DIVISIONAL COST OF CAPITAL: A STUDY OF ITS USE BY MAJOR U.S. FIRMS

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ABSTRACT

The study examines the use of divisional cost of capital by *Fortune 1000* companies. Two hundred and ninety eight firms (29.8 percent) responded to the survey. While the concept of weighted average cost of capital is utilized by 85.2 percent of the respondents, less than 50 percent use divisional cost of capital. By using a single firm cut-off criterion for all projects, there is the potential for intrafirm misallocation of capital since projects initiated by high risk divisions are more likely to be accepted because of high returns. Lower return divisions with less risk may be starved for capital when only a single weighted average cost of capital is used. The author also suggests some normative approaches to solve the problem.

INTRODUCTION

In the traditional literature of corporate finance, a key metric is weighted average cost of capital. After it is determined, the WACC is intended to be the cut-off point in capital budgeting decisions. Projects that equal or exceed the hurdle rate are viewed as adding to stockholder wealth maximization, while those that fail the test are viewed as dilutive to value. Perhaps no other principle of finance is further off the mark.

As stated in the Brealey and Myers text on corporate finance, "Company costs of capital are nearly useless for diversified firms" [4]. To the extent that divisions in a corporation have degrees of risk and financial characteristics that are different from the parent corporation, using the overall corporate hurdle rate is certain to lead to incorrect decisions and failure to maximize stockholder wealth [8, 12, 13, 14]. The major consequence of using a single cut-off criterion for all projects is an intrafirm misallocation of capital since projects that are initiated by high risk-divisions are more likely to be accepted because of their potentially higher return. A similar bias works against lower risk divisions in that they may be starved for capital because their relatively low returns do not match up to the corporate cost of capital, which is based on normal risk [8]. In a typical risk-averse environment, these lower-risk projects maybe rejected in spite of the fact

that on a risk-adjusted basis they might be quite acceptable. Management may, in fact, have capital budgeting procedures that work against its own objective.

The intent of this study is to determine how many firms actually go to the point of using divisional cost of capital when it is the appropriate measure.

The principles discussed above were illustrated in the Internet boom of the late 1990s. Many large U.S. firms added divisions related to the Internet that were high risk in nature, but were only required to pass the same hurdle rate test as more traditional investments. The same pattern was followed in the telecommunications industry where firms entered new markets for untested means of communication, only to find the market was unaccepting of their new products. Had the full risk associated with these projects been included in their hurdle rates, many new ventures would not have been initiated.

The effect of failing to establish appropriate costs of capital for different projects or divisions is shown in FIGURE 1, which is an adaptation from the Pinches text, *Essentials of Financial Management* [21]. As demonstrated in FIGURE 1, Project B clearly has a higher internal rate of return (IRR) than Project A. If the deciding factor is the firmwide cost of capital, it will be accepted, while Project A will be rejected. However, if the company establishes project or divisional cost of capital based on risk, Project A (the lower risk project) can be seen as exceeding divisional cost of capital, while Project B (the higher risk project) fails to cover divisional cost of capital. By using divisional cost of capital and project risk considerations, the decision is reversed, and A will be accepted in preference to B and the firm is more likely to maximize stockholder wealth in a risk averse, efficient capital market environment.

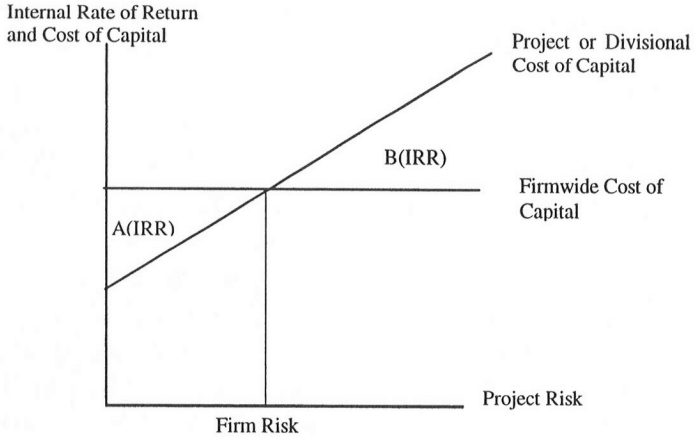

FIGURE 1: The Effect of the Use of Firmwide and Divisional Cost of Capital

THE DATABASE

The *Fortune* magazine April 2001 listing of the 1,000 largest U.S. corporations served as the database for this study. A carefully pre-tested three-page questionnaire was sent to the top ranking financial officer of each of the firms. Two hundred and ninety-eight useable responses were returned. Key financial attributes of the respondents are presented in TABLES 1, 2, 3, and 4. Participants included such well-known companies as General Motors, Boeing, Intel, Halliburton, and Textron.

