

Journal of Forest Products Business Research  
Volume No. 3, Article No. 5

## Corporate Use of Derivatives for Hedging in the Forest Products Industry

**Brooks C. Mendell**

*The author is Principal, Forisk Consulting and Visiting Assistant Professor, Center for Forest Business, Warnell School of Forestry and Natural Resources, University of Georgia, 1960 McDowell Street, Augusta, GA 30904, email: [bmendell@forisk.com](mailto:bmendell@forisk.com). This project represents part of the of the author's Ph.D. dissertation research at the University of Georgia (UGA). The author thanks the Warnell School of Forestry and Natural Resources and Dr. Mike Clutter at UGA for supporting this research.*

### ABSTRACT

The extent to which firms in the forest products industry use financial derivatives for hedging purposes remains undocumented in the forestry and finance literatures. This study provides evidence of derivatives-based hedging activity by forest products firms from the 2002 10-K filings of 19 U.S.-based, publicly traded forest products firms. These firms represented nearly \$123 billion of the U.S. forest products industry as measured by revenues in 2002. While all 19 firms claim to use derivatives, 17 specify active derivative positions as of December 31, 2002. The total notional values – the face value – of these derivative contracts stood at \$9.2 billion. Interest rate hedges – mostly in the form of swaps – accounted for 62 percent of these derivatives, with foreign currency and commodity derivatives accounting for 35 percent and 3 percent, respectively.

*Keywords: forestry, risk management, options*

### Introduction

The extent to which firms in the forest products industry use financial derivatives for hedging purposes – especially with respect to managing exposures to changes in interest rates, foreign currencies, and commodity prices – remains undocumented in the forestry and finance literatures. As such, this study establishes a (current) baseline for derivatives use for hedging purposes by firms in the forest products industry. This baseline can be used to further investigate enterprise-level risk management programs and test derivatives use and effectiveness in relation to other industries and against corporate finance theory.

This study informs current research into the role of derivative instruments and financial risk management in a specific industry; the firms studied do not represent a random sample. Rather, this effort attempts a nearly comprehensive study of derivative use for one industry as of one point in time. For 19 publicly traded, U.S.-based forest products firms, this study presents detailed evidence of the levels – the magnitudes as measured by the notional amounts of the derivative contracts<sup>1</sup> – and nature of derivative contracts used to hedge financial risk exposures associated with interest rates, foreign

exchange rates, and commodity prices as of December 31, 2002. Three approaches are used to aggregate data and calculate summary statistics on the derivative contracts:

- by hedge type as defined by the Financial Accounting Standards Board (FASB);
- by hedge purpose (i.e., hedging interest rate, foreign currency or commodity risk); and
- by derivative contract type (i.e., forwards, futures, options, or swaps).

Derivative securities offer relatively inexpensive and efficient methods for corporations to isolate and restructure various aspects of risky exposures, allowing for the transference of risks from those who do not want them to others who may manage them more efficiently.

---

(1) Notional value refers to the principal or face value of the respective derivative contracts. The fair value estimates the value of the contract itself under current conditions. For example, in the case of an option on Weyerhaeuser stock, the price of the option is the fair value and the price of the stock is the notional value. The press and derivatives industry often report in terms of notional amounts to indicate an overall level of market usage.

Cross-industry empirical studies have demonstrated that derivatives use is common across a range of industries. Nance et al. (1993) found 104 of 169 surveyed firms (61.5%) in 1986 reported using forwards, futures, options, and/or swaps. Dolde (1993) collected survey data on 244 Fortune 500 firms in 1992; 85 percent said they used swaps, options, forwards, and futures. Mian (1996) aggregated hedging data from the 1992 annual reports of 3,022 firms; 25.5 percent used derivatives. Within Mian's sample, 13 firms were classified as Agriculture and Forestry, and 5 of these reported using derivatives.

