

Income Statement Effects of Derivative Fair Value Accounting: Evidence from Bank Holding Companies

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Abstract

SFAS 133 requires earnings recognition of most types of fair value based hedge ineffectiveness. This earnings recognition requirement was the focal point of controversy surrounding the adoption of SFAS 133. The debate also reflects the more general controversy over whether the recognition in earnings of a new value relevant but potentially volatile accounting item improves or dilutes earnings as a summary performance measure. Using a sample of bank holding companies, I find evidence that the newly recognized earnings component following the adoption of SFAS 133—the fair-value-based hedging performance measure, improves the value and risk relevance of accounting earnings. The findings of this study are relevant to the evaluation of SFAS 133 as well as the ongoing debate on the income statement treatment of net asset changes due to the application of fair value accounting.

1. Introduction

Prior to the adoption of Statement of Financial Accounting Standards No. 133 (Accounting for Derivative Instruments and Hedging Activities; hereafter, SFAS 133), most hedging derivatives were carried off balance sheet. Accordingly, changes in the market value of these derivatives were generally *not* reflected in the financial statements until the derivative contracts impacted cash flows at the time of their settlement. SFAS 133 has changed this accounting practice by requiring all derivative instruments to be recognized on the balance sheet. Per SFAS 133, unrealized gains/losses on hedging derivatives will impact earnings to the extent that the hedge is ineffective. This study investigates whether the incorporation of the fair value based hedging performance measure as required by SFAS 133 improves the value and risk relevance of accounting earnings.

Studying SFAS 133's income statement effects is important given that the earnings recognition requirement was the focal point of controversy surrounding the adoption of SFAS 133.¹ The significance attached to accounting earnings by various financial reporting constituents explains why there has been so much attention devoted to SFAS 133's earnings impact. While previous research (Ahmed et al., 2006) provides evidence on the value relevance of recognized derivative fair values on the balance sheet as standalone information, their findings cannot speak to the effect of the earnings recognition requirement under SFAS 133.² This study is the first that directly examines the highly debated question of whether SFAS 133 improves or worsens earnings' ability to summarize information on firm performance.

Earnings' role as the most sought-after performance measure results in earnings volatility being perceived as an important gauge for firm risk. In fact, a key motivation for the support for more fair value based income measures comes from the notion that earnings variability under fair value accounting provides better risk assessment (Ryan, 1997). However, previous empirical studies (Barth et al. 1995; Hodder et al. 2006) have found mixed results regarding the risk relevance of the volatility of fair-value-based income measures. These studies focus on the incremental volatility of a constructed aggregate fair value income measure that is derived by

¹ Singh (2004) reports that almost two thirds of the comment letters in response to the exposure draft list the standard's earnings impact as a major point of discussion.

² Barth et al. (2003) show that the recognition of a price-relevant accounting amount can decrease the value relevance of earnings if the signal-to-noise ratio of the new component is sufficiently lower than the signal-to-noise ratio of the previously recognized amount.

adding to GAAP earnings *all* fair value gains/losses available from required disclosures. As such, it is difficult to identify the source of the examined earnings variability or to determine whether the disclosed fair value gains/losses from different activities contribute uniformly to the results. Instead of focusing on a disclosure-based aggregate fair-value income measure, this study examines the risk relevance of the fair value based hedging performance measure that is required to be recognized into earnings under SFAS 133 where the source of the earnings variability can be attributed to firms' risk management activities.

Besides shedding light on a hitherto un-researched dimension of SFAS 133 as changes to the standard are being debated, this study can also help shed light on a larger controversy that has frequently arisen in the ongoing debate over fair value accounting. The controversy concerns whether fair value accounting treatment on the balance sheet should always extend to the income statement. Due to earnings' prominent role in the investment as well as contracting setting, this is more than a battle among accounting purists. For example, the recent SEC report on mark-to-market accounting highlights that current GAAP allows a substantial subset of assets measured at fair value on the balance sheet *not* to be marked-to-market through the income statement (changes in fair values flowing to OCI instead of to earnings) in face of the opponents' argument that fair-value-based gains/losses are transitory in nature and thus should be excluded from core earnings. In the aftermath of the global financial crisis, the income statement treatment of changes in financial instruments' fair values has received even greater attention.³ Despite the heightened attention this issue has received from accounting practitioners and regulators, empirical evidence of fair value accounting's income statement effects is much thinner than for balance sheet effects. The current study contributes to this under-researched area by providing evidence on the income statement effects of one of the most prominent fair value accounting standards to date.

Using a sample of bank holding companies, I find evidence inconsistent with the widely held notion that the fair-value-based hedging performance measure represents a form of 'transitory' income. Most interestingly, the fair-value-based hedging performance measure recognized into

³ As an example, in spring 2009, the FASB issued FASB Staff Position Papers regarding issues related to the other-than-temporary impairment model for debt and equity securities in response to pressure from finance industries and regulatory bodies. One of the most significant changes provided by the position papers is to require the recognition of only credit losses through earnings while allowing the remaining portion of fair value losses to be recorded in other comprehensive income (OCI). This move was strongly backed by major interest groups representing financial industries, including the American Bankers Association and the International Swaps and Derivatives Association.

earnings under SFAS 133 is shown to be persistent with a positive autocorrelation while the fair values of hedging derivatives are mean reverting with changes in these fair values exhibiting a negative autocorrelation. I also find that the reported earnings measure in the post-SFAS 133 period outperforms a constructed income measure excluding the impact of hedging derivatives in terms of the ability to explain concurrent stock returns. Moreover, I find that the fair value based hedging performance measure has incremental explanatory power over stock returns with hedging losses being given a higher weight than hedging gains. On the risk dimension, I document a positive association between the volatility of the earnings component attributed to SFAS 133 and a measure of firm-specific risk (idiosyncratic stock return volatility). Taken together, the results from this study suggest that the recognition of the fair value based hedging performance measure under SFAS 133 improves the value and risk relevance of accounting earnings.

This study differs from previous research on fair value income measures (e.g. Barth et al. 1994; Hann et al. 2007; Hodder et al. 2006) by focusing on the fair valued earnings component produced by an actual accounting standard instead of a researcher-constructed, disclosure-based income measure. In particular, the fair-value-based earnings component attributed to SFAS 133 is intended to capture, albeit imperfectly, a meaningful aspect of underlying firm performance (i.e. hedging performance) that is likely to be persistent. The findings from this study suggest that SFAS 133 has been at least partially successful in achieving this intention. At the same time, fair values of hedging derivatives are shown to be mean reverting with the changes in these fair values exhibiting a negative autocorrelation. This means that a study based on a fair value income measure constructed from available disclosures of derivative fair values would yield findings that point to the opposite direction. Therefore, SFAS 133 exemplifies a setting where the transitory nature of changes in fair values does not apply to the actual earnings component introduced into earnings by the fair value accounting standard.

The rest of the paper is organized as follows. The next section reviews institutional background and previous literature on derivative accounting. Section 3 develops testable hypotheses. Section 4 describes the data. Section 5 presents the results of the empirical tests. Section 6 concludes.

2. Institutional Background and Related Research

2.1. Accounting for derivatives before SFAS 133

The primary authoritative literature of derivative accounting prior to SFAS 133 consisted of SFAS 52, *Foreign Currency Translation*, and SFAS 80, *Accounting for Futures Contracts*. By definition, these standards only cover a limited set of hedging instruments; consequently, a large number of derivative instruments (most notably, swaps and options) are not covered by any formal accounting standard. In practice, accounting treatment of these derivative instruments was determined by analogies to SFAS 52 and SFAS 80 and related consensus positions of the FASB's Emerging Issues Task Force (EITF). For example, EITF Issue No. 84-36 introduced the notion of 'synthetic alteration,' which developed into the standard way of accounting for interest swap contracts (Gastineau et al. 2001). Briefly, synthetic accounting bundles an interest swap hedging a floating-rate (fixed-rate) note with the hedged item and treats the combination as a fixed-rate (floating-rate) note. As a result, the swap contract itself is not recognized as an asset/liability on the balance sheet. Generally, gains/losses on a derivative instrument was mostly excluded from the income statement until net settlements hit cash flows in the pre-SFAS 133 regime, unless the instrument was held for trading or speculative purpose (i.e., no hedging relationship is designated/established for the instrument).

Disclosure requirements prior to SFAS 133 were governed by SFAS 119, *Disclosure of Information about Derivative Financial Instruments and Fair Value of Financial Instruments*, which amended two previous statements covering derivatives (SFAS 105, *Disclosure of Information about Financial Instruments with Off-Balance-Sheet Risk and Financial Instruments with Concentrations of Credit Risk*, and SFAS 107, *Disclosures about Fair Value of Financial Instruments*). SFAS 119 expanded the disclosure requirement under SFAS 105 and SFAS 107 by requiring firms to provide disaggregated information on notional amounts and fair values of derivatives instruments for each derivative category (interest rate, foreign currency, equity, commodity, and other), for derivatives held for trading purpose and non-trading purpose separately, and to clearly indicate whether the reported fair value of each derivative portfolio represents a net asset or a net liability position.

2.2. Accounting for derivatives under SFAS 133

SFAS 133 requires all derivatives, regardless of the underlying purpose of the derivative holdings, to be carried at fair value on the balance sheet as either an asset or a liability. However, derivatives held for trading purpose were already recognized at fair value on the balance sheet with any gains or losses (both realized and unrealized) included in earnings before the adoption of SFAS 133. As such, SFAS 133 mainly changes the accounting treatment of non-trading/hedging derivatives.⁴

The income statement effect of a derivative instrument depends on the underlying risk being hedged. SFAS 133 identifies three types of hedge based on the source of the underlying risk: fair value hedge, cash flow hedge, and foreign currency exposure hedge. A *fair value hedge* is a hedge of the exposure to changes in the fair value of recognized assets/liabilities or *off-balance-sheet* firm commitments. A *cash flow hedge* is a hedge of the exposure to potential variability in future cash flows associated with recognized assets/liabilities or *forecasted* transactions. A *foreign currency cash flow hedge* is for a foreign-currency-denominated forecasted transaction or a hedge of the foreign currency exposure of a net investment in a foreign operation.

If a derivative instrument does not qualify for any one of the aforementioned types of hedge, its fair value must be recognized on the balance sheet, and any change in the holding position will immediately flow to the income statement without any 'offsetting' effects allowed. By contrast, a derivative instrument that qualifies as a hedge can have preferential accounting treatment because the change in the fair value of the instrument is either recognized together with the offsetting gains/losses on the hedged item (fair value hedge) or allowed to be deferred to OCI (cash flow hedge). To qualify for the preferential accounting treatment, firms are required to designate the hedging instrument, the hedged item, and the specific risks being hedged at the inception of the hedge and to provide evidence confirming the effectiveness of the hedge on a continuous basis.

