

# Northern Forest Products

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## RISK ADJUSTED COST OF CAPITAL AND DIVISIONAL HURDLE RATES

**Directed**

Northern Forest Products (NFP) was established in the 1800s to log timber in the Great North Woods. In response to changing conditions, the company underwent radical changes in the way it operates and currently it is a large multidivisional corporation. The major focus of the company remains managing over one million acres of timber production and overseeing the manufacture of consumer paper products from pulp derived from its land holdings. Over the years the company has diversified into several other related businesses, such as a moderately sized mill that produces paneling and wood flooring. This operation has developed a consistent outlet for all of its output and therefore is stable. The company is also involved in real estate as a result of developing some of the prime lake front properties from its forestlands for residential and private recreational use. Successful property development during the 1970s resulted in expanded real estate holdings. However, residential development was particularly hard hit during a recent economic downturn, and the company struggles in this area. NFP is aware of the increasing international demand for wood products and is concerned about recent environmental pressures concerning logging. The company believes that diversification strengthens its overall economic health and, therefore, recently acquired a plastics firm specializing in a high quality flooring product that looks like natural wood, but is actually tougher than wood because it is resistant to fading, staining, burns, and scratches. The synthetic product is currently marketed to wholesale customers currently purchasing the company's wood flooring. NFP initially was concerned about potential cannibalization of the wood floor division by the plastics division if customers substituted one product for the other. However, the impact has been negligible. Because of the unique nature of plastics manufacturing and the geographic location of the production facility, the company considers the wood milling and plastics production as two separate operations

Because of the nature of the various product lines, the company is divided into five divisions: Timber Management, Paper Products, Wood Milling, Real Estate, and Plastic Products. This structure has worked reasonably well, but shareholders have expressed concerns that NFP's stock is under-performing and frictions have developed among the divisions. Therefore, the board of directors appointed a special committee to evaluate company performance and make suggestions that would improve company value. The committee asked Laura Shilling, the firm's financial vice president, to identify problems and recommend ways to eliminate them.

Shilling was able to recommend numerous small changes in financial operations that would benefit the company. However, her investigation made her aware of major problems in the company's financial planning process. Currently, NFP does not have a formal procedure for incorporating differential risk into project evaluations and the capital allocation process. Each division manager is provided a maximum amount of money to fund small projects and the use of this money is reviewed each year as part of the division manager's evaluation. Decisions for funding projects over \$50,000 are made at the corporate level. For large projects, each division manager estimates the future cash flows for projects they would like considered for funding. NFP's corporate treasurer enters these cash flows into the computerized capital budgeting system and calculates each project's NPV, IRR, and MIRR. A single corporate rate, based on a 4-percentage point premium over the cost of capital, is used to compute the NPV or to evaluate the project's return. The premium is based on management's desire to undertake projects only if the return provides a 4 percent profit. However, some lower level managers think this number is too high and believe the premium should be reduced to 2 percent. Still others think that any projects that breakeven should be considered.

In addition, the company requires a payback period of six years or less. The payback period is set by the board and based on the belief that cash flows more than six years in the future are unreliable. Projects with paybacks in the five to six year range are considered marginal and accepted or rejected depending on management's confidence in the cash flow forecasts and on the project's long-run, strategic effects on the firm.

It is widely understood that the company's expertise lies in traditional lumbering operations. Thus, because the company has more difficulty estimating cash flows associated with projects in the Plastic Products Division, such projects are considered riskier than those in Timber Management and Wood Milling Divisions. Also, the plastics and real estate industries in general have greater risk because they are more susceptible to economic conditions. Although differential risk levels are widely acknowledged, no explicit allowance is made for these differences. As a result, the Plastic Products Division and riskier projects from all divisions have had disproportionately more funding because high-risk projects typically offer high returns. Shilling is concerned about how this informal risk-adjustment process impacts the overall risk of the company. She believes that project risk must be given more formal consideration in the capital budgeting process, and that the idea of different hurdle rates for different divisions should be investigated. She knows that top management will resist applying different rates of return for each division unless she can document why such a radical departure from past practices is necessary and how the current practice is depressing company value.

