

# Cost of Capital Techniques Used by Major US Firms: 1997 vs. 1980

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*This study reports the findings of a recent (1997) survey of the cost of capital practices of major US corporations and compares them to an earlier (1980) study that used the same survey instrument. Clearly practitioners are changing their methodology for computing many of the cost of capital metrics investigated in this study. For example, 93% of firms estimating required shareholder returns use CAPM. Currently, almost twice as many firms report using the cost of capital to estimate the firm's value; this is believed consistent with firms' increasing focus on shareholder value. The findings reported in this study should help to further narrow the theory-practice gap in the measurement and application of the cost of capital and allow academics to better report the state-of-the-art to their students. [JEL: G31, G32, G30]*

■ During the past 15 to 20 years, the cost of capital has remained one of the key financial metrics used to allocate the firm's scarce financial resources to long-term investments. Regardless of the type of investment, the financial literature is replete with discussions of how the cost of capital can be applied to make good capital budgeting decisions, assess the economic value added (EVA®) or shareholder value added (SVA) by a long-term investment, and value (often for investment purposes) the ownership of a firm (public or private).

Most of the recent attention to cost of capital is attributable to the growth of performance evaluation models, which were introduced in the 1980's by Stern Stewart & Co. (EVA®) and Alfred Rappaport (1998) (SVA). Cost of capital plays a key role in both of these widely used models, although they give primary attention to measurement of the relevant cash flows (residual income or shareholder value added) rather than to the calculation of cost of capital. Both of these somewhat similar models tend to rely on traditional "textbook" approaches for computing the cost of capital. In support of the attention given performance evaluation models, Ibbotson Associates, the dominant

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purveyor of historical return data on major US asset classes, recently began marketing *Cost of Capital Quarterly (CCQ)*, which, for a fee, provides subscribers with an annual yearbook with quarterly updates. *CCQ* includes cost of equity, weighted average cost of capital, and industry financial statistics on over 300 industries. In addition, Ibbotson Associates sponsors an annual cost of capital conference and conducts cost of capital workshops intended to help practitioners improve their understanding and application of cost of capital and related measures in their financial decision processes. Clearly, the increased attention to cost of capital and its role in capital budgeting and valuation analysis attest to its important pivotal role in a firm's strategic decision process.

More than 15 years ago, Gitman and Mercurio (1982), based on a mailed questionnaire survey of *Fortune's* 1000 performed in 1980, reported the procedural and general measurement techniques used by large US industrial firms to manage, calculate, and apply the cost of capital to their long-term decisions. The study generally found that while some firms understood and implemented cost of capital techniques that were presented in the financial literature, a significant gap remained between financial theory and practice. Without levying blame, the paper urged academics to communicate more clearly to convince practitioners of the potential benefits from applying modern

procedures and techniques to cost of capital measurement and application. Since 1982, the cost of capital literature has grown slowly. Most of the attention has been given to the calculation of the cost of equity capital, typically involving application of a market-based model such as the capital asset pricing model (CAPM). Cornell, Hirshleifer, and James' (1997) recent example of such a paper focuses on estimation of the cost of equity capital which found that in court proceedings and regulatory hearings the Discounted Cash Flow (DCF) approach (which relies on a dividend valuation model) tends to be the primary technique used to measure a firm's cost of equity; CAPM is typically viewed as a secondary technique.

A more comprehensive recent survey of "best practices" based on telephone interviews with senior financial officers of 27 world class firms, interviews with ten of the most active merger and acquisition advisers, and a study of four leading graduate-level textbooks was performed by Bruner, Eades, Harris, and Higgins (1998). While the study addresses some of the issues covered in Gitman and Mercurio's 1980 study, its primary focus is on the detailed procedures used by respondents to measure and combine the key inputs needed to apply CAPM to measure the cost of equity capital. While this excellent study provides interesting insights into the application of CAPM to estimate equity cost, it provides little new information on the cost of capital procedures and techniques reported by Gitman and Mercurio.

In light of the growing interest in cost of capital and the numerous new developments in the practice of corporate finance occurring over the last 15 to 20 years, this paper updates the earlier work of Gitman and Mercurio (1982). Its purpose is 1) to assess the current cost of capital practices of the nation's leading firms, 2) compare today's practices to those profiled in Gitman and Mercurio's 1980 study, and 3) integrate these findings with observations of other research reported during the 17 or so years since the 1980 study. The importance of this study is threefold: 1) it documents the state-of-the-art of actual cost of capital practices of the nation's leading firms, 2) longitudinally assesses and documents changes in the adoption of cost of capital practices and techniques by these firms, and 3) allows both academics and practitioners to reassess their joint progress toward the development and adoption of improved cost of capital practices and techniques.

The remainder of this paper is presented in five additional sections. Section I provides a brief description of the survey methodology and profiles the respondents. In Section II, the cost of capital measurement techniques employed by respondents are profiled and their actual costs of capital are reported.

Section III focuses on risk considerations; both the procedures employed and the respondent's knowledge and use of various risk-oriented financial techniques. In Section IV, aspects of the firm's cost of capital administration are reported and analyzed. Section V presents summary and conclusions.

## I. Survey Methodology and Respondent Profile

The survey methodology was modeled after the one used by Gitman and Mercurio (1982) in order to permit a consistent longitudinal comparison of this study's results with their earlier study. Additionally, the goal was to elicit information from respondents who were similar to those who responded to the Gitman and Mercurio's study.

### A. Methodology

The findings reported and analyzed in this paper are drawn from a mail questionnaire survey sent in April 1997 to the chief financial officer of each firm listed in the 1996 *Fortune* 1000 listing. The *Fortune* listing is based on each firm's revenues for the year ended December 31, 1995. Revenues of sample firms ranged from a high of \$168 billion for General Motors to a low of \$886 million for Birmingham Steel. As a result of the inflation and consolidation over the 1980 to 1995 time period, the range in size of sample firms grew considerably for the 1,000 sample firms in the 1980 study (revenue range of \$118 million to \$79 billion) by Gitman and Mercurio (1982). Although the firms in 1997 are indeed larger than those in 1980, their relative rather than absolute size is important to ensure that this study, like the 1980 study, is based on a sample of the largest US firms. It is expected that given the sample firms' financial dominance, an understanding of the cost of capital techniques they employ should provide meaningful insight into state-of-the-art cost of capital measurement and utilization.