If the hedge is designated as a fair value hedge, the gains/losses on the derivative instrument, together with the offsetting gains/losses on the hedged items, must be immediately recognized in current earnings. In practice, this means that not only the change in the fair value of the derivative contract but also the change in the fair value of the hedged item will directly flow to

⁴ Following previous literature in the area (Ahmed et al., 2006; Venkatachalam, 1999), I use the terms 'non-trading derivatives' and 'hedging derivatives' interchangeably throughout this paper even though I recognize that they are not strictly overlapping.

earnings. As a result, a fair value hedge extends the fair value accounting treatment to the hedged item that is otherwise accounted for at historical value or carried off-balance sheet.⁵ For example, a fair value hedge of an off-balance-sheet firm commitment will result in the firm commitment being recognized at fair value on the balance sheet. By contrast, a cash flow hedge only requires the ineffective portion of the hedging gains/losses to be recognized in earnings and allows the effective portion to be deferred to OCI. The hedging gains/losses parked in OCI are proportionally ‘recycled’ back into earnings as an offset to the earnings effect of the hedged item when the hedged item impacts earnings.

2.3.Previous research on derivative accounting

The evolution of accounting standards covering derivatives has largely followed a path of transition towards expanded disclosure and more fair-value-based accounting treatment of derivative instruments. The rationale for such a transition is that more current and better presented information about derivative instruments will make financial statements more transparent and thus more useful to investors. In this section, I briefly review previous research that examines whether past accounting standards covering derivatives achieved this purpose.

Most studies in this category evaluate the accounting standard of interest by examining the valuation implications of the newly available information about derivative instruments. Specifically, these studies usually use a cross-sectional regression approach and examine whether the derivative information mandated by the standard of interest provides incremental explanatory power over equity prices or returns beyond traditional financial statements items. The derivative information is considered value-relevant and thus useful when the associated regression coefficient is statistically different from zero.

Using such an approach, Barth et al. (1996), Eccher et al. (1996), and Nelson (1996) examine the value relevance of fair value information of a variety of banks’ financial assets/liabilities (including derivatives) that is mandated to be disclosed under SFAS 107. All three studies found evidence that fair values of investment securities have explanatory power beyond book value. Barth et al. (1996) find fair values of loans to be consistently value-relevant, while Eccher et al.

⁵ SFAS 133 does *not* allow assets/liabilities that are already measured at fair value (e.g. trading securities) under otherwise applicable GAAP to be designated as the hedged item for a fair value hedge.

(1996) and Nelson (1996) find no reliable evidence of loans' value relevance. None of the studies finds the fair values of deposits and off-balance sheet instruments (including derivatives) to have incremental power in explaining equity values.

Attributing the insignificant results for off-balance sheet financial instruments in the above studies to the ambiguities in the derivative fair value disclosures under SFAS 107, Venkatachalam (1996) examines the value relevance of derivative fair value disclosures under SFAS 119 based on a sample of 99 bank holding companies. The findings suggest that the disclosed derivative fair values are positively associated with equity values and have incremental explanatory power beyond notional amounts of derivatives. By contrast, Ahmed et al. (2006) document that derivative fair values disclosed but not recognized under SFAS 119 are not value-relevant. Using the adoption of SFAS 133 as a setting to examine the differential valuation implications of recognized and disclosed assets/liabilities, Ahmed et al. (2006) find that fair values of recognized derivatives have incremental explanatory power over equity prices but that fair values of disclosed derivatives do not.

It is noteworthy that the studies discussed above focus on the value relevance of derivative fair value as standalone information, which is a different issue than whether incorporating derivative gains/losses into earnings will improve the ability of earnings to reflect underlying economic performance. As a summary measure of firm performance, accounting earnings is intended to capture information predictive of future performance rather than information that reflects the firm's current financial position but has no implications for future performance. Therefore, fair value change that represents a completely transitory income shock is expected to be value-relevant as standalone information because it reflects the firm's current financial position and should be reflected in the end-of-period equity price. However, incorporating this fair value change into core earnings will dilute the ability of earnings to reflect firm performance because it has no implications for future performance and thus should be reported separately from core earnings.

Barth et al. (2003) demonstrate this tension by illustrating how recognition affects the quality of the recognized accounting amount in a separate recognition regime versus an aggregate recognition regime, where quality is defined as the accounting amount's explanatory power of concurrent stock returns (R^2 from the regression of equity value on the accounting amount). In a separate recognition regime (i.e., the recognized amount in question refers to a financial

statement line item), recognition of a previously only disclosed value-relevant accounting amount always increases the quality of that accounting amount given the assumption that the information processing cost is lower for recognized information than for disclosed information. In an aggregate recognition regime (i.e., the recognized amount in question refers to a summary accounting measure such as earnings), however, recognition of a previously only disclosed value-relevant accounting amount can decrease the quality of the summary measure if the signal-to-noise ratio of the new component is sufficiently lower than the signal-to-noise ratio of the previously recognized amount. Given this tension, it is not surprising that the income statement effect of SFAS 133 was the focal point of controversy surrounding the adoption of SFAS 133.

Prior studies investigating the income statement effect of SFAS 133 (Park 2004; Singh, 2004) focus on observed earnings volatility and find no significant change in the standard deviation or coefficient of variation of quarterly earnings following the adoption of SFAS 133. However, comparing overall earnings volatility across the pre- and post-SFAS period is not a promising avenue to investigate SFAS 133's income statement effect because there is no reason to expect *ex ante* a significant change in *average* earnings volatility unless firms *on average* are highly ineffective in using derivatives to hedge risks.

As SFAS 133 only requires hedge ineffectiveness to be recognized in current earnings, observed earnings volatility will increase only if hedging derivative users *on average* experience earnings shocks from hedge ineffectiveness that are sufficiently significant to have a sizable impact on overall earnings volatility. This is unlikely given the evidence that firms on average effectively use derivatives to reduce risks (e.g., Guay 1999). Therefore, the income effect of SFAS 133 is unlikely to be borne out through a shift in *average* earnings volatility for derivative users.

In summary, while previous research provides a fair amount of evidence on the value-relevance of either disclosed or recognized derivative fair values as standalone information, no study has provided a direct answer to the highly debated question of whether the required recognition of hedge ineffectiveness under SFAS 133 improves or dilutes earnings as a performance summary measure. The present study fills this gap in the literature.

3. Hypothesis Development

3.1. Forecasting power of hedging performance

SFAS 133 requires hedge ineffectiveness (measured as the gains/losses on hedging derivatives, net of the hedge item's impact on earnings) to be recorded in net income in each period in which it occurs. By contrast, prior to the adoption of SFAS 133, hedging performance was mostly excluded from the income statement until net settlements hit cash flows. A lot of the opposition to the earnings' recognition requirement of SFAS 133 is based on the notion that the fair value based hedging performance measure represents 'transitory' earnings, one-time income shocks that have no implication to future outcomes. However, there has been no empirical evidence showing that the earnings component unique to SFAS 133 indeed has the properties associated with transitory income.

As formalized in Ohlson (1999), transitory earnings have three defining properties: unpredictability, forecasting irrelevance, and value irrelevance. First, unpredictability establishes that current transitory earnings have no predicative power over future transitory earnings (no serial correlation). Second, forecasting irrelevance indicates that transitory earnings are irrelevant in the forecasting of future total earnings. Finally, value irrelevance implies that transitory earnings play no informational role in equity valuation. Ohlson (1999) further demonstrates that any two of the three attributes imply the third while any one of the three attributes alone has no implications concerning the remaining two. Based on these properties, Ohlson (1999) makes the case that transitory earnings need to be eliminated, or at least separated, from core earnings.

Consistent with Ohlson (1999), testing whether hedging performance has forecasting power provides a starting point to evaluate the income statement effect of SFAS 133. Ohlson (1999) highlights how unpredictability and forecasting irrelevance of an earnings component translates into its value irrelevance. According to the model, incorporating a potential earnings line item into core earnings will dilute the ability of accounting earnings to reflect firm performance if and only if the earnings line item demonstrates neither autocorrelation nor predictive power over other earnings components. These propositions provide testable predictions to identify transitory earnings.

In the debate leading up to the adoption of SFAS 133, opponents argue that the fair-value-based hedging gains/losses represent a form of transitory income since in an efficient market current price move has no predictive power over future price move. Moreover, critics argue that

the hedging performance measure recognized under SFAS 133 can be misleading as the technical requirement to qualify for hedge accounting treatment is too stringent for some economically qualified hedges. As a result, SFAS 133 can force mark-to-market accounting treatment of only one-side of the hedging relation, for example, in the case of a sudden termination of hedge accounting treatment for a hedging pair that barely missed the hedge effectiveness threshold in one period. Critics of SFAS 133 argue that recognizing the gains/losses on the mismatch position can produce a hedging performance measure that by design tends to fluctuate and reverse.

At the same time, there are reasonable grounds to argue against this notion. While the market value of any given derivative instrument can be considered to follow a random walk or mean-reverting process, the hedging portfolio is not randomly assigned to each firm but is determined by the firm's risk management strategy and practice. To the extent that hedge ineffectiveness captures ineffective hedging policies or lack of risk management expertise, earnings under SFAS 133 will capture information that has implications for future performance but was ignored in the pre-SFAS 133 regime. While the 'one-sided' mark-to-market in the application of hedge accounting can be problematic, it is an empirical question whether the problem is so severe that the hedging performance measure recognized under SFAS 133 exhibits zero or negative autocorrelation.

In order to evaluate the opposing views on the forecasting power of hedging performance, I empirically test the following hypotheses (in null form):

H1a (unpredictability): The fair value based hedging performance measure has no serial correlation.

H1b (forecasting irrelevance): The fair value based hedging performance measure has no predictive power over next period's total earnings.

3.2. Pre-and-post comparison of earnings response coefficients

To follow up on the discussion over transitory earnings as demonstrated in Ohlson (1999), the attributes of the fair-value-based hedging performance measure have testable consequences that can be detected through the change in earnings response coefficients following the adoption

of SFAS 133. Specifically, SFAS 133's earnings recognition requirement would lead to lower (higher) earnings response coefficients if the fair-value-based hedging performance measure represents a form of transitory (non-transitory) income.⁶

According to the model discussed above, *ceteris paribus*, the adoption of SFAS 133 would lead to lower (higher) earnings response coefficients if the fair-value-based hedging performance measure contains primarily transitory (permanent) earnings. In order to isolate the effect of SFAS 133 from other unrelated factors, the empirical prediction focuses on the cross-sectional differences in the change in earnings response coefficients following the adoption of SFAS 133 across different level of hedging derivative exposure. Such prediction is based on the assumption that any impact of SFAS 133 on earnings should be more prominent for firms with higher level of hedging derivative exposure. This generates the following hypothesis (in null form):

H2: The change in earnings response coefficients following the adoption of SFAS 133 does not differ across levels of hedging derivative exposure.

