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Value-relevance of banks' derivatives disclosures

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Abstract

This paper investigates the value-relevance of banks' derivatives disclosures provided under SFAS 119. The findings suggest that the fair value estimates for derivatives help explain cross-sectional variation in bank share prices and that the fair values have incremental explanatory power over and above notional amounts of derivatives. I also conduct cross-sectional tests to provide preliminary evidence on the usefulness of derivatives disclosures in examining banks' risk-management strategies. While I find that banks, on average, are reducing their risk exposures using derivatives, further analysis reveals that only 47% of the sample banks appear to use derivatives to reduce risk.

Key words: Derivatives; Banks; Fair value disclosures; Notional value disclosures; Risk management

JEL classification: C21; G21; M41

1. Introduction

This study investigates the value-relevance of banks' derivatives disclosures under the recently issued Statement of Financial Accounting Standards (SFAS) No. 119, '*Disclosure about Derivative Financial Instruments and Fair Value of*

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Financial Instruments'. SFAS 119 was instituted against the backdrop of continuing debate over regulation of and disclosure for derivative financial instruments. Of primary interest in this study is whether these new and expanded disclosures, particularly the disclosures relating to derivatives used for purposes other than trading, are useful to investors in equity valuation. In addition, I provide descriptive evidence on the risk-management practices of banks by examining the relation between derivatives gains and losses and on-balance sheet gains and losses.

Previous research examines the valuation implications of two types of disclosures for off-balance sheet instruments: (i) contractual amounts and (ii) fair values. Riffe (1996) examines the valuation implications of disclosures on contractual (notional) amounts for off-balance sheet financial instruments using quarterly Y-9 reports filed by bank holding companies. Her findings suggest that the contractual amounts for loan commitments and swaps are positively related to market value of bank equity.

Three concurrent studies (Barth, Beaver, and Landsman, 1996; Eccher, Ramesh, and Thiagarajan, 1996; Nelson, 1996) examine the valuation implications of fair value disclosures for both on- and off-balance sheet instruments provided under SFAS 107. Barth et al. (1996) and Eccher et al. (1996) employ a cross-sectional valuation framework. Both of these studies find that fair value disclosures for investment securities and loans provide significant explanatory power beyond book values. Nelson (1996) examines the association between market-to-book ratios and SFAS 107 fair value disclosures and finds that only fair values of securities are value-relevant. None of these studies finds the fair values of banks' *off-balance sheet* instruments (including derivatives) to be useful in assessing equity values.

The insignificant results for off-balance sheet instruments are attributed primarily to ambiguities in the fair value disclosures provided under SFAS 107, especially disclosures relating to off-balance sheet derivatives.[1] In many instances, for example, the disclosures did not reveal whether the off-balance sheet financial instruments represented assets (a net receivable position) or liabilities (a net payable position). SFAS 119 was established, in part, to resolve these ambiguities and improve the transparency of financial reports. Three features of the disclosures stipulated under SFAS 119 are especially noteworthy. First, SFAS 119 requires banks to *identify the purpose* for which derivative financial instruments are used (for trading or other than trading).[2] Second, banks have to

[1] 'The AICPA Special Committee on Financial Reporting told the board (FASB) that investors and creditors it interviewed almost uniformly complained of being mystified and frustrated about the effects of derivatives on the companies they follow . . .' SFAS 119, par. 24.

[2] This classification may not clearly reflect the nature and intent of all derivative financial instruments because the second category (i.e., purposes other than trading) is likely to include derivatives used in risk, increasing (speculating) as well as risk, reducing activities. However, all the

clearly indicate whether the aggregate fair value of the derivatives portfolio represents a *net asset or net liability* position. Third, banks are required to provide *disaggregated information* for fair values and contractual amounts of derivatives segregated by *category* of instrument and by *purpose* for which they are held. These expanded disclosures allow the construction of more powerful tests of value-relevance of derivatives disclosures than was possible in previous studies.

This study extends prior research by testing: (i) whether SFAS 119 fair value disclosures for derivatives are reflected in bank stock prices, (ii) whether notional amounts for derivatives provide incremental information after controlling for the fair values of derivatives, and (iii) how derivative fair values coupled with fair value information for on-balance sheet items may be used in understanding banks' risk-management activities. Two tests examine these research questions. First, I test the value-relevance of fair values and notional values of derivatives using a standard cross-sectional valuation approach (e.g., Landsman, 1986; Barth, 1991). This test examines whether the fair values and notional amounts of derivatives exhibit a significant association with bank stock prices, after controlling for the fair values of a variety of on-balance sheet assets and liabilities.

Second, I test whether banks, on average, use derivatives (that are classified as used for purposes other than trading, hereafter *risk-management* derivatives) for reducing risk exposures. This test uses the cross-sectional relation between fair value gains and losses on derivatives and on-balance sheet fair value gains and losses. If the derivatives reduce banks' risk exposures and the reported fair values of derivatives are reliable, then the gains and losses on derivatives should be negatively related to the gains and losses reported for on-balance sheet financial assets and liabilities.

Empirical findings suggest that the fair values of off-balance sheet derivatives are correlated with equity values beyond the notional values for such derivatives. The result is robust to the inclusion of potential omitted variables and the deletion of outliers. I also document a negative association between notional values of derivatives and bank equity values after controlling for the fair values of derivatives. Finally, I find that across firms the fair value gains and losses for on-balance sheet financial instruments are negatively correlated with the fair value gains and losses on derivative hedge instruments. On the surface, this finding suggests that banks, on average, use derivatives to reduce their risk exposures. However, for a significant number of banks (over 50%) changes in

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banks in this study reported that the derivatives classified as other than trading pertain primarily to those used for asset-liability management or hedging purposes. Therefore, the terms 'risk-management derivatives' and 'nontrading derivatives' are used interchangeably. Derivatives classified as held or issued for trading purposes primarily include the derivative contracts entered into as an intermediary in arranging transactions for customers and, therefore, are not necessarily speculative transactions.

the fair values of derivatives move in the same direction as changes in the fair values of net on-balance sheet items. This suggests that some banks may be using derivative positions to increase, rather than to reduce, risk. A more complete test of this possibility is the subject of ongoing research.

Section 2 provides institutional background and describes the evolution of disclosure requirements for derivatives. Section 3 describes sample selection procedures and sample characteristics. The research design and results for the cross-sectional test of value-relevance of fair values and notional values of derivatives are presented in Section 4. Section 5 provides evidence on the risk-management activities of banks. A summary and the study's conclusions are presented in Section 6.

2. Institutional background

Banks are exposed to a multitude of financial risks (e.g., interest rate risk, foreign exchange risk, credit risk, liquidity risk) due to the nature of their operations. Although banks may use on- and off-balance sheet strategies to manage this risk exposure, there is an increasing reliance on derivatives as a vehicle to manage financial risk.[3] One reason for the increased reliance on derivatives is that bank managers often consider derivatives to be more efficient tools than on-balance sheet strategies to manage financial risks. In addition to using derivatives to manage risk exposures, banks may also enter into derivative contracts as a dealer or as a speculator.

The value of financial derivatives outstanding worldwide, as measured by notional principal and open interest in organized exchanges and over-the-counter markets, rose from $1.5 trillion in 1986 to $10 trillion by the end of 1991. The growing derivatives market reflects, in part, the increasing role of derivatives as a tool for risk management, particularly for banks and other financial institutions (Remolona, 1992–93, p. 39).[4] Despite the explosive growth in derivative financial instruments, analysts and regulators have expressed concern that current financial statements do not adequately represent the underlying economics of these instruments.[5] Because of the complexity of recognition and

[3] *Banking off the Balance Sheet* (BAI and McKinsey & Company, 1994).

[4] According to recent research by Hentschel and Kothari (1995), the derivative holdings of financial firms are, on average, substantially higher than those of nonfinancial firms.

[5] For example, in the AICPA Special Committee on Financial Reporting (Jenkins Committee) report, the committee noted 'Accounting standards have not kept pace with the proliferation of innovative instruments', *Improving Business Reporting – A Customer Focus* (AICPA, 1994). Similar concerns were expressed in the General Accounting Office Report, *Financial Derivatives: Actions Needed to Protect the Financial System*, GAO/GDD-94-133 (May 1994, p. 92) and in the Association for Investment Management and Research Report, *Financial Reporting in the 1990's and Beyond* (1993, p. 18).

measurement issues relating to these instruments, the Financial Accounting Standards Board (FASB) opted to improve and expand disclosures for derivatives as a first step in addressing these concerns (SFAS 119, par. 2). Consequently, SFAS 105, '*Disclosure of Information about Financial Instruments with Off-Balance-Sheet Risk and Financial Instruments with Concentrations of Credit Risk*', and SFAS 107, '*Disclosures about Fair Value of Financial Instruments*', were issued in March 1990 and December 1991, respectively.