Two primary motivations drive the use of derivative securities by non-financial firms: foreign exchange risk and interest rates (Bodnar et al. 1998). For example, Geczy et al. (1997) study the use of currency derivatives, and in their sample of 372 of the Fortune 500, they find 41 percent of the firms used currency derivatives in some form in 1990. Howton and Perfect (1998) study currency and interest rate derivative use in a sample of 451 Fortune 500/S&P 500 firms and 461 randomly selected firms. Of these, 61 percent and 36 percent of the firms use derivatives, respectively, with swaps accounting for over 90 percent of the interest-rate derivatives and forwards and futures accounting for over 80 percent of the derivatives used for hedging foreign currency exposures.

The forestry literature addresses the topic of derivatives, but not their use within corporate risk management programs. Rather, the forestry literature, for the most part, has emphasized transaction-specific applications for derivatives. Deneckere et al. (1986) explore the hedging of lumber spot prices with lumber futures contracts. Zinkhan explores the use of Black-Scholes to price the option associated with valuing timberlands (1991) and develops the thinking with regards to viewing forest management decisions as a series of options (1995). Yin and Izlar (2001) address qualitatively the potential role of option-based supply contracts and note the potential application of these tools for forest industry firms.

## Note on Hedge Accounting

Data collection for each forest products firm in the final study group, included fiscal year end (FYE) 2002 information on the types of derivative securities held, the notional principal of these derivative instruments, and the designated purpose of each derivative security as required by Statement of Financial Accounting Standards (SFAS) No. 133, "Accounting for Derivative Instruments and Hedging Activity."<sup>2</sup> Fiscal year 2002 is the latest year for which data were available at the time data was collected for this study, which focuses on hedge accounting as specified in No. 133.

(2) Generally Accepted Accounting Principles (GAAP) pertaining to disclosure about financial derivatives is contained in Financial Accounting Standard No. 133, which was released in 1998, and supersedes No. 119, No. 138, and No. 149 contain amendments to No. 133. Complete descriptions of these statements are available at [www.fasb.org](http://www.fasb.org).

SFAS 133 changed hedge accounting because for the first time it required that all derivative instruments be shown on the balance sheet as assets or liabilities at fair (market) value. The accounting for changes in fair value would depend on the purpose of the derivative. Prior to SFAS 133, derivative instruments were typically recorded off of the balance sheet (Gastineau et al. 2001).

Under SFAS 133, the accounting emphasis moved toward disclosing the firm's objectives for using a derivative instrument while moving away from accounting for the specific types of derivative instruments used. As a general example, it has become more important to know that an instrument is hedging the fair value of an asset exposed to interest rate changes, and less important to know that the instrument was an option, swap, or forward contract. Derivatives that qualify for hedge accounting hedge risks associated with changes in interest rates, prices, foreign currency exchange rates, and credit. Also, the exposure to risk must have the potential of affecting earnings as reported. Firms that utilize derivatives to hedge these risks must designate the derivative as either:

*A fair value hedge*, which hedges the exposure to changes in fair value of a recognized asset or liability, or an unrecognized firm commitment. One example of fair value risk is found in fixed interest bonds, where the fair value of the bonds falls with increases in interest rates. Thus, fair value hedges eliminate risk associated with asset fair values.

*A cash flow hedge*, which hedges cash flow volatility associated with a recognized asset or liability, or future transaction. The future cash flows hedged may also be associated with an expected transaction for which a contract does not yet exist. To contrast the example cited for the fair value hedge, variable interest rate bonds are subject to cash flow risk, as the interest cash flows are subject to change as a result of changes in interest rates. Cash flow hedges can also be used to manage cash flow variability associated with commodity purchases or sales, such as those associated with energy and agricultural commodities, and future transactions exposed to foreign currency rate changes. Thus cash flow hedges use derivatives to offset the variability of expected future cash flows.