3.3. Relative explanatory power of alternative income measures

One primary purpose of this study is to investigate how the ability of earnings to summarize firm performance is affected by the earnings recognition requirement under SFAS 133. According to the extant literature, the most direct way to examine this issue is to compare two alternative 'versions' of earnings, one including the fair-value-based hedging performance measure and the other excluding it, in terms the ability to explain concurrent stock returns. Initiated in Dechow (1994), this approach represents a significant departure from the emphasis on *unexpected* components of performance measures in capital market research (Kothari, 2001). Instead, the comparison focuses on performance measures in their *realized* form based on the argument that only realized summary performance measures are used for contracting purpose. Under this approach, concurrent stock returns serve as a proxy or benchmark for 'true' firm performance and the objective is to evaluate the relative superiority of alternative performance measures rather than to identify incremental price relevant information.

⁶ The rationale behind this prediction is also consistent with the consequences of transitory earnings as discussed in Kothari (2001) (p. 133-134).

As the focal point of controversy surrounding the adoption of SFAS 133 centers on the earnings recognition requirement rather than on disclosing hedging performance information to investors, evaluating earnings measures in their *realized* form is well suited for the purpose of this study. Along this line, the impact of the SFAS 133's earnings recognition requirement can be borne out through the relative explanatory power of two alternative earnings measures (one including the fair-value-based hedging performance measure and the other excluding it) over concurrent stock returns. This generates the following hypothesis (in null form):

H3: The two earnings measures (one including the fair value based hedging performance measure and the other excluding it) do not differ in terms of the ability to explain concurrent stock returns, regardless of the level of hedging derivative exposure.

3.4. Valuation coefficients of hedging gains and hedging losses

As discussed earlier, the earnings component unique to SFAS 133 represents a fair valued hedging performance measure. Previous research (Bleck and Liu, 2007) argues that the main advantage of fair value accounting in general lies in its ability to provide timely signals of impending financial distress and thus serve as an early warning mechanism. According to this view, historical cost accounting grants managers a free call option that allows them to hide losses to maximize compensation while fair value accounting removes such convex payoff feature.

This emphasis on ensuring the downside of performance to be apparent in financial statements seems particular relevant to the context of SFAS 133. In fact, the adoption of SFAS 133 is closely related to the 1994 derivative debacles, during which a number of entities suffered dramatic and highly publicized losses on derivative holdings designated as hedging derivatives. In the aftermath of these debacles, the outcry for more transparent reporting of derivative holdings provided the direct motivation for the FASB to expedite its efforts to reform derivative accounting that ultimately led up to the issuance of SFAS 133 in 1998. Given this background, it is not surprising that proponents of the standard tend to focus on the importance of ensuring that earnings timely reflects hedging losses when discussing the standard's earnings recognition requirement (e.g. Gastineau et al., 2001). However, there is no empirical evidence in place

indicating that hedging losses play a more prominent informational role than hedging gains. I examine this issue by testing the following hypothesis (in null form):

H4: There is no difference between valuation coefficients of hedging gains and hedging losses, regardless of the level of hedging derivative exposure.

3.5. Hedge ineffectiveness and idiosyncratic volatility

Due to accounting earnings' role as the most sought-after summary performance measure, the volatility of earnings is widely perceived as an important gauge for firm risk. In the context of fair value accounting, proponents of fair value based income measures often argue that earnings variability under fair value accounting provides better risk assessment (Ryan, 1997). However, empirical studies (Barth et al. 1995; Hodder et al. 2006) have found mixed results regarding the risk relevance of the volatility of fair-value-based income components.

Both Barth et al. (1995) and Hodder et al. (2006) use an aggregated approach and examine the risk relevance of the incremental volatility of a constructed fair value income measure that is derived by adding to GAAP earnings all fair value gains/losses available from required disclosures. The fair-value-based earnings components are considered to be risk relevant when higher incremental volatility of the hypothetical income measure is shown to attenuate valuation coefficients of earnings in a cross-sectional price-earnings regression. The underlying assumption is that all value-relevant risk factors are linearly aggregated into the cost of equity, which is essentially the reciprocal of the earnings multiple in the earnings-based valuation model. Therefore, the valuation coefficient of earnings is assumed to be negatively associated with value-relevant risk factors.

Clearly, existing literature on the risk relevance of fair value income measures almost exclusively focuses on systematic (diversifiable risk). While such an approach is consistent with the tenets of classic asset pricing theories⁷, there seems to be a disconnection between accounting research and practice about what would constitute 'relevant' risk factors. As Ryan (1997) notes, focusing on diversifiable risk may limit the implications of risk relevance research to important

⁷ It is worth noting that recent studies (Ang et al. 2006; Jiang et al. 2009) have documented a negative association between idiosyncratic risk and stock returns. Moreover, the findings from these studies suggest that this relation cannot be explained by classic asset pricing risk factors or known market anomalies.

financial statement stakeholders (e.g. SEC) who are most concerned about how particular classes of assets/ liabilities contribute to the firm's downside performance potential.

A focus on firm-specific risk is well suited for the context of SFAS 133. Most notably, hedging is a firm-specific activity. Due to the highly leveraged nature and the non-linearly payoff feature associated with derivative instruments, the fluctuation in hedging performance needs to be closely monitored. The application of hedge accounting under SFAS 133 requires hedge ineffectiveness to be immediately recognized in earnings. From a risk management perspective, the ideal case is for the firm to be able to consistently minimize hedge ineffectiveness over time. This would translate into close-to-zero volatility in the hedge ineffectiveness measure. By contrast, high volatility in the hedge ineffectiveness measure may signal potentially serious problems with risk management practice and potential large losses in the future, an uncertainty factor that can contribute to firm-specific risk that is associated with greater downside performance potential. To examine the risk relevance of the hedge ineffectiveness measure under SFAS 133, I test the following hypothesis (in null form):

H5: There is no correlation between the volatility of the hedge ineffectiveness measure and the firm's idiosyncratic risk, regardless of the level of hedging derivative exposure.

4.Data

4.1. Sample selection

The sample used in this study covers bank holding companies during the period from 1995 through 2005. I use data from bank holding companies for two reasons. First, financial industries are the most important users of derivatives; thus, derivative accounting should be of economic significance to bank holding companies. Second, bank holding companies are required by law to provide detailed information on derivative holdings in a uniform format through regulatory filing (FR-Y9C reports filed with the Federal Reserve Bank). This helps avoid sample selection bias and data discrepancy due to differential disclosure policies across firms. I restrict the sample period to after 1995 to ensure that derivative position data are available for the entire sample

period.⁸ The sample period stops at the end of 2005 because, beginning in 2006, the Federal Reserve Bank increased the asset-size threshold for filing the FR Y-9C report from \$150 million to \$500 million, which would result in an inconsistent sample base across the years if years after 2005 were included. Thus, my sample period spans 11 years: six years in the pre-SFAS 133 period (1995 to 2000) and five years in the post-SFAS 133 period (2001 to 2005).

Bank holding companies in my sample must meet the following criteria: (1) quarterly financial statement data are available through COMPUSTAT, (2) stock return data are available through CRSP, and (3) the bank holding company filed FR-Y9C reports with the Federal Reserve Bank during the sample period. This selection procedure yields a final sample of 434 unique bank holding companies. An important set of my analyses is based on the subsample of hedging derivatives users in the post-SFAS 133 period, which comprises 168 unique bank holding companies.

4.2. Descriptive statistics

Table 1 provides descriptive statistics for the sample used in this study. Panel A, B and C report descriptive statistics for the entire sample period (1995-2005), the pre SFAS 133 period (1995-2000), and the post SFAS 133 period (2001-2005) respectively. As reported in Table 1, the sample has a mean assets book value of \$12.64 billion and a median assets book value of \$1.05 billion. More than 95% of observations in my sample have a Tier 1 capital ratio above 6% and a total risk-based capital ratio above 10%, which are the threshold value to be considered well-capitalized under federal bank regulatory agency definitions.

Table 1 also reports descriptive statistics for derivatives used for risk management. Overall, 37.63% of the observations in the sample carry non-zero amount of hedging derivatives with a mean dollar value of \$3.67 billion in notional amount (Panel A). A Comparison across pre- and post-SFAS 133 periods shows a moderate increase in the use of hedging derivatives following the adoption of SFAS 133, both in terms of the number of users (the percentage of observations with non-zero hedging derivatives increases from 36.95% to 38.92%) and the level of exposure (the mean dollar value of hedging derivative notional amount increases from \$3.47 billion to

⁸ In the pre-SFAS 133 period, FR-Y9C reports filed after 1995 contain the notional amount and fair value of derivatives held for trading and non-trading purposes in compliance with SFAS 107 and 119.

\$3.86 billion). These figures suggest that the adoption of SFAS 133 is unlikely to have severely suppressed the use of hedging derivatives as some critics of the standard predicted.

4.3. Fair valued hedging performance measure

The purpose of this paper is to evaluate how the fair value accounting treatment of hedging derivatives as stipulated by SFAS 133 impacts the value and risk relevance of accounting earnings. As such, the fair valued hedging performance measure serves as a key metric in interpreting the income statement effects of SFAS 133. I use three terms interchangeably to refer to this measure: the earnings component attributed to risk management (non-trading) derivatives under SFAS 133, the fair valued hedging performance measure, and the measure for hedge ineffectiveness. In this section, I discuss the conceptual construct underlying this accounting measure and its empirical construction in more detail.

It is clear that SFAS 133 intends for the newly recognized earnings component attributed to risk management derivatives to timely reflect hedge ineffectiveness, a key concept emphasized throughout the statement. This is achieved by the application of hedge accounting, defined as “special accounting treatment that alters the normal accounting for one or more components of a hedge so that counterbalancing changes in the fair values of hedged items and hedging instruments, from the date the hedge is established, are not included in earnings in different periods”(SFAS 133, Paragraph 320). In fact, a lot of the technical complexities of SFAS 133 are associated with the application of hedge accounting, particularly the qualifying requirement and the measurement of hedge ineffectiveness. The implicit assumption behind this accounting maneuver is that, by carefully matching the fair value gains/losses of the hedging instrument and the hedged item, SFAS 133 requires accounting earnings to capture an important aspect of underlying firm performance (i.e. hedge ineffectiveness) rather than simply the effect of market price fluctuations during the period.