SFAS 105 requires the disclosure of the extent (i.e., the contractual or notional amount), nature, terms, and credit risk of financial instruments with 'off-balance sheet' risk, and the concentrations of credit risk for all financial instruments. SFAS 107 requires banks to disclose the fair value of all financial instruments for which it is practicable to estimate value, whether recognized (on-balance sheet) or unrecognized (off-balance sheet) in the financial statements. The FASB considers the fair value for these unrecognized financial instruments to be a relevant measure of the present value of net future cash flows that reflects assessments of both risks and returns (SFAS 107, par. 38,40).

SFAS 107 disclosures of the fair values of off-balance sheet items in the financial statements are often ambiguous. This concern is shared by the GAO (Report on Financial Derivatives, 1994) and other researchers (Barth et al., 1996; Eccher et al., 1996; Nelson, 1996). To provide further insight, I examine a sample of 83 bank annual reports for 1993 and detect a number of limitations with SFAS 107 disclosures which cloud their interpretation. First, fourteen (17%) of the 83 bank annual reports contain language that makes it difficult to discern from the fair value disclosures whether the reported off-balance sheet position represents an asset (net receivable) or a liability (net payable) position. Second, twenty banks (24%) do not identify whether the fair value of off-balance sheet derivatives relates to trading or risk-management purposes. Third, eight banks (10%) disclose only an aggregate net fair value for all off-balance sheet instruments (loan commitments, interest rate derivatives, foreign exchange derivatives, etc.) without revealing fair value information by individual category.

SFAS 119 sought to address the reporting and disclosure concerns outlined above by amending the disclosure requirements of SFAS 105 as follows (SFAS 119, par. 14):

> a. The disclosures under SFAS 105 (i.e., the extent, nature, terms, and credit risk of financial instruments with off-balance sheet (OBS) risk) are **extended to all derivative financial instruments** including instruments without OBS risk under the purview of SFAS 119, and
>
> b. The disclosures shall *distinguish between financial instruments held or issued for trading purposes and financial instruments held or issued for purposes other than trading* (emphasis added).

SFAS 119 also amends SFAS 107 as follows (SFAS 119, par. 15):

> a. The fair value disclosures under SFAS 107 (as applied to off-balance sheet derivatives) shall *clearly indicate* whether the fair value and carrying amount of financial instruments **represent assets or liabilities** (emphasis and parenthesis added),
>
> b. Such disclosures shall *distinguish between financial instruments held or issued for trading purposes and financial instruments held or issued for purposes other than trading* (emphasis added), and
>
> c. Entities *shall not aggregate or net the fair value of derivative financial instruments with other derivative/non-derivative financial instruments* except as permitted under FASB Interpretation No. 39, *Offsetting of Amounts Related to Certain Contracts* (emphasis added).

To illustrate these improvements in disclosures, the off-balance sheet derivative disclosures for Suntrust Banks, Inc. (a representative sample bank) is reproduced in Exhibit 1 (improvements italicized in boldface). Whether these improved disclosures are useful to investors in equity valuation is at the heart of this study.

3. Sample and descriptive statistics

The sample for this study consists of 99 bank holding companies that meet two criteria: (1) assets of $150 million or more at the end of 1994 and (2) use off-balance sheet financial derivatives. The financial statement data for the empirical analysis are hand-collected from bank annual reports/SEC 10-K filings for 1994 and 1993. The annual reports/10-Ks are obtained either directly from the banks or from the LEXIS/NEXIS database. Stock prices for the banks in this sample are obtained from the 1993 Compustat Annual Bank Tape and Bloomberg Financial Markets.

Table 1 presents descriptive statistics for the various balance sheet assets, liabilities, and off-balance sheet items of sample banks for 1993 and 1994 fiscal years. Panel A of Table 1 reveals that the mean fair value estimate of balance sheet assets (*TASS*) exceeds the average book value in 1993 by $461 million. This is 25% of the average book value of common equity, indicating the presence of unrecognized and unrealized gains, due probably to the declining interest rate environment in the early 1990's. Compared to 1993, the book value of assets, on average, exceeds its fair value by $11 million in 1994, implying the existence of unrealized and unrecognized losses. The change from unrealized gains in 1993 to unrealized losses in 1994 is consistent with the increasing interest rate environment in 1994. On the liabilities side, in 1993 the mean fair

Excerpts from the 1994 annual report.

Note 12 - Off-Balance Sheet Financial Instruments

In the normal course of business, the Company utilizes various financial instruments to meet the needs of customers and to manage the Company's exposure to interest rate and other market risks. These financial instruments, which consist of derivatives contracts and credit-related arrangements, involve, to varying degrees, elements of credit risk and market risk in excess of the amount recorded on the balance sheet in accordance with generally accepted accounting principles.

Credit risk represents the potential loss that may occur because a party to a transaction fails to perform according to the terms of the contract. Market risk is the possibility that a change in interest or currency exchange rates will cause the value of a financial instrument to decrease or become more costly to settle. The contract/notional amounts of financial instruments, which are not included in the consolidated balance sheet, do not necessarily represent credit or market risk. However, they can be used to measure the extent of involvement of various types of financial instruments....

(paragraph omitted)

(in millions)	At December 31, 1994			At December 31, 1993		
	Contract or Notional Amount		Credit risk	Contract or Notional Amount		Credit risk
	End User	For Customers	Amount	End User	For Customers	Amount
Derivative contracts:						
Interest rate contracts:						
Swaps	***$ 1,838***	***$ 888***	***$ 53***	***$ 2,188***	***$ 989***	***$ 85***
Futures and forwards	*-*	*-*	*-*	*477*	*-*	*-*
Options written	*-*	*370*	*-*	*-*	*416*	*-*
Options purchased	*-*	*360*	*-*	*-*	*401*	*4*
Total	*1,838*	*1,618*	*53*	*2,665*	*1,806*	*89*
Foreign exchange contracts	*170*	*-*	*22*	*117*	*-*	*16*
Total derivative contracts	***$ 2,008***	***$ 1,618***	***$ 75***	***$ 2,782***	***$ 1,806***	***$ 105***
Credit-related arrangements						
Commitments to extend credit	$ 12,670		12,670	$ 10,826		10,826
Standby letters of credit and similar arrangements	2,618		2,618	$ 2,243		2,243
Total credit-related arrngmts.	$ 15,288		15,288	$ 13,069		13,069
When issued securities:						
Commitments to sell	$ 16		-	$ 353		-
Commitments to purchase	6		-	395		395
Total credit risk amount			$ 15,363			$ 13,569

Exhibit 1. Off-balance sheet disclosures by Suntrust Banks, Inc.

value of deposits and debt ($TLIB$) exceeds the mean book value by $111 million reflecting unrealized losses. The reverse is true in 1994, i.e., the book value of liabilities exceeds its fair value by an average of $76 million representing unrealized gains.

Cumulating the unrecognized gains and losses in assets and liabilities for which fair value information is available under SFAS 107, there is an average net unrealized gain of $350 million ($65 million) for 1993 (1994), which is 19% (3.5%) of the average equity book value. However, the unrecognized gain for

Derivatives

The Company enters into various derivatives contracts in managing its own interest rate risk and in a dealer capacity as a service for customers. Where contracts have been created for customers, the Company enters into offsetting positions to eliminate its exposure to market risk.

Interest rate swaps are contracts in which a series of interest rate flows, based on a specific notional amount and a fixed and floating interest rate.....

The Company monitors its sensitivity to changes in interest rates and uses interest rate swap contracts to limit the volatility of net interest income. Due to the characteristics of the Company's funding sources, the majority of swaps involve the Company receiving a fixed rate and paying a floating rate. ***At December 31, 1994 and 1993 there were no deferred gains and losses relating to terminated interest rate swap contracts. The Company records all swap income and expense in the interest expense category. The total reduction of interest expense of 1994, 1993 and 1992 related to interest rate swaps was $30.6 million, and $36.3 million. Included in those amounts are $0.4 million, $0.5 million, and $0.3 million representing income from swaps entered into for customers.***

Futures and forwards are contracts for the delayed delivery of securities or money market instruments in which the seller agrees to.....

(paragraph omitted).