*An exposure to changes in the value of a net investment in a foreign operation* refers to risk associated with changes in value of net investments in a foreign operation. For example, a U.S. firm

may own 100 percent of a British company with net assets of 50 million British pounds. Any increase or decrease in value of the British pound relative to the U.S. dollar will result in a corresponding change of the value of the U.S. firm's net investment in the British company. Thus net investment hedges refer to derivative contracts or cash instruments to hedge the foreign currency exposure of a net investment in a foreign operation.

Derivatives that fail to qualify for hedge accounting must be so identified in the financial statements as non-designated. Under SFAS 133, derivatives that do not qualify for hedge accounting are marked to market through earnings. Also, changes in the fair value of derivative and embedded derivative instruments would be included within net income.

## Data Collection

Aggregating information on the derivatives used by forest products firms include recording types of hedges used, types of financial instruments used (when specified in the 10-K), and the notional value of the derivative positions. Focus is given to notional value because it provides a ready indication of the magnitude of the assets, cash flows, and transactions being hedged with derivatives. While fair value measures the market value of the financial contract itself, the notional value indicates the value of the assets underlying the derivative positions.

The reporting of derivative notional values in the financial statements varied across firms. To calculate notional values in situations with incomplete information, two approaches are used. For commodity contracts with specified commodity types and volumes, 2002 year-end prices are used to estimate the notional values of the contracts. For contracts that required additional information, firms were contacted directly to seek data and clarification. In most cases, Investor Relations or Treasury groups at the respective firms were able to confirm assumptions and/or identify other publicly-available documents that provided the necessary insight to estimate notional values. All assumptions and calculations made to estimate notional values not explicitly listed in published 10-Ks are included as footnotes to the raw data set.

Recording the derivatives information of the firms did not include recording, analyzing, or comparing of the firms' hedging objectives. This is an important and current topic of additional study, because risk management objectives say something about what the firm is concerned about (cash flows, earnings, value) and how it will implement derivative-based hedges.

The following corporate-level criteria are specified for inclusion within the study group:

1. headquartered in the United States,
2. publicly traded on a U.S. stock exchange,
3. Market Cap exceeded \$500M at some point in 2002, and
4. derived 50 percent or more of 2002 revenues from the manufacture and sale of primary forest or wood products: timber, logs, pulpwood, lumber and conventional building materials, pulp and paper and/or depend on wood raw materials as a primary input or output of the business.

Using relevant four-digit SIC codes under the broader two-digit 24 (lumber and wood products), 26 (paper and allied products), and 08 (forestry), produced an initial list of 95 publicly-traded, U.S. based forest products firms with sales exceeding \$250 million.<sup>3</sup> This did not include Plum Creek Timber Co., a timber-based real estate investment trust (REIT). Of the 53 publicly-traded, U.S. based REITs with revenues exceeding \$250 million, Plum Creek, at the time this study began, was the only one primarily in the timber business. This screen provided an initial list of 96 firms. Screening out duplicate listings and reconciling for mergers reduced the list to 59 firms.

(3) \$250 million was used as the initial screen to develop a rough picture of the possible candidates. Screening by market capitalization may have screened out legitimate candidates, as we sought to include firms that exceeded \$500 million in market cap at any point in 2002. The credentials of the screened firms were later checked by pulling maximum 2002 stock price from COMPUSTAT and multiplying this by shares outstanding.

This list was screened against criteria 4, which requires 50 percent or more of the firm's revenues be derived from or dependent on primary forest products. The process was comprised of checking the business description, raw material summary, and divisional revenues of the firms in their 2002 10-K SEC filings. This process reduced the list to 22 firms.

The remaining 22 firms were screened against criteria 3, which requires that companies exceeded \$500 million in market capitalization at some point during 2002. While the \$500 million figure is somewhat arbitrary, the hedging literature identifies some correlation and economies of scale associated with hedging activities. Moreover, this size requirement was consistent with prior literature using large samples (such as Guay and Kothari 2003). Screening out these smaller firms eliminated Buckeye Technologies, Crown Pacific Partners (filed for Chapter 11), and Pope & Talbot, reducing the final list to 19 firms. The process for identifying the candidate firms is summarized in **Table 1**.

