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Fair-Value Accounting of Derivatives and the Heterogeneity of Investor Beliefs

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FAIR-VALUE ACCOUNTING OF DERIVATIVES AND THE HETEROGENEITY OF INVESTOR BELIEFS

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University.

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“Far better is it to dare mighty things, to win glorious triumphs, even though checkered by failure, than to rank with those poor spirits who neither enjoy nor suffer much, because they live in a gray twilight that knows not victory nor defeat.”

– Theodore Roosevelt

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Abstract

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A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Business at Virginia Commonwealth University.

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Using a sample of 51 banking organizations, I examine the effect of the Statement of Financial Accounting Standard 133 on the belief heterogeneity of market participants and how this heterogeneity affects abnormal trading volume surrounding earnings announcements. SFAS 133 is the first standard to require that all derivatives be recognized at fair-value and that the fluctuations in derivative fair-values be reported in either net income or other comprehensive income. The behavior of derivative instruments and the fair-valuation and treatment prescribed by SFAS 133 are complex. Due to the underlying complexity of both derivatives and the accounting treatment prescribed by the SFAS 133 standard, I expect that investors may have differing interpretations of the newly provided information. My hypothesis is that the income effects arising from the fair-value accounting for derivatives (SFAS 133) are associated with an increase in differing beliefs among individuals.

I find that the income effects of SFAS 133 are significantly and positively related to belief heterogeneity among investors. The net income and other comprehensive income effects of SFAS 133 are significantly and positively related to increasing levels of abnormal trading volume surrounding earnings announcements. Additionally, levels of SFAS 133 net income is positively and significantly associated with three measures of belief heterogeneity derived from analysts' forecasts. In an extended analysis I model the SFAS 133 income effects on abnormal volume using the three belief heterogeneity measures as the conduit. I find support for two of the three heterogeneity measures acting as a conduit for the effect of the SFAS 133 related income measures on abnormal volume.

The results of this study indicate that, while the recognized fair-value of derivatives is value relevant to equity prices (Ahmed, Kilic, & Lobo, 2006), the income effects of the same financial standard causes heterogeneity in beliefs about the firm. This suggests that, at least in the case of derivative fair-values, there exists a trade-off between value relevance and the strength of consensus surrounding beliefs in the market.

I Introduction

The promulgation of Statement of Financial Accounting Standard (SFAS) 133 represents another significant step in the movement toward fair-value accounting. SFAS 133 requires that all derivatives be recognized (versus disclosed) at fair-value and that the fluctuations in fair-value be reported in either net income or other comprehensive income. Recent literature (for example, Ahmed, Kilic, & Lobo (2006)) provides evidence that the fair-value recognitions required under SFAS 133 are value-relevant. Value relevance is inferred from the aggregate market response operationalized as equity price reactions surrounding SFAS 133 recognitions. Prior studies suggest that trading volume can provide insights into the effects of information on market participants not available though an examination of consensus valuation (price) alone (Karpoff, 1987). Price responses reflect the aggregate market valuation whereas trading volume reflects differing beliefs, and possible information asymmetry among individuals. This study seeks to evaluate the possible asymmetry effect of the new standard by examining the belief heterogeneity among investors.

Using a sample of 51 banking organizations, I examine the heterogeneity in market participant responses to the fair-value recognitions required under SFAS 133. Under conditions where information is commonly received, assessments of the firm value can vary among individual market participants when they possess differential expertise in processing the information and/or they apply different underlying assumptions in their interpretation of the information.[1] While market forces will impound the consensus (average) interpretation of available information into the market value of the firm, SFAS 133 recognitions may expand the range of differential valuations held by individuals around the consensus price.[2] To the extent that the new information resulting from SFAS 133 generates greater differential (heterogeneous) beliefs among market participants, the standard may be inducing asymmetry among individuals.

The Financial Accounting Standards Board (FASB) has issued several standards dealing with the valuation, disclosure, and recognition of derivative fair-values. Disclosure of derivative information was first broadly addressed in 1990 with SFAS 105.[3] SFAS 107 and SFAS 119 (issued in 1991 and 1994, respectively) expanded the guidance for adequate disclosure of derivative information. SFAS 107 required, where practically estimable, the disclosure of derivative fair-values. SFAS 119 required the disclosure of derivative fair-values along with disaggregated amounts classified by type and purpose of the position.

With SFAS 133 in 1998, FASB required the recognition of derivative fair-values either as an asset or a liability on the statement of financial position. Gains and losses on the derivative position are handled differently depending on how the instrument is designated. At inception, a derivative position must be designated as a fair-value hedge, cash-flow hedge, foreign currency hedge, or a non-hedge position. In cases where the

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[1] Differential opinions also arise from asymmetric access to information. In this study, I assume that information is commonly received within the event window (3 and 7 days) surrounding the announcement date.
[2] Efficient price discovery in the financial markets is a necessary and maintained assumption in this analysis.
[3] SFAS 52 (1981) and SFAS 80 (1984) dealt with specific derivative instruments. Instruments not specifically covered by these standards were generally treated in a way that was consistent with the intent of

derivative is used as a fair-value hedge, the gain or loss on the hedge is recorded in current earnings along with the fair-value gain or loss on the instrument being hedged. The net result is that the ineffective portion of the hedge is reported in current period earnings.[4] The gains and losses associated with cash-flow hedges are reported in current period earnings. Alternatively, gains and losses associated with foreign currency hedges are reported in other comprehensive income as part of the cumulative translation adjustment. If the derivative is not used as a hedge, then the gains and losses associated with that instrument are recorded in current period earnings. The effect of the statement is that derivative positions are now shown in the body of the statements, thus altering the reported position and income measures of the firm.[5] The standard's complexity and implementation challenges have caused FASB to issue several clarifying standards and establish the Derivatives Implementation Group to deal specifically with derivative accounting issues.[6,7]

Empirical studies find value-relevance (equity price and return) in the information reported under SFAS 119 and SFAS 133. Venkatachalam (1996) examines the value-relevance of derivative disclosures required by SFAS 119. Through a cross-sectional analysis of banking institutions, he shows that the fair-value estimates of derivatives

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these standards. Nonetheless, SFAS 105 represents the first formal broad standard that set disclosure requirements for derivatives as a class of financial instrument.

[4] The effectiveness of a hedge is the degree to which fluctuations in the fair-value of the hedged item are offset by the hedging derivative. A perfect hedge is a situation where fluctuations in the hedged items are exactly offset by fluctuations in the hedging derivative. The ineffective portion of a hedge is, therefore, the amount by which the fluctuation in the hedged item is over or under the fluctuation in the hedging derivative.

[5] Income measures here refers to the combined effect on Net income and Other Comprehensive Income

[6] SFAS 138, 157 and 161 were all issued subsequent to SFAS 133 with the intent of clarifying SFAS133.

[7] The Derivatives Implementation Group, the first of its kind, was established by FASB with the purpose of providing ongoing guidance and consultation relative to the implementation of derivative related standards.

(provided under SFAS 119) have a positive and significant relationship with market valuations of the firm. Seow and Tam (2002) find that the disclosure of credit exposures and fair-value gains and losses on derivatives required under SFAS 119 have a significant association with equity returns. Most recently, in an examination of banks that held derivative positions requiring disclosure under SFAS 119 and recognition under SFAS 133, Ahmed, Kilic, and Lobo (2006) find that derivative fair-value recognition exhibit a significant positive relationship with equity valuation. They do not find significant coefficients on disclosed derivative fair-values. In the context of the prior studies, Ahmed et al., (2006) conclude that the disclosed derivative fair-values do not have incremental explanatory power of equity valuations in the presence of recognized derivative fair-values. Taken together, these studies show that derivative fair-values are relevant to equity valuations and that the relationship between recognized derivative fair-value and equity valuations overpowers that of disclosed derivative fair-values.

The analysis of price response thus far in the literature shows that the aggregate market finds value-relevance in these disclosures and recognitions. Since equity price reflects the aggregate or average market belief, changes in equity prices and abnormal returns reflect the revision in the aggregate or average market belief (Kim & Verrecchia, 1991). However, market participant beliefs and belief revision patterns can be inferred from an analysis of equity price and returns only if market participants are assumed to (1) possess homogeneous prior beliefs and (2) follow a homogeneous (parallel) path of belief revision after an announcement patterns (Karpoff, 1986).

An analysis of individual belief revisions is important since it shows how consistently the information is interpreted by market participants. When interpretations vary widely among investors, the reported information may not be clear or the ultimate valuation effect on the firm may not be commonly understood. To the extent that the standard is associated with widening differential beliefs among investors, the standard may induce asymmetry in the market.

Prior work suggests that increased trading volume is observed when investors revise their beliefs differentially (Bamber, Barron, & Stober, 1997, 1999; Karpoff, 1986; Kim & Verrecchia, 1991). As a result, the literature suggests that both price (consensus response) and volume reactions (belief revision response) should be examined when investigating the effect of information flows (Bamber & Cheon, 1995; Holthausen & Verrecchia, 1990; Morse, 1980; Ziebart, 1990). In these studies, consensus response is inferred from observed price response, and belief revision response is inferred from measures such as trading volume reaction, bid-ask spread, and dispersion of analysts' forecasts.

Due to the complexity of derivative instruments, the complexity of SFAS 133, differing capabilities and assumptions of individual investors, and the departure from historical cost measurement, I expect that heterogeneity in investors' beliefs surrounding earnings announcements after the adoption of SFAS 133 is greater than before the adoption. Further, consistent with prior literature, I expect that the increase in heterogeneity of beliefs manifests as increased abnormal trading volume surrounding post-SFAS 133 earnings announcements.

Using a sample of banking organizations, I examine the relationships between the income effects of SFAS 133, three measures of investor belief dispersion identified by Bamber et al., (1997), and three measures of abnormal trading volume. I focus on banking organizations since it is this industry most generally affected by this standard. The analysis centers on the adoption of SFAS 133, which occurred from 1998 through 2001. Since I am interested in fully capturing the adoption period of SFAS 133, I collect data for the fiscal years ending 1996 through 2003 for all firms included in the sample.

My general expectations is that SFAS 133 compliant earnings announcements result in increased heterogeneity of beliefs and that this heterogeneity is observed as abnormal trading volume. I first test for differences in the levels of trading volume and belief heterogeneity between the pre-SFAS 133 and the post-SFAS 133 periods. Second, I test for the degree of association between belief dispersion and the income effects of SFAS 133. Finally, I establish an association between belief dispersion attributable to the SFAS 133 income effect and abnormal trading volume.

I find that the income effect of SFAS 133 is significantly related to belief heterogeneity among investors. The income and other comprehensive income effects of SFAS 133 are significantly related to levels of abnormal trading volume surrounding earnings announcements. Additionally, the income effect of SFAS 133 is significantly associated with three measures of belief heterogeneity derived from analysts' forecasts. In an extended analysis I model the SFAS 133 income effects on abnormal volume using the three belief heterogeneity measures as the conduit. I find only weak support for two of the three heterogeneity measures acting as a conduit for the effect of the income measures on abnormal volume.

The results of this study may be informative to standard-setters as they seek to meet the objective of providing information that is useful in making rational investment decisions.[8] To the extent that investors' decisions seem less consistent and belief revisions become more divergent subsequent to issuing the fair-value standard, policy makers may need to either re-evaluate the ultimate purpose of such a standard, or evaluate the method by which the standard is implemented. In either case, standard-setters should be concerned not only with the consensus reaction (price) but also with the effect certain reporting has on individual investor's beliefs and belief revisions. Regulators may find it informative to evaluate the effect derivative fair-value reporting has on asymmetry among investors and the observed abnormal volume.[9]

This study contributes to the literature on derivative reporting by evaluating the effect fair-value derivative reporting has on investors' beliefs and trading volume. While prior studies have demonstrated the value-relevance of derivative reporting through the examination of equity prices (Ahmed et al., 2006), the literature provides no information on how these fair-value standards affect the informational landscape for individual market participants. Through an examination of investor belief revisions and the related trading

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[8] *Statement of Financial Accounting Concepts No. 1* (FASB, 1978), states that 'Financial reporting should provide information that is useful to present and potential investors and creditors and other users in making rational investment, credit, and similar decisions.'

[9] In a June 2000 address to the American Conference Institute, Commissioner Laura Unger stated "... we have to remember that information can only empower investors if they understand it and can effect apply it. Access to information is no substitute for knowing how to interpret it."

volume, I explore how belief heterogeneity may be induced by SFAS 133. Several researchers posit that, since price and trading volume reflect different information about the effect of announced data, value-relevance research should evaluate both price and volume effects (Bamber & Cheon, 1995; Karpoff, 1987). Yet, no prior studies have examined the investor belief revision and trading volume patterns associated with the application of fair-value recognition of derivatives on financial statements.

The remainder of this dissertation is organized as follows. Chapter 2 reviews the literature dealing with fair-value standards, heterogeneity of investors' beliefs, and analysts' forecasts. Chapter 3 provides a theoretical basis and motivation for the hypothesis. Chapter 4 describes the methodology, empirical models, and data sources used in, my examination. Chapter 5 presents the results of the analysis and the resultant implications. Chapter 6 concludes the analysis and identifies the limitations of the study as well as potential future areas of research.

II Literature Review

Background

There are three primary streams of research relevant to this study. The first stream of research deals with the fair-value reporting of derivatives. Generally these studies have provided empirical evidence that both notional and fair-value information is relevant to the level and change in equity prices.[10] Second, several studies have examined the information contained in trading volume incremental to the information contained in valuation (equity price and return) studies alone. These studies have generally demonstrated that where examination of price provides information on the aggregate market response, an analysis of trading volume yields insights into the dispersion of beliefs around the aggregate response. The third body of research relevant to this study deals with analysts' forecasts. These studies examine the degree to which analyst forecast error and the dispersion of analysts' forecasts provide insights into the clarity of the informational landscape in which investment decisions are made. Each of these research streams is now discussed in greater detail.

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[10] The notional amount (or notional principal amount or notional value) on a financial instrument is the nominal or face amount that is used to calculate payments made on that instrument. This amount generally does not change hands and is thus referred to as notional. In a bond, the buyer pays the principal amount at issue (start), then receives coupons (computed off this principal) over the life of the bond, then receives the principal back at maturity (end). In a swap (a type of derivative position), no principal changes hands at inception (start) or expiry (end), and in the meantime, interest payments are computed based on a notional amount, which acts as if it were the principal of a bond, hence the term notional principal amount, abbreviated to notional.

Value-Relevance of Derivative Reporting

Nelson (1996) examines the usefulness of the disclosures required under SFAS 107 in assessing the market value of common equity. She finds that the fair value of securities, whether included on the financial statements or not, was unrelated to the firm's equity valuations after controlling for future earnings.

In contrast to Nelson (1996), Barth (1996) finds evidence that fair-valuations explain market valuation premiums over book values even when bank-specific effects (regulatory capital requirements, deposit profile, etc) are included as control variables. However, she finds that off-balance sheet items (derivatives) are not significant in explaining the market-value versus book-value premium assigned by the market. While the two studies conflict with regard to the relationship between equity valuation and fair-valued assets, both conclude that footnote disclosures prior to SFAS 107 did not provide valuable information to the market.

Venkatachalam (1996) also finds that fair-value disclosure was value-relevant in explaining the cross-sectional variation in bank stock prices. Notional amounts of the derivative instruments also provided incremental information even in the presence of the fair-value information. The model specification used in the study treated disclosed and recognized information as equivalents, such that the coefficients on disclosures and recognitions were the same. Therefore, the results of the study reflect the different value-relevance of content (notional vs fair-value) rather than reporting method (disclosure vs. recognition).

In a study of international manufacturing firms, Wong (2000), finds a positive and statistically significant relationship between the notional derivative disclosures required under SFAS 119 and the foreign exchange risk exposure of the firm. He concludes that investors can use the disclosed notional information to evaluate the foreign exchange exposure of the firm since the notional value of the firm's derivative positions (hedges) is related to the level of foreign exchange rate exposure.

Moses (2002) identifies the conflict in prior literature regarding the value-relevance of fair-value disclosure (e.g. Barth et al., (1996) and Nelson (1996)) and finds that disclosures arising from SFAS 119 are value-relevant. The valuation model employed by Moses effectively controls for variables omitted in the literature prior to his study. Specifically, the difference between book- and market-value is used in earlier models without controlling for unique, firm-specific variables. Failure to control for these unique factors may have obscured the relationship under examination and may be the reason for the lack of significance in prior studies.

Seow and Tam (2002) also examine the value-relevance of SFAS 119 and attempt to remedy the omitted variable problem by controlling for firm-specific market beta. In their model, the firm-specific market beta is used to capture the firm-specific aspects not explicitly represented in the model. The derivative fair-values reported in footnote disclosures have a significant relationship with observed market returns for the period following the disclosure. They conclude that SFAS 119 disclosure requirements represented improved transparency to the investor and convey valuable information relative to observed returns.

Wang, Alam, and Makar (2005) examine the value relevance of notional disclosures required under SFAS 119 when fair-value information was also available. They find that the value relevance of notional derivative information was robust to the inclusion of fair-value information. In conjunction with Seow and Tam (2002), their results indicate that both the notional and fair-value reporting of derivatives are individually and jointly relevant for investors in evaluating future prospects of the firm.

Most recently, Ahmed et al. (2006) examine the value relevance of disclosure versus recognition with regard to SFAS 133. Using a sample of banking organizations, they examine the effect of SFAS 133 recognitions on the equity price level and return. More specifically, by examining those institutions that held risk management derivatives both before and after the adoption of SFAS 133, they are able to demonstrate the incremental value-relevance of the post SFAS 133 recognitions. They find that while the coefficients estimated for disclosed derivative information are not significant, the estimated coefficients on recognized derivative information are significant. This evidence indicates that the recognition of derivative fair-values provides value-relevant information to market participants.

Trading Volume and Belief Heterogeneity

As early as Bachelier (1900), researchers have hypothesized that changes in price level and changes in the level of trading volume could provide insights into different aspects of investor opinions about firm value. Beaver (1968) claims that isolating the volume effect is necessary to distinguish between market consensus changes and individuals' expectation changes. As such, Beaver (1968) implies that volume provides insights into the differential interpretation of information while price indicates the consensus interpretation of information.

Karpoff (1987) in an analytical examination of trading volume, concludes that abnormal trading volume does not necessarily imply disagreement regarding the newly available information. He shows that identical interpretation of new information when prior expectations were divergent could also give rise to abnormal trading as investors revise beliefs. To the extent that investors have homogeneous priors and homogeneous belief revisions arising from the new information, volume is merely a noisy artifact of market dynamics and contains no information. However, when prior beliefs and revisions are not homogeneous, volume may offer insight into the revision patterns of investors, and therefore, the degree to which investors similarly interpret information ((Bamber et al., 1999; Karpoff, 1987; Kim & Verrecchia, 2001).

Holthausen and Verrecchia (1990) introduce the notions of consensus and informedness. Consensus refers to the level of agreement among market participants at the release of new information, and informedness refers to the extent that participants become more knowledgeable at the point of information release. Both effects occur at the release of information, and the joint evaluation of price and volume reveals which of these two effects dominate the trading environment. An increase in informedness is inferred when the variance of unexpected price change and changes in trading volume are positively related. When the variance of unexpected price change and changes in trading volume are negatively related, the consensus effect dominates. This study introduces a conceptual joint interpretation of price and volume effects in the trading environment, but relies on the condition of homogeneous priors.