Consistent with this conceptual framework, the earnings recognition requirement under SFAS 133 ensures that most types of hedge ineffectiveness are immediately incorporated into earnings.⁹ In addition, if a non-trading derivative instrument does not qualify for hedge accounting under SFAS 133, the entire gains/losses on the derivative instrument has to be

⁹ The exception is for under-hedged cash flow hedges.

immediately recognized into earnings without any offsetting effect allowed. As most derivatives classified as other than trading by bank holding companies are reported as hedging rather than speculative derivatives, this situation arises mostly when the hedging relationship fails to meet the minimum effectiveness threshold required for hedge accounting. In this case, the recognized derivative gains/losses can be viewed as a measure of hedge ineffectiveness when the ability of the hedging pair to offset each other seriously deteriorates.

The fair valued hedging performance measure used in this study is derived from bank holding companies' FR-Y9C reports in the post-SFAS 133 period. Specifically, the variable is the sum of three Schedule HI (income statement) memoranda item M10(a), (b) and (c) 'Impact on income of derivatives held for purposes other than trading', (i.e. bhck8761, bhck8762, and bhck8763). According to FR-Y9C instructions, the three M10 items should report the net sum of all amounts recognized in the income statements that are attributable to the use of non-trading derivatives based on whether the amounts impact interest income (M10a), interest expense (M10b), or other (non-interest) allocations (M10c). Moreover, one of the edit tests designed to check the internal consistency of the data reported in FR-Y9C form (listed in December 2005 FR-Y9C instruction form) explicitly states that the aggregated income effect of non-trading derivatives should be non-zero as long as the total notional amount of non-trading derivatives exceeds one million: *"If the sum of HC-L13A, HC-L13B, HC-L13C and HC-L13D is greater than \$1M, then the sum of HI-Mem10a through HI-Mem10c should not equal zero. If (bhck8725 + bhck8726 + bhck8727 + bhck8728) > 1000, then (bhck8761 + bhck8762 + bhck8763) ≠ 0"*.

It is important to differentiate the hedging performance measure discussed above from the change in the fair value of non-trading derivatives. In particular, the fair valued hedging performance measure captures the effect of hedge accounting under SFAS 133 and therefore incorporates the offsetting gains/losses on the hedged item. As a check for data validity, I calculated the change in the fair value of non-trading derivatives in each period based on non-trading derivative fair values reported in FR-Y9C Schedule HC-L and compared it to the earnings component attributed to non-trading derivatives under SFAS 133. The two values diverge significantly. This is still the case for bank holding companies that do not use cash flow hedges (when the accumulated net gains/losses on cash flow hedges reported in Schedule HC-R, i.e. bhck4336, has consistently zero values across all periods) and thus no gains/losses from non-trading derivatives are deferred to OCI. Further analysis confirms that the two measures are not

correlated with a very low correlation coefficient of 0.0039 and a corresponding p value of 0.86. Descriptive statistics for the two measures are reported in Panel D of Table 1. I also include descriptive statistics for the absolute value of the two measures to indicate the two measures' relative magnitude.

5. Empirical tests and results

5.1. Forecasting power of hedging performance (H1a and H1b)

This section reports results on the time series property and forecasting relevance of the earnings component unique to SFAS 133. The analysis is based on the following two equations:

$$(1) \text{HEDGE}_{i,t+1} = a_0 + a_1 \text{HEDGE}_{i,t} + \varepsilon_{i,t}$$

$$(2) \text{IB}_{i,t+1} = b_0 + b_1 \text{EXIB}_{i,t} + b_2 \text{HEDGE}_{i,t} + \varepsilon_{i,t}$$

The dependent variable in equation (1) is next quarter's fair-value-based hedging performance measure, scaled by the market value of equity at the beginning of the quarter. The dependent variable in equation (2) is next quarter's income before extraordinary items, scaled by the market value of equity at the beginning of the quarter. HEDGE is the earnings component attributed to hedging derivatives under SFAS 133, scaled by the market value of equity at the beginning of the quarter. EXIB is income before extraordinary items excluding the earnings component attributed to hedging derivatives under SFAS 133, scaled by the market value of equity at the beginning of the quarter.

Coefficient a_1 in equation (1) indicates the time series property of the fair-value-based hedging performance measure. A non-zero a_1 would suggest that current hedging performance has predictive power over future hedging performance and thus violates the 'unpredictability' property of transitory earnings as defined in Ohlson (1999). Coefficient b_2 in equation (2) shows whether the earnings component unique to SFAS 133 has predictive power over future total earnings. A non-zero b_2 would violate the 'forecasting irrelevance' property of transitory earnings.

As the scope of SFAS 133 is limited to the accounting treatment of hedging derivatives, the analysis in this section is based on the subsample of hedging derivative users in the post-SFAS 133 period. Given that firms self-select into the hedging derivative user and non-user group, empirical evidence on SFAS 133's income statement effect is based on a non-randomly selected subgroup (the hedging derivative user group). As such, self-selection bias may arise to the extent

that the decision as to whether to use derivatives to hedge following the adoption of SFAS 133 is endogenous to the standard's impact on the informational properties of accounting earnings. This seems plausible in light of the criticism that SFAS 133 would distort hedging choices as firms stop use hedging derivatives in order to avoid the perceived adverse impact of hedging derivatives on their financial statements under SFAS 133. While empirical findings from previous literature (e.g. Ahmed et al., 2004) provide no evidence that this concern actually materializes, it is preferable to address the potential self selection bias.

I follow the common approach to use the Heckman two-stage method to control for the self-selection bias. In the first stage, I use a probit model to predict the use of hedging derivatives based on Sinkey and Carter (2000). The predictors for the first-stage regression include LNTASS (natural logarithm of total assets), EQRAT (book value of equity scaled by total assets), NIM (net interest income scaled by total assets), NOTES (notes and debentures scaled by total assets), DIV (dividend payout scaled by total assets), LIQUID (liquid assets), GAP12 (the absolute value of the difference between assets repricing or maturing within 12 months and liabilities repricing or maturing within 12 months, scaled by total assets), and NETCO (net loan charge off scaled by total assets).

Table 2 reports results on the forecasting power of the fair value based hedging performance measure recognized into earnings under SFAS 133. The post-SFAS 133 period observations of bank holding companies in my sample form the population sample for the two stage analysis. The population sample consists of observations that use hedging derivatives and observations that do not use hedging derivatives. The observations within the population sample that do not use hedging derivatives are referred to as the censored observations because it is impossible to observe the value of the variable of interest (the fair value based hedging performance measure recognized into earnings under SFAS 133). The observations within the population sample that use hedging derivatives are referred to as the uncensored observations because the value of the variable of interest (the fair value based hedging performance measure recognized into earnings under SFAS 133) can be observed.

Panel A reports the coefficient estimates from the first-stage selection model, while Panels B and C report the second stage model based on equation (1) and (2) respectively. As shown in Panel A, almost all of the predictors included in the selection model have a significant loading, suggesting that the selection model is well-specified. Panel B reports that the fair valued hedging performance measure in equation (1) has an estimated coefficient of 0.5512 with a z statistic of 29.29, thus rejecting H1a (unpredictability). Panel C reports that the fair valued hedging performance measure in

equation (2) has an estimated coefficient of 0.5035 with a z static of 26.03, thus rejecting H1b (forecasting irrelevance).

I replicate the above analysis based on OLS regression and get consistent results (not tabulated).¹⁰ Specifically, a_1 is estimated to be 0.5546 with a two-way clustered t stat of 14.07 (clustered by firm and quarter). Moreover, the model that uses current hedging performance to predict next quarter's hedging has an R square of 0.3116. The fair value based hedging performance measure also has incremental explanatory power over future total earnings. In particular, hedging performance has an estimated parameter of 0.5347 with a clustered t value of 6.30 in equation (2). I also examine the time series properties of the changes in fair values of hedging derivatives and document a negative first order autocorrelation coefficient of -0.5370 with an R square of 0.2251. Taken together, the results highlight the different time series properties of the two fair value based measures. In particular, the fair-value-based hedging performance measure recognized into earnings under SFAS 133 is shown to be persistent with a positive autocorrelation while the fair values of hedging derivatives are mean reverting with changes in these fair values exhibiting a negative autocorrelation.

5.2. Pre and post comparison of earnings response coefficients (H2)

This section discusses tests comparing earnings response coefficient across the pre- and post-SFAS 133 period. The underlying assumption of the empirical strategy is that any impact of SFAS 133 on earnings is more prominent for firms using more hedging derivatives¹¹. Specifically, I use the following returns-earnings model to examine the differential change in earnings response coefficient from pre- to post-SFAS 133 period:

$$(3) \text{ret}_{i,t} = \alpha_0 + \alpha_1 \text{IB}_{i,t} + \alpha_2 \text{LOSS} + \alpha_3 \text{AFTER} + \alpha_4 \text{IB}_{i,t} * \text{LOSS} + \alpha_5 \text{IB}_{i,t} * \text{AFTER} + \alpha_6 \text{NOTIONAL}_{i,t} + \alpha_7 \text{IB}_{i,t} * \text{NOTIONAL}_{i,t} + \alpha_8 \text{NOTIONAL}_{i,t} * \text{AFTER} + \alpha_9 \text{IB}_{i,t} * \text{AFTER} * \text{NOTIONAL}_{i,t} + \varepsilon_{i,t}$$

¹⁰ To avoid bias in standard error estimates resulting from correlated residual errors in panel data, I follow the recommendation of Petersen (2009) and report two-way clustered standard errors and t statistics (clustered by firm and time).

¹¹ One potential concern with this approach is that hedging derivative use may change over time and could be affected by the adoption of SFAS 133. In this regard, Ahmed et al. (2006) document that there is no significant change in bank holding companies' extent of derivative usage and composition of the derivative instrument portfolio from pre- to post-SFAS 133 period. My sample yield similar results.

The dependent variable $ret_{i,t}$ is defined as bank holding company i 's 5-day cumulative return around the day when earnings for quarter t is announced. I use both raw returns and market-adjusted returns (adjusted for CRSP value weighted market return). IB is income before extraordinary items scaled by the market value of equity at the beginning of the quarter. LOSS is a dummy variable coded as 1 when IB is negative control for the well-known differential valuation of negative earnings (Hayn, 1995). AFTER is a dummy variable coded as 1 for observations in the post-SFAS 133 period. NOTIONAL is the measure of hedging derivative exposure, defined as the total notional amount of non-trading derivatives scaled by the market value of equity at the beginning of the quarter (a value of zero for non- users).