The questionnaire contained 23 closed-end questions constructed to enhance the response rate while gathering as much useful information as possible.<sup>1</sup> Twenty-one of the questions were identical to the questions included in Gitman and Mercurio's 1980 study. Two new questions were added to address an important issue surrounding the cost of capital weights used by respondents, as raised by Ehrhardt (1994) in his discussion of the 1980 study by Gitman and Mercurio (1982). In addition, one response choice was expanded to allow respondents to indicate whether they used Arbitrage Pricing Theory (APT) to

<sup>1</sup>A copy of the questionnaire can be obtained by contacting the authors.

calculate the cost of equity. Each questionnaire was sent to the chief financial officer (Vice-President of Finance, Treasurer, etc.) whose name appeared in the SEC's EDGAR (1997) database, or if not listed there, in Standard & Poor's *Register of Corporations, Directors, and Executives* (1997). Accompanying each questionnaire was a personally addressed letter to the CFO explaining the follow-on nature of this study and requesting that the person most informed about the firm's cost of capital techniques complete the questionnaire. A copy of the original study by Gitman and Mercurio (1982), along with a postage-paid return envelope and a form that could be returned under separate cover (to maintain promised anonymity) to obtain a copy of the survey results once they became available, were also included. Unlike the 1980 study, the questionnaires were *not coded* to allow determination of which 100 of the *Fortune* 1000 each respondent was in. The absence of such coding was hoped to enhance the response rate by removing any suspicion that the promise of anonymity could be violated. This tactic was used because only a small amount of additional information was gained by coding in the earlier study.

## B. Respondent Profile

One-hundred-eleven usable questionnaires were returned, accounting for a response rate of about 11%, well below the 18% usable response rate of the earlier study by Gitman and Mercurio.<sup>2</sup> Because respondents were guaranteed anonymity and no self-classifying financial size questions were included, any bias with regard to respondent size cannot be assessed. There is no reason to believe that the sample distribution in this study is different from that of the previous study. Similarly, while we assume that the responding chief financial officer or designee is knowledgeable, it is possible that technical competence bias might exist if the non-respondent firms lack the sophistication of those firms that responded. This study's intent is to use a convenience sample of large firms to assess the state-of-the-art in cost of capital techniques and practices. Therefore, because its intent is not to use

<sup>2</sup>The authors' experience from performing many mail questionnaire surveys of leading firms over the past 20 years is consistent with generally decreasing response rates. Where in the early 1980's response rates near 20% were achievable, starting in the late 1980's response rates closer to 10% were more common. These lowered response rates are attributed to organizational and technological restructuring of major US companies to achieve greater operating efficiency and improved focus on share price maximization. Simply stated, today's management is far less willing to devote its limited time to responding to academic surveys they feel will provide little, if any, discernable financial return.

responses from a representative sample of all firms to make inferences about the general behavior of all firms, the issue of non-response bias is deemed inconsequential to the study's goals.

Only about 41% of the 111 respondents classified their firm's principal activity as manufacturing. The majority of them (about 46%) indicated that the firm was primarily a service company, with the remaining (about 13%) respondents classifying themselves as distributors. This is in stark contrast to the 1980 survey by Gitman and Mercurio (1982) in which about 94% of respondents self-classified their firms as manufacturers, none as service companies and about 6% as distributors. In both 1997 and 1980, those respondents classifying their firms as manufacturers were almost evenly split between manufacturers of durable and non-durable goods. This major shift of respondent firm principal activity is believed reflective of the general shift in the structure of the US economy from a manufacturing to a service focus. Exhibit 1 shows the distribution of the respondents and the distribution of the 1996 *Fortune* 1000 into the same classifications. As can be seen, the respondents in the sample are distributed in approximately the same way as those in the 1996 *Fortune* 1000. This transformation, "driven by digitization and deregulation," is eloquently described by *Fortune* (1995) in an article explaining the merging of the *Service* 500 into the *Fortune* 500 due to a blurring of the distinction between manufacturing and service companies and the shrinking number of large companies that are purely one or the other. Although it is unimportant in this study that the respondent firms reflect the actual mix of manufacturers versus service companies in the economy, the reported shift in this mix from that in the 1980 study is considered reflective of structural shifts in the economy rather than a sampling anomaly.

## II. Cost of Capital Measurement Techniques

A number of questions in the questionnaire elicited information on the techniques used by respondent firms to measure the cost of capital. Key aspects of this process considered were the relevant sources of capital, weighting schemes, measurement of specific cost components, and the actual cost of capital values and stability.

### A. Relevant Sources of Capital

Consistent with the 1980 study of Gitman and Mercurio (1982), respondents indicated that, except for current liabilities, they tend to include all their

**Exhibit 1. Industry Classifications of Sample Firms vs. 1996 Fortune 1000**

Group	Distributor	Durables	Non-Durables	Service
Sample (111 Firms)	15.18%	17.86%	21.43%	45.54%
Fortune 1000	15.70%	20.20%	21.70%	42.40%

long-term financing sources when calculating the cost of capital. The exclusion of current liabilities is consistent with the generally-accepted belief that the cost of capital should include only the cost of long-term financing. The responses also confirm the finding in the 1980 study that a substantial number (but well less than half) of respondent firms exclude certain of their sources of long-term financing when calculating the cost of capital. For example, about 35% of the firms with capital (financial) leases and 21% of firms with preferred stock exclude these sources from the cost of capital calculation. While the reason for exclusion is unknown, it may be the result of their use of a broad debt and equity cost approach that for convenience, does not focus on the detailed cost of each long-term financing source in the firm's capital structure. Or, it may be attributable to their use of a target capital structure that differs greatly from their current capital structure. Regardless, this finding suggests that the respondents' approach to cost of capital calculation differs from the traditional textbook approach which includes all capital structure components.<sup>3</sup>