Ziebart (1990) finds that changes in abnormal trading volume are positively associated with both the changes belief dispersion and the change in the aggregate belief revision. He operationalizes belief dispersion as dispersion in analysts' forecasts and aggregate belief revision as the absolute value of the change in analysts mean forecast. Both belief dispersion and aggregate belief revision are jointly significant in the explanation of abnormal trading volume. Therefore, belief dispersion has incremental explanatory power for abnormal trading volume even after controlling for aggregate belief revisions.

Kim and Verrecchia (1991) find that the unexpected volume and the variance of price change are increasing functions of the precision of the announced information and decreasing functions of the amount of preannouncement public and private information. Investors are diversely informed and differ in the precision of their prior information (prior beliefs). Therefore, investors respond differently (heterogeneous belief revisions) to new information and this leads to positive trading volume effects. They assert that trading volume contains the differences among investors which are averaged out in the return data. Therefore, the examination of volume information in conjunction with returns information may identify systematic differences in investors' knowledge or other characteristics giving rise to different reactions across firms and types of announcements.

Abarbanell (1995) claims that inferences from studies using changes in forecast dispersion are threatened by the failure to control for the magnitude of price changes. Since the information released will likely affect both the trading volume and changes in forecast dispersion, including the magnitude of price change in the model is necessary to isolate the belief revision effect inferred from forecast revisions.

Bamber & Cheon (1995) investigate the relationship between the magnitude of equity price movement and the corresponding trading volume. They find that, on average, there exists a positive relationship between the magnitudes of price and volume reactions. However, in approximately 25 percent of the cases, the magnitude of price movement is different than the magnitude of volume movement. They report that the results of their study are broadly consistent with the idea that trading volume reaction is likely high (relative to price reaction) when the announcement generates differential belief revisions among individual investors.

Bamber et al.,(1997) investigate three distinct aspects of investor disagreement (heterogeneity of beliefs). They show that each of the measures (dispersion in prior beliefs, change in dispersion, and belief jumbling) plays an incremental role in explaining investor disagreement. Additionally, they note that each of these measures provides incremental explanatory power for abnormal trading volume. The dispersion in prior beliefs refers to the a priori disagreement among market participants prior to the release of new information. Larger prior dispersion leads to greater belief revision after information release and, therefore, larger trading volume. Belief jumbling occurs when market participants revise beliefs differentially from other market participants. This shows that the newly arrived information is processed and interpreted differently by individual market participants, thus causing the formulation of differential beliefs. Under conditions of jumbling, Bamber et al., (1997) found increased trading volume. Finally, the change in dispersion reflects the extent to which beliefs are, on average diverging (versus converging) around earnings announcements. As beliefs diverge, the degree of disagreement is increasing, and increased trading volume is observed.

In an examination of trading volume under speculative conditions, Kandel and Pearson (1995) show that models restricting market participants to common (or homogeneous) interpretation of commonly received information are overly restrictive. Along the same lines, Bamber, Barron and Stober (1999) identify two conditions under which differential interpretations explain a significant amount of the earnings announcement period trading volume. First, they show that trading coincidental with small price changes reflects differential interpretation of the information by investors. Second, differential interpretation is also significantly related to trading volume where trading volume is higher than the firm-specific non-announcement period trading volume. This study specifically identifies the importance of inventors' differential priors and differential interpretations when evaluating belief heterogeneity and its effect on trading volume.

Tkac (1999) finds that excess turnover (abnormal trading volume) is positively related to option availability and institutional ownership. Firm size is also influential, but the relationship was negative.

Cready and Hurtt (2002) demonstrate that volume-based metrics provide a stronger test of investor reaction than the conventional return-based metrics. As a result, they conclude that studies designed to detect investor response should include an examination of both return-based and trading-based metrics.

Literature in this stream of research shows the importance of examining both price and trading volume effects and how differential beliefs and belief revisions are manifest in trading volume.

Dispersion of Analyst Forecast and Belief Heterogeneity

Dispersion in analysts' forecasts, reflecting differential beliefs of analysts, has been examined in prior literature (Abarbanell, 1995; Bamber et al., 1997, 1999; Chaing, 2005; Irani & Karamanou, 2003; Rich, Raymond, & Butler, 1992). Additionally, these studies apply the dispersion in analysts' forecasts as a proxy for the general level of dispersion (belief heterogeneity) among market participants. Daley, Senkow and Vigeland (1988) specifically examine the use of analysts' forecasts as an *ex ante* measure of aggregate market uncertainty. They find that variance in analysts forecasts are a useful indicator of the aggregate markets uncertainty surrounding earnings announcements.

The source of differential beliefs is unobservable and may result from asymmetrical information and/or the differential processing of the same information (Barron, 1995; Kim & Verrecchia, 2001). Ajinkya, Atiase, and Gift (1991) examine the relationship between forecast dispersion and mean forecast revisions with trade volume. The results of this study indicate a significant positive relation between the dispersion of analysts' forecasts of annual EPS and the volume of trading. The relationship holds even after controlling for the volume effect of the magnitude of monthly revisions in the mean analysts forecast. That is, even after controlling for the surprise effect of the revisions, the dispersion of forecasts (a proxy for heterogeneity of beliefs) provides significant explanatory power for trading volume.

In a study of forecast dispersion and the underlying uncertainty of the forecast, Rich et al. (1992) examine the inflation expectations of analysts. They show that the forecast dispersion across respondents to the survey is positively and significantly associated with the measures of inflation uncertainty. While their results are tempered with sensitivity to the survey series used, the findings nonetheless, show that uncertainty manifests as dispersion in analysts' forecasts.

Barron (1995) extends the belief revision literature by isolating the differential belief revision effect. He measures differential belief revisions as the degree to which individual analyst forecasts are ordered (ranked) differently after the announcement than before the announcement. Consistent with Karpoff's (1986) supposition, Barron (1995) found that differential prior beliefs and differential belief revisions both demonstrated incremental explanatory power for variations in trading volume.

Diether, Malloy, and Scherbina (2002) find a negative relationship between analyst forecast dispersion and future expected returns. Similarly, Athanassakos and Kalimipalli (2003) found that analyst forecast dispersion was related to future return volatility. Together these studies indicate that the *ex-ante* uncertainty, observed *ex-post* as volatility in stock return, is associated with the level of dispersion in analysts' forecasts.

Hope (2003) found that a firm's disclosure of accounting policy was associated with reduced forecast dispersion. The finding suggests that as the transparency of a firm's reporting increases, the analysts' uncertainty is reduced, and more common (consensus) forecasts are rendered. Benrud (2007) in an analytical examination of dispersion, shows that both an increase in the cost of information and a decrease in the availability of information give rise to increased dispersion of analysts' forecasts. Therefore, several studies have used analyst forecasts as a proxy measure for belief heterogeneity in the market.

The preceding streams of research provide the basis for the development of this study's hypotheses. In anticipation of increased belief heterogeneity induced by SFAS 133 compliant earnings announcements, I hypothesize that the income effects of SFAS 133 are associated with increased trading volume. The hypotheses are now formally developed.

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III Hypothesis Development

Earnings announcements associated with SFAS 133 are expected to give rise to differential beliefs for four primary reasons. First, derivatives may be the most complex and least generally understood of all financial instruments. These instruments have little or no initial cost, and yet, can represent significant claims or liabilities to the firm. Actual performance of the derivative position is typically driven by specific contractual arrangements sensitive to fluctuations in underlying economic conditions (e.g. interest rates and default rates) or other performance conditions (e.g. delivery of a commodity, default). Understanding the net position is further complicated when the derivative is a hedge. Under hedge conditions, evaluating the true exposure of the firm requires an understanding of the hedged item, the conditions that change its value, and the degree to which the hedging derivative offsets the fluctuation in the hedged item. As such, understanding the specific conditions that drive the value of a given derivative position, and understanding the appropriate assumptions to use in assessing that derivative positions are not trivial. Given this inherent complexity of derivatives and their use, I expect market participants to develop differential opinions about the effect these instruments have on the firm.

Second, the complexity of accounting treatment prescribed in the standard may evoke differential evaluations by investors. The reporting of gains and losses on the derivative position depends on how the derivative is designated. At inception, a derivative position must be designated as a fair-value hedge, cash-flow hedge, foreign currency hedge, or non-hedge. In cases where the derivative is used as a fair-value hedge, the gain or loss on the hedge is recorded in current earnings along with the fair-value gain or loss on the instrument being hedged. The net result is that the ineffective portion of the hedge is reported in current period earnings.[11] The gains and losses associated with cash-flow hedges are reported in current period earnings. Alternatively, gains and losses associated with foreign currency hedges are reported in other comprehensive income as part of the cumulative translation adjustment. If the derivative is not used as a hedge, then the gains and losses associated with that instrument are recorded in current period earnings. The effect of the statement is that derivative positions are now shown in the body of the statements, thus altering the reported position and income of the firm. As a result, the meaning of fluctuations in fair-value and related income effects may be unclear, causing investors to make differential evaluations.

Third, commonly received information can, and generally is, interpreted differently by market participants. Investors possess different evaluative capability and experience and will apply different underlying assumptions when interpreting financial results. The uncertainly induced by the very nature of derivatives and the complexity of the standard may accentuate differences among investors' interpretations. Further, given the sensitivity of derivative fair-values to underlying assumptions and the difficulty in parsing permanent

[11] The effectiveness of a hedge is the degree to which fluctuations in the fair-value of the hedged item is offset by the hedging derivative. A perfect hedge is a situation where fluctuations in the hedged items are exactly offset by fluctuations in the hedging derivative. The ineffective portion of a hedge is, therefore, the amount by which the fluctuation in the hedged item is over or under the fluctuation in the hedging derivative.

and transitory income effects from derivatives, I predict the heterogeneity in investors' beliefs to increase after adoption of SFAS 133.

Finally, as the justification for historical cost accounting finds its roots in reliability and freedom from bias, a departure from an historical cost basis introduces the potential for reduced reliability and increased bias. The action by FASB following the introduction of SFAS 133 supports this concern. To clarify SFAS 133, FASB has issued SFAS 138, SFAS 157, and SFAS 161 (issued in 2000, 2006, and 2008, respectively). All of these subsequent standards are designed to clarify the valuation and financial accounting treatment of derivatives prescribed in the original standard. Each of these standards specifically addresses some aspect of SFAS 133 and provides modification or continuations of its applicability. Additionally, due to the complexity of the issues surrounding implementation of SFAS 133, FASB has instituted the Derivatives Implementation Group. The first of its kind, the purpose of the group is to provide ongoing guidance and consultation relative to the implementation of derivative related standards. The significant effort invested in clarifying SFAS 133 shows that the promulgating body believes that the standard has the potential to evoke inconsistent treatment and interpretation.

Ahmed et al., (2006) find that, based on observed equity prices and equity returns, the recognitions required under SFAS 133 generated a balance sheet effect that is value relevant.[12] They find differences between the coefficient on the fair-value of *disclosed* derivatives prior to SFAS 133 implementation and the coefficient on the fair-value of

[12] Ahmed et al., (2006) utilize the fair-value of financial assets and the fair-value of financial liabilities as the measure of the effect of SFAS 133. These measures will be discussed in greater detail in Chapter 4.

recognized derivatives after SFAS 133 implementation. The current study examines the effect of the earnings announcements under SFAS 133 on the differential beliefs of market participants and abnormal volume. Recognizing derivatives under SFAS 133 affects both Net Income (NI) and Other Comprehensive Income (OCI). The fair-value changes that affect both measures of income not only have the potential for reversal in subsequent periods, but also involve reclassification from OCI to NI under certain conditions. Additionally, the portion of fair value changes deemed to be associated with the ineffective portion of the hedge is not necessarily stable across time. In all of these cases, the OCI and NI effects are dependent on the underlying assumptions employed by the preparer. Market participants can be expected to evaluate the same information differentially and arrive at differential conclusions regarding the prospects of the firm. As a result, the changes in the fair-value of derivatives included in NI and OCI will be sources of differential beliefs. Given the inherent complexity of derivative instruments, the multifaceted nature of the standard, and the difficulty in interpreting the financial results reported under SFAS 133, I expect that the incremental income effect of SFAS 133 is related to differential beliefs held by market participants.

Bamber et al., (1997) identify three distinctly different aspects of differential beliefs; *prior dispersion*, *change in dispersion*, and *belief jumbling*. They report that trading volume around earnings announcements is increasing in prior dispersion, changes in dispersion, and belief jumbling after controlling for the magnitude of the contemporaneous price change. First, *prior dispersion* refers to market participants holding different beliefs about a firm and its prospects prior to the earnings announcement. This pre-existing dispersion in beliefs reflects the general disagreement that exists among investors prior to release of the new information. Upon release of the new information beliefs will either be confirmed or refuted. Other things equal, large prior belief dispersion will lead to a large magnitude of belief revision as market participants revise their views to be in line with the new information. Increased magnitudes of belief revisions drive the propensity to trade and result in the observed increase in abnormal volume. Given the complex valuation methods and reporting for changes in the fair-value of derivatives under SFAS 133 market participants can be expected to develop different prior views about the impending SFAS 133 compliant earnings announcements. Therefore, I anticipate increased belief dispersion prior to SFAS 133 compliant earnings announcement. My first set of hypotheses (in alternate form) is:

> **H1a: The *belief dispersion* prior to earnings announcements in the post-SFAS 133 periods is larger than that in the pre-SFAS 133 periods.**
>
> **H1b: The *belief dispersion* prior to earnings announcements in the post-SFAS 133 periods is positively related to the magnitude of NI and OCI attributable to SFAS 133.**

The second measure of differential beliefs used in the study is the *change* in belief dispersion. This measures the degree to which the announced information gives rise to more or less divergence in beliefs. That is, when post-announcement dispersion of beliefs is larger than pre-announcement dispersion of beliefs, then a positive *change* in belief dispersion has occurred. Where pre-announcement dispersion of beliefs measures the *a priori* disagreement among market participants, the *change* in belief dispersion measures the effect the new information has on the dispersion of beliefs among market participants. A positive *change* in dispersion of beliefs surrounding an announcement is interpreted as evidence that the new information has exacerbated the divergence of opinion in the market (Bamber et al., 1997, 1999). As divergence of opinion increases, the propensity to trade also increases since investors will seek to take equity positions consistent with the newly determined post-announcement beliefs.

I argue that the introduction of SFAS 133 is expected to give rise to a positive *change* in dispersion surrounding earnings announcements. Under the provisions of SFAS 133, changes in the fair-value of derivatives are handled as either an adjustment to capital through Other Comprehensive Income (OCI) or are reported in current Net Income (NI). The conditions that determine which classification is used depend on whether or not the derivative position is a hedge and if any portion of the hedge is considered ineffective. While the initial classification is likely to induce some level of belief heterogeneity, it is the unpredictable *changes* in these classifications from period to period that I believe will contribute significantly to heterogeneity of beliefs. The fair-value changes that affect both measures of income not only have the potential for reversal in subsequent periods, but also involve reclassification from OCI to NI under certain conditions. Additionally, the portion of fair value changes deemed to be associated with the ineffective portion of the hedge is not necessarily stable across time. In all of these cases, the OCI and NI effects are dependent on the underlying assumptions employed by the preparer. Market participants can be expected to evaluate the same information differentially and arrive at heterogeneous conclusions regarding the prospects of the firm. As a result, the changes in the fair-value of derivatives included in NI and OCI will be sources of differential beliefs. Therefore, I expect a positive *change* in belief dispersion surrounding SFAS 133 compliant earnings announcements, and that this positive *change* is more pronounced than is the case for pre-SFAS 133 earnings announcements. My second set of hypotheses (in alternate form) is:

> **H2a: The *change in belief dispersion* surrounding earnings announcements in the post-SFAS 133 periods is larger (exhibiting less convergence) than that in the pre-SFAS 133 periods.**
>
> **H2b: The *change in belief dispersion* surrounding earnings announcements in the post-SFAS 133 periods is positively related to the magnitude of NI and OCI attributable to SFAS 133.**

The third component of differential beliefs is belief jumbling and refers to the belief revision pattern for market participants. When the belief revision patterns (from pre-announcement to post-announcement) are not parallel and belief revision paths cross (such that the most optimistic prior to the announcement is not the most optimistic after the announcement), jumbling has occurred. Alternatively, when participants modify their beliefs of a firm's prospects in a parallel fashion (meaning the rank order of the participants' beliefs do not change), then jumbling has not occurred. When market participants' beliefs change rank order relative to an informational release, then they are differentially revising their opinions. Belief jumbling may occur when an announcement fails to remove informational disadvantages, or conveys private information to a subset of market participants who possess advantages in processing information (Bamber et al., 1997). Where participants in the market may have differential skills in interpreting newly released information, jumbling is likely to be observed. This reflects the effect of different interpretations of commonly received information as described by Barron (1995).

Given the complexity of the standard, the sensitivity of financial results to underlying assumptions and the volatility of NI and OCI results, I expect that some participants are more expert in discerning which derivative information is relevant and in drawing conclusions from that information. As a result, belief jumbling surrounding earnings announcements should be more pronounced in the post-SFAS 133 periods than in the pre-SFAS 133 announcement periods. My third set of hypotheses (in alternate form) is:

> **H3a: The degree of *belief jumbling* surrounding earnings announcements in the post-SFAS 133 periods is larger than that in the pre-SFAS 133 periods.**
>
> **H3b: The degree of *belief jumbling* surrounding earnings announcements in the post-SFAS 133 periods is positively related to the magnitude of NI and OCI attributable to SFAS 133.**

Bamber et al. (1997; 1999) have shown that all the three measures of disagreement are incrementally valuable in explaining abnormal trading volume. Further, trading volume around earnings announcements is increasing in all three of these measures (Bamber et al., 1997). Consistent with prior research, each of the three belief dispersion measures is expected to provide incremental explanatory power for observed abnormal volume. The first three hypotheses tested for a relationship between SFAS 133 income effects and each measure of belief heterogeneity. Hypothesis four is designed to directly test the underlying assertion of this paper; that post-SFAS 133 earnings announcements result in increased heterogeneity of beliefs and that this heterogeneity manifests as abnormal trading volume.

As discussed in greater detail in the Methodology section, I separate the portion of belief heterogeneity explained by the SFAS 133 income effects and the portion of belief heterogeneity attributable to other factors. The parsed heterogeneity metrics (the portion related to SFAS 133, and the portion related to all other factors) are then used as independent variables in a model designed to explain abnormal volume. Consistent with prior hypotheses, I expect SFAS 133 income effects to induce incremental belief heterogeneity, and this additional heterogeneity, in turn, has explanatory power for abnormal volume. My last three hypotheses are formally stated (in alternate form):

> **H1c: *Belief dispersion* attributable to SFAS 133 is positively associated with abnormal trading volume around earnings announcements in the post SFAS 133 period.**
>
> **H2c: *Change in belief dispersion* attributable to SFAS 133 is positively associated with abnormal trading volume around earnings announcements in the post SFAS 133 period.**
>
> **H3c: *Jumbling* attributable to SFAS 133 is positively associated with abnormal trading volume around earnings announcements in the post SFAS 133 period.**

IV Methodology

Data Sources and Sample Selection

The sample consists of banks and bank holding companies for which SFAS 133 applies. To be included in the sample, the bank or bank holding company must (1) use derivatives for non-trading purposes, (2) be publicly traded, (3) have 10K reports on LexisNexis, (4) have annual observations in the Bank Regulatory database for two years before and two years after the adoption of SFAS 133, (5) have analysts' forecasts available from I/B/E/S, and (6) have data reported in the Compustat and Center for Research in Security Prices (CRSP) databases. Since SFAS 133 was adopted at the firm's discretion between 1998 and 2001, I included data for all firms from 1996 to 2003. The data set, therefore, includes two years of data before any firm adopted SFAS 133, and two years after all firms had adopted SFAS 133.[13] Stock price, equity return, and trading volume data were obtained from CRSP. The effect of derivative reporting under SFAS133 was collected manually from firm 10Ks reported through the SEC and FRY-9 reports from the Bank Regulatory database. Analyst forecast information is taken from First Call and I/B/E/S. Based on the preceding selection criteria, and data availability, a sample of 51 firms representing 223 firm-years is used. Of the surviving 51 firms, all adopted SFAS 133 for the 2001 fiscal year. Therefore, the sample does not include any early adopters.