A follow-up telephone survey of forty randomly selected non-respondents indicated no statistically significant differences between those that initially answered the questionnaire and those that elected not to participate.

TABLE 1: Year 2000 Total Revenue of Survey Participants

	Number	
Under $2 billion	89	
$2 billion to $4 billion	102	
$4 billion to $6 billion	26	
$6 billion to $8 billion	19	
$ 8 billion to $10 billion	13	Mean $12.41 billion
$10 billion to $15 billion	19	Median $9.92 billion
$15 billion to $20 billion	11	
$20 billion to $30 billion	15	
Over $30 billion	14	
	298	

TABLE 2: Year 2000 Total Assets of Survey Participants

	Number	
Under $500 million	24	
$500 million to $2 billion	22	
$2 billion to $4 billion	34	
$4 billion to $6 billion	42	
$6 billion to $8 billion	48	
$8 billion to $10 billion	19	Mean $10.84 million
$10 billion to $15 billion	27	Median $7.78 billion
$15 billion to $20 billion	29	
$20 billion to $30 billion	23	
Over $30 billion	30	
	298	

TABLE 3: Year 2000 Net Profit (Loss) of Survey Participants

	Number	
Deficit	35	
0 to $200 million	40	
$200 to $400 million	51	
$400 to $600 million	58	Mean $706.4 million
$600 to $800 million	41	Median $501.2 million
$800 million to $1 billion	29	
$1 billion to $1.5 billion	25	
$1.5 billion to $2 billion	10	
Over $2 billion	9	
	298	

TABLE 4: Year 2000 Ratio of Fixed Assets to Total Assets of Survey Participants

	Number	
0 to 9	4	
10 to 19.9%	14	
20 to 29.9%	18	
30 to 39.9%	41	
40 to 49.9%	49	Mean \$51.3%
50 to 59.9%	86	Median \$54.7%
60 to 69.9%	59	
70 to 79.9%	22	
Over 80.0%	5	
	298	

The study first addresses the use of capital budgeting techniques in general and then focuses in on the most important topic of this paper, the use of divisional cost of capital.

CAPITAL BUDGETING PROCEDURES IN GENERAL

In terms of overall capital budgeting procedures, there is clearly a movement toward the normative. Of the 271 survey participants, (90.9 percent) use discounted cash flow as the primary method of evaluation, with a slight preference for the internal rate of return over the net present value method. This is consistent with other survey studies [1, 2, 10, 11, 20, 23, 24, 27] that report similar trends.

In measuring the required rate of return, 254 of the 298 respondents (85.2%) indicated a preference for the weighted average cost of capital, with the other 44 survey participants choosing various other measures. The distribution of answers is presented in TABLE 5. This is once again consistent with a movement toward the normative approach that has been cited in the other research studies mentioned in the paragraph above.

TABLE 5: Primary Method of Determining the Required Rate of Return

1.	Weighted average cost of capital	254
2.	Cost of equity financing	19
3.	Desired growth rate for the firm	15
4.	Desired return on stockholders' equity	8
5.	Industry average rate of return	2
		298

DIVISIONAL COST OF CAPITAL

The same pattern of progressive enlightened responses is less evident on the topic of divisional cost of capital. Only 139 of the 298 respondents (46.6 percent) answered positively to the question: "Do you have different rates of return that are required for different divisions, subsidiaries or projects of the firm?"

The question would appear to be unambiguous and the response indicates that in spite of much progress by corporate management in regard to capital budgeting procedures in general (discussed in prior section), a similar pattern is not evident for the topic of divisional cost of capital.

A series of chi-square tests were run to determine if there was an independence of classification between the use of divisional cost of capital and a number of other variables including revenue, total assets, net profit, or the ratio of fixed assets to total assets. Revenue appeared to be significant at an alpha level of .10 and fixed assets to total assets at a level of significance of .01 (APPENDIX A). The other two variables showed no meaningful relationship.

It is interesting to note that firms with a heavy component of fixed assets in their capital structure are more likely to employ the divisional cost of capital concept. One can only surmise that when firms become increasingly dependent on large, permanent asset acquisitions, the depth of analysis increases.

FIRMS THAT USE DIVISIONAL COST OF CAPITAL

For the 139 firms that use divisional cost of capital in the present study, follow-up questions were presented as to their approaches. As can be seen in TABLE 6, 121 out of the 139 firms that use divisional cost of capital consider risk to be the primary consideration differentiating the required return for the division. Thus, consideration of the topic of risk follows.