### B. Weighting Schemes

The responses summarized in Exhibit 2 for both the 1980 and the 1997 studies show that the majority of respondents use some type of weighted average when determining the cost of capital. It is interesting to note that the percent of respondents using the cost of the specific source of funds, rather than a weighted-average cost, declined by around 50% from about 17% of respondents in 1980, to around 8% of respondents in 1997. The use of the weighted cost of capital has increased. In 1997 about 92% of respondents used weighted-average cost, up from about 83% in 1980. This is further confirmed by the fact that in Brigham's (1975) study of 31 firms, only about 61% of respondents indicated use of a weighted average. The current study's finding is also consistent with

Bruner, et al. (1998) who found that about 95% of the 27 firms they interviewed used a weighted average.

Of the firms that indicated the use of a weighted-average cost of capital, it can be determined from the data in Exhibit 2 that about half used target weights, both in 1980 and 1997. The second most popular in both studies was market value weights, followed by book value and other weighting schemes. The 1997 study, unlike the 1980 study, included questions specifically aimed at the weighting schemes used by respondents. About 59% of respondents indicated use of market value weights; about 38% use book values, and the remaining 12% use some other weighting scheme (a few firms reported using more than one weighting scheme). These findings seem reasonably consistent with those of Bruner, et al. (1998) in spite of the fact that the results are not directly comparable to those from this study.

When the respondents were asked to indicate the percentage each broad source of capital represented in their capital structures (both current and target) without reference to whether the weights were based on market or book values, the average weights shown in Exhibit 3 resulted. It can be seen that the respondent firms generally appear to have current capital structures that are consistent with their target capital structures.

### C. Measurement of Specific Cost Components

Several questions were asked to assess the procedures used by respondents to calculate the costs of specific capital components.

**Tax Adjustments:** When asked what components they tax adjusted when calculating the cost of capital, the majority of respondents for *all* types of capital (debt or equity) indicated they *did not* tax adjust. About 43% of respondents said they tax adjusted debt costs, 32% tax adjusted capital leases, 11% tax adjusted preferred stock, and about 14% tax adjusted common stock. These percentages are similar to those for the respective financing sources reported in the 1980 study. Interestingly, in the Bruner, et al. (1998) study, the authors' question with regard to debt cost presumed that respondents would tax adjust their cost of debt. What is clear from this study is that more respondents tax-adjust debt costs than any other component cost,

<sup>3</sup>See the most recent editions of any of the leading undergraduate or MBA-level corporate finance texts. Nearly all detail the procedures for calculating the specific costs of long-term debt, preferred stock, common stock, and retained earnings, and then use them to calculate the firm's weighted average cost of capital.

**Exhibit 2. Approach and Weighting Schemes in Cost of Capital Calculations**

Approach/Weighting Schemes	Percentage of the Respondents*	
	1980	1997
Use cost of specific source of financing planned for funding the alternative	16.90%	8.10%
Use weighted average cost of capital based upon book value weights	16.40%	19.80%
Use weighted average cost of capital based upon target value weights	41.80%	49.50%
Use weighted average cost of capital based upon current market value weights	28.80%	34.20%
Use weighted average cost of capital based upon some other weighting scheme	.60%	1.80%
<i>Totals**</i>	104.50%	113.40%

\*\*Response totals greater than 100% because of multiple responses.

\*111 Respondents in 1997, 177 Respondents in 1980

**Exhibit 3. Capital Structure Weights**

Source	Current Capital Structure 1997	Target Capital Structure 1997
Debt	33.96%	30.48%
Preferred Stock	4.84%	5.32%
Common Stock	61.20%	52.76%
Other	0.00%	11.44%
<i>Totals</i>	100.00%	100.00%

and very few tax-adjust equity costs.

**Debt/Preferred Cost:** Slightly more than two-thirds of respondents (68.5%) indicated that they used current market-based costs of similar obligations when measuring the cost of debt and/or preferred stock; other respondents indicated use of the historical contractual cost of the obligation.

**Equity Cost:** Only about 11% of the respondents indicated that they differentiate between existing equity capital and anticipated equity offerings when measuring the cost of common stock equity. This finding is similar to, but slightly below, the 16% responding this way in the 1980 study. This finding implies that most firms calculate only one cost of equity capital: not differentiating the cost of existing equity from the cost of new common stock equity.

A series of questions were used to assess the methods respondents take to calculate their cost of equity. The choices as well as the percentage responses are included in Exhibit 4 along with the responses from the 1980 study. Note that the choices with regard to techniques used by respondents,

indicating they estimated the return required by investors, were added in the 1997 study and therefore comparative 1980 values are not available. A number of respondents answered positively to more than one choice because the choices are not mutually exclusive. The data supports the idea that firms use more than one approach to calculate the cost of equity. These data indicate that the majority of respondents measure the cost of equity as the return required by investors.<sup>4</sup> This was also the dominant response in the 1980 study, but nearly twice the percentage of respondents used this method in 1997 than used it in 1980. The increased use of this method seems to have occurred as a result of the declining use of 1) *current* dividend yield plus estimate of growth (Gordon model), 2) the earnings/price (E/P) ratio, and 3) the *market* return adjusted for risk. An

<sup>4</sup>Because a strict definition of what is meant by "return required by investors" was not included in the question, the conclusions drawn from this response may suffer from ambiguity caused by this terminology. However, it is clear respondents considered this term to be a synonym for CAPM. The term was used to maintain continuity with the 1982 study.