The job of proving the need for, and then designing, a risk evaluation system will not be easy and will require the cooperation of managers from all parts of the organization. Therefore, Shilling set up a team to study the question of risk-adjusted hurdle rates. Betty Zoller, a high level employee in the CEO's office, had just completed an advanced certificate in corporate finance. Because of her strong mediation abilities and financial background, she was selected as the team director. Yolanda Trebble (the corporate treasurer), John Sales (the corporate capital budgeting director), and the four divisional controllers completed the group. The team was asked to research the following questions, plus any others they regarded as important:

1. Should hurdle rates be established for each division, for each product line within a division, or on an individual project basis?
2. How should project risk be measured?
3. How should capital structure, or debt capacity, be handled? This issue is important because the Real Estate division manager, Kelly Dubree, has been complaining about her need to use more debt if she is to compete effectively with other firms in the real estate development business.

Zoller decided that a reasonable place to start her inquiry was to focus on the concept of market risk. After several discussions, she explained that well-diversified investors see the firm's risk as the key determinant of its cost of equity capital and convinced NFP's senior management that investors estimate risk, in large part although not exclusively, by a stock's relative volatility as measured by its beta coefficient. Because NFP's divisions have such different levels of risk, Zoller investigated publicly traded companies that were similar to each of the company divisions and examined their betas. She then analyzed the volatility of earnings in each division vis-à-vis earnings on the S&P 500 index and found a high level of correlation among divisions and with the index. With this information she separately met with each division director to determine the appropriate divisional betas. The agreed upon betas are listed in the following table:

DIVISION	MARKET BASED PERCENT OF CORPORATE ASSETS	ESTIMATED DIVISIONAL BETA
Paper Products	38%	1.12
Timber Production	33%	0.98
Wood Products	15%	0.82
Plastic Products	9%	1.28
Real Estate	5%	1.43

Betty Zoller wanted to use these divisional betas to estimate the corporate beta and compare it against NFP's corporate beta of 1.04 as reported by ValueLine and 1.12 as reported by Merrill Lynch. Before tackling a divisional risk-adjusted hurdle rate, she believed it was important to establish the company's cost of equity by using the CAPM. For the purpose of comparison, she wanted to use the computed beta (as opposed to the ValueLine beta). She determined that the long-run treasury rate was 6.5 percent and the long-run return on the NYSE index was 14.2 percent. This exercise would clearly demonstrate that each division's cost of equity differs from corporate cost, depending on the division's risk.

Next, Betty needed to consider how capital structure should be incorporated into the weighted average cost of capital (WACC). Should the corporate average be used or should different divisions be assigned different capital structures and debt costs? If different capital structures are appropriate, how should they be derived? What interest rate should be used for debt? How should divisional equity costs be adjusted to reflect varying capital structures?

Management believes the company's optimal capital structure is 42 percent debt. Betty initially decided to use this capital structure for each division. She also decided to use NFP's before-tax cost of debt of 12.0 percent and its federal-plus-state marginal tax rate of 35 percent in all calculations. She reasoned that she was already going to have a hard time persuading management to accept multiple hurdle rates. Therefore, starting with a simple approach that was consistent with the beliefs of management would increase her chance of success. However, she realized that these decisions would be controversial and she knew that she must present strong arguments for her decision.

With her investigation clearly underway, Betty called the first meeting and presented her initial ideas. The meeting did not run smoothly. Kelly Dubree, vice president of the Real Estate Division, voiced a strong objection to the fact that a uniform capital structure of 42 percent debt was proposed. She argued that firms in the real estate industry averaged close to 75 percent debt and even the most conservative firms used about 60 percent debt. Based on the conservative firms' bond ratings, the before-tax cost of debt for their competitors averaged only 11.25 percent, 75 basis points below NFP's overall cost of debt as a result of the riskiness of NFP's other divisions.

