# THE COST OF FINANCING DEBT AND EQUITY ISSUES IN THE CANADIAN FOREST PRODUCTS INDUSTRY

**TONY C. LEMPRIÈRE, DON G. ROBERTS AND ILAN B. VERTINSKY***

*ABSTRACT*

*In recent years the Canadian forest products industry has undergone significant restructuring and it may soon enter a phase of consolidation. The financing of such activity is explored in this paper by assessing the determinants of the compensation paid to underwriters of new debt and equity issues by Canadian forest products companies in the 1985–94 period. Previous studies have investigated underwriter compensation in terms of the influences on the cost of certification and marketing services provided by underwriters to firms that seek to raise new external capital. We suggest that various issue and issuer characteristics also influence investor response to new issues of Canadian forest sector companies. We found that the larger the issue, the less the uncertainty associated with the company, and the smaller the underwriting syndicate, the lower is the up-front cost of issuing new debt and equity. We also found that companies pay different amounts depending on the type of issue. Finally, we found support for the hypothesis that the stated purpose of an issue affects its financing cost. In particular, companies that intend to use the proceeds from an issue for acquisition/expansion pay higher financing costs. These results suggest a number of considerations for lowering the financing cost of restructuring and consolidation.*

*Keywords: Debt, equity, financing costs, underwriter compensation.*

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## INTRODUCTION

This decade has posed considerable challenges for the global forest products industry as companies have faced the pressures of increasing globalization and integration of markets, shifting fibre supplies and pressures related to concerns about sustainable use of forests. In response, com-

* Tony C. Lemprière, Senior Economist, Canadian Forest Service, Natural Resources Canada, 7th Floor, 580 Booth Street, Ottawa, ON Canada K1A 0E4. Lemprière was a Research Associate at the Forest Economics and Policy Analysis Research Unit, University of British Columbia, when this paper was completed.

Don G. Roberts, Managing Director, CIBC Wood Gundy Securities, Suite 1024, 50 O'Connor Street, Ottawa, ON Canada K1P 6L2.

Ilan B. Vertinsky, Professor, and Director, Forest Economics and Policy Analysis Research Unit, University of British Columbia, Room 468, 2206 East Mall, Vancouver, BC Canada V6T 1Z3.

The views in the paper do not necessarily reflect those of the Canadian Forest Service or CIBC Wood Gundy Securities.

panies have sought to gain economies of scale, focus on strategic lines of business and obtain secure access to fibre. At the international level, since late 1995 some significant moves toward restructuring and consolidation of the industry have occurred, especially in the pulp and paper sector. The world's largest forest products company, International Paper, merged with Federal Paperboard. Kimberly-Clark and Scott Paper merged to form the world's third largest forest products company and the world's largest tissue manufacturer, based on 1995 sales. The merger of the two largest Finnish companies, Repola and Kymmene, as UPM-Kymmene created the fourth largest forest products company, Europe's largest company in the industry and the world's largest producer of printing and writing paper. New Oji Paper (itself the result of a 1993 merger) and Honshu Paper, the second and third largest forest products companies in Japan, merged as Oji Paper with a ranking as the fifth largest forest products company in the world.

The trend toward consolidation in the global forest products industry has special significance for Canadian companies. In 1994 they supplied 28% of world newsprint production, 20% of softwood lumber production, and 16% of market pulp production (FAO 1996). Overall, they accounted for almost 20% of the value of world exports of forest products in 1994. Yet Canadian forest products companies are relatively small by international standards. Sales of MacMillan Bloedel, the largest Canadian company, stood 26th among the world's top 50 public forest companies in 1995 (Price Waterhouse 1996). The next largest Canadian company stood in the 40th position. Indeed, the North American industry as a whole is fragmented. For example, Figure 1 shows that, despite consolidation since 1980, many segments of the North American paper industry are still fragmented. Among the least concentrated segments are newsprint and uncoated groundwood where the bulk of North American production is in Canada.

Although fragmented and characterized by relatively small firms, there nevertheless has been significant change among Canadian firms in recent years. They have engaged in considerable restructuring and moved toward greater focus on their strategic lines of business through divestitures of non-strategic assets, spin-offs and acquisitions

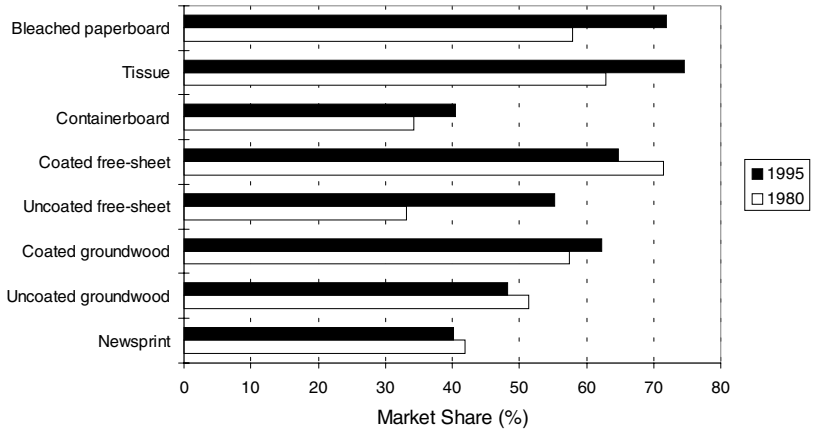


FIGURE 1. MARKET SHARE OF TOP 5 PRODUCERS, 1980 AND 1995
*The North American paper industry remains quite fragmented despite consolidation over the past 15 years.*

of assets which complement their core business. They have also sought to improve their balance sheets by raising equity to reduce their debt loads. Having improved their balance sheets and developed greater product focus, Canadian companies may now be on the verge of a period of consolidation as has been seen elsewhere. Some moves have already been made. For example, in 1995 Stone-Consolidated purchased Rainy River Forest Products to become the largest producer of groundwood printing papers in North America. In the same year, Donohue merged with QUNO Corporation at a cost of over $1 billion, the largest consolidation in the Canadian industry to date. Other smaller mergers and acquisitions have also occurred.