[13] The data, therefore, fully accounts for the entire period over which SFAS 133 was adopted.

Measures

Heterogeneity of Beliefs

According to Bamber (1997), the heterogeneity of investor's beliefs has three aspects. I compute the disagreement measures in accordance with Bamber (1997) using analysts' forecasts and changes in those forecasts. First, dispersion in prior beliefs (DISP) refers to the a priori disagreement among market participants prior to the release of new information. It is measured as the pre-announcement standard deviation of analysts' forecasts of annual earnings divided by the absolute value of the mean forecast[14]. For consistency with Ajinkya, Atiase, and Gift (1991) and Barron (1995), only analysts' forecasts issued within 45 days of the announcement are included. Due to normality issues and for consistency with Bamber et al. (1997), I use the log-transformed measure (LDISP).

The change in forecast dispersion reflects the extent to which beliefs are, on average, diverging (converging) around earnings announcements (Bamber et al., 1997). This metric is computed by first computing the post-announcement standard deviation of analysts' forecasts based on all forecasts generated within 30 days following an announcement. From this I subtract the pre-announcement standard deviation computed on all analysts forecasts issued within 45 days before the announcement. The change in standard deviation is then divided by the absolute value of the mean pre-announcement forecast and is denoted as ΔDISP.

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[14] The absolute value of analyst mean forecast is used to avoid the computation of a negative dispersion, and directly follows Bamber et al.,(1999)

Belief jumbling occurs when individual investor's expectations change relative to that of other investors. Following Barron (1995), I measure jumbling around an announcement as the complement of the correlation (Spearman) between the relative position of individual analyst's pre-announcement forecasts and post-announcement forecasts. The pre-announcement forecasts are those that were issued within 45 days of the announcement and the post-announcement forecasts are those issued within 30 days following the announcement. I order the forecasts from lowest to highest, compute the Spearman correlation (ρ), and then subtract the estimate of ρ from 1 to obtain the measure of jumbling. Consistent with Bamber et al., (1997), the lognormal transformation of the resulting measure is used in the analysis.[15]

Fair-Value Measures

Aspects of the earnings announcement that are suspected of driving the re-evaluation of firm prospects are the Net Income and Other Comprehensive Income effects of derivative fair valuation. The two major income components of interest are Net Income before Extra Ordinary Items (NI) and Other Comprehensive Income (OCI). For this study, both income measures are separated into the SFAS 133 component, and the non-SFAS 133 component. I decompose NI into the SFAS 133 portion (DNI) and the non-SFAS 133 portion (NDNI). Similarly, I decompose OCI into a SFAS 133 portion (DOCI) and the non-SFAS 133 portion (NDOCI). The sum of DNI and DOCI, then, represents the total

[15] Bamber et al., (1997) use $\ln(1.1 - \rho)$ to avoid taking the log of zero when $\rho=1$.

income effect of SFAS 133. All of the income effect variables, DNI, DOCI, NDNI, and NDOCI, are scaled on number of shares outstanding.

Abnormal Volume

To evaluate the volume effect I establish three alternative measures grounded in prior literature. I initially employ a 3-day event window (-1 to +1) to examine the abnormal volume surrounding earnings announcements. Additionally, I repeat the analysis with a 7-day event window (-1 to +5) since prior research has shown that abnormally high trading volume persists for at least 5 days following the event (Morse, 1980). All three measures require the estimate of normal trading volume which is based on a non-announcement period beginning the 50th trading day prior to the announcement date and ending the 10th day prior to the announcement date. Exclusion of the 10 trading days before the announcement is consistent with Bamber and Cheon (1995).[16] The same non-announcement period is used for both the 3-day and 7-day abnormal volume metrics.

For the first and second measures of abnormal volume, I estimate the normal liquidity trading volume for the firms, and then predict the normal volume during the announcement period. The difference between the estimated normal volume and the actual trade volume is taken as the abnormal volume during the announcement period.

The first measure of abnormal volume is based on a cross-sectional, two-way fixed effect estimation. Following Bamber et al. (1997), I include of controls for market-wide

[16] Bamber and Cheon (1995) computed normal liquidity volume for a firm by excluding the trading volume for the 21 days surrounding an earnings announcement. They exclude observations 10 days prior and 10 days subsequent to earnings announcement.

trading (MKTVOL) and firm size (MVE). Also consistent with Bamber et al. (1997), I use the natural log of both control variables. Utama and Cready (1997) utilize year dummy variables to allow for different year-effects in normal trading volume over time. Accordingly, I control for year-specific effects by including year-effects (YE) in the model. Finally, to allow for firm-specific effects that may be related to volume, I include firm-effects (FE) estimation in my model.

Using the non-announcement period defined earlier (beginning 50 trading day prior to the announcement date and ending the 10 days prior to the announcement date), I estimate equation 2 for the non-announcement period. Using the estimated coefficients from equation 2, I predict the daily trading volume for firm *i* ($\hat{V}_{id}$) during the 3-day (7-day) announcement period. The sum of the predicted daily volume through the announcement period is the estimated volume for the announcement period (EV_{it}). The sum of the actual daily volume (V_{id}) through the announcement period is the actual announcement period trade volume (V_{it}). Abnormal trading volume for firm *i* during announcement period *t* (AV_FE_{it}) is the difference between the actual volume (V_{it}) over the announcement window and the predicted volume (EV_{it}) over the announcement window. The subscript *i* represents the firm and the subscript *t* represents the announcement period. Since the study examines a total of six annual earnings announcements for each firm, the subscript *t* will take on a value of one to seven for each firm. Equation 2 is estimated using a cross-sectional panel data set.

$$V_{id} = \beta_0 + \beta_1 (LN\_MKTVOL_d) + \beta_2 (LN\_MVE_{it}) + (FE_i) + (YE_t) + \varepsilon_{id} \quad \textbf{(2)}$$

$$V_{it} = \sum_{d-1}^{d+1} \left(V_{id} \right) \quad \textbf{(3)}$$

$$EV_{it} = \sum_{d-1}^{d+1} \left(\hat{V}_{id} \right) \quad \textbf{(4)}$$

$$AV\_FE_{it} = (V_{it} - EV_{it}) \quad \textbf{(5)}$$

Where;

$\boldsymbol{V_{id}}$ =daily trading volume as a percentage of shares outstanding for firm *i* on day *d*
$\boldsymbol{LN\_MKTVOL_d}$=daily market trading volume as a percentage of shares outstanding in the market on day *d*
$\boldsymbol{LN\_MVE_{it}}$=market value of equity for firm *i* in year *t* measured at the end of the day before the annual announcement date
$\boldsymbol{FE_i}$ **=** firm-effect estimator for firm *i*
$\boldsymbol{YE_t}$ **=** year-effect estimator for year *t*
$\boldsymbol{V_{it}}$= actual trading volume as a percentage of shares outstanding for firm *i* during announcement period *t*
$\hat{V}_{id}$ = predicted trading volume as a percentage of shares outstanding for firm *i* during announcement period *t*
$\boldsymbol{EV_{it}}$ = sum of $\hat{V}_{id}$ over the 3-day and 7-day windows representing the estimated trading volume as a percentage of shares outstanding for firm *i* during the announcement period in year *t*
$\boldsymbol{AV\_FE_{it}}$ = the difference between $\boldsymbol{V_{it}}$ and $\boldsymbol{EV_{it}}$ for firm *i* during announcement period *t*

The second measure for abnormal volume closely follows Cready and Hurtt (2002). They control for market and idiosyncratic trading volume with the use of a serially correlated regression (time-series) which regresses the log of the percent of shares traded for firm *i* on day *d* on the log of the percent of shares traded for firm *i* in day *d-1* and the log of the percent of shares traded for the market on day *d*. In their 2002 study, Cready and Hurtt examine alternative measures of investor reaction surrounding earnings announcements. They test both trading volume and equity return metrics. They conclude that volume measures, and in particular the one I employ here, are superior in correctly rejecting the null hypothesis of no investor response. Consistent with their approach, I estimate the following first order auto-regressive model separately for each firm for the non-announcement period. I use the same non-announcement period definitions used before:

$$V_{id} = \beta_{0i} + \beta_{1i}V_{id-1} + \beta_{2i}MV_{id} + \varepsilon_{id} \qquad \textbf{(6)}$$

Based on the estimated model, I forecast the estimates of firm daily volume through the announcement period (3-day and 7-day). Actual volume (V_{it}) is the sum of the actual volume observed during the announcement period. Likewise, estimated normal volume (EV_{it}) is the sum of the predicted volume over the announcement period using estimates from equation 6. Consistent with Cready and Hurtt (2002), abnormal volume from the time-series model is the difference between the actual volume and the predicted volume standardized by the standard deviation of the residuals from the regression used to estimate EV. The representations below are for the three day announcement window.

$$EV_{it} = \sum_{d-1}^{d+1}\left(\hat{V}_{id}\right) \qquad \textbf{(7)}$$

$$V_{it} = \sum_{d-1}^{d+1}\left(V_{id}\right) \qquad \textbf{(8)}$$

$$AV\_TS_{it} = \frac{\left(V_{it} - EV_{it}\right)}{\sigma_{it}} \qquad \textbf{(9)}$$

Where;

$\boldsymbol{V_{id}}$ =log of daily trading volume as a percentage of shares outstanding for firm *i* during day *d*
$\boldsymbol{MV_{d}}$ =log of daily market trading volume as a percentage of shares outstanding for the market on day *d*

$\boldsymbol{V_{it}}$= log of actual trading volume as a percentage of shares outstanding for firm *i* during announcement period *t*
$\boldsymbol{EV_{it}}$= log of estimated trading volume as a percentage of shares outstanding for firm *i* during announcement period *t*
$\boldsymbol{\sigma_{it}}$= the standard deviation of the residuals from the market regression used to determine EV_{it}
$\boldsymbol{AV\_TS_{it}}$= the difference between V_{it} and EV_{it} for firm *i* during announcement period *t*

The third abnormal volume metric follows Bamber and Cheon (1995). They compute two measures; one measuring fluctuations in the firm's percentage of shares traded, and the other measuring the difference between the firm's percentage of share traded relative to the market's percentage of shares traded. Tkac (1999) suggests that fluctuations in market volume can influence firm trading volume. Therefore, a single measure of a firm's abnormal trading volume should capture the firm's fluctuations in trading volume while controlling for fluctuations in trading volume market-wide. By controlling for market-wide fluctuations the firm's idiosyncratic abnormal trading volume can be isolated. Accordingly, I adjust Bamber and Cheon's (1995) firm specific measure by subtracting from it the difference between the market-wide percentage of shares traded during the announcement period and the market-wide percentage of share traded during the non-announcement period.[17] This difference-in-differences approach produces a measure of firm abnormal trading volume adjusted for fluctuations in market-wide trading volume.

I compute the firm's difference in volume as the difference between the percentage of outstanding shares traded during the 3-day (7-day) announcement period and the

[17] This is a difference-in-differences approach since I am subtracting the difference in the market-wide percentage of shares traded (between announcement period and non-announcement period) from the

average percentage of shares traded during the non-announcement period. The market-wide difference in volume is the difference between the percentage of outstanding shares traded market-wide during the 3-day (7-day) announcement period and the percent of shares traded market-wide during the non-announcement period. The difference between the firms' volume difference and the markets' volume difference are the measures of abnormal volume AV03DF (3-day) and AV07DF (7-day). Formally, AV03DF and AV07DF are calculated as:

$$(AVxxDF_{it}) = \left[\left(\frac{AP\_TRADE_{it}}{AP\_OUT_{it}}\right) - \left(\frac{NA\_TRADE_{it}}{NA\_OUT_{it}}\right)\right] - \left[\left(\frac{AP\_TRADE_{market,t}}{AP\_OUT_{market,t}}\right) - \left(\frac{NA\_TRADE_{market,t}}{NA\_OUT_{market,t}}\right)\right] \quad \textbf{(1)}$$

Where;

$AVxxDF_{i,t}$ = represents 3-day window (AV03DF) and 7-day window (AV07DF) abnormal volume for firm 'i' in year 't'.
AP_TRADE_{it}= sum of trading volume over three (seven) day announcement period for firm 'i' in year 't'.
AP_OUT_{it}= sum of firm shares outstanding over three (seven) day announcement period for firm 'i' in year 't'.
NA_TRADE_{it}= sum of trading volume for firm 'i' in year 't' over the non-announcement period which begins fifty days prior to the announcement date and ends ten days before the announcement date of firm 'i'.
NA_OUT_{it}= sum of firm shares outstanding for firm 'i' in year 't' over the non-announcement period which begins fifty days prior to the announcement date and ends ten days before the announcement date of firm 'i'.
$AP\_TRADE_{market,t}$= sum of market-wide trade volume over three (seven) day announcement period in year 't'.
$AP\_OUT_{market,t}$= sum of market-wide shares outstanding over three (seven) day announcement period in year 't'.
$NA\_TRADE_{market,t}$= sum of market-wide trading volume in year 't' over the non-announcement period which begins 50 days prior to the announcement date and ends ten days before the announcement date of firm 'i'.
$NA\_OUT_{market,t}$= sum of market-wide shares outstanding in year 't' over the non-announcement period which begins 50 days prior to the announcement date and ends ten days before the announcement date of firm 'i'.

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difference in the firm's percentage of shares traded (between announcement period and non-announcement period).

Control Variables

Abnormal Returns

Many researchers (Abarbanell, 1995; Bamber & Cheon, 1995; Barron, 1995; Cready & Hurtt, 2002; Holthausen & Verrecchia, 1990; Karpoff, 1986) have suggested that studies designed to detect investor response should include an examination of both return-based and trading-based metrics. As the trading volume response is in part related to the price response, the inclusion of this control is necessary to isolate the trading volume fluctuations attributable to other factors. Consistent with prior research, I include a control variable for abnormal returns. Cumulative abnormal returns are computed for both the three-day (CAR03) and seven-day (CAR07) event windows.[18] Following Bamber et al., (1999), the natural log of the absolute value of the computed abnormal return is used in the model (LCAR03 and LCAR07).

Earnings Surprise

Abarbanell (1995) suggested that research using dispersion in analysts' forecasts as a proxy for investor disagreement should include a measure for earnings surprise as well as other controls. Consistent with Bamber et al. (1997), the control variable for earnings surprise is defined as the absolute value of the difference between the mean analysts forecast and the actual EPS (before extra items), deflated by the absolute value of the mean

[18] CRSP excess returns are only sparsely available for my sample. Therefore, I compute excess returns.

forecast (SUR).[19] Following Bamber et al., (1999), the log of this variable will be used to control for skewness (LSUR).

Institutional Holding

Utama and Cready (1997) and Tkac (1999) examine the differential access to information as well as differential capacity for processing that information between institutional and non-institutional investors. These studies indicate that the observed volume response attendant to an earnings announcement can be expected to be partially explained by the differences in institutional holdings across firms. Therefore, I include the percent of shares held by institutions as a control variable in my volume models (INST). I measure institutional holdings at the close of the last trading day before the announcement date.

Level of Derivative Activity

Ahmed et al., (2006) found value-relevance in the magnitude of the net fair-value of recognized derivatives (post SFAS 133). However, they found no value-relevance for the net fair-value of disclosed derivatives (pre SFAS 133). The interest in the current study is to isolate the income effect of the new standard, and, therefore a control for the magnitude of derivative activity is necessary. Consistent with the operationalization employed by Ahmed et al., (2006), I use the net fair-value of *recognized* derivatives (RFVD) as a control for the magnitude of derivative activity in the post SFAS 133 period and the net fair-value of *disclosed* derivatives (DFVD) as a control in the pre-SFAS 133

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[19] I also replicate the analysis under a random-walk assumption using earnings in time t as the expectation of earnings in time t+1.

period. Both RFVD and DFVD are scaled on the number of shares outstanding at the close of business the day before the earnings announcement. To allow a direct examination of the differential effect between disclosure and recognition on the heterogeneity measures, I include both DFVD and RFVD in the model as FVD (fair-value of derivatives) and introduce an interaction term (POST) that takes the value of one in the post-SFAS 133 periods.

Tests for Hypotheses H1a-b, H2a-b, and H3a-b

Hypotheses H1a, H2a, and H3a are examined via univariate analysis and statistical tests for differences in means. Hypotheses, H1b, H2b, and H3b claim a relationship between the three measures of belief heterogeneity and income measures. These models are estimated individually using a cross-sectional panel data set.

$$LDISP_{it} = \beta_0 + \beta_1(DNI_{it}) + \beta_2(DOCI_{it}) + \beta_3(NDNI_{it}) + \beta_4(NDOCI_{it}) + \beta_5(FVD_{it}) + \beta_6(POST*FVD_{it}) + \beta_7(LSUR_{it}) + \beta_8(INST_{it}) + (FE_i) + (YE_t) + \varepsilon_{it} \quad \textbf{(10)}$$

$$\Delta DISP_{it} = \beta_0 + \beta_1(DNI_{it}) + \beta_2(DOCI_{it}) + \beta_3(NDNI_{it}) + \beta_4(NDOCI_{it}) + \beta_5(FVD_{it}) + \beta_6(POST*FVD_{it}) + \beta_7(LSUR_{it}) + \beta_8(INST_{it}) + (FE_i) + (YE_t) + \varepsilon_{it} \quad \textbf{(11)}$$

$$JUMB_{it} = \beta_0 + \beta_1(DNI_{it}) + \beta_2(DOCI_{it}) + \beta_3(NDNI_{it}) + \beta_4(NDOCI_{it}) + \beta_5(FVD_{it}) + \beta_6(POST*FVD_{it}) + \beta_7(LSUR_{it}) + \beta_8(INST_{it}) + (FE_i) + (YE_t) + \varepsilon_{it} \quad \textbf{(12)}$$

Where;

$LDISP_{it}$ = pre-announcement standard deviation of analysts' forecasts of annual earnings divided by the absolute value of the mean forecast for firm *i* in year *t*

$\Delta DISP_{it}$ = standard deviation of earnings forecasts after earnings announcement less the standard deviation of earnings forecasts preceding the earnings announcement. This change in the standard deviation is divided by the absolute value of the mean pre-announcement forecast for firm *i* in year *t*

$JUMB_{it}$ = the complement of the correlation (Spearman) between the relative position of individual analysts' pre and post announcement forecasts for firm *i* in year *t*

DNI_{it} = portion of net income before extraordinary items attributable to SFAS 133, scaled by the number of shares outstanding at the close of business the day before the earnings announcement for firm *i* in year *t*

$DOCI_{it}$ = portion of Other Comprehensive Income attributable to SFAS 133, scaled by the number of shares outstanding at the close of business the day before the earnings announcement for firm *i* in year *t*
$NDNI_{it}$ = portion of net income before extraordinary items ***not*** attributable to SFAS 133, scaled by the number of shares outstanding at the close of business the day before the earnings announcement for firm *i* in year *t*
$NDOCI_{it}$ = portion of Other Comprehensive Income ***not*** attributable to SFAS 133, scaled by the number of shares outstanding at the close of business the day before the earnings announcement for firm *i* in year *t*
FVD_{it} = gross fair value of derivatives (recognized and disclosed) for firm *i* in year *t* scaled on the market value of equity at the close of business the day before the earnings announcement
$POST_{it}$ = a binary variable taking on the value of one in the post-SFAS 133 periods, otherwise the variable takes the value of zero.
$LSUR_{it}$ = log of the absolute value of the difference between the mean analysts forecast and the actual EPS (before extra items), deflated by the absolute value of the mean forecast for firm *i* in year *t*
$INST_{it}$ = percentage of outstanding shares held by institutional investors for firm *i* in year *t*
FE_i = firm-effect estimator for firm *i*
YE_t = year-effect estimator for year *t*

Support for hypotheses H1b, H2b, and H3b is found when the coefficients on DOCI and DNI are significant and positive. A significant and positive coefficient would indicate that measures of belief heterogeneity are increasing in the magnitude of income effects arising from SFAS 133 (DOCI and DNI).

