Cost of Capital at Ameritrade

In mid-1997, Joe Ricketts, Chairman and CEO of Ameritrade Holding Corporation, wanted to improve his company's competitive position in deep-discount brokerage[1] by taking advantage of emerging economies of scale. The success of the strategy required Ameritrade grow its customer base. The growth would require substantial investments in technology, to improve service and capacity, and in advertising, to increase customer awareness. The strategy would require large expenditures relative to Ameritrade's existing capital. In order to evaluate whether the strategy would generate sufficient future cash flows to merit the investment, Ricketts needed an estimate of the project's risk.

Company Background

Formed in 1971, Ameritrade has been a pioneer in the deep-discount brokerage sector. Not only did Ameritrade help create the deep discount market, but it also was the first to offer many new services that changed the way individual investors managed their portfolios. Ameritrade, for example, was the first to offer automated touch-tone phone trading (1988), online Internet trading[2] (1994), a personal digital assistant to access trades (1995), and online program investing for individual investors (1996).

The average return on equity during 1975 to 1996 was 40%, as all years, except two, posted a positive return. Recent returns on equity were much higher, with each of the most recent five years having larger returns than the 40% average.

In March 1997, Ameritrade (NASDAQ: AMTD) raised $22.5 million in an initial public offering allowing the company to continue its long tradition of adopting the latest advances in technology, and to substantially increase advertising to build its brand and improve market share.

Revenue Sources

Exhibit 1 displays Ameritrade's income statement for the fiscal years 1995–1997, and Exhibit 2 presents the balance sheet for 1996 and 1997.

Ameritrade's two primary sources of revenue were from transaction and net interest. Transaction revenues consisted of brokerage commissions, clearing fees, and payment for order flow, which were cash payments received by Ameritrade for routing orders to execution agents. Interest revenues were generated by charging customers on debt balances

maintained in brokerage accounts and the investment of customers' cash segregated in compliance with federal regulations in short-term marketable securities. Interest revenues were offset by interest payments to customers based on credit balances maintained in brokerage accounts.

Virtually all of Ameritrade's revenues were directly linked to the stock market. Investors generally curtailed trading activity and their borrowing in response to sustained downward movements in the stock market. For example, trading activity declined more than 20% in 1988 following the stock market crash of October 19, 1987. A substantial decline in the stock market could therefore lead to a steep decline in Ameritrade's brokerage commissions and net interest revenues.

Full-service brokers were less sensitive to market movements than deep-discount brokers like Ameritrade. Full-service brokers received asset management fees, which partially shielded the revenue stream from market declines. Moreover, most full-service brokerage firms such as Merrill Lynch diversified their revenue stream by engaging in investment banking activities such as mergers and security underwritings.

Planned Investments and the Cost of Capital

Ricketts planned to grow Ameritrade's revenues by targeting self-directed investors. Ricketts decided Ameritrade's mission was "to be the largest brokerage firm worldwide based on the number of trades."

Ricketts' strategy called for price cutting, technology enhancements, and increased advertising. First, Ameritrade would reduce commissions from $29.95 to $8.00 per trade for all Internet market orders. There were currently no major players in this price range although many customers were price sensitive. To ensure competitors such as Charles Schwab and E*Trade did not follow Ameritrade's lead and try to compete on price, Ameritrade would have to become the low cost provider of reliable online brokerage services. State of the art technology was the only way to prevent system outages and move towards the goal of 100% reliability. Therefore, up to $100 million would be budgeted for technology enhancements, which also would increase trade execution speed—an important attribute to individual investors. Finally, Ameritrade's advertising budget would be increased to $155 million for the 1998 and 1999 fiscal years combined.

In order to gauge the financial impact of the advertising program and the investment in physical plant and technology, there needed to be some accounting for the project's risk. The plan would only create value if the investment returned more than it cost. Surely the providers of capital would demand a return that reflected the riskiness of the investment. Joe Ricketts strongly believed that his role as CEO was to maximize shareholder value. If the expected returns on investment were greater than the cost of capital, he was going to invest, even if there was a chance of bankrupting the firm. Ricketts felt that the expected return on investment was very high, on the order of 30% to 50%. But, he also knew that some members of his management team were not nearly as optimistic as he was, estimating the expected investment returns at only 10% to 15%. But what was the cost of capital?