Companies can finance their restructuring and mergers and acquisitions by using internal funds, primarily retained earnings, by borrowing or by taking new debt and equity issues to the capital markets. Most of the determinants of the cost of capital are beyond the control of individual companies. However, one element of the cost which can be influenced by management is the cost of financing equity and debt issues. In this paper we examine these financing costs by considering the Canadian forest product industry in the decade from 1985 to 1994. During that period, the Canadian industry raised $12.6 billion from investors through 99 issues of seasoned equity (the firm

had issued equity before), initial public offerings of equity and new debt.[1] Most of this amount, $10.6 billion, was raised in the 1991–94 period. The up-front cost over the decade of financing these issues amounted to almost one-half billion dollars paid in fees to underwriters plus an unknown amount in terms of other issuer expenses and underpricing. Our objective is to assess the determinants of the compensation (fees as proportion of issue gross proceeds) paid to underwriters by the companies that took primary seasoned issues to the market during the period, and identify those issue and issuer characteristics which are associated with lower fees. This information should be useful in providing guidance on strategies for lowering the financing cost of restructuring and consolidation.

Underwriters provide marketing and certification services for which they must be compensated. Previous studies, primarily of United States industrial and public utility companies, have found that the cost of these services to the issuer, and therefore the magnitude of underwriter fees or total floatation costs, is determined most strongly by issue size and by the uncertainty associated with the issuing company, or non-systematic risk (Hansen & Pinkerton, 1982; Bhagat *et al.,* 1985; Bhagat & Frost, 1986; Booth & Smith, 1986; Blackwell *et al.* 1990; Denis, 1991; Hansen & Torregrosa, 1992; Denis, 1993).

We also found these influences to be important determinants of compensation paid by Canadian forest product companies during the period studied. We found that companies issuing debt faced lower up-front costs for access to capital markets than did common share issuers. We identified the purpose for which the funds from each issue were to be used and found support for the hypothesis that underwriting compensation was lowest when new capital was to be used for debt repayment, presumably because underwriters expected investors to view this use as generating a better risk/return tradeoff addition to their portfolios than use for acquisition or expansion. This is the first study that has attempted to relate the purpose of new offerings to the underwriting cost of the issue, although some previous studies have related issue

[1] All dollar amounts in this paper refer to 1994 Canadian dollars, calculated using the Producer Price Index.

purpose to the choice of issue type (Eckbo, 1986; Mikkelson & Partch, 1986). We also explored the effect of syndicate size, issuer characteristics (company size and degree of product diversification), and share-price run-up prior to the issue.

## CERTIFICATION AND MARKETING SERVICES

Underwriters require compensation for the marketing and certification services they supply to capital-raising firms since these services require costly effort or risk-bearing by the underwriting syndicate. The extent of underwriter effort or risk-bearing required may vary from issue to issue according to the characteristics of the issue, the issuer, the underwriters, and general market conditions. Marketing services encompass all activities related to advising the issuer, management of the issue, assessing and stimulating demand for the issue, and providing insurance services to the issuer by guaranteeing the gross proceeds from the new offering. The price of these services includes the general operating costs of underwriters (legal, advising, and overhead expenses), expected "normal" profit, and a risk premium that reflects the uncertainty faced by underwriters with respect to general market conditions and the response of investors to the particular issue.

Marketing risk borne by underwriters arises from two sources. Systematic risk reflects the risk associated with the issuer related to uncertainties in the market as a whole. Issuer beta generally is used to proxy this uncertainty. Non-systematic risk, associated with the unique features of the company and its industry, reflects the company-specific component of the uncertainty. Researchers commonly assume non-systematic risk to be captured by the variance of residuals from a beta market-model equation. As either of these risks rises, the insurance risk borne by the underwriters rises since they may be less able to sell the issue. They may need to undertake increased costly efforts to market the issue. This increased risk and effort mean that underwriter compensation must be higher.

Issue size should also influence underwriter compensation through its effect on marketing costs. We expect to observe economies of scale in managing and marketing an issue so that marketing costs should fall as issue size

rises.On the other hand, the marketing risk borne by underwriters increases as size increases so that compensation must rise. Which effect dominates is an empirical question.

The cost of the certification service also should vary positively with the non-systematic risk of the issuer. Since company insiders (managers, the board of directors) hold better and more complete information they have an opportunity to exploit less informed potential investors (Myers & Majluf, 1984). The latter are aware of this problem of asymmetric information so that without some trustworthy assurance of full and true disclosure of relevant information they will expect new issues to be overpriced, and will be reluctant to purchase them. Thus Booth & Smith (1986) hypothesized that issuers employ underwriters to certify that the price of new issues reflects inside knowledge and that the prospectus contains all pertinent information. Underwriters stake their good name on the issue and, in effect, lease their reputational capital to the issuer. As well, they must be compensated for the effort required to become an insider by investigating the issuer, with the required effort increasing as the market's uncertainty about the company increases. Non-systematic risk should be correlated with this uncertainty about the true value of the issuer. In general, the potential for an adverse impact on investors of asymmetric information should fall as the riskiness of the issue falls, so that certification costs should fall as riskiness declines.

The type of issue also will influence the compensation demanded by underwriters since, in a world of asymmetric information, the choice of issue signals information regarding manager's expectations about company performance (Myers & Majluf, 1984). In particular, an issue of common shares or convertible debt is more likely to be seen as a signal that the issuer is overvalued than is an issue of straight debt. Thus, different issue types require varying levels of investment by the underwriter in obtaining information from the issuer (Booth & Smith, 1986). Certification of common share issues requires that the underwriter must invest the most effort in information gathering and that the issuer must lease the greatest amount of reputational capital in its effort to assure potential investors that they are not being exploited.