Note 14 - Fair Values of Financial Instruments

The following table represents the carrying amounts and fair values of the Company's financial instruments at December 31, 1994 and 1993:

(in thousands)	1994		1993	
	Carrying Amount	Fair Value	Carrying Amount	Fair Value
Financial assets:				
Cash and short-term investments	$3,591,767	$3,591,767	$3,454,947	$3,454,947
Trading account	98,110	98,110	112,522	112,522
Investment securities	9,318,521	9,318,521	10,643,953	10,643,953
Loans	28,548,887	28,317,927	25,592,078	25,403,676
Financial Liabilities:				
Deposits	32,218,416	32,193,724	30,485,805	30,552,911
Short-term borrowings	5,137,549	5,137,549	4,856,165	4,856,165
Long-term debt	930,447	890,041	630,350	674,933
Off-balance sheet financial instruments:				
Interest rate swaps:				
In a net receivable position		***18,125***		***70,088***
In a net payable position		***(16,383)***		***(3,031)***
Commitments to extend credit		***6,837***		***7,592***
Standby letters of credit		***1,238***		***1,457***
Other		***22***		***16***

The following methods and assumptions were used by the Company in estimating fair value of financial instruments.

(paragraphs omitted)

Fair values for off-balance sheet instruments (futures, swaps, forwards, options, guarantees, and lending commitments) are based on quoted market prices, current settlement values, or pricing models or other formulas.

Exhibit 1 (continued)

Table 1
Descriptive statistics for on-and off-balance sheet items

Panel A: *On-balance sheet assets and liabilities* (in $ millions);[a,b] 1993: $N = 98$ and 1994: $N = 99$

Variable		Mean		Median		Std. dev.	
		1993	1994	1993	1994	1993	1994
*CSHEQ**	FV	2993.39	3409.78	680.80	720.39	5321.07	6432.41
SEC	FV	5117.61	4835.13	2964.46	2692.09	6111.03	5699.23
	BV	5050.99	4938.28	2962.70	2766.70	6045.23	5832.79
*TRD**	FV	1229.48	1008.34	2.89	4.00	5076.49	4009.97
NLN	FV	14638.96	15825.96	6378.01	7555.02	22720.44	24661.18
	BV	14244.66	15734.14	6213.49	7440.68	22174.92	24404.68
NETBV		1514.59	1684.09	462.13	478.08	2842.23	3178.98
TASS	(FV-BV)	460.92	− 11.33	179.21	− 36.90	705.22	580.40
DEP	FV	17903.66	18795.77	8003.84	8946.36	25920.74	27455.10
	BV	17843.51	18840.44	7971.15	8957.55	25844.38	27476.30
STD	FV	3841.21	4256.02	1091.09	1546.20	8218.55	8143.92
	BV	3840.52	4256.38	1091.09	1546.20	8217.94	8144.45
LTD	FV	1410.48	1549.46	282.27	352.69	2936.21	3044.60
	BV	1360.79	1580.65	272.78	366.96	2859.34	3088.65
TLIB	(FV-BV)	111.13	− 76.22	42.12	− 20.95	182.71	162.41
EQ	MV	2862.32	2779.63	1315.61	1277.04	3620.13	3492.60
	BV	1844.16	1937.70	894.53	919.58	2536.36	2777.42

Panel B: *Off-balance sheet items* (in $ millions);[c] 1993: $N = 98$ and 1994: $N = 99$

Variable		Mean		Median		Std. dev.	
		1993	1994	1993	1994	1993	1994
IRDER	FV	68.92	− 95.14	0.35	− 11.69	218.16	254.44
	CV	8.04	12.22	0.00	0.00	49.48	82.73
FXDER	FV	2.37	1.37	0.00	0.00	11.92	17.50
	CV	0.98	1.00	0.00	0.00	7.52	7.85
DER	FV	71.29	− 93.81	0.35	− 11.43	223.61	250.44
	CV	9.02	13.22	0.00	0.00	50.57	83.34
OBS	FV	− 5.25	− 5.17	0.00	0.00	37.22	40.14
	CV	− 1.15	− 0.31	0.00	0.00	14.01	15.23
TABO		13.79	14.36	2.42	1.58	110.24	110.66
NPL		287.70	189.49	60.33	40.85	823.22	541.89

Table 1 (continued)

Panel C: Off-balance sheet instruments positions for 1994 (in $ millions);[d] $N = 99$

Variable	Mean	Median	Std. dev.
NPCOMM	12585.64	2888.00	24735.33
NPLC	1629.37	242.99	3785.94
NPOBS	16105.40	3565.05	31610.18
NPDERH	12643.80	1286.10	40503.69
NPDERT	131457.40	93.39	470125.40
NPDER	144101.20	1876.74	505581.00

[a]FV denotes fair value. BV denotes book value. MV denotes market value. *CSHEQ* denotes cash and cash equivalents. *SEC* denotes investment securities held-to-maturity and available for sale. *TRD* denotes trading account securities. *NLN* denotes net loans. *NETBV* denotes book value of other on-balance sheet assets net of liabilities (all amounts recorded in the books relating to off-balance sheet items are excluded). *TASS* denotes total assets. *DEP* denotes total deposits. *STD* denotes short-term debt. *LTD* denotes long-term debt. *TLIB* denotes total liabilities. *EQ* denotes shareholders' equity.

[b]For cash and cash equivalents and trading account securities variables the book value approximates fair value.

[c]FV denotes fair value. CV denotes carrying value. *IRDER* denotes interest rate derivative financial instruments held for risk-management purposes. *FXDER* denotes foreign-exchage-related derivative financial instruments held for risk-management purposes. *DER* denotes all derivative financial instruments held for risk-management purposes. *OBS* denotes other off-balance sheet instruments. *TABO* denotes amount of pension assets net of pension and postretirement benefit obligations. *NPL* denotes book value of nonperforming loans.

[d]*NPCOMM* denotes contractual amounts of commitments to extend credit. *NPLC* denotes contractual amounts of standby and commercial letters of credit. *NPOBS* denotes contractual amounts of all off-balance sheet items excluding derivatives. *NPDERH* denotes notional values of derivative contracts used for risk-management purposes. *NPDERT* denotes notional values of derivative contracts used for trading purposes. *NPDER* denotes notional values of all derivative contracts.

balance sheet net assets is far less than the excess of market value of equity over the book value of $1018 million ($842 million) for 1993 (1994), which is 55% (43%) of the average book value of equity. The aggregate difference between fair and book values of on-balance sheet items explains about 10% of the variation in the difference between market and book value of equity (results not reported). This suggests that other items, such as off-balance sheet items, core deposit intangibles, and market expectations about future earnings growth, are reflected in the market value of equity. The extent to which such items help explain cross-sectional variation in market-to-book differences in equity is examined in Section 4.

Panel B of Table 1 reports the descriptive statistics for off-balance sheet items. The mean fair value (carrying value) of all nontrading derivatives is $71 million ($9 million) and $ − 93 million ($13 million) for 1993 and 1994, respectively. Because trading derivatives are marked to market, their fair values are included

as part of the trading securities (*TRD*) on the balance sheet. The median fair value for derivative contracts is substantially less than its mean, suggesting skewness in the distribution of fair values. The mean fair value of other off-balance sheet items (*FOBS*) is $ −5 million for both years. The average amount of net pension and post-retirement assets (*TABO*) for 1993 (1994) is $ −13.79 million ($14.36 million).

To illustrate the extent of involvement in off-balance sheet activities by the banks in this sample, descriptive data on contractual amounts for off-balance sheet instruments for 1994 are presented in panel C of Table 1. The mean (median) contractual amounts of commitments to extend credit is $12.6 billion ($2.9 billion), while that of letters of credit is $1.6 billion ($.2 billion). The mean (median) contractual/notional amounts for nontrading derivatives (*NPDERH*) is $12.6 billion ($1.3 billion), while that for derivative contracts used in trading activities (*NPDERT*) is $131.5 billion ($93 million). While this may suggest that a majority of the derivative contracts are used for trading purposes, it must be recognized that the comparatively low median amount for *NPDERT* indicates that the mean is driven by a few money center banks that are major dealers in derivatives.

4. Test of value-relevance of derivatives disclosures

4.1. Value-relevance of fair values of derivatives

To test whether derivative fair values are useful in equity valuation, I use a cross-sectional valuation model. I begin with the accounting identity (expressed in market values),[6]

$$MVE = MVA + MVL + NOBA, \tag{1}$$

where MVE denotes the market value of equity, MVA denotes the market value of balance sheet assets, MVL denotes the market value of balance sheet liabilities, and $NOBA$ denotes the net market value of off-balance sheet assets and

[6]Translating the accounting identity in terms of market values instead of book values does not necessarily preserve the identity. Indeed, Coase (1937) suggests that there are benefits that accrue to the corporate form through reduced transaction costs in coordinating the various factors of production. Therefore, the market value of equity may exceed the net market value of reported assets and liabilities. The implication is that there are omitted variables when relating the market value of the firm to the net market value of reported assets and liabilities. A priori, I do not expect the omitted variables to be correlated with the fair value of derivatives (the variable of interest in this study). Nevertheless, to mitigate this concern, I include future growth opportunities as a proxy for the omitted variable in the empirical specification of Eq. (1) and find that tenor of the results are unaltered.

liabilities. *NOBA* excludes pension and post-retirement related assets and obligations. These variables are considered separately in the empirical specification.