The coefficients for the interaction terms in equation (3) indicate how earnings response coefficient varies across sections. The coefficient of interest is α_9 , which captures the *differential* magnitude of the change in earnings valuation coefficient following the adoption of SFAS 133 based on the level of hedging derivative exposure. By focusing on the difference in the change across sections, this approach helps remove effects due to factors unrelated to SFAS 133.

I estimate equation (3) using the full sample, as well as the subsample of bank holding companies that have observations in both the pre-and post-SFAS 133 periods (the matched sample). As the analysis based on the matched sample uses the same set of bank holding companies in the pre-and-post comparison, it helps rule out the possibility that the detected change in the valuation coefficient of earnings results from the sample difference across the pre-and post-SFAS 133 periods. To avoid bias in standard error estimates resulting from correlated residual errors in panel data, I report two-way clustered standard errors and t- statistics (clustered by firm and time).

As reported in Table 3, the coefficient on the three-way interaction term (α_9) is consistently positive and significant across the models regardless of the choice of return measure and sample base. The results suggest that the adoption of SFAS 133 is associated with an increase in earnings informativeness for bank holding companies with higher level hedging derivative exposure, a pattern that is consistent with the notion that SFAS 133 improves earnings as a summary measure of firm performance by requiring the recognition of hedge ineffectiveness.

5.3. Relative explanatory power of alternative income measures (H3)

This section reports analysis comparing two alternative ‘versions’ of earnings, one including the fair-value-based hedging performance measure and the other excluding it, to determine which one has the superior ability to reflect firm performance (H3). Following Dechow (1994) and Dhaliwal et al. (1999), I compare the two performance measures based on a likelihood ratio test designed to evaluate competing non-nested models (Vuong, 1989). Intuitively, Vuong’s test provides a statistical procedure to determine which model ‘fits’ the data better (i.e., which model has relatively more explanatory power over the dependent variable for the given data). Consistent with Dechow (1994) and Dhaliwal et al. (1999), I use concurrent stock returns as the benchmark to evaluate the relative ability of the two performance measures to reflect firm performance based on the assumption that stock prices efficiently impound all information concerning firm performance.

Naturally, one expects hedging performance to contribute more to earnings’ ability to summarize information on firm performance for sections where hedging derivatives are most likely to have material impact on firm performance. As such, I sort the sample of hedging derivative users into quintiles based on the level of hedging derivative exposure and perform Vuong’s tests for that sample and for each quintile. Consistent with previous research (Barton, 2001; Guay, 1999), I measure hedging derivative exposure as the total notional amount of non-trading derivatives scaled by the market value of equity at the beginning of the quarter.

Panel A of Table 4 reports the descriptive statistics on hedging derivative exposure across quintiles. Clearly, the use of hedging derivatives is highly concentrated among heavy derivative users. For example, observations in the top quintile account for more than 90% of hedging derivatives outstanding measured by the total notional amount. This pattern still holds for the size-adjusted measure of hedging derivative exposure. In particular, observations in the top quintile have an average exposure level of 3.45 while observations in the bottom quintile have an average exposure level of 0.02.

For the sample of hedging derivative users and for each quintile within the sample, I perform Vuong’s tests to compare the relative explanatory power of the following two models:

$$(4) R_{i,t} = \beta_0 + \beta_1 IB_{i,t} + \beta_2 LOSS_{i,t} + \beta_3 IB_{i,t} _ LOSS_{i,t} + \varepsilon_{i,t}$$

$$(5) R_{i,t} = \beta_0 + \beta_1 EXIB_{i,t} + \beta_2 LOSSE_{i,t} + \beta_3 EXIB_{i,t} _ LOSSE_{i,t} + \varepsilon_{i,t}$$

$IB_{i,t}$ is bank holding company’s income before extraordinary items during quarter t , scaled by the market value of equity at the beginning of the quarter. $EXIB$ is quarterly income before

extraordinary items excluding the earnings component attributed to hedging derivatives under SFAS 133. LOSS is a dummy variable coded as 1 if IB is negative and LOSSE is a dummy variable coded as 1 if EXIB is negative.¹² The dependent variable is the bank holding company's cumulative stock returns during the same quarter.

One issue of concern regarding this analysis is whether stock returns efficiently impound all available information. If investors are 'fixated' on earnings, Vuong's tests using stock returns as the benchmark will be biased in favor of the earnings measure in the reported form. Therefore, it is important to corroborate the results using an alternative benchmark based on future realized measures of performance such as future earnings (Skinner, 1999). To address this problem, I use future earnings as an alternative benchmark and replicate Vuong's tests for the sample of hedging derivative users and for each quintile of hedging derivative exposure.

Panel B of Table 4 reports the results for Vuong's tests using concurrent stock returns as the benchmark. For the sample of bank holding companies in the post-SFAS 133 period, the earnings model has a R^2 of 0.0938 while the model based on the income measure excluding the earnings component attributed to hedging derivatives has a R^2 of 0.0485. Vuong's test confirms that accounting earnings outperforms the alternative income measure in terms of the ability to explain concurrent stock returns with a Z statistic of 4.42. Results by hedging derivative quintiles show that the superior explanatory power of earnings is more prominent among sections with higher level of hedging derivative exposure, both in terms of statistical significance and the magnitude of the difference in explanatory power. Moving from the lowest to the highest quintile, the difference in R^2 between the two models increases from 0.004 (0.0324 versus 0.0283) to 0.068 (0.0972 versus 0.0296). The results suggest that the recognition of the fair-value-based hedging performance measure improves earnings as a summary measure of firm performance.

As reported in Panel C of Table 4, Vuong's tests using future earnings as the benchmark yield similar results. For the sample of bank holding companies in the post-SFAS 133 period, the earnings model has a R^2 of 0.2628 while the model based on the income measure excluding the earnings component attributed to hedging derivatives has a R^2 of 0.1638. Vuong's test confirms that earnings outperforms the alternative income measure with a Z statistic of 2.13. Moving from the lowest to the highest quintile, the difference in R^2 between the two models consistently and

¹² Loss dummies are included to control for the well-known differential valuation of negative earnings (Hayn, 1995).

significantly increases. The findings corroborate the results based on analyses using stock returns as the benchmark to evaluate alternative income measures.

5.4. Valuation coefficients of hedging gains and hedging losses (H4)

This section reports empirical tests that examine whether hedging losses are given a higher weight than hedging gains. Specifically, I estimate the following two equations for the sample of hedging derivative users and for each quintile formed based on the level of hedging derivative exposure, as described in the last section:

$$(6) R_{i,t} = \gamma_0 + \gamma_1 EXIB_{i,t} + \gamma_2 HEDGE_{i,t} + \varepsilon_{i,t}, \text{ and}$$

$$(7) R_{i,t} = \gamma_0 + \gamma_1 EXIB_{i,t} + \gamma_2 HEDGE_{i,t} + \gamma_3 LOSSE_{i,t} + \gamma_4 LOSSH_{i,t} + \gamma_5 EXIB_{i,t} * LOSSE_{i,t} + \gamma_6 HEDGE_{i,t} * LOSSH_{i,t} + \varepsilon_{i,t}$$

EXIB is income before extraordinary items excluding the earnings component attributed to hedging derivatives under SFAS 133, scaled by the market value of equity at the beginning of the quarter. HEDGE is the earnings component attributed to hedging derivatives under SFAS 133, scaled by the market value of equity at the beginning of the quarter. LOSSE is a dummy variable coded as 1 when EXIB is negative and LOSSH is a dummy variable coded as 1 when HEDGE is negative.

As the sample of the analysis is limited to hedging derivative users in the post-SFAS 133 period, I use the Heckman two-stage method to control for the potential self-selection bias as discussed in Section 5.1. The first stage selection model is identical to the model discussed in Section 5.1. In the second stage, I estimate equation (6) and (7) with the inverse mills ratio derived from the first stage as an additional implicit independent variable that is intended to be the correction for sample selection bias. As a baseline model, equation (6) examines whether the earnings component attributed to hedging derivatives provides incremental explanatory power over concurrent stock returns in the post-SFAS 133 period. At the same time, equation (7) is intended to capture the differential valuation implication of hedging gains and losses.

Table 5 reports the results from the two-stage analysis. Panel A reports the coefficient estimates from the first-stage selection model, while Panels B and C report the second stage model based on equation (6) and (7) respectively. As reported in Panel B, the coefficient on HEDGE in Panel B has a coefficient estimate of 2.15 with a z value of 8.05 and a p value lower than 0.01, suggesting that the hedging performance measure recognized under SFAS 133 has

incremental power over concurrent stock returns. The coefficient on HEDGE_LOSSH in Panel C has a coefficient estimate of 3.29 with a z value of 4.21 and a p value lower than 0.01, suggesting that the hedging losses have a higher valuation coefficient than hedging gains.

I replicate the analysis based on OLS regression to compare patterns across different levels of hedging derivative exposure. The results are reported in Table 6. The first column of Table 6 confirms the results from the two-stage analysis. Specifically, the earnings component attributed to SFAS 133 has incremental power over concurrent stock (γ_2 from equation (6) is positive and statistically significant with a clustered t value of 2.87) and that hedging losses have a higher valuation coefficient than do hedging gains (γ_6 from equation (7) is positive and statistically significant with a clustered t value of 2.05). Moreover, Further analysis shows that the asymmetric valuation of hedging gains and losses is driven by heavy derivative users (γ_6 from equation (7) is positive and statistically significant only for the top exposure quintile with a clustered t value of 2.68). As discussed earlier, the use of hedging derivatives is highly concentrated in the heavy users. The results reported in Table 6 are consistent with the notion that the fair valued hedging performance measure, in particular hedging losses, captures value-relevant information, especially for the section where hedging derivatives are most likely to have material impact on firm performance.

5.5. Hedge ineffectiveness and idiosyncratic volatility (H5)

This section reports analysis on the association between idiosyncratic volatility and hedge ineffectiveness recognized in earnings under SFAS 133 based on the sample of hedging derivative users in the post-SFAS 133 period. As I expect the impact of hedging activities on firm-specific risk to be most significant for firms with the highest level of hedging derivative, I perform a double-sort analysis based on the sample of hedging derivative users in the post-SFAS 133 period to examine whether a greater level of hedge ineffectiveness over time is associated with higher idiosyncratic risk for firms with higher level of hedging derivative exposure.