In contrast, certification of straight debt requires that the underwriter certify only that there is no threat of bankruptcy. In other words, the more senior the security, the less is the need for certification. Denis (1991) provides indirect empirical evidence of this in his study of shelf registration in the United States. Shelf registration was introduced by the United States Securities and Exchange Commission in 1982 in order to simplify the regulatory requirements for issuing new securities. It allows certain firms, typically well known large ones, to register once for all the securities they plan to issue in the ensuing two years. Issues can then be taken off the shelf and sold with less need for stringent underwriter certification effort at the time of issue. Denis found that shelf registration has been used more commonly for straight debt and preferred stock issues than for common share issues, reinforcing the theory that less certification is needed for more senior securities. Other researchers have found clear evidence that issue announcement-day effects (as measured by abnormal common share price movements) tend to be much more negative for common stock issues than for convertible debentures, with little or no announcement-day effect observed for debentures or preferred stock (Smith, 1986; Bayless, 1994). This implies that markets are most concerned about the existence of asymmetric information when companies issue new common shares, and least concerned when companies issue straight debt.

## UNDERWRITER COMPENSATION, ISSUER CHARACTERISTICS AND ISSUE PURPOSE

Prior research has explained variations in marketing service costs primarily in terms of uncertainty of investor response to the issue (measured by systematic and non-systematic risk) and the effect of increasing issue size (which creates economies of scale for underwriters but also increases risk). Variations in certification service costs have been explained in terms of non-systematic risk. We suggest that issuer characteristics and issue purpose may also affect the cost of marketing and certification services. Underwriters seek to set their compensation based on the perceived ease with which they can sell an issue, an assessment that depends on how investors rate the attractiveness of an issue. In turn, this depends on how investors

evaluate the characteristics of the company in question and its issue in terms of the contribution the issue would make to the overall return and riskiness of their portfolios.

Among other things, the assessment of investors may be influenced by the stated purpose of the firm in seeking external capital. Just as announcement-day share price effects provide clues about the information the market extracts from the choice of issue type, so too should these effects reflect the nature of the information conveyed by the stated issue purpose. However, studies by Eckbo (1986) and Mikkelson & Partch (1986) show no consistent relationship between stated issue purpose and issue announcement-day effects. The latter study found that issue purpose had no effect when companies issued straight or convertible debt. When they issued common stock, a stated purpose of debt repayment had a more negative announcement-day effect than did a stated purpose of capital expenditure. On the other hand, Eckbo (1986) found that when convertible stock was issued, a stated purpose of capital expenditure had the most negative effect on share price at announcement. We hypothesize that investors regard certain proposed uses of the new capital (such as debt repayment or capital investment) as ones which increase the attractiveness of a company in terms of reduced risk and/or increased return, while other uses (such as acquisition/expansion) may be seen as adding to risk or reducing expected return. This will affect investor interest in the issue and therefore will influence underwriter marketing effort. Certification services also have relevance here because underwriters must certify that companies have revealed all information necessary to assess the possible implications of the proposed use of the issue proceeds. The riskier the proposed use, the greater will be the need for certification services. These considerations lead to the following hypothesis:

*Hypothesis 1: Underwriter compensation increases as the stated purpose for seeking new external capital changes from debt repayment, to capital expenditure, to acquisition/expansion.*

Marketing costs will be influenced by the market's valuation of the issuing company in the period leading up to the issue. Prior research has shown that companies tend

to issue new equity and convertible debt after a run-up in stock value that creates abnormal positive returns (Asquith & Mullens, 1986; Masulis & Korwar, 1986; Mikkelson & Partch, 1986; Lucas & McDonald, 1990). Investors observe the run-up in stock value and therefore may regard the announcement of a new issue as a signal of overvaluation. Thus, significant negative announcement-day effects imply that certification reduces but does not eliminate the market's concern about asymmetric information and potential overvaluation. This suggests that the greater is the run-up, the more vigorous must be the marketing effort of underwriters, yielding the following hypothesis:

*Hypothesis 2: Underwriter compensation increases as the magnitude of the short-term share price run-up increases.*

We also consider the effect on compensation of the number of underwriters used to float the issue. Each participant in an underwriting syndicate must receive adequate compensation for their marketing services, and total marketing effort increases as syndicate size increases. In addition, there may be diseconomies to syndicate size as syndicate management and coordination costs rise. This suggests the following hypothesis:

*Hypothesis 3: Underwriter compensation increases as the number of underwriters increases.*

Non-systematic risk, as measured by the variance in residuals from a market model equation, measures variations in company value that do not reflect general market conditions. Thus, it captures variations in how the market assesses the firm itself, its competitors and its general line of business. In cross-sectional analysis of companies a higher non-systematic risk for a company means that the market's assessment of its value has relatively more to do with company-specific and industry-specific characteristics than with market conditions. The more important are these features, the greater will be the uncertainty associated with the company because the characteristics are less observable than market conditions. Our sample of Canadian forest products companies involves firms that pursue similar lines of business and compete against one

another. As a result, differences in non-systematic risk across these companies should be important in explaining underwriting compensation only insofar as they capture differences in firm characteristics. We expect that some of the difference in the firm-specific component of market valuation should reflect differences in observable company attributes, such as degree of product diversification and company size. Thus, we hypothesize that these variables should help to explain differences in firm-specific risk across issues, and hence help to determine differences in underwriter marketing costs.

Forest product commodities (lumber, pulp, newsprint, oriented strand board, etc.) tend to be susceptible to significant price fluctuations, potentially leading to significant changes in company value. However, these fluctuations usually are not synchronous across products so that the more diversified a company, the lower will be changes in company value. Significant short-term changes in the value of specialized firms afford investors the possibility of higher returns than might be available from diversified companies. As well, investors may prefer to diversify their own portfolio rather than seek diversification through investment in diversified companies. In this case, investors would prefer to purchase the issues of less diversified companies, and underwriter compensation might be relatively lower for such companies. A recent study by Prins *et al.* (1995) suggests that Canadian and United States investors do not value diversification in forest products firms, lending support to this possibility. On the other hand, relatively diversified companies likely will be less risky and should display relatively low non-systematic risk since their value should be more highly correlated with broader market movements. If potential investors are attracted to diversified companies because they provide relatively stable returns, then underwriters may bear less insurance risk and need to undertake less marketing effort to sell the new offering. This implies a negative relationship with compensation. Thus, the relationship between compensation and diversification can be determined only empirically. We offer the following hypothesis for testing:

*Hypothesis 4: Underwriter compensation increases as the degree of forest products company diversification increases.*