Because market values are not observable, I use SFAS 107 fair values as proxies for the market values of on-balance sheet assets (*MVA*) and liabilities (*MVL*) in Eq. (1).[7] Fair values of Cash and Cash Equivalents (*CSHEQ*), Net Loans (*NLN*), Investment Securities including trading securities (*INV*), Deposits (*DEP*), and Total Debt (*DBT*) form the primary on-balance sheet assets and liabilities for the empirical tests. To complete the empirical specification, I aggregate the remaining book values of on-balance sheet assets net of liabilities (*NETBV*) and include this variable in the specification.[8]

Unrecognized off-balance sheet items are grouped into two categories: i) derivative financial instruments and ii) other off-balance sheet items which include loan commitments, letters of credit, and guarantees. I use fair values for derivatives (*FDER*) provided under SFAS 119 and fair values for other off-balance sheet items (*FOBS*) provided under SFAS 107, in place of the unobservable 'true' market values. Note that *FDER* pertains to derivatives held for purposes other than trading because derivatives used in trading activities are generally *marked to market* and included in trading account securities.

The empirical specification of Eq. (1) is

$$MVE_i = \beta_0 + \beta_1 CSHEQ_i + \beta_2 INV_i + \beta_3 NLN_i + \beta_4 DEP_i + \beta_5 DBT_i + \beta_6 NETBV_i + \beta_7 FDER_i + \beta_8 FOBS_i + \varepsilon_i \qquad (2)$$

where

MVE = market value of equity at year-end,
CSHEQ = fair value of cash and cash equivalents,
INV = fair value of investment securities (including trading securities),
NLN = fair value of net loans,
DEP = fair value of deposits (expressed as negative amounts),
DBT = fair value of total debt (expressed as negative amounts),
NETBV = net book value of other on-balance sheet assets and liabilities,

[7] The primary objective of this study is not to investigate whether the fair value disclosures are incrementally useful to book values in explaining bank stock prices. Rather, the focus is on the value-relevance of off-balance sheet derivatives disclosures. Therefore, including both book values and fair values (in absolute terms or in changes form) in the specification could confound inferences due to potential cross-correlation in the measurement error in book values and fair values. But excluding book values from the specification could bias in favor of finding a result simply because fair values are correlated with book values. Therefore, as a sensitivity check, I include the aggregate book value of SFAS 107 assets and liabilities in the empirical specification. These results are discussed later.

[8] Aggregation of assets and liabilities assumes coefficients on the assets and liabilities to be the same, thereby reducing the power of tests. But, given the small sample size and the number of regressors already in the specification, I consider it prudent to use the *NETBV* instead of separating them into assets and liabilities.

$FDER$ = fair value of derivative financial instruments used in asset-liability management,
$FOBS$ = fair value of other off-balance sheet items,
ε = residual error term,
i = individual bank subscript.

If markets were perfect and complete, and if the reported book (fair) values measured market values without error, then all of the coefficients for the on- and off-balance sheet assets and liabilities would equal one (assuming no correlated omitted variables). Thus, a coefficient of one on $FDER$ would provide evidence consistent with the combined relevance and reliability of the derivative fair values disclosed under SFAS 119. However, the estimated coefficients may not equal one because of potential measurement error in book or fair values, cross-correlation among the measurement errors and correlated omitted variables.

To control for potential omitted variables in Eq. (2), I consider certain other off-balance sheet assets and obligations (e.g., pension assets and obligations and accumulated post-retirement benefit obligations) that have been found to be value-relevant (Barth, 1991; Amir, 1993; Choi, Collins, and Johnson, 1996). I include the total amount of net pension and post-retirement benefit obligations ($TABO$), i.e., the fair value of plan assets net of accumulated pension obligations and accumulated post-retirement benefit obligations (primarily health-care costs) in the empirical specification. Based on prior research, I expect the coefficient on $TABO$ to be positive.

Beaver, Eger, Ryan, and Wolfson (1989) find that in the absence of observable market values for loans, nonperforming loans reflect information about impairment of loan values due to credit risk. This information is incremental to the information on default risk provided by the allowance for loan loss reserves. Further, Barth et al. (1996) report that nonperforming loans provide significant explanatory power incremental to SFAS 107 loan fair values with respect to bank share prices. These findings suggest that neither net loan book values nor their fair values may completely reflect default risk. Hence, the book value of nonperforming loans (NPL) is included to capture any elements of default risk not already accounted for in determination of fair value of net loans. Consistent with prior research, I expect NPL to have a negative coefficient.

In sum, the following empirical specification of Eq. (1) is estimated:[9]

$$\begin{aligned} MVE_i = {} & \beta_0 + \beta_1 CSHEQ_i + \beta_2 INV_i + \beta_3 NLN_i + \beta_4 DEP_i \\ & + \beta_5 DBT_i + \beta_6 NETBV_i + \beta_7 FDER_i + \beta_8 FOBS_i \\ & + \beta_9 TABO_i + \beta_{10} NPL_i + \varepsilon_i. \end{aligned} \tag{3}$$

[9]Note that the error structure in Eq. (3) is likely to differ from that in Eq. (2) because of inclusion of control variables ($TABO$ and NPL). However, for ease of exposition I retain the same error structure.

Estimating Eq. (3) using undeflated variables results in heteroscedastic residuals, i.e., the null of homoscedasticity is rejected under the White (1980) test. Therefore, I estimate Eq. (3) using variables deflated by the number of shares outstanding. When the specification is estimated using per-share deflation, the null of homoscedasticity under the White test is not rejected.

Results reported in Table 2 (regression 1) are consistent with predictions. The estimated coefficient on *FDER* is positive and significantly different from zero (coefficient = 1.70; p-value < 0.01) and is also not statistically different from the theoretical value of one (t-statistic not reported). In contrast, the coefficient on fair value of other off-balance sheet item (*FOBS*) is negative and insignificant. One plausible explanation for the insignificant and inconsistent results obtained for the *FOBS* variable is that for twenty-one banks (21%) *FOBS* is set to zero because they either reported no off-balance sheet obligations or considered the fair value to be equal to the carrying fair value without reporting book value or fair value amounts. Another explanation is that some banks still report fair values of loan commitments and letters of credit as assets (implying unrealized gains). However, given the increasing interest rate environment during 1994, treating fair values of loan commitments and letters of credit as assets appears problematic.[10]

The estimated coefficients for balance sheet assets and liabilities (*CSHEQ*, *INV*, *NLN*, *DEP*, *DBT*, and *NETBV*) are positive and statistically different from zero at $p < 0.01$. Also, the coefficients on these variables are not statistically different from the theoretical value of one at conventional significance levels (t-statistics not reported). The coefficient on total pension assets net of pension and post-retirement benefit obligations (*TABO*) is positive and significant, consistent with prior research findings (Barth et al., 1996). Further, the coefficient on nonperforming loans (*NPL*) is negative as predicted, but only weakly significant.

To provide an indication of the importance of off-balance sheet items relative to on-balance sheet variables in assessing equity values, I estimate a regression of market-to-book difference in common equity on (i) the aggregate fair-to-book difference for on-balance sheet items, (ii) fair value amounts net of any carrying amounts for off-balance sheet items, (iii) a proxy for core deposit

[10]Barth et al. (1996) report that even though the sign of the fair value amounts for loan commitments and letters of credit is ambiguous, these fair values appear to be liabilities. Appealing to this view, I reestimated Eq. (3) after considering all loan commitment fair values as liabilities. While the coefficient on *FDER* continues to be significantly positive, the coefficient on *FOBS* variable is now positive (coefficient = 4.55) and statistically significant suggesting that market participants perceive the loan commitment fair values as liabilities even if the disclosures are ambiguous. However, the size of the coefficient on *FOBS* is puzzling. This is probably due to a significant number of observations (42 banks) having zero fair value amounts for other off-balance sheet items. Therefore, this result must be interpreted with caution. Also, this clustering of observations at zero for the *FOBS* variable makes comparability of coefficients on *FDER* and *FOBS* difficult.

intangibles (*CORE*), and (iv) a proxy for future earnings growth (all variables are deflated by shares outstanding to control for heteroscedasticity).[11] The aggregate fair-to-book difference on the balance sheet items explains about 10% of the overall variation in the market-to-book difference in equity. The adjusted R^2 for the regression increases from 10% to 28% after including *TABO*, *CORE*, and *FOBS*. Future earnings growth contributes another 10% increasing the R^2 to 38%. Finally, the net fair values of off-balance sheet derivatives contributes an additional 9% resulting in an overall R^2 of 47%. Thus, a non-trivial portion of the cross-sectional variation in the market-to-book difference is explained by net fair values of off-balance sheet derivatives.