**Exhibit 4. Method of Estimating the Cost of Equity Capital**

Procedure	Percentage of the Respondents*	
	1980	1997
Historical dividend yield plus estimate of growth	3.40%	4.50%
Return required by investors	35.60%	70.30%
Technique used to find return required by investor:		
Arbitrage Pricing Theory	na	0.90%
Capital Asset Pricing Model	na	64.90%
Other	na	4.50%
Current dividend yield plus estimate of growth	26.00%	9.00%
Dividend yield estimate only	1.70%	.00%
Cost of debt plus a risk premium for equity	13.00%	17.10%
Earnings/price (E/P) ratio	15.80%	2.70%
Market return adjusted for risk	22.60%	14.40%
<b>Totals**</b>	<b>118.10%</b>	<b>118.00%</b>

\*\*Response totals greater than 100% because of multiple responses.

\*111 Respondents in 1997, 177 Respondents in 1980

increase in the use of the cost of debt plus a risk premium for equity was also observed, with about 17% of respondents using this technique.

Of the about 70% of respondents using the return required by investors, nearly 93% of them ( $64.90\% \div 70.30\% = 92.30\%$ ) use the capital asset pricing model (CAPM) to calculate their cost of equity. While the users of CAPM represent only about 65% of the 111 respondents, this value compares favorably with the Bruner, et al. (1988) study which found that about 85% of its 27 interviewee firms used some form of CAPM to calculate their cost of equity.<sup>5</sup> It is also consistent with the paper on estimating the equity cost of capital by Cornell, et al. (1997) which points out that although the CAPM "is the overwhelming asset-pricing model of choice" for estimating the cost of equity, regulatory bodies still prefer to rely on DCF approaches such as the Gordon model. The finding in this study is consistent with the literature and reflects the fact that more firms are moving toward use of the CAPM approach. It is interesting that the move to CAPM has occurred while recent literature suggests that CAPM may have serious defects.

#### D. Actual Cost of Capital Values and Stability

Respondents were asked to note, on a scale with 2%

<sup>5</sup>Bruner, et al. (1988) found that their "best practice" respondents when applying CAPM to find the cost of equity: 1) draw betas primarily from published sources, 2) use the 10-year yield on US government Treasury bonds as the risk-free rate, and 3) use an equity market risk premium of 6% or lower.

intervals, their firm's approximate overall cost of capital as of April 15, 1997, a time when the yield on (default-risk-free) US government bonds was about 7.1%. Exhibit 5 summarizes responses to this question and includes the responses to the same question from the 1980 study, which was performed at a time when the yield on US government bonds was about 12.4%. The most frequent response in the current study indicated a value of 9 to 11%, while about 86% of the respondents had an overall cost of capital running between 9 and 15%. In the 1980 study, the most frequent response was in the 15 to 17% range and about 65% of the respondents had an overall cost of capital in the 11 to 17% range. Weighting the midpoint of each cost of capital range and summing the weighted values results in an approximate mean value<sup>6</sup> for the respondents' overall cost of capital of 11.5%. The comparable mean value for the 1980 study was 14.3%. The difference in these values between 1980 and 1997 result from the known decline in interest rates reflected in the US government bond rates cited<sup>7</sup> and may also be attributable to a general shift in the average responding firms' risk, as well as, the risk preferences of investors in the economy. Interestingly, the mean costs of capital for the 1980 and 1997 study of 14.3% and 11.5% respectively, are consistent with Gitman and Forrester's (1977) study for

<sup>6</sup>Because there were two opened-ended categories, it is impossible to calculate the exact mean.

<sup>7</sup>The difference is also significantly less than the difference in "spot" inflation rates in 1980 and 1997, indicating that firms did adjust the cost of capital for long-term expected inflation rather than short-term inflation.

## Exhibit 5. Actual Overall Cost of Capital

Range of Overall Cost of Capital	Percentage of the Respondents*	
	October 15, 1980	April 15, 1997
Less than 5%	1.70%	0.00%
5-7%	.60%	.90%
7-9%	3.40%	5.50%
9-11%	10.10%	43.60%
11-13%	20.90%	28.20%
13-15%	21.50%	14.50%
15-17%	22.60%	3.60%
17-19%	12.30%	2.70%
19-21%	4.00%	.90%
21-23%	.60%	.00%
23-25%	.60%	.00%
Greater than 25%	1.70%	.00%
<i>Approximate Mean</i>	14.25%	11.53%

\*111 Respondents in 1997, 177 Respondents in 1980

which 60% of the responding large US firms indicated that their cost of capital was between 10 and 15%.

To assess the variability of the respondents' cost of capital over time, they were asked to indicate the approximate magnitude of the *maximum difference* between the firm's cost of capital on April 15, 1997 and the lowest or highest cost of capital during the two-year period ending on April 15, 1997. The responses to this question are summarized in Exhibit 6 along with the responses for the 1980 study that used October 15, 1980 as the end date for the two-year period. The most frequent response in the current study was less than 1%, and over 89% of the respondents' cost of capital varied from the April 15, 1997 value by no more than 2% during the two-year period preceding April 15, 1997. In the 1980 study, the most frequent response was 3% and more than 50% of the respondents' cost of capital varied from the October 15, 1980 value by between 2 and 4% during the two-year period preceding October 15, 1980. The finding for 1997, like the 1980 findings, seems consistent with the movement of the yield on government bonds during the two-year period, which had a low value of 6.0% in January of 1996 and a high value of 7.4% in April 1995. Based on the government bond yields, the maximum difference in the 7.1% rate on April 15, 1997 and the low or high in the preceding two-year period was 1.1% (i.e., 7.1% minus 6.0%). This value compares favorably with the weighted average difference of 1.6%, which was found by weighting the differences given in Exhibit 6 by the percentage of total responses given to that choice. In

the 1980 study, the maximum difference in the rate on October 15, 1980 and the low or high in the preceding two-year period was 3.6%, which compared quite favorably with the weighted average difference from the response data of 3.5%. While a diversity of responses is reported for both the current 1997 study and the 1980 study, the foregoing comparison in both time periods suggests that the respondent firms tend to adjust their cost of capital in response to changing market conditions. Expectedly, the respondent firms' cost of capital changes tend to track, reasonably closely, changing capital market conditions and rates.