Firm size has been considered a possible influence on issuing costs in two studies (Hansen & Torregrosa, 1992; Denis, 1993). Larger companies will likely be more widely held and better known so that the cost of assessing demand and searching for buyers may be relatively less. As well, Hansen & Torregrosa (1992) argue that underwriters provide an implicit service to firm owners in terms of monitoring management performance, thereby reducing agency costs. They argue that this monitoring service is distinct from a certification service in that it assures the public and the board of directors that company managers perform competently, as opposed to assuring potential investors that all information relevant to a given issue has been disclosed. They suggest that the cost of the monitoring service should fall as firm size increases because larger companies are likely to be more intensively followed by investment analysts. This also implies that certification costs should be lower for larger firms because of reduced information asymmetry. Hansen & Torregrosa (1992) find underwriter size to be strongly negatively correlated to firm size (as measured by the value of outstanding stock). In keeping with this, we have the final hypothesis:

*Hypothesis 5: Underwriter compensation increases as the size of the issuer decreases.*

## THE DATA SAMPLE

Panel A of Table 1 summarizes issue characteristics. We obtained information for 70 seasoned primary issues (common shares, convertible debentures, preferred shares and debentures) by forest product companies in Canada during the 1985 to 1994 period, with real total value of $6.2 billion.[2] The prospectus for each issue provided information on the type of issue, its size (*ISIZE*), the underwriting syndicate fee, the proposed use of the proceeds, and the syndicate size (*SSIZE*). Gross issue proceeds averaged $89 million and the proportion of the proceeds paid to underwriters as compensation for their services (*COMP*) averaged 3.48%.

[2] The sample included several issues of units combining shares and debentures. These were included as common shares or preferred shares, depending on the composition of the units.

TABLE 1. ISSUE AND ISSUING FIRM CHARACTERISTICS.

*Mean and standard deviation of issue and issuing firm characteristics for 70 debt and equity issues by Canadian forest products companies, 1985–1994.*

| PANEL A. ISSUE CHARACTERISTICS | Mean | Standard Deviation |
|---|---|---|
| Offering Size ($million)[a] | 89.3 | 65.5 |
| Underwriter Fee ($million)[a] | 2.78 | 2.28 |
| Underwriter Compensation (%) | 3.48 | 1.44 |
| Syndicate Size (number) | 5 | 2.6 |

| PANEL B. MEAN COMPENSATION BY ISSUE SIZE, TYPE AND PURPOSE (%) | n | Mean | Standard Deviation |
|---|---|---|---|
| *Size of Issue ($million)*[a] | | | |
| $9–49.99 | 23 | 4.47 | 1.29 |
| $50–99.99 | 22 | 3.13 | 1.18 |
| $100–174.99 | 19 | 2.81 | 1.44 |
| $175 and over | 6 | 3.11 | 1.07 |
| *Type of Issue* | | | |
| Common Shares | 49 | 4.06 | 1.14 |
| Convertible Debentures | 8 | 2.75 | 0.53 |
| Preferred Shares/Debentures | 13 | 1.74 | 1.22 |
| *Purpose of Issue* | | | |
| Debt Repayment | 32 | 2.98 | 1.31 |
| Capital Expenditure | 14 | 3.40 | 1.75 |
| Debt Repayment/Capital Expenditure | 14 | 3.73 | 1.05 |
| Acquisition/Expansion | 10 | 4.85 | 0.91 |

| PANEL C. ISSUING FIRM CHARACTERISTICS | Mean | Standard Deviation |
|---|---|---|
| Assets ($billion)a | 1.67 | 1.38 |
| Diversification Index | 1.18 | 0.44 |
| Systematic Risk (Beta) | 0.75 | 0.55 |
| Non-Systematic Risk (× 103) | 0.57 | 0.69 |
| 3-Month Share Price Trend (× 10) | 0.121 | 0.464 |

[a] 1994 Canadian dollars.

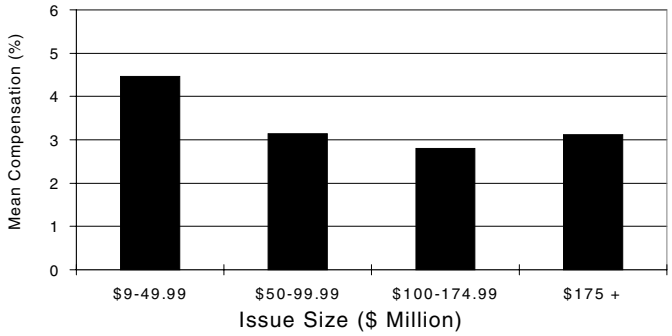


FIGURE 2. MEAN COMPENSATION BY SIZE OF ISSUE
*The financing cost (underwriter compensation as a percent of gross issue proceeds) of an issue was highest for the smallest issues.*

Panel B of Table 1 compares average compensation across various dimensions. Compensation generally declined as issue size rose, but increased somewhat for the largest issues (see Figure 2). Most issues were offerings of new common shares, and almost one half of issuers intended to use the proceeds to repay debt. Average compensation was greatest for common share issues and least for issues of preferred shares and debentures (see Figure 3). It was greatest when issuers intended to use the proceeds to finance an acquisition or expansion, and least when the intended use was debt repayment (see Figure 4). These differences conform to expectations, although not all differences within each dimension are statistically significant, and we have not yet accounted for other factors which influence compensation.