TABLE 6: Most Important Variable in Determining Divisional Cost of Capital

	Level of Importance		
	1st	2nd	3rd
Risk	121	18	0
Strategic Importance of Division	18	100	21
Division's Ability to Raise It's Own Capital	0	11	110
	139		

DETERMINING RISK AND REQUIRED RATES OF RETURN FOR A DIVISION

For those firms that consider risk to be a key variable in determining divisional cost of capital, the academic literature indicates there are a number of approaches they can take. For example, they can estimate the beta for each division and then incorporate it in the capital asset pricing model for the division to determine the cost of common equity. This value can be combined with an assumed cost of debt and the optimal capital structure for the division to determine the opportunity cost of capital for the division [5, 17, 21].

There are many uncertainties associated with this approach. However, the most important variable to be determined is the divisional beta. The beta might be estimated using an accounting-based approach [6, 15, 19, 22]. A more likely alternative is to use an analogous firm approach. Popularized by Fuller and Kerr [8], and also referred to in the literature as the pure-play approach, a proxy beta is derived from a publicly traded firm whose operations are as similar as possible to the division in question. The proxy beta then becomes the systematic risk that is used in the CAPM. While some have urged that there is great difficulty in finding publicly traded firms that are analogous to a firm's division [14, 18], Fuller and Kerr [8] maintain that this is not the case.

In the Fuller and Ken study [8], considerable care was taken to ensure that there was a good match-up between divisions and pure-plays.

All the multidivisional firms followed by *Value Line* for a number of years were screened and a firm was included in the sample if:

1. The firm had clearly identifiable business lines.
2. These business lines accounted for 100% of the firm's revenues, i.e., there was no miscellaneous revenue.
3. There were no unconsolidated subsidiaries.
4. A pure-play could be identified for each business line.

For each division a pure-play was selected from the stocks followed by *Value Line,* based on the following criteria:

1. The firm had only one business line and no miscellaneous revenues. (There were minor exceptions to this.)
2. The pure-play was in the same industry or business line as the division in question.
3. The revenues of the pure-play were roughly the same as those of the division in questions. (There were some exceptions to this.)
4. When geographical factors were deemed important to the business line, pure-plays were selected which operated in the same geographical area as the division in question.
5. When more than one firm could be identified as a potential pure-play, the firm with the median beta was chosen as the pure-play.

Of the approximately 1,700 companies covered by *Value Line,* a total of 60 multidivisional firms and their associated pure-plays that met the above criteria were identified.

Fuller and Kerr further determined that the weighted average of the pure-play betas closely approximated the observed beta of the multidivisional firm in question. That is, if the pure-play beta approach were used to separately find the beta of Division A, B, and C for multidivisional corporation X and then weighted by the division's relative size to the entire corporation, the weighted average beta closely approximated the actual beta for the corporation.

While the Fuller and Kerr study research on risk estimation is highlighted in this paper, there are many other creditable research papers on this topic [3, 6, 14, 18]. There are also studies of approaches used by individual firms such as Fuqua Industries [Gup and Norwood, 13] and Finigan Corporation [Van Horne, 28]. All of these studies stress the importance of *objective* measurements to determine risk and divisional cost of capital.

In the present study of 121 firms that use risk as the primary variable to assess divisional cost of capital, 35 actually use the beta of the publicly traded company (or average beta of the industry) to determine risk. Seven firms use an objective risk measure that is not market related (variability of the division's earnings). More significantly, 79 of the 121 firms use subjective measures of risk. These results are shown in TABLE 7.

In analyzing TABLE 7, item (a) represents a pure-play in which the division is compared on a one-on-one basis to another public company in the same industry. Item (b) suggests that the division's beta be determined on the basis of the average beta for an entire industry.

Category (c) in TABLE 7 calls for using an objective measure for risk, but one that is not market related, as was the case with the previously discussed beta. A measure might be computing the division's variability in income over a number of years and comparing that to the firm's variability over a similar time period.

TABLE 7: Method by Which Risk is Measured

	Responses	
a. An objective measure such as the beta of a public company in same line of business as the division	207	35
b. An objective measure such as the average beta for the entire industry the division is in.	15	
c. An objective measure, not market related, such as the variability of the division's earnings compared to overall corporate earnings.	7	
d. A subjective measure such as top management's view of the perceived risk generally associated with the division	79	
	121	

Far and away the most popular approach to determining risk is through the subjective route as indicated by item (d) in TABLE 7. It is apparent that management often does not use the more objective measures of risk.