4.2. *Value-relevance of notional values of off-balance sheet instruments*

In this section, I investigate whether the notional/contractual amounts of off-balance sheet instruments provide incremental information to that provided by the fair value amounts, and *vice versa*. This analysis is motivated in part by the FASB's assertion that the notional amounts provide investors with 'an idea of the extent of involvement in transactions that have off-balance-sheet risk' and that '(this) information conveys some of the same information provided by amounts recognized for on-balance-sheet instruments' (SFAS 105, par. 89). Further, results from prior research on the valuation implications of notional amounts appear mixed. For example, Riffe (1996) finds that contractual amounts for off-balance sheet loan commitments and swaps are *positively* related to bank equity values. This finding is consistent with notional amounts providing information about the present value of future benefits (fee income) net of any estimated losses from obligations assumed. In addition, Hassan, Karels, and Peterson (1994) provide evidence that off-balance sheet activities, in particular loan commitments, reduce bank risk. However, research by McAnally (1996) suggests that notional value disclosures provide risk-relevant information that has *negative* valuation implications. In particular, she finds that loan commitments increase the market risk of banks, while derivative contracts do not increase market risk.

Based on FASB's assertion and prior evidence, notional values may be viewed as providing competing and/or incremental information to fair values. Alternatively, given fair value information notional values may provide incremental

[11] Domestic deposits *minus* domestic time deposits is used as a proxy for core deposit intangibles and Zacks estimate of next five years earnings growth (obtained from Bloomberg Financial Markets) is used as a proxy for future earnings growth. Due to lack of availability of Zacks estimates of futures earnings growth for ten banks, the regressions are estimated using a sample of 89 banks. Note that these regressions are estimated primarily for illustrating the relative importance of off-balance sheet derivatives in explaining the difference between market and book value of equity; therefore, the results are not reported here. These results are available from the author upon request.

value-relevant information because they serve as a useful proxy for either the risks embedded in off-balance sheet instruments or future income generated by them, that is not already captured by fair values. Therefore, I expand Eq. (3) to include the notional amounts of both derivatives (*NPDER*) and other off-balance sheet instruments (*NPOBS*). If market participants perceive the contractual amounts to proxy for risk in off-balance sheet instruments, then the coefficient is expected to be negative. On the other hand, if the notional amount serves as a measure of expected future net benefits accruing from off-balance sheet activities in addition to net benefits (costs) represented by fair value estimates, then the coefficient is expected to be positive. Therefore, I make no specific predictions for the signs of the coefficients on the notional/contractual amount variables.

Apart from testing the incremental usefulness of fair values and notional values, I also examine the usefulness of disaggregated information on contractual amounts for off-balance sheet instruments. Because the FASB required disaggregated disclosure of the notional amounts for off-balance sheet instruments, one might expect the two variables to exhibit different valuation coefficients. First, I test whether the notional values of derivatives (*NPDER*) are valued differently than the contractual amounts of other off-balance sheet items (*NPOBS*). Second, I exploit the disaggregated disclosures on notional amounts for derivatives, i.e., derivatives used for trading (*NPDERT*) and derivatives used for risk-management purposes (*NPDERH*), to test whether the market participants perceive the information contained in the two variables, *NPDERT* and *NPDERH*, differently. Testing for differences in the coefficients provides evidence on the incremental usefulness of disaggregated disclosures.

Regression results for tests of value-relevance of derivative notional values are reported in Table 2. Two versions are estimated: (1) including two notional amount variables, *NPDER* and *NPOBS* (regression 2), and (2) splitting *NPDER* into notional values of trading derivatives (*NPDERT*) and notional values of risk-management derivatives (*NPDERH*) (regression 3). In both versions, the coefficient on *FDER* is positive and statistically significant suggesting that the fair values of derivatives are incrementally useful to notional values in equity valuation.[12] Results from the first version (regression 2) reveal that the coefficients on the notional amounts of both types of off-balance sheet instruments (*NPDER* and *NPOBS*) are significantly different from zero, suggesting that contractual amounts provide value-relevant information, after controlling for their fair values. The coefficient on *NPOBS* is positive and significant, consistent with findings by Riffe (1996). Results from regression 3 reveals that the coefficients on *NPDER* and *NPOBS* are statistically different from each other

[12]To address concerns due to skewness and nonnormality in the distribution of notional values, I reestimate the regressions using log (notional amounts) and the results are similar to those obtained when using raw notional amounts.

($F = 13.63$, $p < 0.01$) providing evidence on the usefulness of segregated disclosures for notional amounts. Further, the coefficients on *NPDERT* and *NPDERH* are significantly different from each other ($F = 4.43$, $p = 0.07$), indicating that there is value to providing disaggregated notional values for derivatives.

The negative coefficient on the notional values of derivatives is inconsistent with the findings by Riffe (1996). However, Riffe's result obtains without controlling for the fair values of derivatives. Therefore, one plausible interpretation of the negative coefficient is that the notional amounts of derivatives provide some risk-relevant information, after controlling for the fair value information. I speculate that the notional amounts may capture the credit risk in derivative contracts (i.e., the exposure to financial loss resulting from a counterparty's failure to meet its financial obligations) that may not be fully reflected in the aggregate fair values of derivatives. To explore this explanation, I estimate a regression (regression 4) after including the credit risk amounts (*CRISK*) disclosed by banks, as required under SFAS 105. The coefficient on *CRISK* is predicted to be negative. If notional amounts capture information that is correlated with the credit risk amounts, then one might expect the coefficient on the notional amounts to be insignificant after the inclusion of the *CRISK* variable. Results reported in Table 2 indicate that the coefficient on *CRISK* is negative and significant, consistent with predictions. Also, the coefficient on notional values is negative but no longer significant. This suggests that, after controlling for the credit risk amounts of derivatives, the derivative notional amounts provide no incremental value-relevant information.

4.3. *Sensitivity analysis*

Several potential omitted variables may have contributed to the significance of *FDER* and on-balance sheet fair value variables reported earlier. To control for the effects of omitted variables, I include proxies for core deposit intangibles and future earnings growth that have received the most attention in prior research. Results (unreported) from estimating Eq. (3) after including the proxy variables do not alter the tenor of the conclusions reached earlier.

As a final specification check, I estimate Eq. (3) in changes form:

$$\begin{aligned}\Delta MVE_i = {} & \beta_0 + \beta_1 \Delta CSHEQ_i + \beta_2 \Delta INV_i + \beta_3 \Delta NLN_i + \beta_4 \Delta DEP_i \\ & + \beta_5 \Delta DBT_i + \beta_6 \Delta NETBV_i + \beta_7 \Delta FDER_i + \beta_8 \Delta FOBS_i \\ & + \beta_9 \Delta TABO_i + \beta_{10} \Delta NPL_i + \varepsilon_i, \end{aligned} \tag{3'}$$

where Δ is the prefix that denotes the change in the value of the corresponding variable during the year 1994. All the variables in Eq. (3') are deflated by shares outstanding at the end of 1993. Because SFAS 119 is applicable for fiscal years beginning after December 15, 1994, annual reports for 1993 do not contain

Table 2
Summary statistics for regression of market values on fair values of on- and off-balance sheet items, including notional amounts, for 1994[a,b] (all variables are deflated by shares outstanding at the end of 1994); $N = 99$