Dubree argued that if she were forced to use a higher hurdle rate while competing firms use a lower rate, NFP would lose ground in the real estate business. John Sales backed her up, noting

that he had read an article in his professional journal about a diverse food company struggling with the issue of divisional hurdle rates. The article noted that the restaurant industry tends to have debt ratios of about 70 percent, which are about twice that of the other major divisions. The company decided to use a 70 percent debt ratio for its restaurant division, compared to 40 percent for its frozen foods division, so that comparability with stand-alone competitors could be achieved. The article further pointed out that Zenith Steel Corporation's Equipment Lease Financing Division also has a high debt ratio (about 80 percent debt, as opposed to 42 percent for its other divisions). In both situations, the companies indicated that they could remain competitive only if their divisions could follow industry practice for capital structure when calculating hurdle rates.

When John finished his discussion of debt ratios for restaurants and equipment leasing, Yolanda Trebble noted that both the restaurant and equipment leasing industries have been experiencing financial difficulties. Within the past quarter, the financial press had reported lost earnings and drops in the bond ratings for several companies in these industries. She then suggested that their problems might have been compounded by over-expansion resulting from using unrealistically low hurdle rates. Others agreed with her point, but the issue of using divisional capital structures was not resolved and needed to be discussed further.

Following the meeting, Betty decided to focus on ways of accounting for individual project risk. She met with employees in various operations of the company and discovered that most individual projects are parts of larger processes. Also, the results of a given capital project are highly sensitive to market and production conditions for the product. The experienced operating personnel were more confident about the projected cash flows for some projects than for others. They mentioned that some projects are simply riskier than others. Also, John reported that some operating personnel have better "track records" in forecasting cash flows than others. Therefore, John adjusts project cash flows based on post audit results of individual manager's previous projects. With this information in mind, Betty concluded that any system accounting for individual project risk would necessarily be somewhat arbitrary and imprecise. However, she believes that risk needs to be incorporated into the analysis for extremely large projects, particularly those involving entirely new technologies or product lines. In these cases, Betty thinks that Monte Carlo simulation or scenario analysis should be used to generate risk and return characteristics of the project. However, she believes that the costs would outweigh the benefits of these approaches for most projects, especially in view of the highly subjective nature of the estimation process that would have to be used for the probability data.

As an alternative, Betty decided to recommend that divisional managers classify all requests for funding into either high-risk, average-risk, and low-risk groups. High-risk projects would be evaluated at a hurdle rate 1.1 times the divisional rate; average-risk projects would be evaluated at the divisional rate; and low-risk projects would be evaluated at a hurdle rate 0.9 times the divisional rate. When this was discussed at the next group meeting, the members agreed that the procedure was arbitrary but reasonable, and most of the group felt that general risk grouping was better than the current procedure.

Just before her final report was due, Betty was reassigned to an emergency situation regarding the loss of the company's major customer in Japan. You have been assigned to take over the task of completing the report and defending it before the group. Before she left, you were able to spend a day becoming familiar with the capital budgeting situation and reviewed Betty's notes. She mentioned that she remained convinced that capital budgeting must involve judgment as well as quantitative analyses. Currently, the capital budgeting process is as follows: (1) one hurdle rate is used throughout the entire corporation; (2) NPVs, IRRs, MIRR, and paybacks are calculated; and (3) these quantitative data are used, along with such qualitative factors as "what the project does for our strategic position in the market," in making the final "accept, reject, or defer" decision. Betty emphasized that this general procedure should be retained, but that the quantitative inputs used in the final decision would be better if differential risk-adjusted discount rates were used. She wanted to make sure that you explained the need for differential risk adjustments and how they impact firm

value. She also wanted you to resolve the issues raised concerning capital structure. She noted that Yolanda had been looking into issues involved in estimating beta and since this would be the primary method of adjusting for divisional risk she believed that it was important to cover these issues.

Betty mentioned that the group responded well to in-depth discussions of the intuition behind the issues and supporting quantitative analysis. To help you explain the impact of risk adjustments to the costs of equity and WACC and the resultant decisions for funding, she suggested that you prepare examples of the company's capital budgeting process using an example with the following cash flows.