Tests for Hypothesis H1c, H2c, and H3c

Hypotheses H1c, H2c, and H3c posit that the association between SFAS 133 reporting and abnormal volume is translated through belief revisions. That is, the new reporting (SFAS 133) gives rise to differential beliefs which in turn gives rise to abnormal trading volume. It is through the dispersion of beliefs that the new standard affects volume. To test this, heterogeneity must be decomposed into the portion attributable to SFAS 133, and the portion attributable to other factors. Accordingly, I first compute the portion of the three measures of belief heterogeneity attributable to SFAS 133. Using the coefficients for

DOCI and DNI from equations 10, 11, and 12, I construct variables for a second step regression with equations 13, 14, and 15 below. The metrics $\hat{LDISP\_DNI}_{it}$, $\Delta\hat{DISP\_DNI}_{it}$, and $\hat{JUMB\_DNI}_{it}$ each are estimates of the portion of the belief heterogeneity that is attributable to the SFAS 133 net income effect. The metrics $\hat{LDISP\_DOCI}_{it}$, $\Delta\hat{DISP\_DOCI}_{it}$, and $\hat{JUMB\_DOCI}_{it}$ each are estimates of the portion of the belief heterogeneity that is attributable to the SFAS 133 other comprehensive income effect. Second, I compute the portion of the belief heterogeneity measures not directly associated with SFAS 133 income effects by subtracting the total of the SFAS 133 income effects from LDISP, ΔDISP, and JUMB, respectively. As shown in equations 16, 17, and 18, these variables are denoted $\hat{LDISP\_OTH}_{it}$, $\Delta\hat{DISP\_OTH}_{it}$, and $\hat{JUMB\_OTH}_{it}$, respectively.

$$\hat{LDISP\_DNI}_{it} = \hat{\beta}_1(DNI_{it}) \tag{13a}$$

$$\hat{LDISP\_DOCI}_{it} = \hat{\beta}_2(DOCI_{it}) \tag{13b}$$

$$\Delta\hat{DISP\_DNI}_{it} = \hat{\beta}_1(DNI_{it}) \tag{14a}$$

$$\Delta\hat{DISP\_DOCI}_{it} = \hat{\beta}_2(DOCI_{it}) \tag{14a}$$

$$\hat{JUMB\_DNI}_{it} = \hat{\beta}_1(DNI_{it}) \tag{15a}$$

$$\hat{JUMB\_DOCI}_{it} = \hat{\beta}_2(DOCI_{it}) \tag{15b}$$

$$\hat{LDISP\_OTH}_{it} = LDISP - [\hat{LDISP\_DNI}_{it} + \hat{LDISP\_DOCI}_{it}] \tag{16}$$

$$\Delta\hat{DISP\_OTH}_{it} = \Delta DISP - [\Delta\hat{DISP\_DNI}_{it} + \Delta\hat{DISP\_DOCI}_{it}] \tag{17}$$

$$\widehat{JUMB\_OTH}_{it} = JUMB - [\widehat{JUMB\_DNI}_{it} + \widehat{JUMB\_DOCI}_{it}] \quad \textbf{(18)}$$

The decomposed heterogeneity measures are used in equations 19, 20, and 21. The model is then estimated to identify the relationship between heterogeneity induced by SFAS 133 and abnormal volume. Each of the models below is estimated separately as a cross-sectional regression including firm and year effects.

$$AV_{it} = \beta_0 + \beta_1\left(\widehat{LDISP\_DNI}_{it}\right) + \beta_2\left(\widehat{LDISP\_DOCI}_{it}\right) + \beta_3\left(\widehat{LDISP\_OTH}_{it}\right) + \beta_4(LCAR03_{it}) + \beta_5(LSUR_{it}) + \beta_6(INST_{it}) + (FE_i) + (YE_t) + \varepsilon_{it} \quad \textbf{(19)}$$

$$AV_{it} = \beta_0 + \beta_1\left(\widehat{\Delta DISP\_DNI}_{it}\right) + \beta_2\left(\widehat{\Delta DISP\_DOCI}_{it}\right) + \beta_3\left(\widehat{\Delta DISP\_OTH}_{it}\right) + \beta_4(LCAR03_{it}) + \beta_5(LSUR_{it}) + \beta_6(INST_{it}) + (FE_i) + (YE_t) + \varepsilon_{it} \quad \textbf{(20)}$$

$$AV_{it} = \beta_0 + \beta_1\left(\widehat{JUMB\_DNI}_{it}\right) + \beta_2\left(\widehat{JUMB\_DOCI}_{it}\right) + \beta_3\left(\widehat{JUMB\_OTH}_{it}\right) \beta_4(LCAR03_{it}) + \beta_5(LSUR_{it}) + \beta_6(INST_{it}) + (FE_i) + (YE_t) + \varepsilon_{it} \quad \textbf{(21)}$$

Where;

AV_{it} represents abnormal volume for firm *i* in period *t* and all other measures are as previously defined. Equations 19, 20, and 21 are estimated separately using each of the three previously defined abnormal volume measures; AV03TS, AV03FE, and AV03DF. The 7-day window versions of each of the three measures AV07TS, AV07FE, and AV07DF are also estimated.

One issue that arises in estimating equations 19, 20, and 21 is that the standard errors for the estimated belief heterogeneity measures are understated and are inappropriate for drawing inferences. According to Pagan (1984), Oxley and McAleer (1993), and Murphy and Topel (2002), the standard errors generated from the second step of a two step regression with constructed regressors will understate the true standard error. One solution is to apply post-hoc adjustments to the variance-covariance matrix to obtain correct standard errors. Another solution, and the one I use, is a bootstrap estimate of the standard errors. A more detailed discussion of the understated standard errors and the bootstrap approach is provided in the results section.

Hypotheses H1c, H2c, and H3c are supported when the coefficients β_1 and β_2 from equations 19, 20 and 21 are positive and significant. In each case, a significant finding would indicate that a portion of the abnormal trading volume in the post SFAS 133 period is associated with the heterogeneity of beliefs induced by the income effects of SFAS 133. Further, this would lend credence to the notion that the recognition of derivative fair-values gives rise to abnormal trading volume by altering the belief and belief revisions of investors.

Results indicate that the income effect (DNI and DOCI) resulting from the fair-value recognition of hedging derivatives induces differential beliefs among investors. This suggests that while fair-value recognition of hedging derivatives has value relevance (Ahmed et al., 2006), the income effect of such reporting induces a reduction in the consensus of beliefs in the market. That is, a trade-off exists between the value relevance of the fair-value recognition of hedging derivatives under SFAS 133 and the degree of consensus surrounding earnings under the standard.

IV Results

Sample Size Determination

The sample of banks required for the analysis was identified from the Bank Regulatory Database which is based on regulatory filings (Call Reports, FR-Y9, etc). From this database, a total of 439 banking organizations were identified as utilizing derivatives for hedging purposes. Only 101 of these organizations, representing 707 firm-years, also had 10-K filings with the SEC during the period 1996 though 2003. Since the income effect of SFAS 133 is only available from the 10-K filings, firms not filing with the SEC were excluded from the study.

Trading volume data for the firms in the sample were obtained from the Center for Research in Security Prices (CRSP) database. Trading volume data were needed for the period between 50 days prior to five days after the earnings announcement dates for each firm for the period 1996 - 2003. A total of 208 firm-years were lost from my sample due to an insufficient number of trading volume observations during the non-announcement period.

Measures of belief heterogeneity were computed from analysts' forecasts issued within 30 days prior to the earnings announcement date and 45 days following the earnings announcement date. The prior dispersion (LDISP) and change in dispersion (ΔDISP) heterogeneity measures rely on the standard deviation in analysts forecasts. The ΔDISP measure requires the standard deviation in analysts' forecasts both before and after the announcement date. For consistency I only include the forecasts for analysts that are present both before and after the announcement. In computing LDISP I use only forecasts from analysts that are retained for the ∆DISP computation. As a result, a total of 276 firm-year observations were lost. The analyses dealing with prior dispersion (LDISP) and change in dispersion (∆DISP), therefore, are restricted to 51 firms representing 223 firm-year observations. The third heterogeneity measure is based on the non-parametric correlation of analysts' rank ordered earnings forecast before and after the earnings announcement. Computation of this measure where only two analysts are present produces a correlation of 1 or -1. Therefore, I omit firm-years with less than three analysts providing forecasts before and after the announcement date. An additional 14 firms and 131 firm years are lost. The remaining sample for the analyses related to jumbling (JUMB) is restricted to 37 firms with 92 firm-years. Determination of sample just described is summarized as Table 1.

Data Set Description and Univariate Statistics

Table 2 reports the summary statistics for the firm-year observations included in the study. Panel A shows the summary statistics for the entire sample (N=223) in the study. Panel B shows the summary statistics for the firm-year observations before adoption of SFAS 133. In Panel B, derivative NI, derivative OCI, and derivative incomes are not reported since derivative income measures were not available prior to the adoption of SFAS 133. Panel C shows the summary statistics for the firm year observations after the adoption of SFAS 133. Overall, the table shows the consistency of the total sample with the pre and post SFAS 133 sub-samples.

TABLE 1
Sample Determination

This table provides a summary of how the final sample was determined.

	Number of Firms	Number of Firm-Years
Firms Identified as using Derivatives on the Bank Regulatory Database	439	
Initial Sample from SEC 10-K Collection	101	707
Loss due to missing volume data		(208)
Loss due to insufficient analyst following		(276)
Sample used in analysis of LDISP and ΔDISP	**51**	**223**
Observations having less than 3 analysts following		(131)
Sample used in analysis of JUMB	**37**	**92**

Firms were originally identified as using derivatives for hedging purposes for the period 1996 through 2003 based on reporting in the Bank Regulatory Database (form FY-9). Of these institutions, only 101 also filed 10-K with the SEC. These 101 firms represented 707 firm-years of data. Due to missing information necessary for the analyses, a total of 51 firms representing 223 firm-years are used in examinations of LDISP and ΔDISP. Further reduction in sample size is necessary to obtain reasonable estimates of JUMB. Therefore, a total of 37 firms, representing 92 firm-years, are used in examinations of JUMB.

The gross fair-value of derivatives reported in Table 2 shows the sum of the absolute value of all hedging derivative positions (asset or liability) for the firm. Panel A shows that the gross fair-value of derivatives for the total sample ranges from $0.01 million to 28.43 million with an average of $1.15 million. Panel B shows that in the pre-

SFAS 133 period the gross fair value of hedging derivatives ranges from 0.09 to 28.43 million with an average of 1.55 million. In the post SFAS 133 period (Panel C) the gross fair value of hedging derivatives ranges from 0.01 to 8.34 million with an average of 0.83. This represents a slight reduction in the nominal values of gross derivative positions, and may reflect a more careful application of derivative instruments after SFAS 133 was introduced.

Derivative net income and derivative other comprehensive income are also reported in Table 2. Since derivative income is only reported after the adoption of SFAS 133, the derivative income statistics reported in Panel A are identical to those reported in Panel C. Panel C shows that the derivative net income ranges from a loss of $2.5 million to profit of $0.9 million with the average being a loss of $14.6 thousand. Derivative other comprehensive income ranges from a negative equity adjustment of $472.0 thousand to a positive equity adjustment of $930.0 thousand with an average of $10.13 thousand. Panel C of Table 2 also reports the total of derivative incomes (net income and other comprehensive income) as a percent of total incomes (net income and other comprehensive income). This ratio ranges from negative 2.6 percent to positive 2.3 percent.

Table 3 reports the descriptive statistics of the variables in the study. All income measures used are shown as dollars per share. Income measures (DNI, NDNI, DOCI, NDOCI) exhibiting extreme values are winsorized at the 99 and 1 percent levels rather than dropped from the sample. Of the three abnormal volume measures, only the fixed-effect estimated abnormal volume (AV03FE and AV07FE) and the difference-in-differences estimated abnormal volume (AV03DF and AV07DF) can be expressed as percentages. Both of these measures express abnormal volume as a percent of outstanding shares traded. The time-series estimated volume measures (AV03TS and AV07TS) are scalars that do not directly represent a volume level or a volume percentage. Rather, the time-series estimates can only be used to indicate relative size of the estimated abnormal volume. Consistent with prior literature, the positive average abnormal returns (CAR03 and CAR07) and positive average abnormal volume statistics (AV03FE, AV07FE, AV03DF, and AV07DF) surrounding earnings announcements indicate that investors do react to earnings announcements both in terms of equity prices and in trade activity.

The heterogeneity measures are computed consistent with Bamber et al., (1997). The Bamber et al., (1997) study covers the 10 year period from 1984 through 1994, and is not restricted by industry. They report mean and median values for prior dispersion of 0.127 and 0.063, respectively with a standard deviation 0.297. Table 3 shows that prior dispersion in this study has a mean of 0.0462, a median of 0.0079, and a standard deviation of 0.122. Change in dispersion is reported by Bamber et al., (1997) with a mean of -0.006, a median of -0.015, and a standard deviation of 0.163. Table 3 reports a mean for change in dispersion of -0.0009, a median of 0.0081, and a standard deviation of 0.0968. Bamber et al., (1997) also report the Spearman correlation between the rank ordered analysts forecast before and the rank ordered analysts for each after earnings announcement. This is the base number used in computing JUMB. They report a mean of 0.477, a median of 0.589, and a standard deviation of 0.415. Table 3 reports the same statistic (CORR) for this study and shows a mean of 0.3652 a median of 0.5867, and a standard deviation of 0.6959. The differences between the heterogeneity measures reported in Table 3 and those reported by

Bamber et al.,(1997) is likely attributable to this study's focus on regulated banking organizations. Due to the U.S. regulatory environment, banking organizations receive greater scrutiny and bear a heavier reporting burden than many other industries. As a result, it seems reasonable to expect that the banking industry would also experience lower divergences in investor opinion than the broader market. This is the case when comparing prior dispersion and change in dispersion with the Bamber et al., (1997) study.

Pairwise correlations for variables in the study are included as Table 4. Correlations over 0.25 and /or significant at the $p<.001$ level are discussed. Derivative other comprehensive income (DOCI) is negatively correlated (-0.564) with non-derivative other comprehensive income (NDOCI). This reflects the recording of cash flow hedge effects in other comprehensive income along with changes in the hedged item being recorded in other comprehensive income. Only the cash flow hedge portion is classified by SFAS 133 as a derivative income effect. As such, an increase in cash-flow hedge fair-value (DOCI) is negatively related to decreases in the hedged items (NDOCI).

Heterogeneity measures prior dispersion (LDISP) and change in dispersion (ΔDISP) show a correlation of -0.444 which is significant at the $p<.001$ level. Since the ΔDISP is reporting the change in the post announcement period dispersion relative to the preannouncement level of dispersion, the negative correlation indicates that the reduction in dispersion associated with the earnings announcement increases as the pre-announcement level of dispersion increases. That is, as prior dispersion increases, the greater the convergence (ΔDISP) of opinion based on the earnings announcement.

Correlations among all six abnormal volume measures are positive, relatively large, and significant at the $p<.001$ level. This is confirmatory that the six abnormal trading volume measures reflect the same underlying phenomenon. The same is true for the two measures of abnormal returns, which show a positive correlation coefficient of .333 and is significant at the $p<.001$ level.

Earnings surprise (LSUR) is positively correlated with prior dispersion (LDISP) and negatively associated with change in dispersion (ΔDISP). Prior uncertainty about a forthcoming earnings report is likely to generate larger dispersion in analysts forecasts (LDISP) and can be expected to manifest in a large error in earnings forecast (LSUR). Additionally, a larger earnings surprise induces a decrease in the dispersion in analyst's revised forecasts (i.e. ΔDISP). This reflects the new information provided to the market when the earnings surprise (LSUR) increases. A larger surprise indicates a greater degree of newly released information. To the extent that the new information is interpreted commonly by individuals, the dispersion in forecasts can be expected to decrease after an earnings announcement containing the new information. This gives rise to the negative and significant correlation between ΔDISP and LSUR.

TABLE 2

This table reports broad financial measures for the firms included in the sample. Panel A reports the measures for all firm-years included in the sample. Panel B and Panel C report the same measures for the firm-years prior to the adoption of SFAS 133 and after the adoption of SFAS 133, respectively.

Descriptive Statistics for Sample Firms – Full Sample

PANEL A: Full Sample (N=223 firm-years)	Mean	Median	Min	Max
Total Assets ($ thousands)	115,211.40	38,564.59	1,394.36	1,264,032.00
Market Value of Equity ($ millions)	21,600.00	9,184.66	156.32	260,000.00
FV of Derivatives - gross ($ millions)	1.15	0.74	0.01	28.43
FV of Derivatives - net ($ millions)	0.34	0.08	(0.96)	11.52
Net Income($ thousands)	1,363.14	486.30	(511.00)	17,853.00
Other Comprehensive Income ($ thousands)	(6.53)	2.76	(3,365.00)	1,912.00
Derivative NI ($ thousands)	(14.64)	0.00	(2,464.00)	985.22
Derivative OCI ($ thousands)	10.13	0.00	(472.00)	930.00
Derivative incomes / Total Incomes	0.001%	0.003%	-2.689%	2.337%
FV of Derivatives (gross) / Total Assets	0.002%	0.002%	0.001%	0.049%
FV of Derivatives (net) / Total Assets	0.001%	-0.001%	-0.001%	0.020%

TABLE 2 (cont)

Descriptive Statistics for Firms in Sample – Before adoption and after adoption of SFAS 133

PANEL B: Pre-SFAS 133 (N=124 firm-years)	Mean	Median	Min	Max
Total Assets ($ thousands)	141,833.50	30,859.13	1,394.36	1,264,032.00
Market Value of Equity ($ millions)	25,700.00	9,060.28	175.04	260,000.00
FV of Derivatives - gross ($ millions)	1.55	0.40	0.09	28.43
FV of Derivatives - net ($ millions)	0.58	0.05	(0.35)	11.52
Net Income($ thousands)	1,679.17	441.73	(41.42)	17,853.00
Other Comprehensive Income ($ thousands)	(0.23)	2.05	(3,365.00)	1,698.00
Derivative NI ($ thousands)	Not Reported Prior to SFAS 133 Adoption			
Derivative OCI ($ thousands)				
Derivative incomes / Total Incomes				
FV of Derivatives (gross) / Total Assets	0.002%	0.000%	0.000%	0.048%
FV of Derivatives (net) / Total Assets	0.001%	0.000%	-0.003%	0.020%

PANEL C: Post-SFAS 133 (N=99 firm-years)	Mean	Median	Min	Max
Total Assets ($ thousands)	88,589.31	45,447.95	1,534.38	716,937.00
Market Value of Equity ($ millions)	17,600.00	10,200.00	156.32	188,000.00
FV of Derivatives - gross ($ millions)	0.83	0.64	0.01	8.34
FV of Derivatives - net ($ millions)	0.14	0.23	(0.96)	1.27
Net Income($ thousands)	1,120.92	601.00	(511.00)	13,519.00
Other Comprehensive Income ($ thousands)	(11.59)	9.50	(2,810.00)	1,912.00
Derivative NI ($ thousands)	(14.64)	0.00	(2,464.00)	985.22
Derivative OCI ($ thousands)	10.13	0.00	(472.00)	930.00
Derivative incomes / Total Incomes	0.001%	0.003%	-2.689%	2.337%
FV of Derivatives (gross) / Total Assets	0.002%	0.001%	0.000%	0.040%
FV of Derivatives (net) / Total Assets	0.000%	0.000%	-0.001%	0.014%

TABLE 3

Descriptive Statistics for Income Measures and Abnormal Trading Volume (N=223 firm-years)

Measure	Description[1]	Mean	Median	Standard Deviation	Minimum	Maximum
Income Measures						
DNI	Derivative NI ($ per share)	0.0296	0.0000	0.1869	-0.6077	1.7344
DOCI	Derivative OCI ($ per share)	0.0471	0.0000	0.4800	-2.4797	3.7000
NDNI	Non-Derivative NI ($ per share)	2.5124	2.3660	1.3245	-4.4007	5.2600
NDOCI	Non-Derivative OCI ($ per share)	-0.0352	0.0124	0.7060	-3.4500	2.6979
Abnormal Trading Volume Measures						
AV03TS	3-day – Time Series model	1.3582	0.9357	3.6695	-6.4611	19.6792
AV03FE	3-day – Firm Effect model	0.255%	-0.043%	1.038%	-0.814%	6.535%
AV03DF	3-day – Difference model	0.037%	-0.012%	0.254%	-0.427%	1.854%
AV07TS	7-day – Time Series model	2.4042	2.3106	6.7015	-11.9265	32.3281
AV07FE	7-day – Firm Effect model	0.432%	-0.045%	1.979%	-2.002%	12.211%
AV07DF	7-day – Difference model	0.015%	-0.019%	0.184%	-0.660%	0.999%

Note 1: See Appendix A for computation and full description of variables

TABLE 3 (cont.)