Recently, a CS First Boston analyst report employed a discount rate of 12% when evaluating Ameritrade. The CFO at Ameritrade often used a 15% discount rate, while there were some managers at Ameritrade who felt that the borrowing cost of 8–9% was the appropriate rate by which to discount the future profit estimates. There was also the issue of the type of business that Ameritrade was in. Was Ameritrade a discount brokerage firm or instead a technology/Internet firm? A recent analyst report

from ABN-AMRO valued Ameritrade on a comparables basis using Internet firms such as Yahoo, Mecklermedia, and Netscape. In addition, E*Trade management continued to insist that E*Trade, while deriving all of its revenues from brokerage operations, was not a brokerage firm, and thus should not be valued as such.

Joe Ricketts hired a consultant to provide a cost of capital estimate that could be used in evaluating Ameritrade's upcoming investments. Exhibits 3–6 provide information that was considered in estimating the cost of capital for Ameritrade.

EXHIBIT 1   Consolidated Annual Income Statements for the Fiscal Year Ending in September

Source: Ameritrade Annual Report, 1997.

	1997	1996	1995
Net Revenues			
Transaction Income	$ 51,936,902	$ 36,469,561	$ 23,977,481
Net Interest	18,193,946	11,477,878	8,434,584
Other	7,107,492	6,391,314	2,607,538
Total Net Revenues	77,238,340	54,338,753	35,019,603
Expenses Excluding Interest			
Employee Compensation	19,290,808	14,049,642	8,481,977
Commissions and Clearance	3,320,262	2,530,642	2,516,796
Communications	5,623,468	3,685,535	2,352,590
Occupancy and Equipment Cost	5,422,839	2,889,654	1,626,725
Advertising and Promotion	13,970,834	7,537,265	4,842,392
Provision for Losses	59,000	148,014	1,428,663
Amortization of Goodwill	363,002	363,002	94,152
Other	7,763,014	4,717,406	2,846,280
Total Expenses Excluding Interest	55,813,227	35,921,160	24,189,575
Income Before Income Taxes	21,425,113	18,417,593	10,830,028
Taxes	7,602,964	7,259,248	3,798,881
Net Income	$ 13,822,149	$ 11,158,345	$ 7,031,147
EPS	$ 1.00	$ 0.87	$ 0.55
Shares Outstanding	13,768,889	12,813,823	12,813,823

EXHIBIT 2   **Consolidated Annual Balance Sheets for the Fiscal Year Ending in September**

Source: Ameritrade Annual Report, 1997.

	1997	1996
ASSETS		
Cash & Cash Equivalents	$ 53,522,447	$ 15,767,170
Cash & Investments Segregated in Compliance with Federal Regulations	319,763,921	175,668,497
Receivable from Brokers, Dealers, & Clearing Organizations	17,823,640	15,096,862
Receivable from Customers & Correspondents	325,407,147	166,075,055
Furniture, Equipment, & Leasehold Improvements	8,709,923	3,746,178
Goodwill	6,346,763	6,709,765
Equity Investments	7,597,972	7,157,783
Other Investments	5,000,000	5,000,000
Deferred Income Taxes	39,314	444,378
Other Assets	13,145,616	6,013,544
Total Assets	$ 757,356,743	$ 401,679,232
LIABILITIES & STOCKHOLDERS' EQUITY		
Liabilities:		
Payable to Brokers, Dealers, & Clearing Organizations	1,404,999	1,193,479
Payable to Customers & Correspondents	666,279,440	356,942,970
Accounts Payable and Accrued Liabilities	19,252,931	7,221,008
Notes Payable to Bank	—	4,853,000
Income Taxes Payable	3,430,279	806,711
Total Liabilities	690,367,649	371,017,168
Stockholders' Equity:		
Class A Common Stock	131,534	114,494
Class B Common Stock	13,644	13,644
Additional Paid in Capital	23,297,506	809,665
Retained Earnings	43,546,410	29,724,261
Total Stockholders' Equity	66,989,094	30,662,064
Total Liabilities & Stockholders' Equity	$ 757,356,743	$ 401,679,232

EXHIBIT 3   **Capital Market Return Data (Historical and Current)**

Source: Yields are from Datastream, historical data are from Ibbotson Associates, *SBBI 2000 Yearbook.*

Prevailing Yields on U.S. Government Securities (August 31, 1997)

	Annualized Yield to Maturity
3-Month T-Bills	5.24%
1-Year Bonds	5.59%
5-Year Bonds	6.22%
10-Year Bonds	6.34%
20-Year Bonds	6.69%
30-Year Bonds	6.61%

Historic Average Total Annual Returns on U.S. Government Securities and Common Stocks (1950–1996)