#### Project Cash Flows

YEAR	CASH FLOW
0 (start up)	(255,000)
1	47,000
2	52,000
3	55,000
4	57,000
5	58,000
6	60,000
7	62,000
8 (+ terminal CF)	125,000

Finally Betty knew that Laura Shilling was heavily involved in analyzing the company's incentive-based compensation plan for upper management personnel. Since many of the managers will be at the meeting and the recommendations could impact their compensation, Betty was sure that these issues would be brought up at the meeting. She felt your chances for promotion would be enhanced if you were prepared to speak to the issues involved and made a recommendation concerning changing or maintaining the current plan. Under the current plan, division managers receive approximately half of their annual compensation as bonuses or incentive stock. These percentages vary greatly from year to year, depending on the state of the economy and the recent performance of both the corporation and the divisions. The incentive compensation at the division level is based on three factors: (1) the division's ROE, (2) its sales growth, and (3) its earnings growth, all averaged over the last three years. The incentive compensation of the senior corporate executives is based on the same three factors, but measured for the entire corporation.

You must now prepare the report to be presented at the meeting. The night before her flight Betty e-mailed you the following questions to help structure your thoughts and to make sure that you have covered the important issues.

#### QUESTIONS

1. Explain the importance of risk adjustment in the capital budgeting allocation process by answering the following questions.
  - a. Explain why risk adjustments are important and how they can affect firm value.
  - b. Explain how the single hurdle rate currently used by Northern Forest Products can change the risk structure of the company. For example, think about what would happen if the Plastic Products Division received a disproportionately high level of funding because their returns exceed the company hurdle rates (its growth rate substantially exceeds the corporate average). Assuming that the risk of the division remains unchanged, what effect would this have, over time, on NFP's corporate beta and on the overall cost of capital?

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2. Explain the rationale behind using beta as a measure of risk. Compute the company's beta based on the divisional betas and compare it with that provided by ValueLine and Merrill Lynch. Explain some of the inconsistencies that can be found in reported betas. Do historical betas provide good measures of the future riskiness of firms (or divisions)?
3. Using the computed beta, find the cost of equity, the weighted average cost of capital (WACC), and the hurdle rate for the company. Discuss the negative impact of the added premium to the cost of capital.
4. Compute the cost of equity for each of the company's divisions. Then, compute the WACC and the hurdle rates for each division, assuming that all divisions use a 42 percent debt ratio.
5. Do you agree with Betty concerning the capital structure issue? Discuss several arguments that Betty can use to help justify using the company rather than divisional capital structure to determine WACC.
6. How would your thinking about the capital structure decision be affected if:
  - a. Each division raised its own debt; that is, if the divisions were set up as wholly owned subsidiaries, which then issued their own debt? (In fact, Northern Forest Products raises debt capital at the corporate level, and headquarters then makes funds available to the various divisions).
  - b. Divisions issued their own debt, but the corporation guaranteed the divisional debt?
7. Now assume that projects are identified within divisions as being high risk, average risk, or low risk.
  - a. What hurdle rates would be assigned to projects in the three risk categories for the company and within each division?
  - b. How comfortable are you with the 1.1 and 0.9 project risk-adjustment factors? Is there a theoretical foundation for the size of these adjustments?
8. Betty's analysis requires estimated betas for NFP's five divisions. Suppose she did not feel comfortable with beta analysis. Could divisional (and project) hurdle rates be established using total risk analysis? If so, describe how this might be done. (Hint: The risk of divisions (and projects) can be viewed on a stand-alone basis or on a within-firm basis, which treats the firm as a portfolio of assets.)
9. Suppose that, despite the higher cost of capital for risky projects (1.1 times divisional cost), the Plastic Products Division made relatively heavy investments in projects deemed to be more risky than average. What effect would this have on the firm's corporate beta and overall cost of capital? How long would it take for the effects of these relatively risky investments to show up in the corporate beta as reported by brokers and investment advisory services?
10. Compute the Payback, IRR, MIRR, and NPV for the example cash flows. Discuss how the risk adjustments affect the acceptability of the project.
11. How do the Payback, IRR, MIRR, and NPV change if the additional premium is reduced to 2 percentage points or to 0?
12. Northern Forest Products uses an incentive-based compensation plan for its upper management personnel.

- a. Do you see any obvious conceptual problems with the company's compensation program?
- b. How would you expect the compensation plan to influence managers' reaction to Betty's recommendations? Would these reactions be good or bad from the standpoint of maximizing the price of NFP's stock?
- c. What other options could NFP consider to reduce the division impact on compensation?

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