Descriptive Statistics for Heterogeneity Measures and Control Variables (N=223 firm-years)

Measure	Description[1]	Mean	Median	Standard Deviation	Minimum	Maximum
Heterogeneity Measures						
DISP*	Dispersion	0.0462	0.0079	0.1222	0.0013	0.7600
LDISP	Natural log of DISP	-4.4645	-4.8368	1.3981	-6.6765	-0.2744
ΔDISP	Change in dispersion	-0.0009	0.0081	0.0968	-0.6800	0.1970
CORR*	Correlation between pre- and post-announcement analyst forecast rank order	0.3652	0.5867	0.6959	-1.0000	1.0000
JUMB	Natural log of (1.1-CORR)	-0.9007	-0.6673	1.1844	-2.3026	0.7419
Control Variables						
SURP*	Earnings Surprise (dollars per share)	-0.0063	0.0026	0.1660	-0.9300	0.8200
LSUR	Natural log of Earning Surprise	-4.3982	-4.6995	1.5937	-8.2177	-0.0726
INST	Institutional Holdings (% of shares out)	0.4084	0.4634	0.2419	0.0000	0.9247
FVD	Fair Value of Hedge Derivatives ($ per share)	1.1535	0.5236	2.3644	0.0001	8.3448
CAR03*	Cumulative 3-day abnormal return (percent)	0.0030	0.0045	0.0373	-0.2281	0.1231
LCAR03	Natural log of the absolute value of CAR03	-4.0722	-3.9073	1.1041	-8.3653	-1.4782
CAR07*	Cumulative 7-day abnormal return (percent)	0.0052	0.0051	0.0467	-0.1440	0.1313
LCAR07	Natural log of the absolute value of CAR07	-3.7697	-3.5407	1.1501	-8.6337	-1.9377

Note 1: See Appendix A for computation and full description of variables
Note 2: * This form of the variable is not used in the analysis but is shown as a point of comparison to prior literature

TABLE 4
Pearson Correlations

	DNI	DOCI	NDNI	NDOCI	LDISP	ΔDISP	JUMBLE	FVD	LNSR
DNI	1.000								
DOCI	-0.069	1.000							
NDNI	-0.037	0.156*	1.000						
NDOCI	0.046	-0.564***	-0.119	1.000					
LDISP	-0.036	0.015	-0.067	0.026	1.000				
ΔDISP	0.072	0.028	0.076	-0.026	-0.444***	1.000			
JUMB	-0.072	0.047	0.065	0.022	0.047	-0.105	1.000		
FVD	0.186**	0.153*	0.400***	-0.107	0.048	0.024	0.159	1.000	
LSUR	-0.087	-0.028	-0.072	0.085	0.730***	-0.361***	0.086	0.009	1.000
INST	0.153*	0.152*	0.089	-0.041	-0.292***	0.040	0.079	0.142*	-0.221***
AV03TS	0.082	0.136*	0.145*	-0.109	-0.109	0.124	0.132	0.144*	-0.008
AV03FE	0.168*	0.375***	0.174**	-0.308***	-0.048	0.086	0.138	0.119	-0.009
AV03DF	0.181**	0.270***	0.186**	-0.203**	-0.020	0.110	0.155	0.176**	0.002
AV07TS	0.000	0.083	0.126	-0.084	-0.057	0.098	0.137	0.062	0.048
AV07FE	0.091	0.376***	0.159*	-0.335***	-0.030	0.066	0.132	0.064	0.012
AV07DF	0.072	0.230***	0.171*	-0.186**	0.016	0.095	0.158	0.125	0.044
LCAR03	0.018	0.082	-0.122	-0.044	0.080	0.068	0.038	-0.057	0.039
LCAR07	0.044	0.061	-0.054	-0.099	0.158*	-0.045	0.025	-0.024	0.188**

Note 1: *, **, and *** indicate significance at the .05, .01, and .001 levels, respectively

Note 2: All variables are as defined in Appendix A

TABLE 4 (cont.)
Pearson Correlations

	INST	AV03TS	AV03FE	AV03DF	AV07TS	AV07FE	AV07DF	LCAR03	LCAR07
DNI									
DOCI									
NDNI									
NDOCI									
LDISP									
∆DISP									
JUMB									
FVD									
LSUR									
INST	1.000								
AV03TS	0.156*	1.000							
AV03FE	0.193**	0.593***	1.000						
AV03DF	0.148*	0.797***	0.843***	1.000					
AV07TS	0.166*	0.862***	0.472***	0.665***	1.000				
AV07FE	0.184**	0.423***	0.909***	0.672***	0.472***	1.000			
AV07DF	0.118	0.650***	0.668***	0.833***	0.761***	0.724***	1.000		
LCAR03	0.010	0.172*	0.143*	0.180**	0.160*	0.108*	0.145*	1.000	
LCAR07	0.041	0.039	0.179**	0.110	0.101	0.218**	0.142*	0.333***	1.000

Note 1: *, **, and *** indicate significance at the .05, .01, and .001 levels, respectively

Note 2: All variables are as defined in Appendix A

Institutional holding (INST) is negatively associated with prior dispersion (LDISP). Higher levels of institutional holdings are associated with lower levels of prior dispersion in analysts' forecasts and likely reflect the nature of firms where institutional investors invest. These firms may be of an established nature, probably larger, and have a more stable income stream that those firms avoided by institutional investors. A more steady income stream would manifest as a smaller dispersion in analysts' forecasts since the reduced earnings variability makes the earnings prediction more straight forward.

The positive association between non-derivative net income (NDNI) and fair value of derivatives (FVD) is most likely indicative of a size-effect. As NDNI increases the tendency for a financial firm to employ derivatives to hedge that income also increases. Both of the other comprehensive income measures (DOCI and NDOCI) are significantly correlated with the fixed-effect (AV03FE, AV07FE) and difference-in-differences (AV03DF, AV07DF) abnormal volume estimates. Abnormal volume is negatively correlated with NDOCI, indicating that higher levels of non-derivative other comprehensive income results in lower disaggregated beliefs in the market. Conversely, abnormal volume moves in the same direction as DOCI, indicating that the derivative related portion of other comprehensive income increases disaggregated beliefs. A more complete listing of the variables employed in the analyses and the method used to compute each is included as Appendix A.

Preliminary Examination

Broadly, my hypotheses are designed to test for the relationship between income effects of SFAS 133 and belief heterogeneity. While no specific hypothesis is posited for the overall relationship between abnormal volume and SFAS 133 income measures, I examine this overall effect. To isolate the effect of derivative income on abnormal volume, I control for earnings surprise (LSUR), abnormal returns (LCAR03 / LCAR07), and firm effects. The results of this preliminary examination are reported in Table 5. Panel A reports the results of the model using 3-day window abnormal volume measures as the dependent variable. Panel B reports the results of the same regressions with the 7-day abnormal volume windows as the dependent variable.

In Panel A, the AV03TS model shows a model significance at $p<.01$ with an R^2(within) of 6.18 percent. The 'within' R^2 is reported since I apply the within transformation blocked on firm. Therefore, the relevant measure of explained variance is the amount of variation within groups (firms) that is explained by the model. Derivative net income (DNI) shows a positive coefficient of 1.9034 which is significant at the $p<.10$ level. The AV03TS measure is a scalar that does not directly represent a volume level or a volume percentage. Rather it indicates *relative* size of the estimated abnormal volume alone. Therefore, a one dollar per-share increase in DNI translates to a 1.9034 unit increase in the AV03TS measure of abnormal volume. Derivative other comprehensive income (DOCI) has a positive but non-significant coefficient. Non-derivative net income (NDNI) is also positively associated with changes in AV03TS and significant at the $p<.01$ level. As expected, LSUR and LCAR03 both have positive coefficients. The coefficient on LCAR03 is significant at the $p<.05$ level

Also in Panel A, the AV03FE model is significant at the $p<.01$ level and explains approximately 12 percent of the variation in the abnormal volume measure. AV03FE is a measure of abnormal volume expressed as a percent of shares outstanding. DNI shows a positive coefficient significant at the $p<.01$ level. A one dollar per share increase in DNI is positively associated with a 1.11 percent increase in the percent of shares traded. DOCI also shows a positive coefficient estimate, however, it is non-significant. NDNI is positive and significant ($p<.01$). NDOCI is also significant ($p<.01$), but with a negative coefficient. LSUR and LCAR03 both have positive coefficient estimates and are significant at the $p<.1$ and $p<.01$ levels, respectively.

Finally, Panel A also shows the results of the AV03DF model. This model is significant at the $p<.01$ level and explains 9.96 percent of the variation in the abnormal volume measure. DNI is significant at the $p<.01$ level and indicates that a one dollar per share increase in DNI is associated with an increase of 0.30 percent increase in trading volume. In this model DOCI is significant at the $p<.05$ level and indicates a one dollar increase in DOCI per share is associated with at 0.09 percent increase in trading volume. As in the previous models NDNI is also positive and significant at the $p<.01$ level. Both LSUR and LCAR03 have positive coefficients, but only LCAR03 is significant ($p<.01$).

TABLE 5

Relationship Between Derivative Income and 3-Day Abnormal Trading Volume

This table reports the coefficient estimates and their respective p-values for the regression of each 3-day announcement window abnormal volume on SFAS 133 related income measures, controlling for earnings surprise, 3-day abnormal returns, and firm effects. Variable definitions and computations are reported in Appendix A.

$$AV_{it} = \beta_0 + \beta_1(DNI_{it}) + \beta_2(DOC_{it}) + \beta_3(NDNI_{it}) + \beta_4(NDOCI_{it}) + \beta_5(LSUR_{it}) + \beta_6(LCAR03_{it}) + FE_i + \varepsilon_{it}$$

PANEL A

		AV03TS		AV03FE		AV03DF	
Variable	Exp. Sign	Est. Coef.	p-value	Est. Coef.	p-value	Est. Coef.	p-value
Constant	?	2.7181	0.075*	0.0060	0.044**	0.0013	0.220
DNI	+	1.9034	0.094*	0.0111	0.005***	0.0030	0.001***
DOCI	+	0.5953	0.134	0.0033	0.184	0.0009	0.037**
NDNI	?	0.4646	0.001***	0.0013	0.027**	0.0004	0.008***
NDOCI	?	-0.2303	0.499	-0.0017	0.006***	-0.0003	0.179
LSUR	+	0.0234	0.875	0.0007	0.078**	0.0001	0.309
LCAR03	+	0.6062	0.011**	0.0010	0.010**	0.0004	0.007***
Firm Effects		Included		Included		Included	
N			223		223		223
Groups			51		51		51
Wald-sig			0.0000		0.0066		0.0000
Wald-stat			61.95		17.87		32.22
R^2(within)			0.0618		0.1203		0.0996

*, **, *** indicate two tail significance at .10, .05, and .01 levels, respectively.

TABLE 5 (cont.)
Relationship between Derivative Income and 7-Day Abnormal Trading Volume

This table reports the coefficient estimates and their respective p-values for the regression of each 7-day announcement window abnormal volume on SFAS 133 related income measures, controlling for earnings surprise, 7-day abnormal returns, and firm effects. Variable definitions and computations are reported in Appendix A.

$$AV_{it} = \beta_0 + \beta_1(DNI_{it}) + \beta_2(DOC_{it}) + \beta_3(NDNI_{it}) + \beta_4(NDOCI_{it}) + \beta_5(LSUR_{it}) + \beta_6(LCAR07_{it}) + FE_i + \varepsilon_{it}$$

PANEL B

		AV07TS		AV07FE		AV07DF	
Variable	Exp. Sign	Est. Coef.	p-value	Est. Coef.	p-value	Est. Coef.	p-value
Constant	?	3.5900	0.100	0.0111	0.003	0.0005	0.397
DNI	+	0.3228	0.842	0.0129	0.019**	0.0010	0.026**
DOCI	+	0.4750	0.588	0.0042	0.380	0.0005	0.221
NDNI	?	0.6808	0.029**	0.0025	0.016**	0.0003	0.018**
NDOCI	?	-0.4314	0.496	-0.0031	0.009***	-0.0002	0.200
LSUR	+	0.1946	0.467	0.0011	0.059*	0.0001	0.212
LCAR07	+	0.5627	0.156	0.0025	0.000***	0.0002	0.038**
Firm Effects		Included		Included		Included	
N			223		223		223
Groups			51		51		51
Wald-sig			0.0007		0.0000		0.0013
Wald-stat			23.40		39.39		21.90
R^2(within)			0.0361		0.1273		0.0581

*, **, *** indicate two tail significance at .10, .05, and .01 levels, respectively.

Prior literature shows that the full effect of abnormal trading volume extends up to 5 days following earnings announcements (Morse, 1980). Therefore, in addition to the 3-day window, I also test the derivative income effect against similarly computed 7-day abnormal volume measures. Panel B of Table 5 reports the results of these models. The model using AV07TS as the dependent variable is significant at the p<.01 level and explains 3.61 percent of the variation in the dependent variable. The two variables of interest both show positive coefficient estimates, however, neither is significant. The model for the 7-day window of the fixed effect abnormal volume estimate (AV07FE) is significant at the p<.01 level and explains 12.73 percent of the variation in the dependent variable. DNI has a positive estimate coefficient of 0.0129 and is significant at the p<.05 level. A one dollar change in per share DNI is associated with an increase in abnormal trading volume equal to 1.29 percent of shares outstanding. The estimated coefficient for DOCI is also positive, but non-significant. The third model in Panel B reports the regression results for the 7-day difference in differences abnormal volume estimate (AV07DF). This model is significant at the p<.01 level and explains 5.81 percent of the variation in the AV07DF measure of abnormal trading volume. DNI has a significant (p<.05) coefficient of 0.10 percent. A one dollar increase in per share DNI is positively associated with a 0.10 percent increase in trading volume. DOCI also has a positive estimated coefficient, but is non-significant.

The results in Table 5 support my overall hypothesis that SFAS 133 income effects have a positive and significant associate with abnormal volume. SFAS 133 related net income is significant in all but one of the six models. Other comprehensive income arising from SFAS 133 has a positive estimated coefficient in all models, but is significant only in the AV03DF model. Net income arising from SFAS 133 is positively related to heterogeneous beliefs measured by abnormal volume.

Results for Hypotheses H1a, H2a, H3a

The first set of hypotheses (H1a, H2a, and H3a) call for the univariate test of differences between the pre-adoption and post-adoption levels of prior dispersion (LDISP), change in dispersion (ΔDISP), and jumbling (JUMB), respectively. I employ both the difference in means t-test and the Wilcoxon-Mann-Whitney median difference tests. Results for these tests on LDISP, ΔDISP, and JUMB are shown in Panel A of Table 6. The test of means for LDISP shows a significant ($p<.01$) difference between pre-adoption and post-adoption, however, in the reverse direction of my hypothesis. This indicates that prior dispersion had decreased in the period following the adoption of SFAS-133. The test of medians confirms the decline in LDISP and is significant at the $p<.1$ level[20]. The results are contrary to hypothesis H1a, and indicate that the dispersion in analysts' forecasts is smaller in the post-SFAS 133 adoption period than before. Several factors may be masking the univariate difference hypothesized. For example, the adoption of Regulation FD in 2000 may have made the informational landscape significantly more homogeneous, decreasing the information asymmetries that can give rise to dispersion in earnings forecasts.

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[20] All formally stated hypotheses in this study are directional. While this permits usage of single-tailed tests, to be conservative, all tables throughout the study report significance levels for a two-tailed test.

TABLE 6

Pre- and Post-Adoption Differences in Belief Heterogeneity

Hypotheses H1a, H2a, H3a

This table reports the difference in mean and difference in median tests applied to the three measures of heterogeneity. Panel A shows the results using the pre-adoption years of 1996-2000 and the post-adoption years of 2001-2003. Panel B shows the results using the pre-adoption years of 1999-2000 and the post adoption years of 2002-2003.

PANEL A: Pre=1996-2000; Post=2001-2003

		Pre-133	Post-133	Diff.	p-value
LDISP	N	124	99		
	Mean	-4.202	-4.736	-0.534	0.004***
	Median	-4.643	-4.895	-0.252	0.068*
ΔDISP	N	124	99		
	Mean	-0.005	0.001	0.006	0.657
	Median	0.006	0.012	0.006	0.094*
JUMB	N	45	47		
	Mean	-0.642	-0.566	0.076	0.695
	Median	-0.476	-0.357	0.119	0.404

*, **, *** indicate two tail significance at .10, .05, and .01 levels, respectively.

PANEL B: Pre=1999-2000; Post=2002-2003

		Pre-133	Post-133	Diff..	p-value
LDISP	N	57	64		
	Mean	-4.399	-4.931	-0.532	0.024**
	Median	-4.811	-5.073	-0.262	0.415
ΔDISP	N	57	64		
	Mean	-0.016	0.013	0.029	0.089*
	Median	0.007	0.013	0.006	0.083*
JUMB	N	23	31		
	Mean	-0.629	-0.599	0.03	0.906
	Median	-0.435	-0.357	0.078	0.752

*, **, *** indicate two tail significance at .10, .05, and .01 levels, respectively.