**Table 1.** Firm identification process.

Step	Criteria	Firms
SIC search of U.S. public, forest, wood, paper, timber REITs > \$250MM	1 & 2	96
Screen out duplicates and firms eliminated through mergers	1 & 2	59
Screen out firms with primary forest and wood revenues < 50% of total	1, 2, & 4	22
Screen out firms with 2002 Market Cap below \$500MM	1, 2, 3, & 4	19

**Table 2** lists the 19 firms in the final study group with their trading symbol, primary forest product businesses, and selected 2002 financial results.

**Table 2.** Firms in final study group with selected 2002 financial data.<sup>a</sup>

<b>SMBL</b>	<b>Company name</b>	<b>Revenue</b>	<b>Net income</b>	<b>Peak market cap</b>	<b>Primary forest/wood/paper businesses</b>
BCC	Boise Cascade Corp.	7,412.33	11.34	2,262.00	Building products, paper, packaging
BOW	Bowater Inc.	2,581.10	-142.40	3,176.30	Timber, lumber, paper, pulp
GP	Georgia Pacific Corp.	23,271.00	-735.00	7,907.52	Building products, paper, pulp
GLT	Glatfelter	543.82	37.60	844.51	Paper
GPK <sup>b</sup>	Graphic Packaging Intl Corp.	1,057.84	-178.65	1,835.69	Packaging
IP	Intl Paper Co.	24,976.00	-880.00	22,134.42	Paper, packaging, forest products
KMB	Kimberly Clark Corp.	13,566.30	1,674.60	34,116.33	Paper products
LFB	Longview Fibre Co.	769.28	5.13	628.25	Timber, pulp, paper, packaging
LPX	Louisiana Pacific Corp.	1,942.70	-62.00	1,312.53	Building products
MWV	Meadwestvaco Corp.	7,242.00	-389.00	7,301.42	Packaging, paper products
PKG	Packaging Corp. of America	1,735.86	48.18	2,204.76	Packaging
PCL	Plum Creek Timber Co. Inc.	1,137.00	233.00	5,911.89	Timber, building products
PCH	Potlatch Corp.	1,286.22	-234.38	1,041.70	Timber, wood products, pulp
RYN	Rayonier Inc.	1,117.43	54.17	1,626.27	Timber, wood products, fiber products
SSCC	Smurfit Stone Container Corp.	7,483.00	65.00	4,478.22	Packaging
SON	Sonoco Products Co.	2,812.15	135.32	2,870.21	Packaging
TIN	Temple Inland Inc.	4,518.00	53.00	3,227.82	Packaging, building products
WMO	Wausau Mosinee Paper Corp.	948.70	23.07	721.52	Paper
WY	Weyerhaeuser Co.	18,474.00	241.00	15,065.12	Timber, wood products, pulp, paper, packaging

<sup>a</sup> All figures in millions and for 2002 fiscal year ending December 31, 2002.  
<sup>b</sup> Graphic Packaging's 2002 Market Cap is based on peak 2002 stock price and shares outstanding as reported in GPK proxy/prospectus dated July 17, 2003.

## Analysis

All 19 firms state that they use derivative contracts regularly or selectively to manage risk exposures associated with interest rates, foreign exchange rates, and commodity prices. Moreover, each of the 19 firms indicated that none of their derivative positions are used for trading purposes as opposed to hedging purposes. Several firms acknowledged that, in certain situations, efforts to hedge risk through the use of derivatives might not qualify for hedge accounting treatment. As of December 31, 2002, 17 of the 19 firms (89%) had outstanding derivative positions.

**Tables 3, 4, and 5** present descriptive statistics on the notional principals of the derivatives positions by hedging type, as required in SFAS 133, by purpose, and by derivative type as reported in the firms' Form 10-K filings at the 2002 fiscal year end. All statistics distinguish between results for the entire study group and for the sub-group of identified derivative users.