		Regression 1			Regression 2			Regression 3			Regression 4		
Variable	Predicted sign	Coeff. est.	*t*-value	*p*-value	Coeff. est.	*t*-value	*p*-value	Coeff. est.	*t*-value	*p*-value	Coeff. est.	*t*-value	*p*-value
Intercept	?	2.560	1.70	0.0921	0.051	0.04	0.9720	−0.402	−0.28	0.7828	−0.437	−0.31	0.7596
CSHEQ	+	0.732	4.00	0.0001	0.889	5.20	0.0001	0.986	5.58	0.0001	0.934	5.34	0.0001
INV	+	0.921	4.78	0.0001	1.157	6.42	0.0001	1.266	6.76	0.0001	1.169	6.18	0.0001
NLN	+	0.836	4.66	0.0001	0.999	6.04	0.0001	1.123	6.37	0.0001	1.053	5.98	0.0001
*DEP**	+	0.792	4.10	0.0001	0.996	5.54	0.0001	1.120	5.91	0.0001	1.038	5.47	0.0001
*DBT**	+	0.868	4.34	0.0001	1.019	5.58	0.0001	1.141	5.95	0.0001	1.073	5.63	0.0001
NETBV	+	0.821	4.90	0.0001	0.960	6.18	0.0001	1.152	6.23	0.0001	1.098	6.01	0.0001
FDER	+	1.702	2.90	0.0023	1.331	2.48	0.0076	1.498	2.79	0.0033	1.655	3.11	0.0013
FOBS	+	−1.014	−0.69	0.2469	−1.297	−0.98	0.1657	−1.162	−0.89	0.1890	−1.143	−0.89	0.1882
*TABO**	+	3.056	3.36	0.0006	2.171	2.55	0.0063	2.060	2.44	0.0083	2.229	2.69	0.0043
NPL	−	−0.889	−1.53	0.0654	−0.471	−0.79	0.2169	−0.824	−1.33	0.0939	−1.061	−1.72	0.0450
NPDER	+/−				−0.002	−3.46	0.0009						
NPDERH	+/−							−0.016	−2.12	0.0369	−0.006	−0.72	0.4742
NPDERT	+/−							−0.001	−1.62	0.1082	−0.001	−1.17	0.2436
NPOBS	+/−				0.025	3.44	0.0009	0.025	3.48	0.0008	0.027	3.89	0.0002
CRISK	−										−0.163	−2.11	0.0188
Adj. R^2		0.85			0.88			0.88			0.89		

[a]All liabilities and obligations are recorded as negative values. p-values are based on one-tailed t-tests when coefficient sign is predicted, and two-tailed t-tests otherwise.

[b]The regressions reported in the table are as follows:

Regression 1:

$$MVE_i = \beta_0 + \beta_1 CSHEQ_i + \beta_2 INV_i + \beta_3 NLN_i + \beta_4 DEP_i + \beta_5 DBT_i + \beta_6 NETBV_i + \beta_7 FDER_i + \beta_8 FOBS_i + \beta_9 TABO_i + \beta_{10} NPL_i + \varepsilon_i$$

Regression 2:

$$MVE_i = \beta_0 + \beta_1 CSHEQ_i + \beta_2 INV_i + \beta_3 NLN_i + \beta_4 DEP_i + \beta_5 DBT_i + \beta_6 NETBV_i + \beta_7 FDER_i + \beta_8 FOBS_i + \beta_9 TABO_i + \beta_{10} NPL_i + \beta_{11} NPDER_i + \beta_{12} NPOBS_i + \varepsilon_i$$

Regression 3:

$$MVE_i = \beta_0 + \beta_1 CSHEQ_i + \beta_2 INV_i + \beta_3 NLN_i + \beta_4 DEP_i + \beta_5 DBT_i + \beta_6 NETBV_i + \beta_7 FDER_i + \beta_8 FOBS_i + \beta_9 TABO_i + \beta_{10} NPL_i + \beta_{11a} NPDERH_i + \beta_{11b} NPDERT_i + \beta_{12} NPOBS_i + \varepsilon_i$$

Regression 4:

$$MVE_i = \beta_0 + \beta_1 CSHEQ_i + \beta_2 INV_i + \beta_3 NLN_i + \beta_4 DEP_i + \beta_5 DBT_i + \beta_6 NETBV_i + \beta_7 FDER_i + \beta_8 FOBS_i + \beta_9 TABO_i + \beta_{10} NPL_i + \beta_{11a} NPDERH_i + \beta_{11b} NPDERT_i + \beta_{12} NPOBS_i + \beta_{13} CRISK_i + \varepsilon_i$$

where MVE represents the market value of common equity, $CSHEQ$ is the fair value of cash and cash equivalents, INV is the fair value of investment securities and trading account securities, NLN is the fair value of net loans, DEP is the fair value of deposits, DBT is the fair value of short-term debt and long-term debt, $NETBV$ is the book value of all other assets net of liabilties, $FDER$ is the fair value of risk-management derivatives, $FOBS$ is the fair value of other off-balance sheet items, $TABO$ is the amount of net pension and post-retirement obligations, NPL is the book value of nonperforming loans, $CRISK$ is the credit risk amounts for off-balance sheet derivatives, $NPDER$ is the notional amount of all derivatives, $NPDERH$ is the notional amount of risk-management derivatives, $NPDERT$ is the notional amount of trading derivatives, $NPOBS$ is the notional/contractual amount of other off-balance sheet items.

Table 3
Summary statistics for regression of changes in market values on changes in fair values of on- and off-balance sheet items for 1994[a,b]; $N = 97$

$$\Delta MVE_i = \beta_0 + \beta_1 \Delta CSHEQ_i + \beta_2 \Delta INV_i + \beta_3 \Delta NLN_i + \beta_4 \Delta DEP_i + \beta_5 \Delta DBT_i + \beta_6 \Delta NETBV_i + \beta_7 \Delta FDER_i + \beta_8 \Delta FOBS_i + \beta_9 \Delta TABO_i + \beta_{10} \Delta NPL_i + \gamma_i$$

Variable	Predicted sign	Regression statistics		
		Coeff. est.	t-value	p-value
Intercept	?	− 1.014	− 1.25	0.2153
$\Delta CSHEQ$	+	0.201	2.08	0.0202
ΔINV	+	0.253	2.55	0.0063
ΔNLN	+	0.274	2.54	0.0065
ΔDEP*	+	0.206	1.89	0.0309
ΔDBT*	+	0.173	1.68	0.0483
$\Delta NETBV$	+	0.241	2.31	0.0117
$\Delta FDER$	+	0.556	2.27	0.0130
$\Delta FOBS$	+	0.195	0.23	0.4107
$\Delta TABO$*	+	− 0.161	− 0.16	0.4383
ΔNPL	−	− 0.432	− 1.42	0.0798
Adj. R^2		0.33		

[a] ΔMVE denotes change in market value of common equity. $\Delta CSHEQ$ denotes change in fair value of cash and cash equivalents. ΔINV denotes change in fair value of investment securities and trading securities. ΔNLN denotes change in fair value of net loans. ΔDEP denotes change in fair value of deposits. ΔDBT denotes change in fair value of short-term debt and long-term debt. $\Delta NETBV$ denotes change in book value of all other assets net of liabilties $\Delta FDER$ denotes change in fair value of risk-management derivatives. $\Delta FOBS$ denotes change in fair value of other off-balance sheet items. $\Delta TABO$ denotes change in amount of net pension and post-retirement obligations. ΔNPL denotes change in book value of nonperforming loans.

[b] Al variables deflated by shares outstanding at the end of 1993. All liabilities and obligations are recorded as negative values. p-values are based on one-tailed t-tests when coefficient sign is predicted, and two-tailed t-tests otherwise.

unambiguous fair value numbers for derivatives and other off-balance sheet items. However, most of the sample banks in this study provide comparative prior-period information in their 1994 annual reports.[13] Regression results for estimation Eq. (3′) reported in Table 3 indicate that the coefficient on the change in derivative fair values is positive and statistically significant, consistent with predictions. With the exception of the coefficient on net pension assets ($\Delta TABO$)

[13] SFAS 119 does not require disclosure of comparative prior year information in the initial year of application of this statement (SFAS No. 119, par. 17). However, all the banks in the sample used in this study, with the exception of Zions Bancorporation, provided comparative data. Empirical estimation of Eq. (3′) is conducted using 97 banks because of lack of data availability for one other bank.

and fair value of other off-balance sheet instruments ($\Delta FOBS$), the coefficients for all the remaining change variables are of the predicted sign and statistically different from zero. This suggests that the findings documented earlier for the value-relevance of derivative fair values are not sensitive to specification differences.

4.4. Summary

Overall, the evidence from a variety of cross-sectional valuation tests provides consistent support for the value-relevance of fair value estimates of off-balance sheet derivative financial instruments after controlling for the fair value estimates of on-balance sheet assets and liabilities. This result is robust to including potential omitted variables and 'change' specification tests. Results of additional analyses also suggest that fair values of derivatives are incrementally useful to notional values of derivatives and that the notional amounts are negatively related to equity values.

5. Test of the usefulness of derivatives disclosures in understanding banks' risk-management activities

5.1. Research design

Fair values of derivative financial instruments are potentially useful in evaluating banks' risk-management activities because it is possible to relate the fair value gains and losses on derivatives to the fair value gains and losses on on-balance sheet items. Fair value gains and losses represent movement in market values of financial instruments due to unanticipated changes in interest or exchange rates. If banks use derivatives to offset the economic consequences of risk exposure, then market value *changes* (i.e., fair value gains or losses) in balance sheet assets and liabilities during period t will be negatively related to market value *changes* in risk-management derivatives over the same period, i.e., they are expected to be negatively correlated through time. However, limited time-series data preclude analysis of risk-management activities at the individual bank level. Therefore, I conduct a cross-sectional test to evaluate whether banks (on average) reduce their risk exposures using derivatives.