We also collected data on issuing firm characteristics, as shown in Panel C of Table 1. The forest products com-

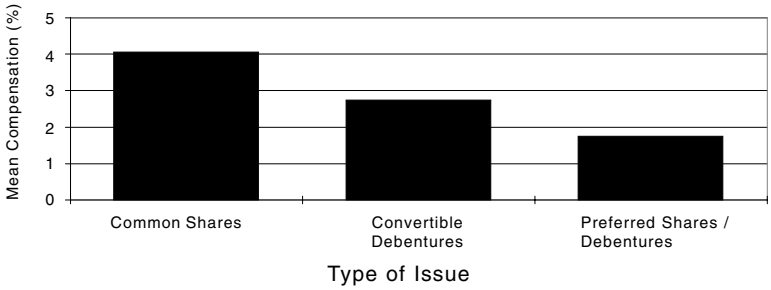


FIGURE 3. MEAN COMPENSATION BY TYPE OF ISSUE
*Common shares issues were more costly to finance than issues of convertible debentures or debentures/preferred shares.*

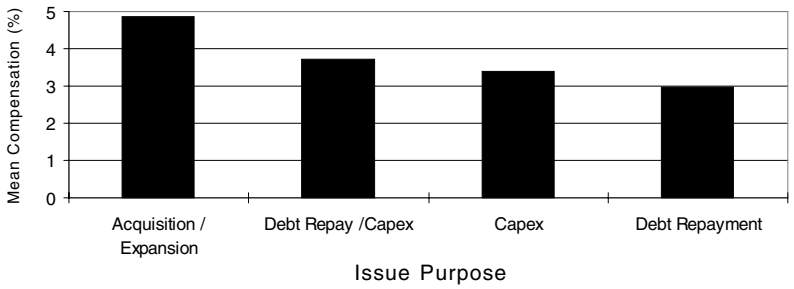


FIGURE 4. MEAN COMPENSATION BY PURPOSE OF ISSUE
*The cost of financing an issue was highest when the proceeds were to be used for an acquisition/expansion, and lowest when they were to be used for debt repayment. Capital expenditure (capex) programs had an intermediate issue financing cost.*

panies involved were typically fairly large (average company size, *CSIZE*, of $1.67 billion in total book assets) and moderately diversified (average diversification index, *DIV*, of 1.18). For each issue we used data for these characteristics for the most recent fiscal year prior to the issue. We measured diversification using a Herfindahl index in which sales shares in nine product groupings were multiplied by the natural log of their inverse and then summed. The index is bounded by zero (no diversification) and 2.2 (equal sales in the nine groupings). Data were derived from the Compustat database and company annual reports.

We estimated systematic risk (*BETA*) and non-systematic risk (*VARE*) for each issuer using the market model estimated over the 150 trading days ending 30 trading days prior to the issue. The market model for a stock relates variation in a stock's returns to market returns. Daily Toronto Stock Exchange (*TSE*) data for common share returns were derived from the TSE Database. We regressed these returns on returns to the market portfolio, as proxied by returns to the TSE300 Index of leading companies, derived from the database. The coefficient on the market portfolio variable, or equity beta (*BETA*), averaged 0.75, as shown in Panel C of Table 1. The average of the residual variances (*VARE*) from the market model regressions was 0.00057, corresponding to a standard error on predicted company returns of 2.39 percentage points. We also used TSE data to derive trend growth in each issuer's common share price in the three months (60 trading days, *T60*) prior to the issue date. This was measured by regress-

TABLE 2. CORRELATION COEFFICIENTS.
*Simple correlation coefficients for variables used in the regression analysis of the determinants of underwriter compensation paid by Canadian forest products companies.*

| | *COMP* | *VARE* | *BETA* | *ISIZE* | *CSIZE* | *DIV* | *SSIZE* | *T60* |
|---|---|---|---|---|---|---|---|---|
| *COMP* | 1.00 | | | | | | | |
| *VARE* | 0.47 | 1.00 | | | | | | |
| *BETA* | –0.004 | 0.35 | 1.00 | | | | | |
| *ISIZE* | –0.35 | –0.34 | 0.08 | 1.00 | | | | |
| *CSIZE* | –0.45 | –0.33 | 0.14 | 0.77 | 1.00 | | | |
| *DIV* | –0.53 | –0.58 | –0.12 | 0.57 | 0.55 | 1.00 | | |
| *SSIZE* | –0.08 | –0.26 | 0.02 | 0.63 | 0.25 | 0.32 | 1.00 | |
| *T60* | 0.31 | 0.05 | 0.05 | –0.17 | –0.12 | –0.03 | –0.16 | 1.00 |

ing the share price on a trend and using the resultant coefficient as the measure of trend growth. On average, issues occurred after share price growth of 1.21 cents per day in the previous three months, indicating that issuers seem to try to take advantage of growing market valuation of their company. Each type of issue tended to occur after a build-up in stock value.

Table 2 presents a simple correlation matrix for the variables. The correlations suggest that larger companies are more diversified while non-systematic risk is higher for less diversified companies. Not surprisingly, there is a strong positive correlation between syndicate size and issue size, and between company size and issue size. The size of a company is negatively correlated with underwriter compensation, suggesting economies of scale in raising capital for larger companies. The negative correlation of diversification with compensation and with non-systematic risk imply that more diversified companies pose less risk and therefore benefit by paying lower underwriter compensation. Of course, the effects of other influences on compensation have not been accounted for in these simple correlations.

## ANALYSIS

We first specify a standard model of underwriter compensation with the variables commonly used to proxy influences on compensation for marketing and certification services. We also use dummies to account for the effect of differences in issue type on these costs. For issue *i*,

$$COMP_i = \beta_0 + \beta_1 VARE_i + \beta_2 BETA_i + \beta_3 ISIZE_i + \beta_4 ISS_{i2} + \beta_1 ISS_{i3} + \varepsilon_i \quad (1)$$

where

$COMP$ = underwriter fee as a proportion of gross proceeds;

$VARE$ = residual variance from the market model equation;

$BETA$ = common stock beta from the market model equation;

$ISIZE$ = real issue size (1994 Canadian dollars);

$ISS_k$ = dummy variables for issue type: debentures or preferred shares ($k$ = 2), and convertible debentures ($k$ = 3) (common shares ($k$ = 1) are represented by the constant); and

$\varepsilon$ = error term.