Also in Panel A of Table 6, I test for a difference in means of ΔDISP. While the computed means for ΔDISP is larger in the post period, the change is non-significant. Results for the median test also show an increase in ΔDISP following SFAS-133 adoption. This result is significant at the p<.1 level. This result supports hypothesis H2a, and indicates that the dispersion in analysts' forecasts expanded in response to earnings announcements in the post SFAS 133 adoption period.

While Jumbling shows a positive difference for both mean and median in the period following SFAS-133 adoption, neither result is significant. As with LDISP, this may reflect other factors inducing jumbling before the SFAS 133 adoption.

In addition to examining the differences across the entire time horizon, I conduct the same differences in mean and differences in median tests between the two years preceding SFAS 133 adoption and two years following adoption. The year of adoption is excluded. By testing only the two years preceding (1999-2000) and the two years after (2002-2003) adoption, I attempt to minimize other factors that may be masking the hypothesized difference. Since all firms in the sample transitioned in 2001, I also drop the transition year to isolate the effects of adopting a new standard. These results are shown in Panel B of Table 3. Prior dispersion (LDISP) shows a significant difference between the two periods, however, the result is counter to my hypothesis. The median test for LDISP is non-significant. Both the mean and median tests for ΔDISP are positive and significant, providing support for hypothesis H2a. As before, both tests for JUMB, while providing a result consistent with my hypothesis, are not significant. Overall, I find support only for hypothesis H2a. The change in dispersion surrounding earnings announcements after the adoption of SFAS 133 shows an increase in heterogeneity as measured by ΔDISP.

Supplemental analysis:

As a final step in examining the expectation of expanded belief heterogeneity after SFAS 133 adoption, I test for differences between the pre-adoption and post-adoption abnormal volume measures with both the mean and median tests. Table 7 reports the results for the mean and median tests over the entire study period (1996-2003). Table 8 reports the results for the mean and median tests including only the two years prior (1999 & 2000) and the two years after the adoption year (2002 & 2003). Both the mean and median difference tests across all abnormal volume measures show positive and significant differences. While I have no specific hypothesis for the univariate analysis of abnormal volume, the results are consistent with the underlying expectation of larger heterogeneity subsequent tot the adoption of SFAS 133. Abnormal volume appears to be reflecting some aspect of belief heterogeneity not captured by the three measure proposed by Bamber et al., (1999). As the LDISP, ΔDISP, and JUMB measures are computed from analysts forecasts, the stronger relationship found in abnormal volume may be attributed to that measure capturing aspects of heterogeneity general to the market but not shared by analysts.

Table 7
Pre- and Post-133 Differences in Abnormal Volume
(full sample)
Pre=1996-2000; Post=2001-2003

This table reports the difference in mean and difference in median tests applied to the three measures of abnormal volume over the entire sample period. Panel A shows the results for the 3-day announcement window. Panel B shows the results for the 7-day announcement window. Pre-133 includes the years 1996-2000 and Post-133 includes the years 2001-2003.

PANEL A: 3-Day Window

		Pre-133	Post-133	Difference	p-value
	N	124	99		
AV03TS	Mean	0.386	2.666	2.28	0.000***
	Median	0.319	2.303	1.985	0.000***
AV03FE	Mean	0.03%	0.44%	0.41%	0.003***
	Median	-0.16%	0.06%	0.22%	0.013***
AV03DF	Mean	-0.02%	0.10%	0.12%	0.001***
	Median	-0.04%	0.03%	0.06%	0.000***

*, **, *** indicate two tail significance at .10, .05, and .01 levels, respectively.

PANEL B: 7-Day Window

		Pre-133	Post-133	Difference	p-value
	N	124	99		
AV07TS	Mean	0.661	4.558	3.897	0.000***
	Median	0.489	3.467	2.979	0.001***
AV07FE	Mean	0.04%	0.65%	0.61%	0.013***
	Median	-0.29%	0.10%	0.39%	0.013***
AV07DF	Mean	-0.02%	0.05%	0.07%	0.002***
	Median	-0.04%	0.02%	0.06%	0.000***

*, **, *** indicate two tail significance at .10, .05, and .01 levels, respectively.

Table 8
Pre- and Post-133 Differences in Abnormal Volume
(restricted sample)
Pre=1999-2000; Post=2002-2003

This table reports the difference in mean and difference in median tests applied to the three measures of abnormal volume for the two years immediately preceding adoption and the two years following the adoption year. Panel A shows the results for the 3-day announcement window. Panel B shows the results for the 7-day announcement window. Pre-133 includes the years 1999-2000 and Post-133 includes the years 2002-2003.

PANEL A: 3-Day Window

		Pre-133	Post-133	Difference	p-value
	N	57	64		
AV03TS	Mean	0.545	3.041	2.495	0.000***
	Median	0.635	2.78	2.145	0.036**
AV03FE	Mean	0.12%	0.64%	0.52%	0.008***
	Median	-0.04%	0.10%	0.13%	0.520
AV03DF	Mean	-0.04%	0.13%	0.16%	0.001***
	Median	-0.03%	0.01%	0.04%	0.083*

*, **, *** indicate two tail significance at .10, .05, and .01 levels, respectively.

PANEL B: 7-Day Window

		Pre-133	Post-133	Difference	p-value
	N	57	64		
AV07TS	Mean	0.916	5.348	4.432	0.000***
	Median	1.509	3.7	2.191	0.083*
AV07FE	Mean	0.27%	0.99%	0.72%	0.044**
	Median	-0.06%	0.25%	0.32%	0.055*
AV07DF	Mean	-0.04%	0.06%	0.10%	0.004***
	Median	-0.04%	0.01%	0.05%	0.022**

*, **, *** indicate two tail significance at .10, .05, and .01 levels, respectively.

Results for Hypothesis H1b, H2b, H3b

The second set of hypotheses (H1b, H2b, H3b) address the expected association between the SFAS 133 income effect (DNI and DOCI) and the three measures of belief heterogeneity (LDISP, ΔDISP, JUMB). The results for these tests are found in Table 9. The model relating LDISP to DNI and DOCI is significant at the p<.01 level and explains 45.52 percent of the variation in LDISP within firms. Consistent with my hypothesis, the estimated coefficient for DNI is positive and significant at the p<.10 level. A one dollar per share increase in DNI is positively associated with a 46.22 percent change in the dispersion of analysts' forecasts prior to earnings announcement.[21] The estimated coefficient on DOCI is also positive, however, it is not significant at conventional levels. The other income measures (NDNI and NDOCI) show negative coefficients, but are non-significant. LSUR is significant (p<.01) and reports an estimated coefficient of 0.5725. Therefore, a one percent change in the earnings surprise is associated with a 57.25 percent increase in prior dispersion. Consistent with prior literature and my expectation, INST reports a negative and significant (p<.10) coefficient of -0.8056. Since the variable INST is the percent of shares outstanding held by institutions an increase of one percent in INST is associated with an 80.56 percent decrease in prior dispersion.

Hypothesis H2b posits that there is a positive relationship between derivative income measures and the change in dispersion (ΔDSIP). Change in dispersion is the

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[21] For sufficiently small changes in DNI the interpretation shown here is generally acceptable. However, since LDISP is of lognormal form and DNI is reported in levels, the exact inference is computed as 100*[exp (.4622) – 1] = 58.76 percent. So, a one dollar change in per share DNI actually results in a 58.76 percent change in LDISP.

dispersion in the post-announcement period less dispersion in the pre-announcement period, standardized by the pre-announcement period mean forecast. Table 9 shows this model is significant at $p<.05$ and explains 11.53 percent of the variation in ΔDISP within firms. The coefficient on DNI is 0.0504 and is significant at the $p<.05$ level. Therefore, a one dollar per share increase in DNI is associated with a 0.0504 increase in dispersion. That is, increasing levels of DNI gives rise to expanding dispersion in analysts' forecasts. DOCI has a positive estimated coefficient, however, it is non-significant. LSUR has an estimated coefficient of -0.0171 and is significant at the $p<.05$ level.

Hypothesis H3b posits that the correlation of the rank ordering of analysts' forecasts before and after the announcement will be smaller as derivative income increases. JUMB is computed as the log of 1.1 minus the non-parametric correlation of the rank order of analysts' forecasts before the announcement and after the announcement. Since the correlation of the rank order can be described as forecast order *consistency*, JUMB can be described as the log of the rank order *inconsistency* or the log of analysts' reordering. As reported in Table 9, the model for JUMB is significant at the $p<.01$ level and explains 35.16 percent of the variation in the dependent variable within firms. The estimated coefficient for DNI is positively associated with JUMB and is significant at the $p<.05$ level. For sufficiently small changes in the independent variables, the interpretation of a coefficient is that 100 times the coefficient is equal to the percentage change in the reordering of analysts' forecasts. A coefficient of 2.4778 means that one cent increase in

TABLE 9

Relationship between Heterogeneity Measures and Derivative Income

Hypotheses H1b, H2b, and H3b

This table reports the coefficient estimates and their respective p-values for the regression of each heterogeneity measure on the SFAS 133 income measures, controlling for earnings surprise, level of institutional holding, fair-value of hedging derivatives, year effects, and firm effects.

$$LDISP_{it}=\beta_0+\beta_1(DNI_{it})+\beta_2(DOCI_{it})+\beta_3(NDNI_{it})+\beta_4(NDOCI_{it})+\beta_5(LSUR_{it})+\beta_6(INST_{it})+\beta_7(FVD_{it})+\beta_8(POST*FVD_{it})+FE_i+\varepsilon_{it}$$

$$\Delta DISP_{it}=\beta_0+\beta_1(DNI_{it})+\beta_2(DOC_{it})+\beta_3(NDNI_{it})+\beta_4(NDOCI_{it})+\beta_5(LSUR_{it})+\beta_6(INST_{it})+\beta_7(FVD_{it})+\beta_8(POST*FVD_{it})+FE_i+\varepsilon_{it}$$

$$JUMB_{it}=\beta_0+\beta_1(DNI_{it})+\beta_2(DOC_{it})+\beta_3(NDNI_{it})+\beta_4(NDOCI_{it})+\beta_5(LSUR_{it})+\beta_6(INST_{it})+\beta_7(FVD_{it})+\beta_8(POST*FVD_{it})+FE_i+\varepsilon_{it}$$

		LDISP		ΔDISP		JUMB	
Variable	Exp. Sign	Est. Coef.	p-value	Est. Coef.	p-value	Est. Coef.	p-value
Constant	?	-1.1237	0.004***	-0.0661	0.270	0.1626	0.767
DNI	+	0.4622	0.097*	0.0504	0.014**	2.4778	0.017**
DOCI	+	0.1819	0.246	0.0029	0.813	0.0223	0.962
NDNI	?	-0.0529	0.425	0.0022	0.792	0.0111	0.930
NDOCI	?	-0.0112	0.909	-0.0042	0.728	0.6608	0.005***
LSUR	+	0.5725	0.000***	-0.0171	0.016**	-0.0435	0.578
INST	-	-0.8056	0.090*	0.0593	0.352	-0.6984	0.314
FVD	+	0.0486	0.281	0.0004	0.910	0.6740	0.010***
FVD*POST	+	0.0033	0.969	-0.0049	0.437	0.1781	0.166
Year & Firm Effects		Included		Included		Included	
N			223		223		92
Groups			51		51		37
Wald-sig			0.0000		0.0306		0.0000
Wald-stat			224.38		26.78		20.87
R^2(within)			0.4552		0.1153		0.3516

*, **, *** indicate two tail significance at .10, .05, and .01 levels, respectively.

per share DNI is associated with a 2.48 percent increase in the reordering of analysts' forecasts.[22] The coefficient of DOCI is positive as hypothesized, but is non-significant. The coefficient of NDOCI is significant at the p<.01 level and indicates that a one dollar per share increase in NDOCI results in a 66.08 percent increase in the degree of reordering among analysts. Finally, in this model the coefficient of FVD is also positive and significant at the p<.01 level. This indicates that a one percent increase in the fair-value of derivatives per share is associated with a 67.40 percent increase in the degree of analysts reordering.

The relationship between DNI and the three measures of heterogeneity is consistently positive and significant in all three models. DOCI has a positive coefficient in all models, but the relationship with the three dispersion measures in not significant at conventional levels. Hypotheses H1b, H2b, and H3b are supported only for the net income effect of SFAS 133. The interpretation for hypothesis H1b is that as the per share derivative net income increases, the degree of dispersion in analysts' forecasts before the earnings announcement increases. This is consistent with analysts having greater difficulty predicting the net income associated with the SFAS 133 standard. Support for hypothesis H2b means that an increase in per share derivative net income is associated with an increase in analysts' forecast dispersion from pre-announcement to post-announcement period. This indicates that the SFAS 133 earnings information is generating heterogeneity

[22] The coefficient of 2.4778 is the estimated association between a lognormal dependent variable and a dependent variable measured in levels. For sufficiently small changes in the independent variable, the interpretation provided is generally accepted. However, the exact inference is computed as 100*[exp (.024778) – 1] = 2.51. A one cent change in per share DNI actually results in a 2.51 percent change in JUMB.

in analysts' beliefs as opposed to increasing homogeneity in beliefs. Finally, as SFAS 133 related net income per share increases, the degree of reordering among analysts (JUMB) also increases. This is consistent with information being differentially interpreted by analysts.

Supplemental analysis:

Additionally, I carry out several other specification tests. First, I examine the relationships above with alternative specifications for the SFAS 133 income effects. I test derivative income expressed as a percent of total income and derivative income expressed as the aggregate sum of DNI and DOCI.[23] Both of the alternative derivative income specifications are positive and significant at the $p<.01$ level for the model with LDISP as the dependent variable. The alternative derivative income measures are positive but insignificant for the models with ΔDISP and JUMB as the dependent variable.

I also test for interactions among the derivative income measures (DNI and DOCI) and control variables (LSUR, INST, FVD, and FVD*POST). None of the interaction effects are significant at conventional levels. Finally, I test for non-linear effects of the derivative income measures (DNI and DOCI). None were significant.

I replicate the analysis with alternative computations for LDISP and ΔDISP. I use the analysts' forecast standard deviation and mean provided by I/B/E/S to recompute LDISP and ΔDISP. That is, I relax the restriction that only those analysts with forecasts both before and after the earnings announcement be used in computing these two measures

[23] Derivative Percent = (DNI+DOCI) / (DNI+DOCI+NDNI+NDOCI) ; Derivative Total = (DNI+DOCI)

of heterogeneity. The results obtained from the alternative LDISP and ΔDISP measures are consistent with the results reported here.

Results for Hypotheses H1c, H2c, and H3c

Hypothesis H1c, H2c, and H3c state that the portion of each of the three dispersion measures predicted by DNI and DOCI is positively related to abnormal trading volume. That is, I expect that the income effects of SFAS 133 influences abnormal volume through the three heterogeneity measures. The method applied requires that the portion the heterogeneity measures (LDISP, ΔDISP, JUMB) predicted by DNI and DOCI be used as regressors in a second model with abnormal volume as the dependent variable. I discuss the results of each of the three hypotheses individually, first by discussing the coefficient estimates and p-values associated with the normally obtained standard errors. After discussing each of these hypotheses in the context of the traditional estimation method, I then re-evaluate the significance of the estimated coefficients in light of p-values generated from standard errors obtained through a bootstrap procedure. Unlike the normally obtained standard errors, the bootstrap procedure accounts for the variability transferred from the first model to the second, providing a standard error appropriate for hypothesis testing.

Hypothesis H1c deals with the relationship between abnormal trading volume and the portion of LDISP predicted by DNI and DOCI. Table 10 shows the results of this examination. This model is significant at the $p<.001$ level and explains 17.70 percent of the variation in AV03TS. Consistent with my hypothesis, the portions of LDISP predicted by DNI (LDISP_DNI) and DOCI (LDISP_DOCI) both have positive estimated coefficients.

Only the portion predicted by DOCI is significant ($p<.01$). This means that a one percent change in the percent of dispersion predicted by DNI is associated with a 3.088 unit change in the AV03TS abnormal volume measure. The portion of LDISP not explained by derivative income measures (LDISP_OTH) shows a significant ($p<.05$) and negative coefficient of -0.3749. A unit change in the portion of dispersion not predicted by derivative income is associated with a 0.3749 unit decrease in AV03TS. Consistent with prior literature cumulative abnormal return (LCAR03) is significant ($p<.01$) with an estimated coefficient of 0.7285.

Since the LDISP_DNI and LDISP_DOCI are generated regressors, the standard errors estimated in the regression do not take into account the fact that these regressors are estimates rather than measures. Estimation with a bootstrap approach is also performed to obtain standard errors appropriate for hypothesis testing. The estimated coefficients are not affected by this approach, but the standard errors are generally larger. The associated p-values are listed adjacent to the standard p-values under the AV03TS model. Under the bootstrap method, only LDISP_OTH and LCAR03 retain significance in the model.

Panel A of Table 10 also reports the results of the model testing the relationship between the abnormal trading volume measure AV03FE and the portion of LDISP predicted by DNI and DOCI. This model is significant at the $p<.01$ level and explains 21.80 percent of the variation in the abnormal volume measure. Consistent with my hypothesis, the portions of LDISP predicted by DNI (LDISP_DNI) and DOCI (LDISP_DOCI) both have positive estimated coefficients. Only the portion of LDISP predicted by DNI is significant ($p<.10$) in explaining variation in AV03FE. A one percent change in the LDISP explained by DNI is positively related to a 1.46 percent change in abnormal volume. Control variables LSUR and LCAR03 are also significant and positive. As before, the significance indicated for the variables of interest in the initial regression is lost when the standard errors are estimated via bootstrap.

Finally, Panel A of Table 10 reports the results of the model testing the relationship between the abnormal trading volume measure AV03DF and the portion of LDISP predicted by DNI and DOCI. This model is significant at the $p<.01$ level and explains 17.23 percent of the variation in the abnormal volume measure. Both LDISP_DNI and LDISP_DOCI have positive estimated coefficients. The coefficient on LDISP_DNI is estimated at 0.36 percent and is significant at the $p<.10$ two tailed level of significance. A one percent change in dispersion explained by DNI is associated with at 0.36 percent increase in AV03DF. The coefficient on LDISP_DOCI is estimated at 0.53 percent and is significant at the $p<.05$ two tailed level of significance. A one percent change in dispersion explained by DOCI is associated with at 0.53 percent increase in AV03DF. The estimated coefficient on LCAR03 is also significant ($p<.01$) and positive. In this model the significance on LDISP_DOCI retains significance at the $p<.1$ level even after estimating via the bootstrap method. It is important to note that the LDISP_DOCI variable is estimated from a regression (Eq.10, Table 9) in which DOCI was not significant at conventional levels in explaining variations in LDISP. Nonetheless, the coefficient estimated on DOCI in equation 10 was able to transfer a sufficient amount of information to the current model that it is significant in explaining variation in AV03DF.

The tests on the relationship between abnormal trading volume and the portion of LDISP predicted by derivative income are also tested in the 7-day event window. These results are shown in Panel B of Table 10. These models are all significant at the p<.001 level and explain between 10.30 percent and 16.86 percent of the variability in the abnormal volume measures. The variables of interest are all non-significant in these models.

Under the normally obtained standard errors and related p-values partial support is found for hypothesis H1c in all of the 3-day abnormal volume models. However, under the bootstrap procedure, support is only found for hypothesis H1c in the portion of LDISP predicted by DOCI in the AV03DF model. This indicates that while LDISP_DOCI and LDISP_DNI do transfer some information into the secondary model (equation 19), the precision of that information is limited. Of the three measures of abnormal volume, the difference-in-differences (AV03DF) measure is able to detect the information transferred in. The lack of significance in the model likely reflects that, while information was successfully transferred into the second model, it lacked sufficient precision to be detected in all but the AV03DF model. Application of a more precise mechanism for transferring the information from the primary model to the secondary model might yield significant results for the other measures of abnormal volume. The lack of any significance in the 7-day window models indicates that any effect of the announcement with regard to SFAS 133 is fully reflected in the 3-day window.