	Average Annual Return	Standard Deviation
T-Bills	5.2%	3.0%
Intermediate Bonds[a]	6.4%	6.6%
Long Term Bonds[b]	6.0%	10.8%
Large Company Stocks[c]	14.0%	16.8%
Small Company Stocks[d]	17.8%	25.6%

Historic Average Total Annual Returns on U.S. Government Securities and Common Stocks (1929–1996)

	Average Annual Return	Standard Deviation
T-Bills	3.8%	3.3%
Intermediate Bonds[a]	5.4%	5.8%
Long Term Bonds[b]	5.5%	9.2%
Large Company Stocks[c]	12.7%	20.3%
Small Company Stocks[d]	17.7%	34.1%

[a]Portfolio of U.S. Government bonds with maturity near 5 years.
[b]Portfolio of U.S. Government bonds with maturity near 20 years.
[c]Standard and Poor's 500 Stock Price Index.
[d]A subset of small cap stocks traded on the NYSE (1926–1981); Dimensional Fund Advisor's Small Company Fund (1982–1997).

EXHIBIT 4 Selected Data for Comparable Firms

Source: Compustat; Standard & Poor's; company public filings

Firm Name (Industry)	Debt/Value (Market Values) Current	Avg 1992–1996	Debt/Value (Book Values) Current	Avg 1992–1996	Brokerage Revenues (%)
A G Edwards (Investment Services)a	0.00	0.00	0.00	0.00	57
Bear Stearns (Investment Services)	0.60	0.50	0.69	0.60	35
Charles Schwab Corp (Discount Brokerage)	0.05	0.08	0.25	0.30	82
E*Trade (Discount Brokerage)	0.00	NA	0.00	NA	95
Lehman Brothers (Investment Services)	0.79	NA	0.80	0.79b	13
Mecklermedia (Internet)	0.00	0.00b	0.00	0.00b	0
Merrill Lynch & Co (Investment Services)	0.57	0.52	0.77	0.65	37
Morgan Stanley Dean Witter (Investment Services)	0.57	0.53	0.70	0.63	12
Netscape (Internet)	0.00	NA	0.00	NA	0
Paine Webber (Investment Service)	0.51	0.53	0.63	0.58	46
Quick & Reilly Group (Discount Brokerage)	0.00	0.00	0.00	0.00	81
Raymond James Financial (Investment Services)	0.05	0.04	0.07	0.06	51
Waterhouse Investor Srvcs (Discount Brokerage)	NA	0.38	NA	0.70c	99
Yahoo (Internet)	0.00	NA	0.00	NA	0

aInvestment Services includes brokerage, asset management, investment banking, and trading.
bIndicates average over 1993–1996.
cIndicates average over 1992–1995.

EXHIBIT 5
Stock Price Data for Discount Brokers

Source: Center for Research on Security Prices, University of Chicago.

	Ameritrade			
Date	Shares	Price	Dividend	Stock Split
31-Mar-97	13,153	15.625	-	
30-Apr-97	13,153	12.500	-	
30-May-97	13,153	14.000	-	
30-Jun-97	14,518	15.750	-	
31-Jul-97	14,518	15.375	-	
29-Aug-97	14,518	18.813	-	

	Charles Schwab			
Date	Shares	Price	Dividend	Stock Split
30-Sep-87	29,121	15.875	-	
30-Oct-87	29,121	7.875	-	
30-Nov-87	29,121	6.625	-	
31-Dec-87	25,388	6.000	-	
29-Jan-88	25,388	6.500	-	
29-Feb-88	25,388	9.000	-	
31-Mar-88	25,388	7.375	-	
29-Apr-88	25,388	7.625	-	
31-May-88	25,388	6.875	-	
30-Jun-88	25,294	7.250	-	
29-Jul-88	25,294	7.500	-	
31-Aug-88	25,294	6.750	-	
30-Sep-88	25,328	6.750	-	
31-Oct-88	25,328	7.500	-	
30-Nov-88	25,328	6.750	-	
30-Dec-88	25,354	6.750	-	
31-Jan-89	25,354	10.250	-	
28-Feb-89	25,354	8.625	-	
31-Mar-89	25,354	8.875	-	
28-Apr-89	25,354	10.125	-	
31-May-89	25,354	11.750	0.030	
30-Jun-89	25,352	11.000	-	
31-Jul-89	25,352	16.500	0.030	
31-Aug-89	25,352	15.750	-	
29-Sep-89	25,386	14.000	-	
31-Oct-89	25,386	13.000	0.030	
30-Nov-89	25,386	12.500	-	
29-Dec-89	25,332	13.875	-	
31-Jan-90	25,332	13.500	0.030	
28-Feb-90	25,332	15.250	-	
30-Mar-90	25,332	17.000	-	
30-Apr-90	25,332	15.125	0.030	
31-May-90	25,332	15.750	-	
29-Jun-90	25,099	15.250	-	
31-Jul-90	25,099	13.625	0.030	
31-Aug-90	25,099	12.625	-	
28-Sep-90	25,255	11.375	-	
31-Oct-90	25,255	12.625	0.040	
30-Nov-90	25,255	11.875	-	
31-Dec-90	24,464	11.375	-	
31-Jan-91	24,464	16.000	0.040	
28-Feb-91	24,464	18.250	-	
28-Mar-91	24,464	20.250	-	
30-Apr-91	24,464	18.125	0.040	