### III. Risk Considerations

A number of questions in the questionnaire were aimed at isolating some of the key risk considerations made by respondents when calculating and applying the cost of capital to financial decisions. Discussion of the risk data obtained as it relates to the cost of capital is focused on the following topics: risk-classification procedures, risk-adjustment procedures, and risk-assessment factors.

#### A. Risk-Classification Procedures

To determine whether respondents differentiate between the risk of capital projects, they were asked to indicate whether they 1) group projects into risk classes, 2) measure project risk individually, or 3) do not differentiate project risk specifically. These

**Exhibit 6. Volatility of the Cost of Capital**

Maximum Cost of Capital Difference Between Date and the Preceding 2 Years	Percentage of the Respondents*	
	October 15, 1980	April 15, 1997
Less than 1%	13.10%	34.50%
1%	6.90%	24.50%
2%	18.10%	29.10%
3%	23.10%	7.30%
4%	11.90%	.90%
5%	14.40%	.90%
6%	5.00%	.00%
7%	.60%	.00%
8%	1.90%	1.80%
9%	.60%	.00%
10%	.60%	.00%
Greater than 10%	3.80%	.00%
<i>Approximate Mean</i>	3.44%	1.62%

} 89%

53% {

\*111 Respondents in 1997, 177 Respondents in 1980

responses should provide general insight into the respondent firm's degree of sophistication. Exhibit 7 summarizes the responses to this question and includes response percentages for the same question from the 1980 study. It can be seen that the majority of respondents both in 1997 and in 1980 measure project risk individually or group projects into risk classes. Surprisingly, about 23% of respondents in the 1997 study *do not* differentiate project risk specifically. This finding is supported by Bruner, et al. (1998) who reported that 41% of the 27 interviewees in their study did not make further adjustments to the cost of capital to reflect the risk of individual projects. To provide perspective, the percent of responding firms that differentiate between project risk in 1971 was 67% (Fremgen, 1973); in 1975 was 52% (Brigham, 1975); in 1977 was 71% (Gitman and Forrester, 1977); in 1980 was 67% (Gitman and Mercurio, 1982); and in the current 1997 study was 77%. Clearly, most firms appear to differentiate project risk. Those firms that do consider risk differences most often do so on a project-by-project, rather than on a group basis.

### B. Risk-Adjustment Procedures

Those respondents who adjust for risk in different areas were asked to indicate how such adjustments are made. Exhibit 8 summarizes their responses to the closed-end question and compares them to the responses from the same question included in the 1980

study; 77% (85 of 111) of respondents in 1997 and 67% (118 of 177) of respondents in 1980 indicated that they do differentiate project risk specifically. The technique used to risk-adjust, favors risk adjusting the cost of capital in the current (1997) study. This reflects a shift from favoring cash flow risk adjustment in the 1980 study. (*Note:* When the joint response percentages [3 on list] are divided equally and added to the first responses [1 and 2 on list] this effect is even more pronounced.) This confirms the findings of Bierman (1993) and Gitman and Maxwell (1987). On a time-series basis, it seems clear that more large firms use discount-rate-adjustments than cash-flow-adjustments to account for differing project risk. This preference is consistent with the frequently documented preference of firms for the use of IRR rather than NPV to make capital budgeting decisions.

### C. Risk-Assessment Factors

To explore the relative importance of various factors in assessing risk, respondents were asked to rate, on a scale of 1 to 5 (1 = very unimportant; 5 = very important), the importance of each of a number of factors. Exhibit 9 summarizes their responses and shows the response percentages from the 1980 study adjacent to response percentages for the same choices in the current (1997) study. Analysis of the weighted-average responses calculated for each factor suggests that the dollar size of the project, the relationship



**Exhibit 7. Risk Classification Procedures**

Procedure	Percentage of the Respondents*	
	1980	1997
Group projects into risk classes	9.60%	16.20%
Individually measure project risk	59.90%	61.30%
Do not specifically differentiate project risk	33.30%	22.50%
<i>Totals**</i>	102.80%	100.00%

\*\*Response total for 1980 greater than 100% because of multiple responses.

\*111 Respondents in 1997, 177 Respondents in 1980

**Exhibit 8. Risk-Adjustment Procedure**

Procedure	Percentage of the Respondents*	
	1980	1997
Risk-adjust cash flow of each project	39.00%	32.00%
Risk-adjust the cost of capital applied to each project	32.20%	39.00%
Risk-adjust both the cash flows and the cost of capital	19.50%	21.00%
Use some other technique	9.30%	8.00%
<i>Totals</i>	100.00%	100.00%

\*111 Respondents in 1997, 177 Respondents in 1980

between the project's returns and the returns on the firm's other projects, and the project's payback period are important in assessing a project's risk. While the track record of the division presenting the project appears to be important in this process, respondents seem to attach less importance to the track record of the individual presenting the project when they assess project risk. The 1997 weighted-average responses are quite consistent with those in the 1980 study. It appears that today, as in 1980, the size of the project, the relationship between its returns and those of the firm's other projects, and its payback period are important considerations in assessing project risk. Each of these factors—project size, correlation of project returns, and time to recover project investment—seem consistent with the causes of risk discussed in the financial literature.

#### **D. Use and Understanding of Common Financial Techniques**

A set of questions were included on the questionnaire to assess the respondents' knowledge, general use, and use in cost of capital and capital budgeting of a number

of techniques commonly cited in the financial literature. Exhibit 10 lists those techniques along with the percentages of respondents responding positively to the three questions pertaining to them for both the current (1997) study and the 1980 study.