Previous empirical studies have used a linear functional specification to investigate underwriter compensation. However, because the range of $COMP$ is limited by zero and one (or by 0 and 100 if expressed as a percentage), we use a logistic functional specification:

$$COMP_i = \frac{1}{1 + exp^{-\sum_j x_{ij}\beta_j}} + \varepsilon_i \quad (2)$$

where $x_{ij}$ is the $j$th independent explanatory variable for company/issue $i$, $\beta_j$ is the corresponding parameter and $\varepsilon_i$ is the error term with the errors assumed to be independently and identically distributed with mean zero and homoscedastic variance.[3] Non-linear least squares estimation of the logistic specification, which does not require normally distributed errors, was used to determine parameter values. Analysis was undertaken using a quasi-Newton iteration procedure to find the set of parameter esti-

[3] An alternative to our assumption of additive errors is that $\varepsilon_i$ belongs inside the summation sign, in which case the logistic function can be linearized with an appropriate transformation of $COMP$. We examined this possibility in our regression analyses and found that the sum of squared residuals was consistently much greater in the linearized logistic model, suggesting that it is an inferior specification.

mates which minimizes the sum of squared errors. Such estimates are asymptotically valid — thus, our fairly small sample size weakens the results we obtain. Non-linear least squares estimation procedures do not guarantee global minima so parameter estimates from ordinary least squares regressions were used as starting values in the iterations. This decreases the chance of finding parameter estimates related to a local minima. Results based on ordinary least squares estimation were similar in magnitude and significance to the results obtained using the logistic specification. Refer to Judge *et al.* (1985) for a discussion of non-linear regression model estimation.

Note that

$$\frac{\delta COMP}{\delta x_j} = COMP^2\left[\beta_j \, exp^{-\sum_j x_j \beta_j}\right] \qquad (3)$$

so that the magnitude of the impact of marginal changes in each explanatory variable $x_j$ on *COMP* depends on the other variables and all parameters, and is different for each company/issue. However, the direction of the impact depends only on the sign of $\beta_j$ .

All prior empirical studies consistently have found non-systematic risk to be significantly and positively related to underwriter compensation or total issuing costs ($\beta_1 > 0$), as suggested by the marketing and certification theories (Hansen & Pinkerton, 1982; Bhagat *et al.*, 1985; Bhagat & Frost, 1986; Booth & Smith, 1986; Blackwell *et al.*, 1990; Denis, 1991; Hansen & Torregrosa, 1992; Denis 1993). Marketing theory also predicts a positive relationship between systematic risk and compensation ($\beta_2 > 0$) but empirical evidence has been weak with some studies reporting no significant relationship (Booth & Smith, 1986; Blackwell *et al.*, 1990; Hansen & Torregrosa, 1992). Bhagat *et al.* (1985) found a negative relationship to total issuing costs while Bhagat & Frost, 1986) found a positive relationship to total issuing costs. All previous studies have found issue size to be a primary determinant of variation in underwriter compensation or total issuing costs ($\beta_3 < 0$). Bhagat & Frost (1986) and Hansen & Torregrosa (1992) found a U-shaped relationship between compensation and issue size by adding the natural log and/or inverse of is-

sue size as explanatory variables. Their results imply that scale economies dominate for issues of small and medium size, but that risk dominates for the largest issues. For estimation purposes only *ISS2* and *ISS3* are included in the regression, leaving the constant to account for common share issues. Thus, relative to the constant we expect $\beta_4 < \beta_5 < 0$, as explained above.

Once we have estimated the standard model, we investigate the five hypotheses outlined above. We assigned each issue to one of four dummies, $PUR_k$, $k = 1$ to 4, representing various possible uses of the proceeds of each issue, where $k$ =1 refers to debt repayment, $k$ = 2 refers to capital expenditure, $k$ = 3 refers to a combination of debt repayment and capital expenditure (the company identified both uses as the purpose of its issue), and $k$ = 4 refers to acquisition/expansion. We add the latter three dummies to the basic model to consider the effect on compensation of the announced use of the proceeds. The constant then represents the basic compensation required for common share issues used for debt repayment, before adjusting for other factors. We also add the variables described above relating to trend share price growth, syndicate size, and issuer characteristics.

## RESULTS AND DISCUSSION

Table 3 shows results for various regressions. A *p*-value (or significance level) is shown in parentheses below each coefficient estimate. The *p*-value indicates the probability of obtaining by chance a Student's t-test statistic that is equal to or greater than the one actually obtained, under the null hypothesis that the true coefficient value is zero. Thus, a *p*-value of 0.05 indicates that a coefficient is significant at the 5% level.

We first report results for the standard model, shown as Model 1 in Table 3. It explains 55% of the variation in the compensation paid by companies to underwriters. Both *VARE* (*p*-value = .007) and *ISIZE* (*p*-value = .060) are significant and have the appropriate signs as suggested by the theory of marketing and certification costs, and by prior empirical research. *BETA* does not have the expected positive sign but is highly insignificant (*p*-value = .269). We explored the possibility that diseconomies of issue size

TABLE 3. REGRESSION COEFFICIENT ESTIMATES.
*Coefficient estimates from regression analysis of the determinants of underwriter compensation paid by Canadian forest products companies.*

| DESCRIPTION | VARIABLE | MODEL 1 | MODEL 2 | MODEL 3 | MODEL 4 |
|---|---|---|---|---|---|
| | *Constant* | –3.116<br>(.000) | –3.222<br>(.000) | –3.347<br>(.000) | –3.133<br>(.000) |
| Non-systematic risk (uncertainty about company) | *VARE* | 0.127<br>(.007) | 0.086<br>(.036) | 0.112<br>(.003) | |
| Systematic risk (uncertainty about market) | *BETA* | –0.061<br>(.269) | | | |
| Issue size | *ISIZE* | –0.001<br>(.060) | –0.001<br>(.066) | –0.002<br>(.033) | –0.002<br>(.075) |
| Issue type: debenture /preferred shares | *ISS2* | –0.773<br>(.000) | –0.779<br>(.000) | –0.736<br>(.000) | –0.734<br>(.000) |
| Issue type: convertible debenture | *ISS3* | –0.298<br>(.036) | –0.229<br>(.082) | –0.287<br>(.036) | –0.284<br>(.034) |
| Issue purpose: capital expenditure | *PUR2* | | 0.139<br>(.128) | 0.088<br>(.249) | 0.090<br>(.244) |
| Issue purpose: debt repayment / capital expenditure | *PUR3* | | 0.050<br>(.338) | –0.015<br>(.397) | –0.010<br>(.397) |
| Issue purpose: acquisition /expansion | *PUR4* | | 0.205<br>(.035) | 0.144<br>(.129) | 0.149<br>(.117) |
| Trend growth in share price | *T60* | | | 0.179<br>(.014) | 0.180<br>(.013) |
| Syndicate size | *SSIZE* | | | 0.034<br>(.056) | 0.033<br>(.056) |
| Company diversification | *DIV* | | | | –0.151<br>(.133) |
| Company assets | *CSIZE* | | | | 0.020<br>(.367) |
| Unexplained non-systematic risk | *VARERES* | | | | 0.104<br>(.034) |
| $R^2$ | | 0.55 | 0.58 | 0.64 | 0.64 |
| Adjusted $R^2$ | | 0.51 | 0.53 | 0.58 | 0.57 |
| Log of the likelihood function | | 226.0 | 228.2 | 233.5 | 233.5 |