The relation between the fair value gains and losses associated with derivatives and on-balance sheet items can be expressed as

$$FGLDER_{it} = \delta \sum_{k} FGLBS_{itk}, \tag{4}$$

where $FGLDER$ is the fair value gains/losses on risk-management derivatives during period t, $FGLBS$ is the fair value gains/losses on k balance sheet items

during period t, and i represents individual bank subscript. It is important to note that fair value gains and losses are not simply the change in fair values from time $t-1$ to t because of acquisitions and disposal of assets and liabilities during period t. Therefore, fair value gains and losses are computed as the difference between end of period fair values at time t and $t-1$ adjusted for acquisitions and disposals. In other words, the fair value gains and losses can be computed as the sum of realized gains and losses and changes in unrealized gains and losses (see Barth, 1994).

Because banks commonly hedge interest rate and exchange rate risk inherent in Investment Securities, Net Loans, Deposits, and Long Term Debt, I restrict the analysis to the cumulative fair value gains and losses on these four balance sheet components.[14] The δ coefficient in Eq. (4) captures the extent of hedging by banks in cross-section. In theory, the δ coefficient should be between 0 and -1. However, cross-sectional differences in banks' risk-management strategies are likely to mitigate the strength of this association.

5.2. *Measurement error issues and proxies for measurement errors*

Recall that the fair value gains and losses for balance sheet items (*FGLBS*) are computed as the sum of change in unrealized gains and losses (calculated as the difference between fair value and book value) during the year and the realized gains and losses. However, the frequency of mergers and acquisitions in the banking industry creates a problem in calculating the unrealized gains and losses portion of *FGLBS*. If an acquisition is accounted for as pooling of interests, a bank's financial statements will include the book values of the acquired entity and prior-period financial information would be restated as if the acquisition had been effected as of the beginning of the current period. To mitigate the measurement error problem caused by pooling of interests accounting, I use the restated prior-period fair (book) values of assets and liabilities, instead of using the data from prior-period annual reports.

A proxy for default risk is included to mitigate potential measurement error arising from the influence of changes in default risk on the fair value gains/losses associated with net loans. This measurement error arises because the fair value of net loans computed in accordance with SFAS 107 is likely to capture changes in both default risk and interest rate risk, whereas the net loan book value only reflects changes in default risk. This is because accounting standards do not generally provide for recognition of changes in loan values due to unanticipated

[14]Generally, the risk-management/asset-liability management strategies of banks are comprehensive programs, taking into account the overall maturity structure of all assets and liabilities rather than micro-hedges of interest rate risk in individual assets and liabilities. Therefore, the amount of aggregate unrealized gains/losses on all the balance sheet components is used instead of separately considering the unrealized gains/losses in each of the individual components.

changes in interest rates; however, generally accepted accounting principles (GAAP) provide for recognition of changes in default risk in loans through the 'allowance for loan losses'.

Beaver et al. (1989) find that the net loans book value does not completely capture default risk because the amount of nonperforming loans helps explain differences in the market and book value of common equity. To partially mitigate the *errors-in-variables* problem that occurs because fair value gains/losses on net loans incorporate elements of changes in default risk, the change in nonperforming loans book value (ΔNPL) is included as a proxy for default risk.

Banks may also use traditional balance sheet tools (primarily investment securities) as either substitutes or complements to derivatives in their risk-management strategies. Banks generally classify such investment securities as *available for sale*.[15] Therefore, I include the fair value gains/losses on investment securities *available for sale* ($FGLAFS$) as a separate variable in the empirical specification of Eq. (4).

I estimate the following empirical specification:

$$FGLDER_i = \delta_0 + \delta_1 FGLBS_i + \delta_2 FGLAFS_i + \delta_3 \Delta NPL_i + \varphi_i, \qquad (5).$$

where $FGLDER$ denotes the fair value gains (losses) on risk-management derivatives, $FGLBS$ denotes the aggregate fair value gains (losses) on balance sheet items except investment securities available for sale, $FGLAFS$ denotes the fair value gains (losses) on investment securities available for sale, ΔNPL denotes the change in nonperforming loans, and i represents bank subscript. Time subscripts are suppressed for convenience.

A statistically significant negative δ_1 coefficient is consistent with banks, on average, using derivatives to reduce risk exposure. If banks use investment securities available for sale as substitutes (complements) to derivatives in their risk-management activities, then δ_2 is expected to be negative (positive). The sign on the proxy for default risk will be opposite to the sign of the partial correlation between the proxy and the measurement error in the independent variable ($FGLBS$).[16] Because ΔNPL variable is expected to be negatively correlated with the measurement error in $FGLBS$, the predicted sign on δ_3 is positive.

There are several caveats to be noted while interpreting the δ_1 coefficient in Eq. (5). First, the maintained hypothesis in this test is that banks that report

[15]SFAS 115, '*Accounting for Certain Investments in Debt and Equity Securities*', requires investment securities to be classified into three categories: (i) securities held-to-maturity, (ii) trading securities, and (iii) securities available for sale. Based on examination of bank annual reports for 1993, I found that many banks indicate that investment securities classified as *available for sale* represent securities primarily used for asset-liability management purposes.

[16]For a discussion on using proxies for measurement errors see Greene (1993) and Kothari and Shanken (1992).

using derivatives for asset-liability management use them to reduce risk exposure.[17] Estimation of Eq. (5) thus provides a joint test of the usefulness of SFAS 119 disclosures and the hedging effectiveness of banks. Second, the δ_1 coefficient is assumed to be a cross-sectional constant. However, there is likely to be considerable cross-sectional variation in the way banks use derivatives because of differences in their desired level of risk exposure. Third, some banks may micro-hedge specific assets or liabilities instead of employing a global asset-liability management strategy.[18] In such circumstances, *FGLBS* will measure the hedged portion of inherent risk exposures with substantial error and the δ_1 coefficient will be biased towards zero.

5.3. Results

Because there is considerable cross-sectional variation in both the usage of derivatives and the size of banks in the sample, estimating Eq. (5) using undeflated variables may result in heteroscedastic residuals and potential scaling problems. Moreover, it is important that the proxy variable (*ΔNPL*) is uncorrelated with the other variables in the specification. Significant correlation of the proxy variable with the dependent variable in the model will violate the assumptions underlying the use of proxy variables in addressing the *errors-in-variables* problem, leading to biased coefficient estimates (see Kothari and Shanken, 1992). Therefore, I consider two deflators, book value of equity and total assets.

Panel A of Table 4 presents the correlation statistics for the variables (deflated by book value of equity) in Eq. (5).[19] The correlation between *FGLBS* and *FGLDER* is negative and statistically significant, consistent with banks using derivatives to reduce risk exposure. Also, the correlation between *FGLBS* and *ΔNPL* is negative though insignificant, consistent with predictions. Further, given the insignificant correlation between the proxy variable and the dependent variable the likelihood of coefficient bias arising from the use of the proxy variable is minimal.

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[17]This is reasonable considering recent research by Schrand (1993) which suggests that Savings and Loan Institutions time their futures contract transactions to hedge against expected adverse consequences. Further, findings by Hentschel and Kothari (1995) are consistent with banks using derivatives to hedge their inherent exposures rather than to take speculative positions.

[18]For example, First Hawaiian in their 1993 annual report state: 'As of December 31, 1993, the company had entered into interest rate swaps of $168,247,000 to modify the repricing characteristics of a portion of its municipal holdings.' Bank of New York Company Inc. in its 1994 annual report provides a list of balance sheet items hedged and the notional amount of the related contracts used in hedging the exposures in each of the items.

[19]The correlation statistics and regression results using variables deflated by total assets are qualitatively similar and hence not reported.

Table 4
Correlation matrix of value changes in balance sheet items, value changes in off-balance sheet items, and proxy for credit risk and summary statistics for regression of gains and losses on hedging instruments on gain and losses for on-balance sheet items for 1994[a]

Panel A: Correlation matrix[b]

	FGLDER	*FGLBS*	*FGLAFS*
FGLBS	− 0.24		
	(0.02)		
FGLAFS	0.06	− 0.09	
	(0.54)	(0.38)	
ΔNPL	0.10	− 0.15	0.20
	(0.31)	(0.14)	(0.05)

Panel B: Regression statistics; $N = 98$

$$FGLDER_i = \delta_0 + \delta_i FGLBS_i + \delta_2 FGLAFS_i + \delta_3 \Delta NPL_i + \varphi_i$$

Variable	Predicted sign	Coeff. est.	*t*-value	*p*-value[c]
Intercept	?	− 0.072	− 5.67	0.0001
FGLBS	−	− 0.110	− 2.26	0.0132
FGLAFS	+ / −	0.003	0.56	0.5770
ΔNPL	+	0.080	0.73	0.2332
Adj. R^2	+	0.04		

[a]*FGLDER* denotes the fair value gains and losses on risk management derivatives for 1994. *FGLBS* denotes the fair value gains and losses on SFAS 107 on-balance sheet items for 1994. *FGLAFS* denotes the fair value gains and losses on investment securities available for sale for 1994. *ΔNPL* denotes the change in book value of nonperforming loans during 1994. All the variables are deflated by book value of equity.