**Table 3.** Notional hedging positions by type.<sup>a</sup>

	Hedge type				
	Total notional	Fair value	Cash flow	Net investment of foreign operations	Non designated
<b>All (19)</b>					
Mean	485.54	166.05	183.54	51.74	84.21
Median	140.00	0.00	64.50	0.00	0.00
Standard deviation	795.16	390.19	305.64	145.68	231.07
<b>Derivative users (17)</b>					
Mean	542.66	185.59	205.13	57.82	94.12
Median	165.00	0.00	70.00	0.00	0.00
Standard deviation	823.64	409.18	316.84	153.30	243.06
Count	17	8	15	3	7
Maximum	3,272.00	1,600.00	1,000.00	570.00	1,000.00
Minimum	8.00	0.00	0.00	0.00	0.00
<sup>a</sup> All values in millions.					

**Table 3**, which segregates derivative-related hedging activity as reported under SFAS 133, shows the majority of derivative-based hedging takes place in the form of fair value and cash flow hedges. For all notional values of derivatives across the study group, fair value and cash flow designated hedges account for 34 percent and 38 percent of total notional value of derivatives use, respectively. This corresponds to the fact that most interest rate hedges – whether fixed to variable or variable to fixed – and foreign currency transaction hedges fall into these two categories. Additionally, the medians and counts across all categories indicate the majority of the activity taking place with a minority of the firms.

**Table 4.** Notional hedging positions by purpose.<sup>a</sup>

	Hedge purpose			
	Total notional	Foreign exchange (FX)	Interest rates	Commodity
<b>All (19)</b>				
Mean	485.54	170.76	301.25	13.52
Median	140.00	8.30	140.00	0.00
Standard deviation	795.16	320.80	593.41	25.57
<b>Derivative uses (17)</b>				
Mean	542.66	190.85	336.69	15.11
Median	165.00	25.00	165.00	0.00
Standard deviation	823.64	334.22	619.25	26.64
Count	17	10	13	8
Maximum	3272.00	1000.00	2600.00	102.00
Minimum	8.00	0.00	0.00	0.00
<sup>a</sup> All values in millions.				

**Table 4**, which segregates the same notional amounts by hedging purpose, shows results consistent with previous empirical research: most derivatives are used for hedging interest rate and foreign currency exposure, with interest rate hedges dominating the mix with 62 percent of the activity as calculated from the aggregated notional values. In contrast, commodity hedges account for 3 percent of the total notional values. Also, of the applications, interest rate hedges appear more commonly used and evenly distributed across the forest products firms, with 13 firms – 76 percent of the derivative users and 68 percent of the total group – reporting active interest rate hedges as of the end of 2002.

**Table 5** summarizes the hedging activity by derivative type. Swaps, mostly associated with interest rate agreements, comprise 61 percent of these contracts as calculated from the aggregated notional values, while options account for but 4 percent. The “other” category refers to debt instruments that qualify for hedging accounting as net investments of foreign operations, but do not fall in the other categories.

**Table 5.** Notional hedging positions by derivative type.<sup>a</sup>

	Derivative type				
	Total notional	Forwards, futures	Swaps	Options	Other
<b>All (19)</b>					
Mean	485.54	126.00	295.92	17.15	46.47
Median	140.00	0.00	70.00	0.00	0.00
Standard deviation	795.16	317.30	607.18	31.48	145.65
<b>Derivative users (17)</b>					
Mean	542.66	140.82	330.73	19.16	51.94
Median	165.00	8.30	140.00	0.00	0.00
Standard deviation	823.64	333.24	634.44	32.76	153.50
Count	17	9	13	5	2
Maximum	3,272.00	1,197.10	2,651.00	100.00	1570.00
Minimum	8.00	0.00	0.00	0.00	0.00
<sup>a</sup> All values in millions.					

