting types of bank i in time t, deflated by total assets
HA_NI_{it}	Net income over all hedge accounting types of bank i in time t (also gain/ loss or fair value adjustment in hedge accounting)
$CFHR\_N_{it}$	Net cash flow hedge reserve of bank i in time t, deflated by total assets
$crisis\_gfc_t$	Dummy variable which equals 1 in the main years of the global financial crisis for the years 2008 and 2009, 0 otherwise in time t
$crisis\_euro_t$	Dummy variable which equals 1 in the main years of the Euro crisis for the years 2011, 2012 and 2013, 0 otherwise in time t
$SIZE_{it}$	Bank size of bank i in time t measured as the natural logarithm of total assets [at]
EXP_{it}	Proxy for securities exposure of bank i in time t calculated by the total of investment securities [ist], deflated by total assets
CAP_{it}	Capitalization structure of bank i in time t calculated as the combined risk-adjusted capital ratio of Tier I and Tier II [capr3]
FVO_{it}	Dummy variable which equals 1 if the fair value option under IAS 39 is applied, 0 otherwise of bank i in time t
NPA_{it}	Proxy for bank risk of bank i in time t calculated as the total of non-performing assets [npat], deflated by total assets

Note: This table presents variables descriptions to the main regression variables. Compustat Global items/ data sources are presented in [brackets].