Specifically, for each quarter, I first sort the observations into five groups based on the same measure of hedging derivative exposure used earlier (total notional amount of hedging derivatives scaled by the market value of equity at the beginning of each quarter). Then, within each group, I further sort observations into quintiles based on hedge ineffectiveness over time

(measured as the volatility of the earnings component attributed to hedging derivatives over the most recent eight quarters, scaled by the market equity value at the beginning of the quarter). Consistent with Ang et al. (2006) and Jiang et al. (2009), I measure idiosyncratic risk for each bank-quarter as the standard deviation of the residuals from the time series regression based on the Fama-French three-factor model using daily CRSP return data.

Table 7 reports the results from the double sort analysis that examines the association between hedge ineffectiveness and idiosyncratic risk. Within each quintile portfolio formed based on the level of size-adjusted hedging derivative exposure, the observations are further sorted into quintiles based on hedge ineffectiveness measured as the size-adjusted volatility of the earnings component attributed to hedging derivatives from the most recent eight quarters. For each level of hedging derivative exposure, Table 7 reports the average idiosyncratic stock return volatility for each quintile and the difference between the top and bottom quintiles along with the corresponding Newey-West *t* statistic.

The results show that for the top quintile of hedging derivative users, idiosyncratic stock return volatility increases from 1.03% for the low hedge ineffectiveness portfolio to 1.39% for the high hedge ineffectiveness portfolio, resulting in a statistically significant difference of 0.36%. In contrast, the difference between the top and bottom hedge ineffectiveness portfolios is not statistically significant and of a noticeably smaller magnitude for the other four quintiles of hedging derivative users. As the use of hedging derivatives is highly concentrated among the heavy users, this finding is consistent with the notion that hedge ineffectiveness signals increased firm-specific risk when hedging derivatives have the potential to materially impact the firm's financial results. The results provide evidence in support of the claim by the financial analyst community that SFAS 133 helps improve the risk relevance of accounting numbers (Gastineau et al., 2001).

6. Conclusion

SFAS 133 requires earnings recognition of most types of fair value based hedge ineffectiveness. This earnings recognition requirement was the focal point of controversy surrounding the adoption of SFAS 133. The debate also reflects the more general controversy over whether the recognition in earnings of a new value relevant but potentially volatile

accounting item improves or dilutes earnings as a summary performance measure. Using a sample of bank holding companies, I find evidence that the newly recognized earnings component following the adoption of SFAS 133—the fair-value-based hedging performance measure, improves the value and risk relevance of accounting earnings. The findings of this study are relevant to the evaluation of SFAS 133 as well as the ongoing debate about the income statement treatment of net asset changes due to the application of fair value accounting.

There may be concerns about whether the findings are generalizable to other sectors, especially non-financial industries. In particular, it is likely that the information content of derivative gains/losses is higher for bank holding companies because risk management is more central to the core business and competitive advantage possibilities among financial than non-financial sector firms. On the other hand, using a sample of bank holding companies can help accurately capture the effect of SFAS 133 by focusing on a setting more likely to be representative of the population of interest, where hedging derivatives are expected to be of material significance to financial reporting. Future research may examine whether the inferences from this study are valid for non-financial sectors where the impact of hedging derivatives are also expected to be material.

Another promising avenue for future research on SFAS 133's income statement effects is in the area of earnings management. For example, firms may take advantage of the differential accounting treatment for fair value and cash flow hedge under SFAS 133 to manipulate earnings. The high-profile cases of Fannie Mae's abuse of cash flow hedge accounting provide anecdotal evidence for such a scenario. Further empirical evidence of SFAS 133's impact on earnings management behavior is important for a complete profile of the consequences of the standard. Such studies would require the simultaneous consideration of firms' incentive to manage earnings and a benchmark model for hedging decisions. This is the subject of an ongoing project.

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Table 1: Descriptive Statistics

Panel A : Sample period (1995-2005)								
Variables	N	Mean	STD	p5	Q1	Median	Q3	p95
Total assets (book value)	11110	12,638	65,802	231.29	485.21	1,049.89	3,757.70	44,248.95
Total assets (risk-weighted)	10320	9,879	50,074	155.37	336.30	736.61	2,585.94	33,990.38
Tier1 risk-based capital ratio	10320	0.1246	0.0406	0.0797	0.1010	0.1163	0.1389	0.1913
Total risk-based capital ratio	10320	0.1408	0.0404	0.1045	0.1177	0.1314	0.1525	0.2060
Notional amount of non-trading derivatives (un-scaled)	10765	3,674.20	26,451.93	0.00	0.00	0.00	65.00	7102.00
Absolute net fair value of non-trading derivatives (un-scaled)	10760	19.84	149.61	0.00	0.00	0.00	0.39	50.12
Notional amount of non-trading derivatives (scaled)	10765	0.3792	1.5957	0.0000	0.0000	0.0000	0.1559	1.6494
Absolute net fair value of non-trading derivatives (scaled)	10760	0.0033	0.0277	0.0000	0.0000	0.0000	0.0008	0.0139
Percentage of observations with non-zero hedging derivatives	37.63%							
Panel B: Pre-SFAS 133 period (1995-2000)								
Variables	N	Mean	STD	p5	Q1	Median	Q3	p95
Total assets (book value)	5458	10,849.66	44,860.99	215.04	448.51	1,065.97	3,984.39	43,759.52
Total assets (risk-weighted)	4668	8,884.35	38,488.62	137.66	306.91	710.88	2,837.20	34,950.05
Tier1 risk-based capital ratio	4668	0.1274	0.0438	0.0768	0.1009	0.1201	0.1452	0.1951
Total risk-based capital ratio	4668	0.1440	0.0451	0.1030	0.1188	0.1350	0.1578	0.2116
Notional amount of non-trading derivatives (un-scaled)	5178	3,474.53	22,364.39	0.00	0.00	0.00	80.00	8,464.79
Absolute net fair value of non-trading derivatives (un-scaled)	5172	13.97	87.36	0.00	0.00	0.00	0.36	41.00
Notional amount of non-trading derivatives (scaled)	5178	0.4213	1.4322	0.0000	0.0000	0.0000	0.1642	1.9198
Absolute net fair value of non-trading derivatives (scaled)	5172	0.0030	0.0296	0.0000	0.0000	0.0000	0.0008	0.0116
Percentage of observations with non-zero hedging derivatives	36.95%							
Panel C: Post-SFAS 133 period (2001-2005)								
Variables	N	Mean	STD	p5	Q1	Median	Q3	p95
Total assets (book value)	5652	14,365.61	81,009.44	248.58	518.28	1,032.81	3,487.87	45,168.00
Total assets (risk-weighted)	5652	10,701.39	57,910.93	165.40	360.80	753.85	2,438.78	33,918.40
Tier1 risk-based capital ratio	5652	0.1223	0.0376	0.0821	0.1010	0.1142	0.1335	0.1857
Total risk-based capital ratio	5652	0.1382	0.0359	0.1055	0.1171	0.1288	0.1485	0.2009
Notional amount of non-trading derivatives (un-scaled)	5587	3,859.26	29,743.69	0.00	0.00	0.00	60.00	6,875.91
Absolute net fair value of non-trading derivatives (un-scaled)	5588	25.27	189.68	0.00	0.00	0.00	0.42	60.51
Notional amount of non-trading derivatives (scaled)	5587	0.3402	1.7328	0.0000	0.0000	0.0000	0.1510	1.3300
Absolute net fair value of non-trading derivatives (scaled)	5588	0.0036	0.0258	0.0000	0.0000	0.0000	0.0008	0.0162
Percentage of observations with non-zero hedging derivatives	38.29%							

Panel D: Hedging derivative users in the post-SFAS 133 period								
Variables (scaled by beginning market value of equity)	N	Mean	STD	P5	Q1	Median	Q3	P95
Earnings component attributed to non-trading derivatives	2159	0.0020	0.0111	-0.0036	-0.0002	0.0001	0.0019	0.0130
Change in fair value of non-trading derivatives	2129	-0.0004	0.0372	-0.0100	-0.0012	0	0.0010	0.0107
ABS earnings component attributed to non-trading derivatives	2159	0.0037	0.0107	0	0.0001	0.0009	0.0031	0.0157
ABS change in fair value of non-trading derivatives	2129	0.0062	0.0366	0	0.0002	0.0012	0.0041	0.0194
Income before extraordinary items	2164	0.0173	0.0167	0.0075	0.0148	0.0177	0.0206	0.0293

Table 1 reports descriptive statistics based on information from FR-Y9C filing. All dollar variables are reported in millions. Total assets (book value) are the balance sheet book value of all assets held by the bank holding company (bhck2170). Per the regulatory requirement set by the Federal Reserve Bank, bank holding companies are required to calculate and report Total risk-weighted assets, Tier 1 capital and Total risk-based capital. Tier 1 capital ratio is calculated as Tier-1 capital (bhck8274) divided by Total risk-weighted assets (bhckA223). Total risk-based capital ratio is calculated as Total risk-based capital (bhck3792) divided by Total risk-weighted assets (bhckA223). Notional amount of non-trading derivatives (un-scaled) is the sum of total notional amount of all derivatives held for non-trading purpose across all categories. Absolute net fair value of non-trading derivative (un-scaled) is the absolute value of the net fair value of all derivatives held for non-trading purpose across all categories. Notional amount of non-trading derivatives (scaled) and Absolute net fair value of non-trading derivatives (scaled) are calculated as the un-scaled amount divided by the market value of equity at the beginning of the reporting quarter. Percentage of observations with non-zero hedging derivatives is the percentage of bank-quarters with non-zero notional amount of derivatives for non-trading purpose.

Panel D of Table 1 reports the descriptive statistics for major variables of interest for the subsample of hedging derivative users in the post-SFAS 133 period. All variables reported in Panel D are scaled by the market value of equity at the beginning of the quarter. Earnings component attributed to non-trading derivatives is calculated as the sum of Schedule HI memoranda item M10(a), (b) and (c) 'Impact on income of derivatives held for purposes other than trading' (bhck8761+bhck8762+bhck8763). Change in fair value of non-trading derivatives is the change in the net fair value of non-trading derivative positions last quarter's value. Each period's net fair value of derivative positions is calculated based on information reported in Schedule HC-L (bhck8741+bhck8742+bhck8743+bhck8744-bhck8745-bhck8746-bhck8747-bhck8748). ABS earnings component attributed to non-trading derivatives and ABS change in fair value of non-trading derivatives are the absolute value of the two variables described above respectively.