EXHIBIT 5
(*Continued*)

Charles Schwab

Date	Shares	Price	Dividend	Stock Split
31-May-91	24,464	22.500	-	
28-Jun-91	24,435	24.750	-	
31-Jul-91	24,435	27.500	0.050	
30-Aug-91	24,435	28.375	-	
30-Sep-91	25,596	31.125	-	
31-Oct-91	25,596	37.750	0.060	
29-Nov-91	25,596	32.750	-	
31-Dec-91	38,394	30.375	-	3 for 2
31-Jan-92	38,394	31.875	0.040	
28-Feb-92	38,394	33.250	-	
31-Mar-92	38,479	34.625	-	
30-Apr-92	38,479	28.500	0.060	
29-May-92	38,479	28.875	-	
30-Jun-92	38,626	23.500	-	
31-Jul-92	38,626	24.625	0.060	
31-Aug-92	38,626	22.500	-	
30-Sep-92	38,149	18.000	-	
30-Oct-92	38,149	20.250	0.060	
30-Nov-92	38,149	24.875	-	
31-Dec-92	37,741	26.125	-	
29-Jan-93	37,741	30.250	0.060	
26-Feb-93	37,741	32.375	-	
31-Mar-93	37,741	36.500	-	
30-Apr-93	37,741	32.750	0.075	
28-May-93	37,741	35.250	-	
30-Jun-93	56,612	28.500	-	3 for 2
30-Jul-93	56,612	29.000	0.050	
31-Aug-93	56,612	32.875	-	
30-Sep-93	57,625	34.500	-	
29-Oct-93	57,625	34.625	0.050	
30-Nov-93	57,815	31.875	-	
31-Dec-93	57,815	32.375	-	
31-Jan-94	57,815	29.500	0.070	
28-Feb-94	57,815	27.500	-	
31-Mar-94	57,815	26.875	-	
29-Apr-94	57,815	28.375	0.070	
31-May-94	57,815	30.250	-	
30-Jun-94	57,114	24.750	-	
29-Jul-94	57,114	26.750	0.070	
31-Aug-94	57,114	30.750	-	
30-Sep-94	56,829	29.625	-	
31-Oct-94	56,829	35.375	0.070	
30-Nov-94	57,325	31.875	-	
30-Dec-94	57,325	34.875	-	
31-Jan-95	57,325	40.000	0.090	
28-Feb-95	57,325	44.375	-	
31-Mar-95	85,988	32.250	-	3 for 2
28-Apr-95	85,988	34.250	0.060	
31-May-95	85,988	35.000	-	
30-Jun-95	85,896	43.875	-	
31-Jul-95	85,896	46.125	0.080	
31-Aug-95	87,061	46.625	-	
29-Sep-95	174,122	29.000	-	2 for 1

EXHIBIT 5
(*Continued*)

Charles Schwab

Date	Shares	Price	Dividend	Stock Split
31-Oct-95	174,122	22.875	0.040	
30-Nov-95	174,678	24.250	-	
29-Dec-95	174,678	20.125	-	
31-Jan-96	174,678	25.125	0.040	
29-Feb-96	174,678	25.500	-	
29-Mar-96	174,678	25.875	-	
30-Apr-96	174,032	24.500	0.040	
31-May-96	174,032	24.250	-	
28-Jun-96	174,989	24.500	-	
31-Jul-96	174,989	24.125	0.050	
30-Aug-96	174,989	25.000	-	
30-Sep-96	175,166	23.000	-	
31-Oct-96	175,166	25.000	0.050	
29-Nov-96	175,166	30.250	-	
31-Dec-96	175,173	32.000	-	
31-Jan-97	175,173	37.500	-	
28-Feb-97	175,173	37.500	0.050	
31-Mar-97	175,173	32.000	-	
30-Apr-97	175,068	36.625	-	
30-May-97	175,068	40.625	0.050	
30-Jun-97	175,813	40.500	-	
31-Jul-97	176,422	47.000	-	
29-Aug-97	176,422	42.750	0.050	