TABLE 10

Panel A: Relationship Between Predicted Dispersion and Abnormal Trading Volume (Hypothesis H1c)

This table reports the coefficient estimates and associated p-values from the regression of each of the three abnormal volume measures on the levels of dispersion predicted by the SFAS 133 income effects (LDISP_DNI and LDISP_DOCI). The results reported here are for the 3-day announcement window statistics. The table also reports the p-values associated with the bootstrap method for estimating standard errors for generated regressors. Controls are included for earnings surprise, institutional holding, abnormal returns, and year and firm effects.

$$AV_{it}=\beta_0+\beta_1(\widehat{LDISP\_DNI}_{it})+\beta_2(\widehat{LDISP\_DOCI}_{it})+\beta_3(\widehat{LDISP\_OTH}_{it})+\beta_4(LSUR_{it})+\beta_5(INST_{it})+\beta_6(LCAR03_{it})+FE_i+YE_t+\varepsilon_{it}$$

PANEL A		AV03TS			AV03FE			AV03DF		
Variable	Exp. Sign	Est. Coef.	p-value	Boot. p-value#	Est. Coef.	p-value	Boot. p-value#	Est. Coef.	p-value	Boot. p-value#
Constant	?	2.8736	0.166	0.143	0.0111	0.016**	0.010***	0.0029	0.061*	0.071*
LDISP_DNI[&]	+	0.9588	0.720	0.835	0.0146	0.062*	0.234	0.0036	0.074*	0.224
LDISP_DOCI[&]	+	3.0880	0.005***	0.315	0.0197	0.173	0.221	0.0053	0.049**	0.091*
LDISP_OTH[&]	?	-0.3749	0.051*	0.069*	0.0000	0.929	0.924	-0.0001	0.626	0.641
LSUR	+	0.2807	0.172	0.187	0.0008	0.080*	0.049**	0.0001	0.327	0.293
INST	-	0.6982	0.468	0.525	-0.0041	0.283	0.300	-0.0006	0.542	0.567
LCAR03	+	0.7285	0.009***	0.009***	0.0012	0.025**	0.019**	0.0005	0.003***	0.005***
Year & Firm Effects		Included			Included			Included		
N			233			233			233	
Groups			51			51			51	
Wald-sig			0.0000	0.0000		0.0002	0.0006		0.0000	0.0001
Wald-stat			80.22	49.80		38.43	35.75		72.30	42.20
R^2(within)			0.1770	0.1770		0.2100	0.2100		0.1723	0.1723

Standard errors estimated via the bootstrap method are typically larger than the normally obtained standard errors. As a result, findings of significance under the normally obtained standard errors may not be significant under the bootstrap estimation procedure.

[&] LDISP_DNI and LDISP_DOCI are the portions of LDISP predicted by the regression in Table 10

*, **, *** indicate two tail significance at .10, .05, and .01 levels, respectively.

TABLE 10 (cont)

Panel B: Relationship Between Predicted Dispersion and Abnormal Trading Volume (Hypothesis H1c)

This table reports the coefficient estimates and associated p-values from the regression of each of the three abnormal volume measures on the levels of dispersion predicted by the SFAS 133 income effects (LDISP_DNI and LDISP_DOCI). The results reported here are for the 7-day announcement window statistics. The table also reports the p-values associated with the bootstrap method for estimating standard errors for generated regressors. Controls are included for earnings surprise, institutional holding, abnormal returns, and year and firm effects.

$$AV_{it}=\beta_0+\beta_1(\widehat{LDISP\_DNI}_{it})+\beta_2(\widehat{LDISP\_DOCI}_{it})+\beta_3(\widehat{LDISP\_OTH}_{it})+\beta_4(LSUR_{it})+\beta_5(INST_{it})+\beta_6(LCAR07_{it})+FE_i+YE_t+\varepsilon_{it}$$

PANEL B		AV07TS			AV07FE			AV07DF		
Variable	Exp. Sign	Est. Coef.	p-value	Boot. p-value#	Est. Coef.	p-value	Boot. p-value#	Est. Coef.	p-value	Boot. p-value#
Constant	?	2.4943	0.380	0.364	0.0179	0.003***	0.002***	0.0013	0.135	0.149
LDISP_DNI[&]	+	-4.6189	0.259	0.515	0.0162	0.166	0.353	0.0007	0.551	0.703
LDISP_DOCI[&]	+	1.6677	0.627	0.816	0.0291	0.303	0.392	0.0029	0.205	0.225
LDISP_OTH[&]	?	-0.4453	0.135	0.222	0.0003	0.773	0.762	0.0000	0.704	0.715
LSUR	+	0.5300	0.078*	0.113	0.0012	0.072*	0.100*	0.0001	0.321	0.343
INST	-	1.9443	0.377	0.347	-0.0063	0.358	0.287	-0.0005	0.513	0.493
LCAR07	+	0.6183	0.115	0.095*	0.0018	0.015**	0.008***	0.0002	0.027**	0.027**
Year & Firm Effects			Included			Included			Included	
N			233			233			223	
Groups			51			51			51	
Wald-sig			0.0000	0.0001		0.0000	0.0001		0.0000	0.0004
Wald-stat			58.09	41.80		52.12	40.27		53.34	37.43
R^2(within)			0.1686	0.1686		0.1530	0.1530		0.1030	0.1030

Standard errors estimated via the bootstrap method are typically larger than the normally obtained standard errors. As a result, findings of significance under the normally obtained standard errors may not be significant under the bootstrap estimation procedure.

[&] LDISP_DNI and LDISP_DOCI are the portions of LDISP predicted by the regression in Table 10.

*, **, *** indicate two tail significance at .10, .05, and .01 levels, respectively.

Hypothesis H2c deals with the relationship between abnormal trading volume and the portion of ΔDISP predicted by DNI and DOCI. Table 11 shows the results of this examination. This model is significant at the p<.01 level and explains 20.00 percent of the variation in AV03TS. Consistent with my hypothesis, the portions of ΔDISP predicted by DNI (ΔDISP_DNI) and DOCI (ΔDISP_DOCI) both have positive estimated coefficients. Only the portion predicted by DOCI (ΔDISP_DOCI) is significant (p<.05). This means that a one percent increase in the portion of ΔDSIP predicted by DNI is associated with a 193.2947 unit change in the AV03TS abnormal volume measure. The extreme coefficient is the result of a very small coefficient on the base regression (equation 11, Table 9) and the dependent variable in this model being a lognormal value. The portion of ΔDISP not explained by derivative income (ΔDISP_OTH) shows a positive and significant (p<.05) coefficient. This means that a unit increase in the change in dispersion not related to derivative income is associated with a 4.0909 unit increase in AV03TS. LCAR03 is also significant (p<.05) with an estimated coefficient of 0.6575. A one percent increase in the 3-day cumulative abnormal return is associated with a 0.6575 unit increase in AV03TS. Only the significance of LCAR03 is retained through the bootstrap estimation.

The same regression model is estimated with AV03FE as the measure of abnormal volume. This model is significant at the p<.01 level and explains 21.80 percent of the variation in the dependent variable. As predicted both ΔDISP_DNI and ΔDISP_DOCI have positive estimated coefficients. However, only ΔDISP_DNI is significant (p<.1) with an estimated coefficient of 0.1339. This means that a one percent increase in the amount of

ΔDISP explained by DNI is associated with an increase in abnormal volume equal to 13.39 percent of shares outstanding. As with the previous model, the magnitude of this coefficient is the result of the small coefficient in regression (equation 11, Table 9). Coefficient estimates for LSUR and LCAR03 are both positive and significant at conventional levels. None of the 7-day window abnormal volume measures show significance.

None of the variables of interest retain significance through the bootstrapping method. Under the normally obtained standard errors and p-values, hypothesis H2c would find support in all three of the 3-day window models. None are significant under the bootstrap method. Therefore, hypothesis H2c is not supported. There is insufficient evidence to conclude that the portion ΔDISP predicted by SFAS 133 income effects has explanatory power for abnormal volume. The lack of significance in the model likely reflects that, while information was successfully transferred into the second model, it lacked sufficient precision to be detected. Use of a more precise mechanism for transferring the information from the primary model to the secondary model might provide significant results.

TABLE 11

Panel A: Relationship Between Predicted Change in Dispersion and Abnormal Trading Volume (Hypothesis H2c)

This table reports the coefficient estimates and associated p-values from the regression of each of the three abnormal volume measures on the levels of change in dispersion predicted by the SFAS 133 income effects (ΔDISP_DNI and ΔDISP_DOCI). The results reported here are for the 3-day announcement window. The table also reports the p-values associated with the bootstrap method for estimating standard errors for generated regressors. Controls are included for earnings surprise, institutional holding, abnormal returns, and year and firm effects.

$$AV_{it}=\beta_0+\beta_1(\widehat{\Delta DISP\_DNI_{it}})+\beta_2(\widehat{\Delta DISP\_DOCI_{it}})+\beta_3(\widehat{\Delta DISP\_OTH_{it}})+\beta_4(LSUR_{it})+\beta_5(INST_{it})+\beta_6(LCAR03_{it})+FE_i+YE_t+\varepsilon_{it}$$

PANEL A		AV03TS			AV03FE			AV03DF		
Variable	Exp. Sign	Est. Coef.	p-value	Boot. p-value#	Est. Coef.	p-value	Boot. p-value#	Est. Coef.	p-value	Boot. p-value#
Constant	?	3.2978	0.119	0.104	0.0114	0.015**	0.013**	0.0030	0.056*	0.055*
ΔDISP_DNI[&]	+	11.6406	0.647	0.807	0.1339	0.082*	0.243	0.0328	0.076*	0.264
ΔDISP_DOCI[&]	+	193.2947	0.011**	0.289	1.1727	0.162	0.212	0.3264	0.050*	0.103
ΔDISP_OTH[&]	?	4.0909	0.049**	0.172	0.0071	0.072*	0.220	0.0023	0.009***	0.048**
LSUR	+	0.1501	0.298	0.345	0.0009	0.007***	0.013**	0.0001	0.141	0.175
INST	-	0.9824	0.315	0.399	-0.0048	0.208	0.198	-0.0007	0.471	0.526
LCAR03	+	0.6575	0.017**	0.013**	0.0011	0.033	0.050**	0.0005	0.004***	0.006***
Year & Firm Effects		Included			Included			Included		
N			223			223			223	
Groups			51			51			51	
Wald-sig			0.0000	0.0000		0.0001	0.0003		0.0000	0.0000
Wald-stat			67.07	43.54		40.34	37.54		53.44	43.08
R^2(within)			0.2000	0.2000		0.2180	0.2180		0.1779	0.1779

Standard errors estimated via the bootstrap method are typically larger than the normally obtained standard errors. As a result, findings of significance under the normally obtained standard errors may not be significant under the bootstrap estimation procedure.

[&] ΔDISP_DNI and ΔDISP_DOCI are the portions of ΔDISP predicted by the regression in Table 10.

*, **, *** indicate two tail significance at .10, .05, and .01 levels, respectively.

TABLE 11 (cont)

Panel B: Relationship Between Predicted Change in Dispersion and Abnormal Trading Volume (Hypothesis H2c)

This table reports the coefficient estimates and associated p-values from the regression of each of the three abnormal volume measures on the levels of change in dispersion predicted by the SFAS 133 income effects (ΔDISP_DNI and ΔDISP_DOCI). The results reported here are for the 7-day announcement window. The table also reports the p-values associated with the bootstrap method for estimating standard errors for generated regressors. Controls are included for earnings surprise, institutional holding, abnormal returns, and year and firm effects.

$$AV_{it}=\beta_0+\beta_1(\widehat{\Delta DISP\_DNI_{it}})+\beta_2(\widehat{\Delta DISP\_DOCI_{it}})+\beta_3(\widehat{\Delta DISP\_OTH_{it}})+\beta_4(LSUR_{it})+\beta_5(INST_{it})+\beta_6(LCAR07_{it})+FE_i+YE_t+\varepsilon_{it}$$

PANEL B		AV07TS			AV07FE			AV07DF		
Variable	Exp. Sign	Est. Coef.	p-value	Boot. p-value#	Est. Coef.	p-value	Boot. p-value#	Est. Coef.	p-value	Boot. p-value#
Constant	?	3.3834	0.229	0.230	0.0180	0.002***	0.002***	0.0014	0.101	0.093*
ΔDISP_DNI[&]	+	-36.8480	0.336	0.616	0.1461	0.164	0.339	0.0065	0.515	0.688
ΔDISP_DOCI[&]	+	100.1900	0.638	0.797	1.7956	0.308	0.356	0.1785	0.206	0.253
ΔDISP_OTH[&]	?	8.2189	0.003***	0.022**	0.0107	0.168	0.245	0.0020	0.001***	0.021**
LSUR	+	0.4646	0.065*	0.072*	0.0015	0.003***	0.013**	0.0001	0.102	0.170
INST	-	2.3313	0.287	0.284	-0.0075	0.270	0.258	-0.0005	0.472	0.469
LCAR07	+	0.5671	0.147	0.154	0.0018	0.012**	0.011**	0.0002	0.030**	0.061**
Year & Firm Effects		Included			Included			Included		
N			223			223			223	
Groups			51			51			51	
Wald-sig			0.0000	0.0001		0.0003	0.0000		0.0000	0.0004
Wald-stat			57.96	42.70		54.10	42.72		45.46	36.93
R^2(within)			0.1686	0.1686		0.1562	0.1562		0.1080	0.1080

\# Standard errors estimated via the bootstrap method are typically larger than the normally obtained standard errors. As a result, findings of significance under the normally obtained standard errors may not be significant under the bootstrap estimation procedure.

[&] ΔDISP_DNI and ΔDISP_DOCI are the portions of ΔDISP predicted by the regression in Table 10.

*, **, *** indicate two tail significance at .10, .05, and .01 levels, respectively.

Hypothesis H3c deals with the relationship between abnormal trading volume and the portion of JUMB predicted by DNI and DOCI. Table 12 shows the results of this examination. In Panel A the results for the models using the 3-day abnormal volume measures are reported. The first model, using AV03TS as the abnormal volume measure is significant at the p<.001 level and explains 32.66 percent of the variation in AV03TS. However, this model fails to show significance for the variables of interest.

Also shown in Panel A of Table 12 are the results for the model using AV03FE as the dependent variable. This model is significant and the p<.01 level and explains approximately 22.8 percent of the variation in the dependent variable. In this model, the estimated coefficients on the variables of interest are positive and significant. The estimated coefficient on the portion of JUMB related to DNI (JUMB_DNI) is 0.41 percent and is significant at the p<.05 level. A percentage increase in the degree of analysts' reordering related to DNI is associated with an increase in the abnormal trading volume equal to 0.41 percent of shares outstanding. The estimated coefficient on the portion of JUMB related to DOCI (JUMB_DOCI) is 0.3616 percent and is significant at the p<.05 level. A percentage increase in the degree of analysts' reordering related to DOCI is associated with an increase in the abnormal trading volume equal to 36.16 percent of shares outstanding. LCAR03 is also significant (p<.05) with an estimated coefficient of 0.30 percent. The JUMB_DOCI variable survives the bootstrap procedure and remains significant at the p<.1 level.

Panel A of Table 12 also shows the results for the model using AV03DF as the dependent variable. This model is significant and the p<.01 level and explains approximately 21.74 percent of the variation in the dependent variable. In this model, the estimated coefficients on the variables of interest are positive and significant. The estimated coefficient on the portion of JUMB related to DNI (JUMB_DNI) is 0.10 percent and is significant at the p<.01 level. A percentage increase in the degree of analysts' reordering related to DNI is associated with an increase in the abnormal trading volume equal to 0.10 percent of shares outstanding. The estimated coefficient on the portion of JUMB related to DOCI (JUMB_DOCI) is 5.51 percent and is significant at the p<.01 level. A percentage increase in the degree of analysts' reordering related to DOCI is associated with an increase in the abnormal trading volume equal to 5.51 percent of shares outstanding. LCAR03 is also significant (p<.01) with an estimated coefficient of 0.11 percent. A one percent increase in the cumulative abnormal 3-day return is associated with a 0.11 percent increase in AV03DF. The JUMB_DNI variable survives the bootstrap procedure and remains significant at the p<.1 level.

TABLE 12

Panel A: Relationship Between Predicted Jumbling and Abnormal Trading Volume (Hypothesis H3c)

This table reports the coefficient estimates and associated p-values from the regression of each of the three abnormal volume measures on the levels of jumbling predicted by the SFAS 133 income effects (JUMB_DNI and JUMB_DOCI). The results reported here are for the 3-day announcement window. The table also reports the p-values associated with the bootstrap method for estimating standard errors for generated regressors. Controls are included for earnings surprise, institutional holding, abnormal returns, and year and firm effects.

$$AV_{it}=\beta_0+\beta_1(\widehat{JUMB\_DNI}_{it})+\beta_2(\widehat{JUMB\_DOCI}_{it})+\beta_3(\widehat{JUMB\_OTH}_{it})+\beta_4(LSUR_{it})+\beta_5(INST_{it})+\beta_6(LCAR03_{it})+FE_i+YE_t+\varepsilon_{it}$$

PANEL A		AV03TS			AV03FE			AV03DF		
Variable	Exp. Sign	Est. Coef.	p-value	Boot. p-value#	Est. Coef.	p-value	Boot. p-value#	Est. Coef.	p-value	Boot. p-value#
Constant	?	8.2701	0.065*	0.004***	0.0235	0.035**	0.036**	0.0071	0.058*	0.047**
JUMB_DNI[&]	+	0.4762	0.347	0.604	0.0041	0.013**	0.107	0.0010	0.007***	0.058**
JUMB_DOCI[&]	+	1.7998	0.379	0.751	0.3161	0.027**	0.083*	0.0551	0.004***	0.181
JUMB_OTH[&]	?	0.6257	0.076*	0.066**	0.0008	0.355	0.441	0.0004	0.097	0.135
LSUR	+	-0.2343	0.354	0.427	-0.0003	0.529	0.623	-0.0002	0.096	0.193
INST	-	-0.8534	0.638	0.671	-0.0110	0.159	0.143	-0.0019	0.257	0.299
LCAR03	+	1.4535	0.005***	0.013**	0.0030	0.025**	0.044**	0.0011	0.004***	0.009***
Year & Firm Effects		Included			Included			Included		
N			92			92			92	
Groups			37			37			37	
Wald-sig			0.0000	0.0062		0.0048	0.0265		0.0000	0.0045
Wald-stat			52.12	29.19		29.96	15.71		100.46	30.13
R^2(within)			.3266	0.3266		0.2282	0.2282		0.2174	0.2174

Standard errors estimated via the bootstrap method are typically larger than the normally obtained standard errors. As a result, findings of significance under the normally obtained standard errors may not be significant under the bootstrap estimation procedure.

[&] JUMB_DNI and JUMB_DOCI are the portions of JUMB predicted by the regression in Table 10.

*, **, *** indicate two tail significance at .10, .05, and .01 levels, respectively.