[b]*p*-values in parentheses.

[c]*p*-values are based on one-tailed *t*-tests when coefficient sign is predicted, and two-tailed *t*-tests otherwise.

Panel B of Table 4 presents the regression results of estimating Eq. (5) using variables deflated by the book value of equity. Consistent with the predictions, the coefficient on *FGLBS* is negative and statistically significant.[20] The small negative coefficient estimate on *FGLBS* of −0.11 suggests (i) potential cross-sectional differences in the management of risk exposures and/or (ii) that banks

[20]To examine whether the findings from panel B of Table 4 are sensitive to outliers, I delete firms in the top decile of derivative holdings and then estimated Eq. (5). The findings are similar to those reported in Table 4.

(on average) hedge only a small portion of their risk exposure using derivatives. The coefficient on fair value gains and losses on investment securities *available for sale* (*FGLAFS*) is positive but not statistically significant. Therefore, it is difficult to infer whether such securities are used as substitutes or as complements. The coefficient on the proxy variable (ΔNPL) is positive but not significant at conventional levels. This insignificant result may be due to two reasons: (1) ΔNPL is a poor proxy or (2) there is no significant measurement error in the fair value gains and losses in net loans due to default risk.

Although the negative relation is consistent with risk reduction by the sample banks, the intercept in the regression is negative and statistically significant. This implies that some of the points lie in the third (southwest) quadrant when relating derivative gains and losses to on-balance sheet holding gains and losses. In other words, for some banks low (high) derivative losses may be associated with high (low) on-balance sheet losses. To explore this further, I plot the fair value gains and losses on balance sheet items (*FGLBS*) against derivative gains and losses (*FGLDER*), both scaled by book value of equity (see Fig. 1). If the sample banks use derivatives for risk reduction, then we would expect the majority of the sample points to lie in the second and the fourth quadrants (area represented by 'H'). Banks whose sample points fall in the first and the third quadrants (area represented by 'R') may actually be assuming additional risk by taking derivative positions. Consistent with the negative intercept, a significant

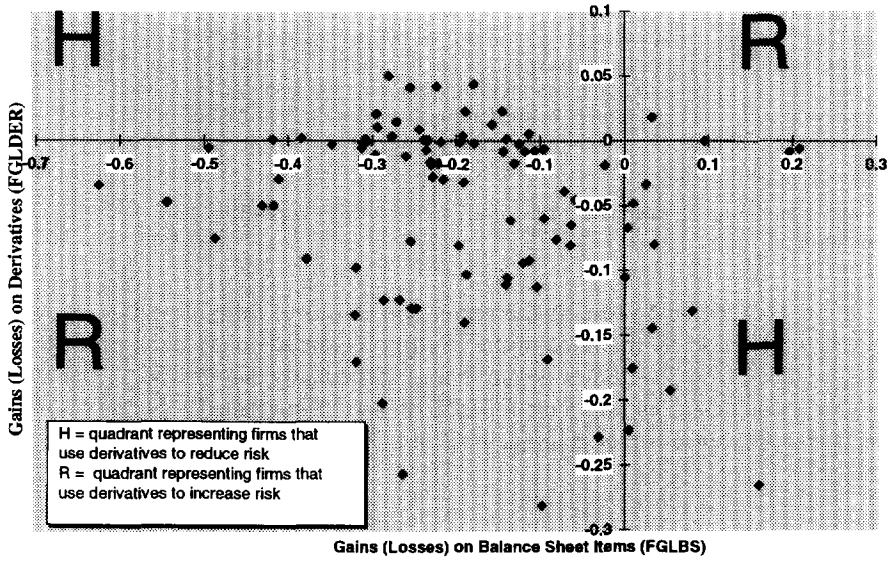

Fig. 1. Relation between gains (loses) on derivatives and gains (losses) on balance sheet items.

number of points (63) lie in the third quadrant. While this indicates that these banks may in fact be using derivative contracts to increase rather than to decrease risk, two alternative explanations are plausible. One, these banks may be hedging economic gains and losses rather than accounting gains and losses. Two, derivative gains and losses are likely to include deterioration in credit risk of counterparties. Because credit risk information for risk-management derivatives is not separately disclosed by the sample banks, I can only investigate the first explanation in more detail.

Economic gains and losses in balance sheet items are likely to differ from accounting gains and losses when fair values of assets and liabilities fail to reflect unrealized gains and losses inherent in them. Although SFAS 107 requires fair value disclosures for all balance sheet assets and liabilities, it mandates that the fair value of deposits with no stated maturity be represented at its book value. Because these deposits represent an inexpensive source of funds that are available for a considerable length of time, an increase in interest rates, such as in 1994, would likely increase the value of these deposits even if the value of core deposit intangibles are ignored. If banks consider the change in the value of these deposits in their overall asset liability management then the gains and losses on balance sheet items will be measured with error. Therefore, I estimate the gains on these deposits by using the proportion of gains on other deposits (i.e., time and savings deposits with stated maturity) and include it in the gains and losses on balance sheet items (*FGLBS*). The resulting plot of *FGLBS* and *FGLDER* provides a somewhat different picture (see Fig. 2). Only 52 banks

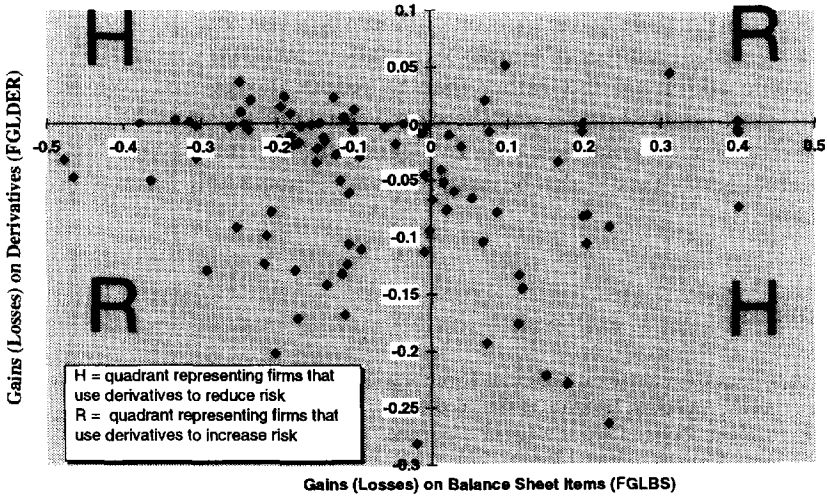

Fig. 2. Relation between gains (losses) on derivatives and gains (losses) on balance sheet items, after adjusting for gains (losses) on deposits without stated maturity.

remain in the off-diagonal quadrants. This suggests that roughly 47% of the sample banks appear to use derivatives to reduce interest and exchange risk while the remaining banks appear to use derivatives to assume additional risk.

6. Summary and conclusions

This study provides evidence on the value-relevance of disclosed fair values of banks' off-balance sheet derivative financial instruments used for risk-management purposes. The results suggest that the fair value disclosures for derivatives help explain cross-sectional differences in bank stock prices. Specifically, the coefficient on the fair value of derivatives is positive as predicted after controlling for the effects of all on-balance sheet assets and liabilities. This result is in contrast to prior research that provides inconclusive evidence on the value-relevance of off-balance sheet instruments. I also document that the notional amounts of derivatives provide incremental information to their fair values, and *vice versa*. Furthermore, the findings for the disaggregated disclosures on contractual/notional amounts for off-balance sheet instruments suggest that there is value to disaggregated information.

The segregated disclosures on risk-management derivatives enable examination of the risk-management strategies of the sample banks in a cross-sectional setting. However, due to the inherent limitation of the cross-sectional test, the evidence should be viewed as preliminary. I document a significant negative association between fair value gains and losses on risk-management derivatives and fair value gains and losses for on-balance sheet items, suggesting that banks (on average) partially hedge their on-balance sheet risk. Further analysis reveals that a significant number of sample banks (about 50%) may be using derivatives to assume additional risk rather than to reduce (hedge) risk. Whether these banks are considered riskier and therefore valued differently in the market place is the subject of on-going research. Evaluating the risk-management activities of individual banks should also be feasible when adequate time-series data become available.

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