As noted previously, the empirical research into corporate hedging and derivatives use includes references and limited summary statistics specific to the forest products industry. Block and Gallagher (1986), in surveying the 500 largest U.S. firms to study the use of interest rate futures, noted that firms in traditional commodity industries (mining, meat products, oil and natural gas, agriculture) were more likely to use interest rate futures and options (25% to 18.6%). Wall and Pringle (1989), in their study of 250 swap users, identified four forest products industry firms (with the notional principal of their 1986 swaps): Great Northern Nekoosa Corporation (\$50 million), James River (\$11.8 million), Mead (unreported), and Scott Paper (\$90 million). These four firms no longer operate as independent entities.

Mian (1996) aggregates hedging data from 1992 annual reports for a sample of 3,022 firms. Of these, 13 firms come from Agriculture and Forestry, 5 (38%) of which are classified as hedgers. Details regarding the purpose of the hedging activities reveal that 2 firms (15%) hedge interest rate exposure, 4 firms (31%) hedge foreign currency exposure, and 4 firms (31%) hedge commodity price risk.



Geczy et al. (1997) study the use of currency derivatives. Their sample includes 372 of the Fortune 500. From this sample, 27 of the firms are identified as “Forest and paper products” firms as categorized by Fortune. Of these 27 firms, 5 (18.5%) used currency derivatives and 12 (44.4%) used derivatives of some type.

While the sample sizes and categories used by separate studies limit comparability, results from Mian (1996) and Geczy et al. (1997) indicate a growing acceptance and use of derivatives for hedging purposes among forest products industry related firms (**Table 6**). At least two issues may influence the results across the three studies in **Table 6**. First, forest industry consolidation – through merger and acquisitions activity (M & A) in the late 1990s and early 2000s – affects the number and characteristics of the firms within the industry. Second, accounting standards and requirements changed after the studies by Mian and by Geczy et al. and prior to this study. These changes, as implemented by SFAS 133, affect, at a minimum, the nature and consistency of derivative-related reporting in firm financial statements.

**Table 6.** Comparison of forest industry specific findings in empirical hedging studies.

	<b>Mian (1996)</b>	<b>Geczy et al. (1997)</b>	<b>Mendell (2006)</b>
Forestry-related sample size	13	27	19
% Hedging w/derivatives	38%	44%	89%
% Hedging IR	15%	n/a	68%
% Hedging FX	31%	19%	53%
% Hedging commodities	31%	n/a	42%

## Conclusion

For 19 forest products firms, I aggregated detailed evidence on the levels of derivatives use for hedging activities. Of the study group, 17 reported active derivative positions as of the end of 2002. For most of these firms, the notional amounts of these derivatives securities are small relative to firm revenues and market values. Consistent with large sample surveys and empirical studies, most derivative activity is associated with hedging exposure to interest rates, followed by foreign currency exposure, and, to a minor degree, commodity prices.

This study extends the literature because it documents for the first time the use – by type, by purpose, and by magnitude – of derivatives in the U.S. forest products industry. As a single industry, small group study of reported derivatives as of one point in time, this project requires caution with regard to generalizing and analyzing the results. However, it does rebut assumptions that the forest products industry lags behind others in the use and adoption of derivatives generally. Also, it is timely because the increasing role of financial investors and private equity firms in acquiring timberlands and forest industry assets has also generally increased the interest in applying financial derivatives to managing cash flow exposures to these investments. Additional work assessing these derivative positions over time will provide added insight into how the use of derivatives in the forest products industry has evolved.

The overall size of the derivatives positions and programs, of the forest products firms is economically small. As such, this may prove consistent with the ideas that forest product firms use derivatives to refine and adjust an overall risk-management program that includes other hedging activities or strategies (e.g., operational hedges). It may be that the risk for forest industry firms (e.g., operating risks, log prices) cannot be managed to any outstanding degree with standard derivatives contracts, traded or OTC, written over asset prices such as interest rates, exchange rates, and commodity prices. Or, it may be that these types of exposures are immaterial to the overall performance of an integrated forest products firm.