*p*-values for t-test statistics are shown below the estimated coefficients.

related to increasing risk might eventually dominate marketing economies. We added the natural log and inverse of *ISIZE*, and also tried partitioning the data into four issue size groups and using issue size dummies rather than

issue size itself. We found no statistically significant evidence that issue size has a U-shaped relationship to underwriter compensation paid by Canadian forest products companies. The coefficients on the two issue type dummies in Model 1 are significant and show that companies paid the least when issuing debentures and preferred shares, while they paid the most for common share issues, with convertible debentures having an intermediate cost. This is consistent with the predictions of certification theory.

Model 2 in Table 3 shows the effect of considering the issuer's stated purpose in raising new external capital. We exclude *BETA* in this and the following regressions — its inclusion does not substantively alter the results. The coefficients for the basic variables are similar in magnitude

TABLE 4. ESTIMATED UNDERWRITER COMPENSATION.
*Estimates of underwriter compensation (underwriter fee as percent of gross proceeds) using the means of the data applied to regression Model 2 of underwriter compensation.*

| | |
|---|---|
| *Common Share Issue* | |
| Debt Repayment | 3.66[a] |
| Debt Repayment/Capital Expenditure | 3.84[b] |
| Capital Expenditure | 4.19[b] |
| Acquisition/Expansion | 4.46 |
| *Preferred Share/Debenture Issue* | |
| Debt Repayment | 1.71 |
| Debt Repayment/Capital Expenditure | 1.80[b] |
| Capital Expenditure | 1.97[b] |
| Acquisition/Expansion | 2.10 |
| *Convertible Debenture Issue* | |
| Debt Repayment | 2.93 |
| Debt Repayment/Capital Expenditure | 3.08[b] |
| Capital Expenditure | 3.36[b] |
| Acquisition/Expansion | 3.58 |

[a] Compensation for common share issues used to repay debt is subsumed in the constant in Model 2.

[b] Not significantly different (at 10% level) from compensation for debt repayment.

to those in Model 1 and retain their significance. The coefficients on the dummies for issue purpose have relative magnitudes as predicted by Hypothesis 1, but both *PUR3* and *PUR2* are insignificant at the 10% level. However, the coefficient on *PUR4* is statistically significant ($p$-value = .035) and implies that forest products companies pay a premium to underwriters when they seek external capital to finance new acquisitions or expansion. Presumably this additional cost reflects the extra compensation required by underwriters because of greater marketing and certification effort required to sell an offering perceived by investors as relatively risky. The Canadian forest products industry historically has provided a low return on capital and the extra cost required for underwriting acquisition/expansion projects may reflect the scepticism of the investment community about the ability of the industry to allocate capital efficiently. In other words, the investors may expect a low return on growth in the Canadian industry. This means that growth-oriented companies need to consider how they can convince the investment community that they have an attractive and solid business strategy behind their acquisition/expansion plans.

Table 4 shows the effect of different issue types and issue purposes on the compensation that must be paid to underwriters, estimated using the means of the data applied to Model 2. The model suggests that firms which choose to issue preferred shares or debentures to raise funds for repayment of debt pay an estimated 1.89 percentage points less in underwriter compensation than when they choose to issue common shares for this purpose, after accounting for other differences. The average size of issues used to repay debt was $99 million in the sample, implying that underwriter fees would be about $1.9 million less. Firms that choose to issue convertible debentures to raise funds to repay debt pay an estimated 0.73 percentage points less.

According to Model 2, firms that seek to raise external capital to finance an acquisition or expansion must compensate underwriters at a rate about 22% higher than when the funds are to be used for debt repayment, after accounting for other factors. The greatest impact of the issue type choice shown in Table 4 is that resulting from the choice of preferred shares or debentures rather than

common shares to finance an acquisition or expansion. The choice lowers compensation costs by 2.36 percentage points: on the average issue size of $50 million for this purpose in our sample, the savings would be about $1.2 million. Despite this, all firms in the sample used a common share issue to finance an acquisition or expansion, suggesting that reasons other than underwriter compensation cost may have played an important role in deciding the choice of issue type. An already existing high debt/equity ratio could be one reason. In any case, in terms of a funding strategy, the implication is that companies need to consider carefully the relative costs of various instruments in relation to issue purpose. Where feasible, debt issues provide the lowest up-front cost of financing an acquisition/expansion strategy. Issuing debt and subsequently repaying it using an equity issue might sometimes be the optimal approach.

We investigated the sensitivity of the results shown in Table 4 by looking at how the results vary across the range of issues and company characteristics in the sample. In all but four cases, the estimated compensation level for individual companies/issues lies within 20% of the results shown in Table 4. As well, the relationships between estimated compensation levels for various combinations of issue type and issue purpose do not change.

Model 3 in Table 3 shows the effect of adding syndicate size (*SSIZE*) and trend share price growth (*T60*) to Model 2, in order to test Hypotheses 2 and 3, respectively. Explained variation in compensation has risen to 64%.The coefficients on the other variables generally remain unchanged, although the coefficient on *PUR4* is now marginally insignificant ($p$-value = .129). Although *SSIZE* and *ISIZE* are highly correlated, multicollinearity does not pose a problem here because the multiple correlation coefficients for the variables in the regression are never higher than 0.47.