**Familiarity:** With regard to the respondents' familiarity with the techniques listed in Exhibit 10, we can see that the majority of *persons filling out the questionnaire* (either the chief financial officers to whom the questionnaires were sent, or the persons they deemed "most informed about the firm's cost of capital techniques") were familiar with most of the techniques listed (both in the 1997 and 1980 study). Respondents in both studies were least familiar with certainty equivalents—the capital market line and the security market line—and between 1980 and 1997 their familiarity with beta, sensitivity analysis, the capital asset pricing model (CAPM), and systematic risk reflects increased awareness of CAPM and its underlying constructs. Increased familiarity with sensitivity analysis is likely the result of the widespread availability and use of electronic spreadsheets, which create a convenient vehicle for use in performing sensitivity analysis. The reduced familiarity shown

## Exhibit 9. Importance of Various Factors in Assessing Project Risk

Factor	Rating of Importance (1 = Unimportant; 5 = Very Important)					Weighted Average Response*						
	1 (1980)	2 (1980)	3 (1980)	4 (1980)	5 (1980)	1980	1997					
Dollar size of project	3.60%	9.01%	4.10%	5.41%	16.50%	14.41%	28.20%	31.53%	47.60%	44.14%	4.12%	4.05%
Relationship between the project's returns and returns on the firm's other projects	8.80%	6.40%	10.60%	15.30%	25.40%	24.30%	27.60%	35.10%	27.60%	21.60%	3.54%	3.55%
Project's payback period	3.50%	3.60%	10.10%	12.60%	27.80%	22.50%	32.00%	36.00%	26.60%	19.80%	3.68%	3.45%
Track record of division presenting project	8.30%	12.80%	13.60%	16.50%	33.10%	33.00%	29.60%	33.90%	15.40%	10.10%	3.30%	3.24%
Track record of individual presenting project	20.70%	36.40%	21.90%	29.40%	26.60%	28.40%	24.30%	25.70%	6.50%	3.70%	2.47%	2.78%

\*Weighted-average response for each factor is calculated as the sum of the product of the response percentage and the importance value across all five importance values (i.e., 1, 2, 3, 4, 5). For example, the weighted average response for "Dollar size of project" is calculated as follows:  $[3.60 \times 1 + 9.01 \times 2 + 4.10 \times 3 + 5.41 \times 4 + 16.50 \times 5] = 4.12$

## Exhibit 10. Knowledge and Use of Various Financial Techniques

Technique	Percentage of the Respondents Answering "Yes" *					
	Are You Familiar with Technique?		Does Your Firm Employ Technique in Some Fashion?		Does Your Firm Use Technique in Determining Cost of Capital and for Capital Budgeting?	
	1980	1997	1980	1997	1980	1997
Formal Risk Analysis	81.40%	71.17%	40.70%	49.55%	23.20%	22.52%
Risk-Adjusted Discount Rate (RADR) Method	83.60%	76.60%	49.70%	55.90%	35.00%	39.60%
Certainty Equivalents	29.40%	22.50%	4.50%	6.30%	4.00%	4.50%
Beta	69.50%	87.40%	29.90%	69.40%	22.60%	60.40%
Capital Market Line	31.60%	31.50%	8.50%	13.50%	6.20%	10.80%
Sensitivity Analysis	80.20%	88.30%	68.90%	79.30%	37.90%	35.10%
Simulation	79.10%	69.40%	49.20%	40.50%	20.90%	14.40%
Linear Programming	76.80%	63.10%	40.70%	16.20%	9.00%	.00%
Zero-Based Budgeting	82.50%	73.90%	32.80%	31.50%	12.40%	9.90%
Security Market Line	24.30%	29.70%	6.80%	13.50%	6.20%	9.90%
Capital Asset Pricing Model (CAPM)	53.70%	89.20%	28.80%	74.80%	21.50%	64.90%
Systematic Risk	40.10%	56.80%	10.70%	30.60%	7.30%	15.30%

\*111 Respondents in 1997, 177 Respondents in 1980

between 1980 and 1997 for formal risk analysis, the risk-adjusted discount rate method, simulation, linear programming, and zero-based budgeting is believed attributable to the growth in understanding and application of CAPM and electronic spreadsheets to quantitatively and behaviorally measure the relevant risk. In other words, a shift from older tools and methods to more recent ones occurred between 1980 and 1997.

**General Use:** Concerning the general use of each of the techniques shown in Exhibit 10, the use of all the techniques listed—except for simulation, linear programming, and zero-based budgeting—increased between 1980 and 1997. Particularly notable is the more than doubling between 1980 and 1997 of the percentage of respondents using the related tools/concepts of beta, the security market line, CAPM, and systematic risk. Only modest increases occurred in the use of formal risk analysis, RADRs, certainty equivalents, the capital market line, and sensitivity analysis. These findings align well with the growing familiarity with certain techniques (discussed earlier) which appear to have replaced other quantitative techniques in terms of use by finance professionals.

**Use in Cost of Capital/Capital Budgeting:** A final

question asked whether respondents used each technique in determining cost of capital and for capital budgeting. Responses to this question, shown in the final two columns of Exhibit 10, indicate a decline between 1980 and 1997 in the use of techniques such as: sensitivity analysis, simulation, linear programming, and zero-based budgeting in determining cost of capital and for capital budgeting. The use of formal risk analysis and RADRs remained about the same over this period. The use in cost of capital and capital budgeting of certainty equivalents—beta, the capital market line, the security market line, CAPM, and systematic risk—increased notably between 1980 and 1997. These findings confirm the widespread adoption of CAPM and its related tools and concepts to cost of capital and capital budgeting analysis. Today, well over half of the respondent firms use CAPM in these areas.

#### IV. Cost of Capital Administration

Respondents were asked a number of questions concerning the procedures they generally use in the administration of cost of capital. The specific issues addressed include: frequency of cost of capital calculation, application of cost of capital to financial

decisions, frequency and cause of capital rationing, and project approval and follow-up procedures employed. An understanding of these procedures should provide useful insight into the operational aspects of cost of capital.