Also, limitations imposed or perceived from SFAS 133 to qualify for hedge accounting may cause firms to restrict their use of derivatives. However, qualitative assessments of the hedging objectives stated in the financial statements, and large non-designated swaps held by International Paper in particular and others, do not indicate extraordinary concern for using derivatives for hedges that do not qualify for hedge accounting as long as the position meets business objectives. Rather, the difficulties associated with aggregating the data for this study may actually have more to say about potential inadequacies or misunderstandings associated with SFAS 133 requirements for reporting derivatives use.

Forest products firms make centralized decisions on using derivatives. For example, mill or division managers may (want to) use derivatives to hedge specific transactions that are important to their respective units (and their performance reviews and bonuses), but may be small relative to the exposure of the entire firm. In fact, the evidence indicates that derivatives are used primarily to manage risk associated with interest rates and foreign currency rates, and these exposures are managed at the treasury level or higher. Commodity derivatives, mostly for energy related products, may be entered into at a division or unit level, but the findings and results remain unclear on that point.

With respect to the derivative positions held by forest products firms, future research may address questions regarding the effectiveness of these hedging activities, the characteristics of derivative positions held by these firms over time, and the relative use of derivatives by firms headquartered internationally. Given the limited economic significance of the derivative positions, on average, relative to firm size and market values, additional research will provide insight as to why firms spend considerable effort and resources to hedge this relatively small component of their overall risk profile.

### Literature Cited

- Block, S.B. and T.J. Gallagher. 1986. The use of interest rate futures and options by corporate financial managers. *Financial Management*, Autumn 1986: 73-78.
- Bodnar, G.M, G.S. Hayt, and R.C. Marston, 1998. 1998 Wharton survey of financial risk management by U.S. non-financial firms. *Financial Management*. 27(4): 70-91.
- Deneckere, R., J. Buongiorno, and S. Bark. 1986. Optimal hedging in lumber futures markets. *Forest Science*. 32(3): 634-642.
- Dolde, W. 1993. The trajectory of corporate financial risk management. *Journal of Applied Corporate Finance*. 6(Fall): 33-41.
- Financial Accounting Standards Board. 1998. Statement No. 133: Accounting for derivative instruments and hedging activities, [www.fasb.org](http://www.fasb.org).

- Gastineau, G.L., D.J. Smith, and R. Todd. 2001. Risk management, derivatives, and financial analysis under SFAS no. 133, The Research Foundation of AIMR and Blackwell Series in Finance, p. 110.
- Geczy, C., B.A. Minton, and C. Schrand. 1997. Why firms use currency derivatives. *The Journal of Finance*. 52 (4): 1323-1354.
- Guay, W. and S.P. Kothari. 2003. How much do firms hedge with derivatives? *Journal of Financial Economics*. 70(3): 424-461.
- Howton, S.D. and S.B. Perfect. 1998. Currency and interest-rate derivatives use in U.S. firms. *Financial Management*. 27(4): 111-121.
- Mian, S. 1996. Evidence on corporate hedging policy. *Journal of Financial and Quantitative Analysis*. 31: 419-39.
- Nance, D.R., C.W. Smith, Jr., and C.W. Smithson. 1993. On the determinants of corporate hedging. *The Journal of Finance*. 48(1): 267-284.
- Wall, L.D. and J.J. Pringle. 1989. Alternative explanations of interest rate swaps: A theoretical and empirical analysis. *Financial Management*. Summer 1989: 59-73.
- Yin, R. and B. Izlar. 2001. Supply contract and portfolio insurance. *J. For.* May 2001: 39-44.
- Zinkhan, F.C. 1991. Option pricing and timberland's land-use conversion option. *Land Economics*. 67(3): 317-325.
- Zinkhan, F.C. 1995. The management of options and values. *J. For.* Jan. pp. 25-29.

© 2006 Forest Products Society.  
Journal of Forest Products Business Research.