Table 2: Forecasting power of hedging performance

Panel A: First stage selection model							
LNTASS	EQRAT	NIM	NOTES	DIV	LIQUID	GAP12	NETCO
0.78	3.15	8.41	2.33	-59.77	-2.73	1.02	-10.85
(35.72)***	(3.15)**	(3.26)***	(7.87)***	(-4.09)***	(-2.76)**	(5.99)**	(-1.09)
N (population)	5382						
N (censored)	3445						
N(uncensored)	1937						
Panel B: Second stage (Predicting future hedging performance)							
HEDGE	Mills (lamda)						
0.5512	-0.0008						
(29.29)***	(-1.98)**						
N	1937						
Wald							
chi-square	857.91	p=0.00					
Panel C: Second stage (Predicting future total earnings)							
EXIB	HEDGE	Mills (lamda)					
0.5035	0.5274	-0.0014					
(26.03)***	(15.81)***	(-2.36)**					
N	1937						
Wald							
chi-square	679.53	p=0.00					

Table 2 reports results on the forecasting power of the fair value based hedging performance measure recognized into earnings under SFAS 133. Regression results are based on Heckman two-stage method to correct for potential self-selection bias. The post-SFAS 133 period observations of bank holding companies in my sample form the population sample for the two stage analysis. The population sample consists of observations that use hedging derivatives and observations that do not use hedging derivatives. The observations within the population sample that do not use hedging derivatives are referred to as the censored observations because it is impossible to observe the value of the variable of interest (the fair value based hedging performance measure recognized into earnings under SFAS 133). The observations within the population sample that use hedging derivatives are referred to as the uncensored observations because the value of the variable of interest (the fair value based hedging performance measure recognized into earnings under SFAS 133) can be observed.

Panel A reports the results of the first-stage regression that models the selection of the uncensored observations from the population sample. The predictors are: Intercept (not tabulated), LNTASS (natural logarithm of total assets), EQRAT (book value of equity scaled by total assets), NIM (net interest income scaled by total assets), NOTES (notes and debentures scaled by total assets), DIV (dividend payout scaled by total assets), LIQUID (liquid assets consisting of cash and balances, federal funds sold, and securities purchased to resell, scaled by total assets), GAP12 (the absolute value of the difference between assets repricing or maturing within 12 months and liabilities repricing or maturing within 12 months, scaled by total assets), and NETCO (net loan charge off scaled by total assets).

Panel B and C report the results of second-stage regressions based on the following models respectively:

$$\text{HEDGE}_{i,t+1} = a_0 + a_1 \text{HEDGE}_{i,t} + \varepsilon_{i,t}$$

$$\text{IB}_{i,t+1} = b_0 + b_1 \text{EXIB}_{i,t} + b_2 \text{HEDGE}_{i,t} + \varepsilon_{i,t}$$

HEDGE is the earnings component attributed to non-trading derivatives under SFAS 133 (the fair value based hedging performance measure recognized into earnings under SFAS 133, scaled by the market value of equity at the beginning of the quarter). IB is income before extraordinary items. EXIB is income before extraordinary items excluding the earnings component attributed to hedging derivatives under SFAS 133, scaled by the market value of equity at the beginning of the quarter. Mills (lambda) is the inverse mills ratio generated from the first-stage estimation that is intended to correct for sample selection bias.

Z statistics are reported in parentheses. *, **, and *** indicate significance (two-tailed test) at 0.1, 0.05, and 0.01 level respectively.

Table 3: Pre-and-post comparison of earnings response coefficients

Panel A: Earnings response coefficient (full sample)									
5-day raw return	IB	LOSS	IB*	AFTER	NOTIONAL	IB*	AFTER*	IB*	IB* AFTER*
			LOSS			AFTER	NOTIONAL	NOTIONAL	NOTIONAL
	0.4109 (2.90)***	0.0095 (1.87)*	-0.2629 (-1.20)	-0.0018 (-0.43)	-0.0002 (-0.28)	0.1473 (1.11)	-0.0032 (-2.65)***	-0.0171 (-0.86)	0.1855 (7.36)***
R-square	0.06								
No. of obs.	10155								
5-day market adjusted return	IB	LOSS	IB*	AFTER	NOTIONAL	IB*	AFTER*	IB*	IB* AFTER*
			LOSS			AFTER	NOTIONAL	NOTIONAL	NOTIONAL
	0.4595 (3.35)***	0.0088 (1.73)*	-0.3498 (-1.52)	0.0009 (0.24)	0.0003 (0.41)	0.1290 (0.79)	-0.0037 (-3.19)***	-0.0255 (-1.15)	0.1939 (7.10)***
R-square	0.06								
No. of obs.	10155								
Panel B: Earnings response coefficient (matched sample)									
5-day raw return	IB	LOSS	IB*	AFTER	NOTIONAL	IB*	AFTER*	IB*	IB* AFTER*
			LOSS			AFTER	NOTIONAL	NOTIONAL	NOTIONAL
	0.4665 (2.51)**	-0.0004 (-0.06)	-0.8258 (-3.47)***	-0.0039 (-0.81)	-0.0007 (-0.83)	0.2987 (2.07)**	-0.0010 (-0.94)	-0.0288 (-1.64)*	0.0909 (2.93)***
R-square	0.02								
No. of obs.	6521								
5-day market adjusted return	IB	LOSS	IB*	AFTER	NOTIONAL	IB*	AFTER*	IB*	IB* AFTER*
			LOSS			AFTER	NOTIONAL	NOTIONAL	NOTIONAL
	0.5358 (2.98)***	-0.0017 (-0.28)	-0.9543 (-4.16)***	-0.0012 (-0.41)	-0.0004 (-0.39)	0.2671 (1.66)*	-0.0012 (-0.89)	-0.0369 (-1.29)	0.0957 (2.30)**
R-square	0.02								
No. of obs.	6521								

Table 3 reports pooled regression results from the earnings-returns regressions based on the following model:

$$ret_{i,t} = \alpha_0 + \alpha_1 IB_{i,t} + \alpha_2 LOSS + \alpha_3 AFTER + \alpha_4 IB_{i,t} * LOSS + \alpha_5 IB_{i,t} * AFTER + \alpha_6 NOTIONAL_{i,t} + \alpha_7 IB_{i,t} * NOTIONAL_{i,t} + \alpha_8 NOTIONAL_{i,t} * AFTER + \alpha_9 IB_{i,t} * AFTER * NOTIONAL_{i,t} + \varepsilon_{i,t}$$

The dependent variable $ret_{i,t}$ is defined as bank holding company i 's 5-day cumulative return around the day when earnings for quarter t is announced. I use both raw returns and market-adjusted returns (adjusted for CRSP value weighted market return). IB is income before extraordinary items scaled by the market value of equity at the beginning of the quarter. $LOSS$ is a dummy variable coded as 1 when IB is negative. $AFTER$ is a dummy variable coded as 1 for observations in the post-SFAS 133 period. $NOTIONAL$ is the measure of hedging derivative exposure, defined as the total notional amount of non-trading derivatives scaled by the market value of equity at the beginning of the quarter (a value of zero for non- users).

Panel A reports regression results for the full sample. Panel B reports regression results for the matched sample representing bank holding companies that have observations in both the pre-and post-SFAS 133 periods. Two-way clustered t statistics are reported in parentheses (clustered by firm and time). *, **, and *** indicate significance (two-tailed test) at 0.1, 0.05, and 0.01 level respectively.

Table 4: Relative explanatory power of alternative income measures

Panel A: Exposure to hedging derivatives					
	Mean exposure level	Median exposure level	Average notional amount outstanding (in thousands of dollars)	Percentage of total notional amount outstanding	Number of observations
Sample	0.8783	0.2518	9,963,812	100.00%	2164
Quintile 1	0.0251	0.0220	31,519	0.06%	432
Quintile 2	0.1164	0.1139	245,788	0.49%	433
Quintile 3	0.2547	0.2518	1,063,962	2.14%	433
Quintile 4	0.5468	0.5161	3,392,628	6.81%	433
Quintile 5	3.4467	1.7580	45,062,224	90.49%	433
Panel B: Relative explanatory power over concurrent stock returns					
	R-Squared (Model: Earnings)	R-Squared (Model: Earnings Adj. for hedging derivatives)	Vuong's Z statistic	p-value	Number of observations
Sample	0.0938	0.0485	4.42	0.00	2133
Quintile 1	0.0324	0.0283	1.36	0.17	429
Quintile 2	0.1255	0.1053	1.13	0.26	431
Quintile 3	0.1091	0.0887	1.69	0.09	421
Quintile 4	0.1280	0.0955	1.97	0.05	426
Quintile 5	0.0972	0.0296	3.42	0.00	426
Panel C: Relative explanatory power over future earnings					
	R-Squared (Model: Earnings)	R-Squared (Model: Earnings Adj. for hedging derivatives)	Vuong's Z statistic	p- value	Number of observations
Sample	0.2628	0.1638	2.13	0.03	1940
Quintile 1	0.1558	0.1729	-1.52	0.13	372
Quintile 2	0.1194	0.0947	0.97	0.33	385
Quintile 3	0.3977	0.3567	2.62	0.00	387
Quintile 4	0.3445	0.2821	1.73	0.08	399
Quintile 5	0.3351	0.0910	1.64	0.10	397

Table 4 reports results of tests comparing the explanatory power for two alternative income measures (earnings and earnings excluding the earnings component attributed to hedging derivatives under SFAS 133) based on the subsample of hedging derivative users in the post SFAS 133 period. This sample is further sorted into quintiles based on the level of hedging derivative exposure, measured as the total notional amount of non-trading derivatives scaled by the market level of equity at the beginning of the quarter.

Panel A reports descriptive statistics on hedging derivative exposure for the overall sample and for each hedging derivative exposure quintile within the sample.

Panel B reports results comparing the following two models:

$$R_{i,t} = \beta_0 + \beta_1 IB_{i,t} + \beta_2 LOSS_{i,t} + \beta_3 IB_{i,t} _ LOSS_{i,t} + \varepsilon_{i,t}$$

Model (Earnings Adj. for hedging derivatives):

$$R_{i,t} = \beta_0 + \beta_1 EXIB_{i,t} + \beta_2 LOSSE_{i,t} + \beta_3 EXIB_{i,t} _ LOSSE_{i,t} + \varepsilon_{i,t}$$

The dependent variable is the bank holding company's cumulative stock returns during the same quarter. $IB_{i,t}$ is bank holding company's income before extraordinary items during quarter t , scaled by the market value of equity at the beginning of the quarter. $EXIB$ is quarterly income before extraordinary items excluding the earnings component attributed to hedging derivatives under SFAS 133. $LOSS$ is a dummy variable coded as 1 if IB is negative and $LOSSE$ is a dummy variable coded as 1 if $EXIB$ is negative. Panel B reports R^2 for each model and Vuong's (1989) Z-statistic comparing the explanatory power of the two models for the overall sample and for each hedging derivative exposure quintile within the sample.