### A. Frequency of Calculation

Respondents were asked to indicate the frequency with which they re-compute their cost of capital. The five possible frequencies and the associated responses for both the current (1997) study and the 1980 study are summarized in Exhibit 11. The responses indicate that the majority of respondents in both studies, revise their cost of capital when environmental conditions change sufficiently to warrant it. About 27% of respondents in 1997 re-compute their cost annually; this reflects an increase from about 21% of respondents in 1980. This finding is also consistent with Bruner, et al. (1998) which found that 37% of its 27 interviewees estimate their cost of capital annually. In general, the responses suggest that respondents re-compute their cost of capital more frequently in 1997 than was the case in 1980, and that these changes tend to be driven by environmental factors. The earlier analysis of the stability of cost of capital (see Exhibits 5 and 6) suggested that it changes in response to changes in the capital markets (i.e., long-term rates). This earlier finding coupled with the responses to this question, suggest that the respondents behave as expected: they re-compute the cost of capital when shifts in long-term rates occur. During recent years these shifts have occurred with greater frequency than in the late 1970s/early 1980s, and therefore, respondents seem to recompute their costs of capital more often.

### B. Application of Cost of Capital

Nearly 90% of the respondents indicated that they used one cost of capital *regardless* of the total amount of financing required.<sup>8</sup> This suggests that most respondents face a flat weighted marginal cost of capital function.

Two questions focused on the decisions to which respondents apply the cost of capital. The first question asked respondents to indicate whether they used cost of capital in a number of financial decisions. The results summarized in Exhibit 12, both for the current (1997) study and the 1980 study, show that cost of capital is used by nearly all firms to make new project decisions. Although the majority of

<sup>8</sup>This would suggest that most firms do not believe that they raise enough capital to have a significant impact on the overall demand for capital.

respondents use cost of capital in leasing decisions, the percentage of respondents remained relatively constant between 1980 and 1997. The use of cost of capital in the other three decisions listed, increased between 1980 and 1997 with a near doubling in its use in abandonment decisions and estimating the firm's value. These findings are consistent with those of Bruner, et al. (1998) who found that 51% of their 27 interviewees use the cost of capital for purposes other than project analysis. It seems clear that cost of capital is more widely used in financial decision making today than in the early 1980s.

Another question asked respondents to indicate the measure they use to discount cash flows for lease-purchase and bond-refunding decisions, given a choice of five possible discount rates. Their response percentages for the current (1997) and the earlier (1980) studies are given in Exhibit 13. The data indicates that while the after-tax cost of debt remains the preferred discount rate for use in both lease-purchase and bond-refunding decisions, its popularity has increased for both decisions between 1980 and 1997. Use of the other rates listed was either very small or declined between 1980 and 1997.

It appears that the cost of capital is used primarily for new project decisions, whereas the after-tax cost of debt is used for the financing decisions concerned with lease-purchase and bond-refunding.

### C. Capital Rationing

To assess the existence and possible causes of capital rationing, respondents were asked to indicate, to the nearest 10%, the percentage of time their firm has more acceptable projects than funds available to invest. The weighted-average percentage for the current (1997) study was about 40%. In other words, about 40% of the time respondents were confronted with capital rationing. This finding is well below the about 66% of the time respondents in the 1980 study faced capital rationing and also below those reported in the earlier studies of Gitman and Forrester (1977) and Petty, Scott, and Bird (1975). This reduction in the percentage of firms with capital rationing may suggest that firms have consciously moved toward the theoretical equilibrium where capital rationing does not exist.

Exhibit 14 summarizes findings concerning the major causes of capital rationing reported by respondents to both the current (1997) study and the 1980 study. The results for both time periods clearly indicate that the dominant cause (reported by 60% of respondents to both studies) is a debt limit imposed by internal management; consistent with the earlier findings of

**Exhibit 11. Frequency of Cost of Capital Revision**

Frequency of Revision	Percentage of the Respondents*	
	1980	1997
Annually	21.50%	27.12%
When environmental conditions change sufficiently to warrant it	50.30%	49.20%
Quarterly or semiannually	4.00%	5.10%
Less frequently than annually	13.00%	8.50%
Each time a major project is evaluated	11.20%	10.20%
<i>Totals</i>	100.00%	100.00%

\*111 Respondents in 1997, 177 Respondents in 1980

**Exhibit 12. Cost of Capital Applications**

Decisions	Percentage of the Respondents*	
	1980	1997
New Projects	92.70%	97.30%
Abandonment of Existing Projects	44.60%	72.40%
Leasing Decisions	64.40%	59.80%
Bond Refunding Decisions	34.50%	45.90%
Estimating the Firm's Value	44.10%	78.60%

\*111 Respondents in 1997, 177 Respondents in 1980

**Exhibit 13. Discount Rates Used in Lease-Purchase and Bond-Refunding Decisions**

Discount Rate	Percentage of Respondents Using Given Rate*			
	Lease-Purchase Decisions		Bond-Refunding Decisions	
	1980	1997	1980	1997
After-tax cost of debt	39.40%	61.30%	37.70%	49.50%
Risk-free rate of return	2.40%	2.70%	3.80%	3.60%
Cost of capital	38.80%	33.30%	29.20%	16.20%
Before-tax cost of debt	14.70%	6.30%	20.80%	14.40%
Cost of common stock	4.70%	.90%	8.50%	1.80%

\*111 Respondents in 1997, 177 Respondents in 1980

**Exhibit 14. Major Causes of Capital Rationing**

Cause	Percentage of the Respondents*	
	1980	1997
Debt limit imposed by outside agreement	16.90%	9.00%
Debt limit imposed by management external to the organization	4.00%	3.60%
Debt limit imposed by internal management	60.50%	58.60%
Restrictive policy imposed on the payment of cash dividend	1.70%	.90%
Need to maintain a target earnings per share or price-earnings ratio	11.30%	22.50%
Other	10.70%	18.90%
<i>Totals**</i>	105.10%	113.51%

\*\*Response totals greater than 100% because of multiple responses.