The coefficients on *SSIZE* ($p$-value = .056) and *T60* ($p$-value = .014) are both significant. In agreement with Hypothesis 2, the coefficient on *T60* shows that companies must pay extra for their preference for resorting to external capital markets only after a run-up in the market's valuation of the company. The stronger is the short-term run-up, the greater is the extra amount that must be paid,

consistent with the idea that certification is not perfect.[4] And in keeping with Hypothesis 3, the coefficient on *SSIZE* shows that companies pay more for larger syndicates because total marketing effort increases, and syndicate management and coordination costs rise. Since companies pay less for smaller underwriting syndicates there is an incentive to use larger investment houses. This is especially true for larger issues, which also require relatively less underwriter compensation. This is reinforced by the current trend within the investment industry toward smaller syndicates with the lead manager taking a larger share of the issue.

We earlier argued that cross-sectional variations in company non-systematic risk (*VARE*) will be related in part to observable differences in company characteristics such as size and product diversification. This implies that when these variables are considered as determinants of compensation, the relevant measure of non-systematic risk is that portion not explained by company size (*CSIZE*) and diversification (*DIV*). Thus, we regressed *VARE* on *CSIZE* and *DIV*, and the residuals from this regression, *VARERES*, represent the unexplained portion of non-systematic risk. *CSIZE* was not significant in this regression ($p$-value = .215) while *DIV* was strongly related to *VARE* ($p$-value = .000). The two variables explained 35% of the cross-company variation in non-systematic risk. Model 4 in Table 3 shows the results when *CSIZE*, *DIV* and *VARERES* are used as explanatory variables for compensation. The coefficient on *VARERES* is similar in magnitude to that on *VARE* in Model 3. Company size is highly insignificant ($p$-value = .367) suggesting that there are no biases against smaller companies in underwriting costs, after accounting for other factors. The coefficient on diversification is also insignificant ($p$-value = .133). Overall, the addition of these variables adds nothing to the explanatory power of Model 3. Co-linearity between *DIV*, *CSIZE* and *ISIZE*

[4] It is possible that the length of the run-up influences the response of potential investors. If the run-up in share value has occurred over an extended period, then the higher company value may be seen not as possible overvaluation but as indicative of underlying company performance. An extended run-up may then be associated with investors who are eager to invest in the company. Marketing efforts and underwriter compensation would be correspondingly lower. We tested this using trend share price growth over the previous year. The sign on the coefficient was negative but highly insignificant.

likely poses a problem in Model 4 (the multiple correlation coefficient on *CSIZE* is 0.77). Removal of *CSIZE* solves much of the problem but does not change the results shown in Model 4.

## CONCLUSION

In this study we were motivated by the observation that the Canadian and global forest products industries have been undergoing a period of significant restructuring. Moreover, the consolidation that is occurring in the global industry may soon affect the Canadian industry. The cost of financing such restructuring and consolidation is not small, and in this paper we have sought to explain the determinants of some of these costs for Canadian forest products companies. We used a logistic functional specification to explain underwriter compensation as a proportion of gross issue proceeds from 70 debt and equity issues. In the context of the non-linear least squares estimation procedure we used, and our small sample size, it should be kept in mind that our results are only asymptotically valid.

We can summarize our main findings as follows:

- In keeping with previous empirical and theoretical work, issue size and uncertainty related to company-specific characteristics (i.e. non-systematic risk) are important determinants of compensation paid to underwriters by Canadian forest products companies. The larger the issue size and the lower the uncertainty, the lower is the compensation.
- The choice of issue type has a strong affect on the compensation paid, with issuers of common shares paying the most.
- We found some support for the theory that issue purpose affects underwriter compensation. The relative magnitudes of the effects generally were in accordance with expectations based on the theory of marketing and certification costs but only a stated purpose of acquisition/expansion was found to have statistical significance.
- The size of the underwriting syndicate affects compensation. Larger issues tend to result in lower compensation because of economies of scale in marketing. However, larger issues also are associated with larger syndicates,

which tend to result in higher compensation because of greater total marketing effort and diseconomies of scale in syndicate management.

- Companies commonly resort to external financing in the form of equity or convertible debt after a run-up in company value. Our results show that the greater the run-up the greater is compensation paid to underwriters since potential investors may be less willing to purchase the issue, despite underwriter certification. In essence, the greater the run-up, the riskier is the issue from the perspective of the underwriter.
- We found that observable company characteristics such as company size and degree of product diversification had no significant affect on underwriter compensation.

Our results suggest various considerations that may help companies reduce the cost of financing restructuring and consolidation. Foremost is the observation that companies need to carefully consider what might be the optimal financing strategy in relation to their purpose for taking an issue to the capital markets. The financing cost of acquisitions/expansions are of particular importance. The higher cost for this purpose observed in our sample may reflect a negative perception of the ability of the Canadian industry to obtain good returns on growth, or it may simply reflect the greater riskiness of this sort of activity in general. If the latter is true, then this result should be generalizable to the forest products industry in other countries. In any case, our results suggest that there may be cheaper financing strategies than the common share issue typically used to raise funds for acquisitions/expansions (e.g. the issue of convertible debentures or straight debt). As well, companies may need to devote more effort to convincing the investment community of the attractiveness of their plans.

Companies may also want to consider the relationship between issue size, syndicate size and underwriter compensation. Typically, they pay less for smaller syndicates and for larger issues. This means that larger investment houses, which can handle larger issues in smaller syndicates may sometimes be preferred as underwriters. This may also help to explain the increasing adoption of "US economics" in the structuring of syndicates (i.e. where

smaller syndicates are formed and the lead underwriter assumes a significantly larger share of the issue).

With respect to the timing of an issue, our results suggest that taking an issue to the capital markets after a run-up in the market value of a company imposes some additional underwriting costs. Companies should consider whether it is worthwhile to try to avoid this extra cost.

Finally, our results are consistent with the findings of studies of underwriter compensation paid by companies in other industries. With the possible exception noted above, we expect our results to be generalizable to forest products industries in other countries, and to other industries as well.

## ACKNOWLEDGEMENT

We would like to thank two anonymous referees for their useful comments. Of course, any remaining problems are our own. We are also grateful for partial funding received from the Network of Centres of Excellence, Sustainable Forest Management.

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