TABLE 12 (cont)
Panel B: Relationship Between Predicted Jumbling and Abnormal Trading Volume (Hypothesis H3c)

This table reports the coefficient estimates and associated p-values from the regression of each of the three abnormal volume measures on the levels of jumbling predicted by the SFAS 133 income effects (JUMB_DNI and JUMB_DOCI). The results reported here are for the 7-day announcement window. The table also reports the p-values associated with the bootstrap method for estimating standard errors for generated regressors. Controls are included for earnings surprise, institutional holding, abnormal returns, and year and firm effects.

$$AV_{it}=\beta_0+\beta_1(\widehat{JUMB\_DNI}_{it})+\beta_2(\widehat{JUMB\_DOCI}_{it})+\beta_3(\widehat{JUMB\_OTH}_{it})+\beta_4(LSUR_{it})+\beta_5(INST_{it})+\beta_6(LCAR07_{it})+FE_i+YE_t+\varepsilon_{it}$$

PANEL B		AV07TS			AV07FE			AV07DF		
Variable	Exp. Sign	Est. Coef.	p-value	Boot. p-value#	Est. Coef.	p-value	Boot. p-value#	Est. Coef.	p-value	Boot. p-value#
Constant	?	8.4984	0.153	0.204	0.0297	0.003***	0.009***	0.0030	0.065*	0.051**
JUMB_DNI[&]	+	0.2952	0.796	0.899	0.0046	0.180	0.364	0.0002	0.514	0.596
JUMB_DOCI[&]	+	-3.1403	0.947	0.984	0.0588	0.075*	0.069*	0.0299	0.071*	0.186
JUMB_OTH[&]	?	1.1589	0.164	0.184	0.0005	0.732	0.793	0.0002	0.239	0.274
LSUR	+	-0.0966	0.842	0.858	-0.0004	0.670	0.736	-0.0002	0.126	0.208
INST	-	1.2162	0.766	0.798	-0.0178	0.189	0.199	-0.0008	0.580	0.595
LCAR07	+	1.2248	0.040*	0.134	0.0031	0.018**	0.097*	0.0005	0.001***	0.013**
Year & Firm Effects		Included			Included			Included		
N			92			92			92	
Groups			37			37			37	
Wald-sig			0.0024	0.0135		0.0019	0.0796		0.0000	0.0065
Wald-stat			32.00	26.75		32.70	20.68		59.96	29.01
R^2(within)			0.2027	0.2027		0.2936	0.2163		0.1988	0.1988

Standard errors estimated via the bootstrap method are typically larger than the normally obtained standard errors. As a result, findings of significance under the normally obtained standard errors may not be significant under the bootstrap estimation procedure.
[&] JUMB_DNI and JUMB_DOCI are the portions of JUMB predicted by the regression in Table 10.
*, **, *** indicate two tail significance at .10, .05, and .01 levels, respectively.

All of the 7-day window models are significant overall; however, only one model indicates significance on the variables of interest. The model using AV07FE as the dependent shows a positive and significant ($p<.1$) coefficient on JUMB_DOCI. A percentage increase in the degree of analysts' reordering related to DOCI is associated with an increase in the abnormal trading volume equal to 5.88 percent of shares outstanding. This effect retains significance ($p<.1$) through the bootstrap procedure. The loss of significance relative to the other abnormal volume measures likely reflects that, while information was successfully transferred into the second model, it lacked sufficient precision to be detected. An improved mechanism for transferring the information from the primary model to the secondary model may yield significant results.

Both hypothesis H1c and H3c find support in the original estimation method and maintain, albeit weaker, support after the appropriate standard errors are estimated. Hypothesis H2c fails to find support through the bootstrap estimation. In all cases, the fixed-effect and difference-in-differences abnormal volume measures are more powerful in detecting the effect than the abnormal volume from the time-series estimation method. There is evidence to support the assertion that the income effects of SFAS 133 have explanatory power for abnormal volume by way of the LDISP and JUMB heterogeneity measures. Both prior dispersion heterogeneity (LDISP) and the differential interpretation heterogeneity (JUMB) are positively associated with SFAS 133 income measures. The portion of the two measures predicted by the SFAS 133 measures are also significantly related to observed abnormal trading volume.

Supplemental analysis:

For each of the models expressed in equations 19, 20, and 21, I test for interactions effects between the variables of interest and the control variables (LSUR, INST, LCAR03, and LCAR07). None of the interactions is significant in explaining variability in abnormal volume.

Finally, I also test H1c, H2c, and H3c using the alternative computations for LDISP and ΔDISP described earlier. I use the analysts' forecast standard deviation and mean provided by I/B/E/S to recomputed LDISP and ΔDISP. The results obtained from the alternative LDISP and ΔDISP measures are consistent with the results reported here.

V Conclusions

Using a sample of 51 banking organizations, I examine four measures of belief heterogeneity surrounding earnings announcements by firms utilizing derivatives for hedging purposes. Due to the underlying complexity of both derivatives and the accounting treatment prescribed by the SFAS 133 standard, I expect that investors may have differing interpretations of the newly provided information. Generally, I hypothesize that the income effects arising from the fair-value accounting for derivatives (SFAS 133) are associated with an increase in differing beliefs among individuals.

I find that the income effects of SFAS 133 are significantly related to belief heterogeneity among investors. The net income and other comprehensive income effects of SFAS 133 are significantly related to increasing levels of abnormal trading volume surrounding earnings announcements. Additionally, the level of SFAS 133 net income is significantly and positively associated with three measures of belief heterogeneity derived from analysts' forecasts. In an extended analysis I model the SFAS 133 income effects on abnormal volume using the three belief heterogeneity measures as the conduit. I find support for two of the three heterogeneity measures acting as a conduit for the effect of the income measures on abnormal volume. This result was only found on the fixed-effect and difference-in-differences estimates of abnormal volume.

Also in an examination of banking organizations, Ahmed et al., (2006) show that the fair-value recognition of derivatives is value relevant. Further, they demonstrate that changes in the levels of fair-value recognition are relevant to equity returns. Their findings show that the recognition of derivatives at fair value is meaningful in establishing the market equilibrium price. The results of this study, taken together with Ahmed et al., (2006), indicate that the SFAS 133 compliant financial information generates heterogeneity of beliefs while at the same time providing value relevant information. While the reporting of recognized derivatives is value relevant in establishing the aggregate belief in the market, the income effects of the same standard cause the aggregate belief to be based on a weaker consensus.

Practitioners should find these results relevant when evaluating the effect of fair-value recognition on market participants. To the extent that differential beliefs and differential interpretations surrounding the reported fair-value information expand and persist over time, standard setters may need to reconcile this market reaction with the underlying purpose of adopting fair-value accounting standards. Accounting researchers may find the results informative for applying a more appropriate standard error estimation technique when generated regressors are employed.

I make several contributions to the literature. First, I employ abnormal trading volume as a tool to examine the effect of derivative fair-value accounting on belief heterogeneity in the market. Second, I relate abnormal volume and three measures of belief heterogeneity to the income effects of SFAS 133. Third, I model the relationship between the portions of the three measures of belief heterogeneity attributable to SFAS 133 income and observed abnormal volume. Fourth, I demonstrate the necessity of applying an alternative standard error estimation procedure when hypotheses are tested in a model with generated regressors.

Limitations:

The results of this study may not be broadly generalizable. First, the sample in this study is restricted to regulated, banking organizations. Second, the study is based on a limited sample of 223 firm-years observations representing 51 firms.

As with most archival market studies, several threats to validity are present. Several external events occurred proximal to the initial announcement dates of SFAS 133 compliant results. Specifically, the effects of the September 11, 2001 terrorist attack cannot be fully assessed nor captured in a model. While the first earnings announcements for financial results compliant with SFAS 133 were not issued until mid January 2002, the lingering effect of the turmoil and passage of the Patriot Act cannot be dismissed. Second, Regulation FD was adopted by the SEC on August 15, 2000. This regulation required that any disclosure made to any group of users (in particular following analysts) must be made readily available to all users in a public forum or media. In response, firms may have made more information available to a broader base of investor. Third, in June 2000, FASB issued SFAS 138. As a result, the effect of SFAS 138 is temporally linked to the valuation and income effects of SFAS 133.

Opportunities for Future Research:

One further exploration dealing with the volume and price reactions around SFAS 133 compliant earnings announcements is in the identification and measurement of announcement specific characteristics. These announcement specific characteristics may influence the relationships explored here. Components of net income and other comprehensive income can be expected to influence the strength of the heterogeneity relationship to income measures. The smoothness (or volatility) of earnings along with levels of disclosure in general may also be an important factors. In this study, I examine the total income and other comprehensive income effect of all derivatives. Future research into the specific types of derivative hedging activity (i.e. cash flow, fair value, and foreign exchange) should be explored. As each of these derivatives strategies have different uses and implications for the firms' financial position and future cash flows, differing levels of each may have an effect on heterogeneity.

Alternative measures of information asymmetry should also be examined. For example, bid-ask and credit yields have been identified in the literature as market measures reflecting differing views about risk and uncertainty. Utilization of these alternative measures provides two significant benefits. First, a significant portion of the 276 firm-year observations lost due to insufficient analysts' following could be recovered into the sample. Second, these alternative measures could be used to test the robustness of the results reported here.

Examination of the level of observed heterogeneity over time should also be explored. Specifically, the question as to whether the market participants learn over time how to build the effects of the new standard into expectations, and if that is observed as a reduction in observed heterogeneity.

Literature Cited

Literature Cited

Abarbanell, J. (1995). Analysts' forecasts as proxies for investor beliefs in empirical research. *Journal of Accounting and Economics, 20*, 30.

Ahmed, A., Kilic, E., & Lobo, G. (2006). Does recognition versus disclosure matter? Evidence from value-relevance of banks' recognized and disclosed derivative financial instruments. *The Accounting Review, 81*(3), 22.

Ajinkya, B., Atiase, R., & Gift, M. (1991). Volume of trading and the dispersion in financial analysts' earnings forecasts. *The Accounting Review, 66*(2), 13.

Athanassakos, G., & Kalimipalli, M. (2003). Analyst forecast dispersion and future stock return volatility. *Quarterly Journal of Business and Economics, 42*(1), 22.

Bamber, L., Barron, O., & Stober, T. (1997). Trading volume and different aspects of disagreement coincident with earnings announcements. *The Accounting Review, 72*(4), 23.

Bamber, L., Barron, O., & Stober, T. (1999). Differential interpretations and trading volume. *Journal of Financial and Quantitative Analysis, 34*(3), 18.

Bamber, L., & Cheon, Y. (1995). Differential price and volume reactions to accounting earnings announcements. *The Accounting Review, 70*(3), 27.

Barron, O. (1995). Trading volume and belief revisions that differ among individual analysts. *The Accounting Review, 70*(4), 17.

Barth, M., Beaver, W., & Landsman, W. (1996). Value-relevance of banks’ fair value disclosures under SFAS no. 107. *The Accounting Review, 71*(4).

Beaver, W. (1968). The information content of annual earnings announcements. *Journal of Accounting Research, Supplement*, 33.

Benrud, E. (2007). A market model of analysts' opinions to explain changes in the dispersion of opinions. *Journal of Economics and Finance, 31*(2), 23.

Chaing, H. (2005). Analyst's financial forecast accuracy and information transparency. *Journal of American Academy of Business, 7*(2), 7.

Cready, W., & Hurtt, D. (2002). Assessing investor response to information events using return and volume metrics. *The Accounting Review, 77*(4), 19.

Daley, L., Senkow, D., & Vigeland, R. (1988). Analysts' forecasts, earnings variability, and option pricing: emperical evidence. *The Accounting Review, 63*(4), 28.

Diether, K., Malloy, C., & Scherbina, A. (2002). Differences of opinion and the cross section of stock returns. *The Journal of Finance, 57*(5), 32.

Statement of Financial Accounting Concept No.1, (1978).

Holthausen, R., & Verrecchia, R. (1990). The effect of informedness and consensus on price and volume behavior. *The Accounting Review, 65*(1), 18.

Hope, O. (2003). Accounting policy disclosure and analysts' forecasts. *Contemporary Accounting Research, 20*(2), 27.

Irani, A., & Karamanou, I. (2003). Regulation fair disclosure, analyst following, and analyst forecast dispersion. *Accounting Horizons, 17*(1), 15.

Kandel, E., & Pearson, N. (1995). Differential interpretation of public signals and trade in speculative markets. *Journal of Political Economy, 103*(4), 42.

Karpoff, J. (1986). A theory of trading volume. *The Journal of Finance, 41*(5), 18.

Karpoff, J. (1987). The relation between price changes and trading volume: a survey. *Journal of Financial and Quantitative Analysis, 22*(1), 15.

Kim, O., & Verrecchia, R. (1991). Trading volume and price reactions to public announcements. *Journal of Accounting Research, 29*(2), 19.

Kim, O., & Verrecchia, R. (2001). The relation among disclosure, returns, and trading volume information. *The Accounting Review, 76*(4), 22.

Morse, D. (1980). Asymmetrical information in securities markets and trading volume. *The Journal of Finance, 41*(5), 19.

Moses, H. (2002). The value relevance of financial institutions' fair value disclosures: A study in the difficulty of linking unrealized gains and losses to equity values. *Abacus, 38*(1), 15.

Murphy, K., & Topel, R. (2002). Estimation and inference in two-step econometric models. *Journal of Business and Economic Statistics, 20*(1), 11.

Nelson, K. (1996). Fair value accounting for commercial banks: An empirical analysis of SFAS No. 107. *The Accounting Review, 71*(2), 22.

Oxley, L., & McAleer, M. (1993). Econometric issues in macroeconomic models with generated regressors. *Journal of Economic Surveys, 7*(1), 39.

Pagan, A. (1984). Econometric issues in the analysis of regressions with generated regressors. *International Economic Review, 25*(1), 26.

Rich, R., Raymond, J., & Butler, J. (1992). The relationship between forecast dispersion and forecast uncertainty: Evidence for a survey data-ARCH model. *Journal of Applied Econometrics, 7*(2), 17.

Seow, G., & Tam, K. (2002). The usefulness of derivative-related accounting disclosures. *Review of Quantitative Finance and Accounting, 18*(May), 19.

Tkac, P. (1999). A trading volume benchmark: Theory and evidence. *Journal of Financial and Quantitative Analysis, 34*(1), 26.

Utama, S., & Cready, W. (1997). Institutional ownership, differential pre-disclosure precision and trading volume at announcement dates. *Journal of Accounting and Economics, 24*, 22.

Venkatachalam, M. (1996). Value-relevance of banks' derivatives disclosures. *Journal of Accounting and Economics, 22*, 39.

Wang, L., Alam, P., & Makar, S. (2005). The value-relevance of derivative disclosures by commercial banks: A comprehensive study of Information content under SFAS 119 and 133. *Review of Quantitative Finance and Accounting, 25*, 15.

Wong, M. (2000). The association between SFAS N0. 119 derivatives disclosures and the foreign exchange risk exposure of manufacturing firms. *Journal of Accounting Research, 38*(2), 34.

Ziebart, D. (1990). The association between consensus of beliefs and trading activity surrounding earnings announcements. *The Accounting Review, 65*(2), 12.

APPENDIX A

Variable Definitions – Income Measures and Abnormal Trading Volume

Variable	Title	Units/Form	Definition/Computation
Income Measures			
DNI	Derivative Net Income	Dollars per share	Per share before tax net income arising from SFAS-133
DOCI	Derivative OCI	Dollars per share	Per share other comprehensive income (gross of tax effect) arising from SFAS-133
NDNI	Non-Derivative Net Income	Dollars per share	Per share before tax net income excluding effect of SFAS-133
NDOCI	Non-Derivative OCI	Dollars per share	Per share other comprehensive income (gross of tax effect) excluding effect of SFAS-133
Abnormal Trading Volume Measures			
AV03TS / (AV07TS)	Time Series estimation of abnormal trading volume for 3-day (7-day) window	No units specified	Difference between the log of actual trading volume during the announcement period and the log of estimated normal trading volume during the announcement period (3 and 7 day). The difference is divided by the standard deviation of the residuals from the time-series regression. Normal trading volume is estimated with a first order autoregressive model where the log of the percent of firm shares traded is the dependent variable, and is regressed on the contemporaneous percent of market shares traded. The non-announcement period used in the estimation begins 50 days prior to announcement date and ends 10 days prior to the announcement date.

APPENDIX A (cont)
Variable Definitions – Abnormal Trading Volume

Variable	Title	Units/Form	Definition/Computation
Abnormal Trading Volume Measures –cont.			
AV03FE / (AV07FE)	Firm effect estimation of abnormal trading volume for 3-day (7day) window	% of shares	Difference between actual trading volume during the announcement period and estimated normal trading volume during the announcement period (3 and 7 day). Normal trading volume is estimated with cross-sectional panel data using both firm effects and year effects. The parameters are estimated over the non-announcement period beginning 50 trading days prior to announcement and ending 10 days prior to announcement. The estimated parameters are then used to estimate normal volume through the announcement period.
AV03DF / (AV07DF)	Difference in Differences estimation of abnormal trading volume for 3-day (7-day) window	% of shares	Difference between firm excess trading volume and market excess trading volume during the announcement period (3 and 7 day windows). Firm excess trading volume is computed as the percent of shares traded over the announcement period less the percent of shares traded over the non-announcement period. Market excess trading volume is computed in the same way with the same announcement and non-announcement periods. The announcement period begins 50 trading days prior to announcement and ends 10 days prior to announcement.

APPENDIX A (cont)
Variable Definitions – Heterogeneity Measures

Variable	Title	Units/Form	Definition/Computation
Heterogeneity Measures			
LDISP	Prior Dispersion		Natural log of the standard deviation of analysts forecasts issued within 30 days prior to the earnings announcement divided by the mean forecast
ΔDISP	Change in Dispersion		Standard deviation of analysts forecasts issued within 45 days of earnings announcement less standard deviation of analysts forecasts issued within 30 days prior to earnings announcement divided by the pre-announcement mean forecast
JUMB	Jumbling		Natural log of 1.1 minus the non-parametric correlation coefficient of the rank order of analysts forecasts prior to earnings announcement and post earnings announcement

APPENDIX A (cont)

Variable Definitions – Control Variables

Variable	Title	Units/Form	Definition/Computation
Control Variables			
LSUR	Earnings surprise	ln(per share)	Natural log of the absolute value of the difference between the mean analyst forecast and actual EPS, divided by the mean analysts forecast
INST	Institutional Holdings	% of shares	Shares held by institutions at end of reporting period divided by shares outstanding at end of reporting period.
FVD	Fair Value of Hedge Derivatives	per share	Gross amount of fair value of derivatives per share.
LCAR03 / (LCAR07)	3-day (7-day) window abnormal returns	ln(CAR)	CAR is computed by estimating the normal return against market return for the period beginning 50 days prior to announcement and ending 10 days prior to announcement. The estimated parameters from that regression are used to forecast normal returns through the announcement period. The difference between actual daily return and predicted normal return are summed over the 3-day (7-day) announcement period.

VITA

Jack Wayne Dorminey was born on May 26, 1965 in Morgantown, West Virginia. He graduated from West Springfield High School in Springfield, Virginia in 1983. He holds a Bachelor of Science in Finance and Management (1988) and an MBA (1989) both from the Pamplin College of Business at Virginia Tech. In 2005, Jack entered the Ph.D. in Business program at Virginia Commonwealth University (VCU). He completed the requirements for a Doctorate in Business with a major in Accounting and a minor in Economics in 2009.

Jack's business experience began with the Federal Reserve Bank of Richmond in 1989. During his 20 years at the Bank, Jack held positions as a banking regulator, financial analyst, risk analyst, and financial manager. He was employed by the Bank until 2009. Jack has accepted a position, which will begin in August 2009, as an Assistant Professor in the Division of Accounting of the College of Business and Economics at West Virginia University.