\*111 Respondents in 1997, 177 Respondents in 1980

Fremgen (1973) and Gitman and Forrester (1977). What's interesting is the more than doubling (to nearly 23%) of the percentage of respondents, indicating that their firms ration capital in order to maintain a target earnings per share or price-earnings ratio. This growth seems to balance the significant decline in the percent of respondents (from about 17% in 1980 to about 9% in 1997) indicating that they ration capital as a result of a debt limit imposed by an outside agreement. Clearly, internal management-imposed debt limits and/or the need to achieve certain financial targets tend to be the primary causes of rationing. The increased importance of certain financial targets (EPS and P/E ratios) between 1980 and 1997 on capital rationing is believed to reflect the greater market focus that occurred during this period.

**D. Project Approval and Follow-Up**

A final group of questions addressed the approval and follow-up procedures employed by respondents. In the current (1997) study, more than 95% of the firms indicated that project approval depends on the magnitude of the outlay involved; about 82% indicated it depends on the appropriate responsible manager and about 74% require approval of a formal committee. Each of these percentages is about ten percentage points higher than the respective response in the 1980 study. These findings suggest that firms today may employ more formal processes and procedures for project approval, particularly for large outlay projects, than they did in 1980.

When asked if their firm has a formal procedure for evaluating the operating performance of existing projects, 47% of the respondents in the current (1997) study indicated "yes" which is down from the 56%,

giving this response in the 1980 study. This decline could possibly be the result of the firm's use of better decision methods up front, or the allocation of less resources to monitoring and following up on projects once they've been implemented. About the same number of respondents in 1997 (33%, versus 32% in 1980), indicated that their firm evaluated existing projects on an informal or *ad hoc* basis. This movement from formal to *ad hoc* follow-up further supports the suggestion that budget reductions have caused firms' monitoring and follow-up activities to be replaced by more direct value-enhancing actions. As a result, in 1997 more than 19% (versus about 12% in 1980) of the respondent firms have no formal or informal follow-up on the operating performance of existing projects.

Further support of the declining respondent follow-up is presented in Exhibit 15 for both the current (1997) study and the 1980 study. Over 22% of the respondents in the 1997 study seldom follow-up on a project's performance once it becomes operational; this is nearly twice that of the 1980 study. In the 1997 study, more of those who follow-up do it annually and less follow-up when conditions warrant—quarterly, semiannually, or less frequently than annually—than in 1980. Clearly, in 1997 the follow-up on accepted projects once they are operational, occurs less often and with less frequency than was the case in 1980.

**V. Summary and Conclusions**

This paper has presented the findings of a survey of the cost of capital techniques used by a sample of 111 major US firms responding to a mail questionnaire sent to all firms in the *Fortune* 1000 listing for 1996. This survey replicated an earlier survey by using a similar sample and questionnaire. This paper provided

## Exhibit 15. Frequency of Follow-Up

Frequency	Percentage of the Respondents*	
	1980	1997
Annually	24.30%	28.80%
Whenever environmental conditions warrant reevaluation	21.50%	17.10%
Quarterly or semiannually	19.80%	14.40%
Less frequently than annually	24.30%	18.90%
Seldom	12.40%	22.50%
Totals**	102.30%	101.80%

\*\*Response total greater than 100% because of multiple responses.

\*111 Respondents in 1997, 177 Respondents in 1980

longitudinal comparisons of findings in addition to describing current practices.

**The key findings of this study are:**

- Respondents include primarily long-term debt and equity when calculating the cost of capital.
- A larger majority of firms in 1997 than in 1980 use some type of weighted average and are less likely to use the cost of specific source to calculate the cost of capital.
- Most firms that use a weighted average rely on the use of target or market value weights rather than on book value weights when calculating the cost of capital.
- Respondents tend to have current capital structures that are consistent with their target capital structures.
- More respondents tax-adjust debt costs than any other component of the cost of capital.
- Very few respondents (11%) differentiate between existing equity and new equity when calculating the cost of equity.
- About 70% of respondents use the required return of investors; most (93%) calculated it using CAPM as the cost of equity capital.
- The respondents' cost of capital averaged about 11.5% in 1997, below the 14.3% in 1980; the difference reflecting primarily changes in the capital market conditions and rates.
- More firms in 1997 (77%) than in 1980 (67%) specifically differentiate project risk, most on an individual project basis and some on a group basis.
- Most respondents risk adjust discount rates rather than cash flows, and more of them do this in 1997 than in 1980.
- Project size, the relationship of project returns to the firm's other projects, and the project's payback period remain the most important factors in assessing project risk.
- Many more firms in 1997 than in 1980 were familiar with CAPM and its related tools and concepts; employed them in some fashion; and used them in determining the cost of capital and in capital budgeting.
- Most respondents re-compute their cost of capital when shifts in long-term rates occur; which, during recent years, has occurred more frequently than reported in the 1980 study.
- Nearly all firms use one cost of capital regardless of the total amount of financing required, and apply it more often today than in 1980 to most long-term decisions, particularly new project decisions.
- Use of the after-tax cost of debt to make both lease-purchase and bond-refunding decisions remains the most popular rate, and its use has grown between 1980 and 1997.
- A smaller percent of respondents (40%) in 1997 than in 1980 (66%) are faced with capital rationing, which continues to exist primarily due to the limits imposed by internal management; the need to maintain target earnings per share or price-earnings ratios has grown in importance as a secondary justification for capital rationing.
- More firms today (1997) than in 1980 indicate that project approval depends on the magnitude of the outlay, the appropriate responsible manager, and formal committee approval.
- Fewer firms in 1997 (47%) than in 1980 (56%) have formal procedures for evaluating existing projects, whereas about the same percentage (33%) continue to rely on *ad hoc* follow-up procedures.
- The follow-up on accepted projects once they are operational, occurs with less frequency in 1997 than in 1980.

Clearly practitioners are changing their methodology for computing many of the metrics asked about in this questionnaire. The findings reported in this study should

help to further narrow the theory-practice gap in the measurement and application of the cost of capital and allow academics to report the current state to our students. ■

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