In a prior study by Gup and Norwood [13], the researchers listed out 14 factors that tend to influence management's subjective judgments related to risk. Survey participants were asked to rank these and came up with the results shown in TABLE 8.

While subjective factors may be interesting to observe, the objective measures (a, b, c and TABLE 7) are more consistent with the literature of finance and a normative approach to financial management. A series of chi-square tests were run to determine whether the use of more sophisticated, objective risk measurement techniques is independent of revenue, total assets, net profit, or the ratio of fixed assets to total assets. Only revenue was found to be significant at an alpha level of .05 as indicated in APPENDIX B. The relationship of size (as measured by revenue) to sophistication in the area of capital budgeting is well documented in prior studies [10, 17, 18, 23].

TABLE 8: Ranking of Subjective Factors Related to Risk

	Average Ranking of Fourteen Risk Factors	
1.	Seasonal business considerations	2.8
2.	Unionization	3.5
3.	Environmental impact	4.1
4.	Cyclical business considerations	4.2
5.	Loss of asset value	4.7
6.	Government involvement or interference	4.9
7.	Change in technology	5.1
8.	Brand distinction	5.8
9.	Exposure to backlogs	7.2
10.	Management failure	8.9
11.	Market position	10.1
12.	Customer base dispersion	10.6
13.	Operational Flexibility	11.2
14.	Availability of Resources	12.4

CONSIDERATIONS OF FOREIGN INVESTMENTS

Perhaps there is no area where the general debate over the use of corporate-wide cost of capital vs. divisional (or project) cost of capital is more compelling than in the international area.

Evaluated as an individual investment, foreign projects tend to be more risky and necessitate a higher hurdle rate than domestic projects. They may carry higher political risks, foreign exchange risk, security risk, transfer payment risk, etc.

However, not all researchers accept the higher hurdle rate argument for foreign investments. Some argue that the diversification benefits offered by foreign investments far outweigh the foreign country risks [25, 26, 27].

Shapiro [26] specifically argues, "that to the extent that foreign cash flows are not perfectly correlated with those of domestic investments, the total risk (systematic and nonsystematic) associated with foreign cash flows appears to be *reduced*, not increased by international investments." The argument becomes

increasingly persuasive when applied to LDCs (less developed countries), which have even lower correlation coefficients with U.S. firms.

Observe in TABLE 9 the returns in the equity markets of emerging countries over a five-year (60 month) time period) and the correlation with the U.S. S&P 500 Index (last column).

Based on this type of evidence, Shapiro would argue that most foreign projects deserve a discount from the corporation's WACC rather than a premium above it. If the corporate-wide cost of capital is 12 percent, perhaps a foreign investment that has a desirable portfolio effect might be evaluated at 10 percent. Such an investment might be in a project in an oil-producing Middle Eastern nation to offset an exposure to oil deficiency in Japan or France.

While Shapiro's argument might appear to be intuitively appealing, the survey participants were not sympathetic to this line of reasoning. Seventy-eight percent responded that foreign investments, as a general rule, should carry higher hurdle rates, thirteen percent opted for lower hurdle rates, and nine percent had no opinion.

The lack of consideration of portfolio effects in this area was further affirmed by only 42 percent of the survey participants explicitly considering correlation between projects when making investment decisions. Gilbert and Reichert [9] and Kelly and Philapattos [16] found similar results (less 50 percent) when approaching the same issue.

TABLE 9: Statistics of the IFC Total Return Indices (In U.S. dollars, December 1994-December 1999)

Market	Number of Months	Mean of Percent Change	Standard Deviation	Annualized Mean	Correlation With S&P 500
Latin America					
Argentina	60	1.38	9.91	16.56	0.42
Brazil	60	1.48	12.80	17.76	0.40
Chile	60	0.16	7.51	1.92	0.40
Columbia	60	-0.60	9.56	-7.20	0.13
Mexico	60	1.35	10.91	16.20	0.44
Peru	60	0.38	8.45	4.56	0.18
Venezuela	60	1.23	15.60	14.76	0.17
Asia					
China	60	0.56	13.69	6.72	0.22
India	60	0.40	8.75	4.80	0.05
Indonesia	60	0.58	18.69	6.96	0.35
Korea	60	1.05	17.02	12.60	0.44
Malaysia	60	-0.06	14.69	-0.72	0.45
Pakistan	60	-0.47	13.06	-5.64	0.20
Philippines	60	-0.73	11.62	-8.76	0.52
Sri Lanka	60	-0.62	10.20	-7.44	0.36
Taiwan	60	0.61	9.29	7.32	0.31
Thailand	60	-1.11	15.29	13.32	0.59
Europe					
Czech Republic	60	-0.25	8.71	-3.00	0.25
Greece	60	3.26	9.47	39.12	0.18
Hungary	60	2.15	12.36	25.80	0.46
Poland	60	1.41	12.23	16.92	0.42.
Russia	34	2.87	26.43	34.44	0.41
Slovakia	34	-3.03	7.89	-36.36	-0.18
Turkey	60	4.21	18.25	50.52	0.20
Mideast/Asia					
Egypt	34	-0.22	7.27	-2.64	0.24
Israel	36	1.75	6.90	21.00	0.32
Jordan	60	0.82	3.73	9.84	0.12