Panel C reports results comparing the following two models:

$$IB_{i,t+1} = \beta_0 + \beta_1 IB_{i,t} + \beta_2 LOSS_{i,t} + \beta_3 IB_{i,t} _ LOSS_{i,t} + \varepsilon_{i,t}$$

Model (Earnings Adj. for hedging derivatives):

$$IB_{i,t+1} = \beta_0 + \beta_1 EXIB_{i,t} + \beta_2 LOSSE_{i,t} + \beta_3 EXIB_{i,t} _ LOSSE_{i,t} + \varepsilon_{i,t}$$

The dependent variable is next quarter's earnings scaled by the market value of equity at the beginning of the quarter. All the independent variables are the same as discussed above. Panel C reports R^2 for each model and Vuong's (1989) Z-statistic comparing the explanatory power of the two models for the overall sample and for each hedging derivative exposure quintile within the sample.

Table 5: Valuation coefficients of hedging gains/losses

Panel A: First stage selection model							
LNTASS	EQRAT	NIM	NOTES	DIV	LIQUID	GAP12	NETCO
0.74	3.17	6.24	2.21	-53.77	-2.30	0.97	-10.77
(36.10)***	(3.39)**	(2.52)**	(7.80)***	(-3.84)***	(-2.43)**	(5.89)**	(-1.13)
N(population)	5601						
N(censored)	3471						
N(uncensored)	2130						
Panel B: Second stage (Model 1)							
EXIB	HEDGE	Mills (lamda)					
1.69	2.15	0.03					
(11.18)***	(8.05)***	(6.48)***					
N	2130						
Wald							
chi-square	130.10	p=0.00					
Panel C: Second stage (Model 2)							
EXIB	HEDGE	LOSSE	LOSSH	EXIB_LOSSE	HEDGE_LOSSH	Mills (lamda)	
3.46	1.47	0.07	-0.01	-2.07	3.29	0.03	
(11.56)***	(4.95)***	(5.22)***	(-1.54)	(-5.75)***	(4.21)***	(5.60)***	
N	2130						
Wald							
chi-square	187.50	p=0.00					

Table 5 reports two-stage regression results on the incremental explanatory power of hedging gains/losses over concurrent stock returns in the post-SFAS 133 period (2001-2005). Regression results are based on Heckman two-stage method to correct for potential self-selection bias. The post-SFAS 133 period observations of bank holding companies in my sample form the population sample for the two stage analysis. The population sample consists of observations that use hedging derivatives and observations that do not use hedging derivatives. The observations within the population sample that do not use hedging derivatives are referred to as the censored observations because it is impossible to observe the value of the variable of interest (the fair value based hedging performance measure recognized into earnings under SFAS 133). The observations within the population sample that use hedging derivatives are referred to as the uncensored observations because the value of the variable of interest (the fair value based hedging performance measure recognized into earnings under SFAS 133) can be observed.

Panel A reports the results of the first-stage regression that models the selection of the uncensored observations from the population sample. The predictors are: Intercept (not tabulated), LNTASS (natural logarithm of total assets), EQRAT (book value of equity scaled by total assets), NIM (net interest income scaled by total assets), NOTES (notes and debentures scaled by total assets), DIV (dividend payout scaled by total assets), LIQUID (liquid assets consisting of cash and balances, federal funds sold, and securities purchased to resell, scaled by total assets), GAP12 (the absolute value of the difference between assets repricing or maturing within 12 months and liabilities repricing or maturing within 12 months, scaled by total assets), and NETCO (net loan charge off scaled by total assets).

Panel B and C report the results of second-stage regressions based on the following models respectively:

Model 1: $R_{i,t} = \gamma_0 + \gamma_1 EXIB_{i,t} + \gamma_2 HEDGE_{i,t} + \varepsilon_{i,t}$, and

Model 2: $R_{i,t} = \gamma_0 + \gamma_1 EXIB_{i,t} + \gamma_2 HEDGE_{i,t} + \gamma_3 LOSSE_{i,t} + \gamma_4 LOSSH_{i,t} + \gamma_5 EXIB_{i,t} * LOSSE_{i,t} + \gamma_6 HEDGE_{i,t} * LOSSH_{i,t} + \varepsilon_{i,t}$.

$R_{i,t}$ is bank i 's cumulative stock returns during the same quarter. EXIB is income before extraordinary items excluding the earnings component attributed to hedging derivatives under SFAS 133, scaled by the market value of equity at the beginning of the quarter. HEDGE is the earnings component attributed to non-trading derivatives under SFAS 133 (the fair value based hedging performance measure recognized into earnings under SFAS 133), scaled by the market value of equity at the beginning of the quarter). LOSSE is a dummy variable coded as 1 when EXIB is negative and LOSSH is a dummy variable coded as 1 when HEDGE is negative. Mills (λ) is the inverse mills ratio generated from the first-stage estimation that is intended to correct for sample selection bias.

Z statistics are reported in Parentheses. *, **, and *** indicate significance (two-tailed test) at 0.1, 0.05, and 0.01 level respectively.

Table 6: Incremental explanatory power of hedging gains/losses by level of hedging derivative exposure

Pane A	Sample	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
EXIB	1.63 (4.25)***	4.02 (2.23)**	2.03 (1.41)	2.42 (3.15)**	1.54 (6.86)***	1.28 (2.49)**
HEDGE	1.97 (2.87)***	6.50 (2.02)**	1.55 (0.75)	4.82 (1.71)*	3.91 (4.21)***	1.41 (2.16)**
R-squared	0.0516	0.0305	0.0281	0.0557	0.1179	0.0374
Number of observations	2133	429	431	421	426	426
Panel B	Sample	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
EXIB	3.61 (4.27)***	4.53 (2.45)**	7.20 (4.05)***	4.91 (2.21)**	3.34 (2.10)**	3.02 (6.16)***
HEDGE	1.23 (2.01)**	17.53 (2.04)**	2.50 (0.60)	6.08 (1.21)	6.22 (2.89)***	0.35 (0.55)
LOSSE	0.08 (3.82)***	0.19 (2.35)**	0.15 (3.02)***	0.17 (1.92)*	0.00 (0.10)	0.06 (3.77)***
LOSSH	-0.01 (-2.29)**	-0.00 (-0.58)	-0.03 (-2.13)**	-0.01 (-0.52)	-0.18 (-0.83)	-0.01 (-1.64)*
EXIB_LOSSE	-2.30 (-2.67)***	29.09 (1.87)*	-6.54 (-3.01)***	-3.03 (-1.27)	-2.14 (-1.31)	-2.40 (-3.61)***
HEDGE_LOSSH	3.64 (2.05)**	-19.50 (-1.26)	-18.22 (-1.87)*	4.66 (0.69)	-9.00 (-0.99)	4.35 (2.68)***
R-squared	0.0807	0.0386	0.1269	0.1151	0.1439	0.0884
Number of observations	2133	429	431	421	426	426

Table 6 reports OLS regression results on the incremental explanatory power of hedging gains/losses over concurrent stock returns based on the subsample of hedging derivative users in the post-SFAS 133 period (2001-2005). This sample is further sorted into quintiles based on the level of hedging derivative exposure, measured as the total notional amount of non-trading derivatives scaled by the market level of equity at the beginning of the quarter. Regression results are reported for the overall sample and for each hedging derivative exposure quintile within the sample

Panel A and B report OLS regression results based on the following models respectively:

Model A: $R_{i,t} = \gamma_0 + \gamma_1 EXIB_{i,t} + \gamma_2 HEDGE_{i,t} + \varepsilon_{i,t}$, and

Model B: $R_{i,t} = \gamma_0 + \gamma_1 EXIB_{i,t} + \gamma_2 HEDGE_{i,t} + \gamma_3 LOSSE_{i,t} + \gamma_4 LOSSH_{i,t} + \gamma_5 EXIB_{i,t} * LOSSE_{i,t} + \gamma_6 HEDGE_{i,t} * LOSSH_{i,t} + \varepsilon_{i,t}$.

$R_{i,t}$ is bank i 's cumulative stock returns during the same quarter. EXIB is income before extraordinary items excluding the earnings component attributed to hedging derivatives under SFAS 133, scaled by the market value of equity at the beginning of the quarter. HEDGE is the earnings component attributed to hedging derivatives under SFAS 133, scaled by the market value of equity at the beginning of the quarter. LOSSE is a dummy variable coded as 1 when EXIB is negative and LOSSH is a dummy variable coded as 1 when HEDGE is negative.

Two-way clustered t-statistics (by firm and quarter) are reported in parentheses *, **, and *** indicate significance (two-tailed test) at 0.1, 0.05, and 0.01 level respectively.

Table 7: Hedge ineffectiveness and idiosyncratic volatility

The analysis reported in Table 7 is based on the subsample of hedging derivative users from the post-SFAS 133 period. For each quarter, I first sort the observations in the subsample into five groups based on a size-adjusted measure of hedging derivative exposure level (total notional amount of hedging derivatives scaled by the market equity value at the beginning of the quarter). Then within each group, I further sort observations into quintiles based on hedge ineffectiveness over time (measured as the volatility of the earnings component attributed to hedging derivatives over the most recent eight quarters, scaled by the market equity value at the beginning of the quarter).

Hedging derivative exposure	Q1 (Low)	Q2	Q3	Q4	Q5 (High)
Hedge ineffectiveness					
Q1 (Low)	1.19	1.30	1.38	1.12	1.03
Q2	1.27	1.28	1.11	1.11	1.09
Q3	1.33	1.38	1.41	1.07	1.03
Q4	1.28	1.33	1.35	1.22	1.21
Q5 (High)	1.40	1.42	1.21	1.15	1.39
Q5(High)-Q1(Low)	0.21	0.12	-0.17	0.03	0.36
Newey-West t statistic	1.46	1.52	-1.60	0.34	2.20**

Table 7 reports the average idiosyncratic stock return volatility (in percentage) for each quintile portfolio, along with the differences between the top and bottom quintiles and the corresponding Newey-West t-statistics. Idiosyncratic volatility for each bank-quarter is measured as the standard deviation of the residuals from the time series regression based on Fama-French three-factor model using CRSP daily data.

*, **, and *** indicate statistical significance at 0.1, 0.05, and 0.01 level respectively (two-tailed test).