Source: *Emerging Market Fact Book,* 2000, published by Standard & Poors

SUMMARY

The movement toward the normative, as suggested in the academic literature, is highly evident in capital budgeting techniques related to discounted cash flow and weighted average cost of capital. However, a concurrent pattern of change has not taken place in the use of divisional cost of capital as evidenced by this study in which only 46.6 percent of the respondents assign a separate cost of capital to divisions. Failure to distinguish between the risk associated with different divisions can lead to sub-optimal decisions in which projects associated with high-risk divisions are more likely to be accepted because of their potentially higher returns. A similar bias works against lower risk divisions, which may receive an under-allocation of capital because their relatively low returns do not meet the overall firm hurdle rate.

Further compounding the problem is that many of those firms that use divisional cost of capital do not avail themselves of the latest academic literature on objective techniques for measuring divisional risk. Of the 298 respondents to the study, 139 apply the concept of divisional cost of capital, but only 42 use objective measurements of risk (such as an analogous company or industry beta or objective internal relationships).

In the financial literature, Fuller and Kerr [8] make a strong case that pure-play betas can be developed for companies analogous to a corporate division and further that the weighted average of the pure-play betas of individual divisions tend to equal the overall beta of a multidivisional firm. Either the academic literature has not been accurately communicated to practitioners or, equally likely, is rejected as being too difficult or impractical to implement. A happy medium must be found for research activities in this area to take on greater meaning.

Foreign investments call for a special consideration of divisional or project cost of capital. Assuming a firm wishes to invest in international opportunities, the question becomes, do investments in foreign countries call for higher or lower hurdle rates than domestic investments? The traditional answer is that the hurdle rate should be increased to compensate for greater political risk, exchange rate risk, and so on. Shapiro [26] takes the opposite approach arguing that there are beneficial portfolio effects associated with investments in foreign countries.

The latter line of reasoning gains little support from survey respondents. Only 13 percent say the hurdle rate should be lower for foreign investments, while 78 percent say it should be higher, and the remainder have no opinion.

APPENDIX A: Chi-square Independence of Classification Tests

			Alpha			
Null Hypothesis	χ^2	D.F.	.01	.05	.10	Conclusion
Use of divisional cost of capital is independent of revenue	15.317	9	21.666	16.919	14.684	Reject the hypothesis at .10 level of significance. Revenue has a significant relationship to the use of divisional cost of capital.
Use of divisional cost of capital is independent of total assets	11.309	9	21.666	16.919	14.684	Accept the hypothesis. Total assets have no significant relationship to the use of divisional cost of capital
Use of divisional cost of capital is independent of net profit	6.904	8	20.090	15.517	13.362	Accept the hypothesis. Net profit has no significant relationship to the use of divisional cost of capital
Use of divisional cost of capital is independent of fixed assets to total assets	22.168	8	20.090	15.507	13.362	Reject the hypothesis at .01 level of significance. Fixed assets to total assets has a significant relationship to the use of divisional cost of capital

APPENDIX B: Chi-square Independence of Classification Tests (continued)

			Alpha			
Null Hypothesis	χ^2	D.F.	.01	.05	.10	Conclusion
Objective measurement of risk is independent of revenue	17.217	9	21.666	16.919	14.684	Reject the hypothesis at .05 level of significance. Revenue has a significant relationship to the objective measurement of risk.
Objective measurement of risk is independent of total assets	13.896	9	21.666	16.919	14.684	Accept the hypothesis. Total assets have no significant relationship to the objective measurement of risk.
Objective measurement of risk is independent of net profit	10.207	8	20.090	15.517	13.362	Accept the hypothesis. Net profit has no significant relationship to the objective measurement of risk.
Objective measurement of risk is independent of fixed assets to total assets	7.392	8	20.090	15.507	13.362	Accept the hypothesis. Fixed assets to total assets have no significant relationship to the objective measurement of risk.

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BIOGRAPHICAL SKETCH

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