E*Trade

Date	Shares	Price	Dividend	Stock Split
30-Aug-96	29,393	10.500	-	
30-Sep-96	29,539	13.188	-	
31-Oct-96	29,539	11.125	-	
29-Nov-96	29,539	10.938	-	
31-Dec-96	29,545	11.500	-	
31-Jan-97	29,545	17.625	-	
28-Feb-97	29,545	24.000	-	
31-Mar-97	30,440	18.000	-	
30-Apr-97	30,440	15.000	-	
30-May-97	30,440	17.625	-	
30-Jun-97	30,958	19.625	-	
31-Jul-97	30,958	30.500	-	
29-Aug-97	30,958	32.125	-	

Quick & Reilly

Date	Shares	Price	Dividend	Stock Split
31-Jan-84	6,318	17.625	-	
29-Feb-84	6,318	15.000	0.050	
30-Mar-84	6,318	14.875	-	
30-Apr-84	6,318	17.125	-	
31-May-84	6,318	17.375	-	
29-Jun-84	6,318	18.000	0.050	
31-Jul-84	6,318	14.750	-	
31-Aug-84	6,318	18.000	0.050	
28-Sep-84	6,318	17.000	-	
31-Oct-84	6,318	17.875	-	
30-Nov-84	6,318	15.250	0.050	

EXHIBIT 5
(Continued)

		Quick & Reilly		
Date	Shares	Price	Dividend	Stock Split
31-Dec-84	6,318	15.500	-	
31-Jan-85	6,318	23.375	-	
28-Feb-85	6,318	23.750	0.110	
29-Mar-85	6,318	23.125	-	
30-Apr-85	6,318	20.625	-	
31-May-85	6,318	22.625	0.060	
28-Jun-85	6,318	24.000	-	
31-Jul-85	6,318	24.125	-	
30-Aug-85	6,318	22.875	0.060	
30-Sep-85	6,318	20.125	-	
31-Oct-85	6,318	22.250	-	
29-Nov-85	6,318	25.500	0.060	
31-Dec-85	6,318	32.500	-	
31-Jan-86	6,318	36.375	-	
28-Feb-86	6,318	39.125	0.170	
31-Mar-86	6,318	39.000	-	
30-Apr-86	6,318	30.375	-	
30-May-86	11,149	33.375	0.070	
30-Jun-86	11,149	35.500	-	
31-Jul-86	11,149	29.000	-	
29-Aug-86	11,149	28.750	0.070	
30-Sep-86	11,149	23.875	-	
31-Oct-86	11,149	32.125	-	
28-Nov-86	11,149	29.500	0.070	
31-Dec-86	11,149	26.750	-	
30-Jan-87	11,149	36.125	-	
27-Feb-87	11,149	36.875	0.200	
31-Mar-87	11,149	36.000	-	
30-Apr-87	16,724	21.375	-	3 for 2
29-May-87	16,724	21.500	0.055	
30-Jun-87	9,477	19.250	-	
31-Jul-87	9,477	20.250	-	
31-Aug-87	9,477	24.625	0.055	
30-Sep-87	9,477	23.000	-	
30-Oct-87	9,477	12.125	-	
30-Nov-87	9,477	11.625	0.055	
31-Dec-87	9,477	12.500	-	
29-Jan-88	9,477	12.625	-	
29-Feb-88	9,477	13.500	0.180	
31-Mar-88	9,452	12.250	-	
29-Apr-88	9,452	12.625	-	
31-May-88	9,452	11.500	0.060	
30-Jun-88	9,452	11.875	-	
29-Jul-88	9,452	11.500	-	
31-Aug-88	9,452	11.250	0.060	
30-Sep-88	9,452	11.750	-	
31-Oct-88	9,452	11.750	-	
30-Nov-88	9,452	11.500	0.060	
30-Dec-88	9,452	10.875	-	
31-Jan-89	9,452	15.000	-	
28-Feb-89	9,452	13.750	0.060	
31-Mar-89	9,452	13.250	-	
28-Apr-89	9,452	13.000	-	

EXHIBIT 5
(Continued)

		Quick & Reilly		
Date	Shares	Price	Dividend	Stock Split
31-May-89	9,452	16.125	0.060	
30-Jun-89	9,452	14.000	-	
31-Jul-89	9,452	16.500	-	
31-Aug-89	9,452	17.000	0.060	
29-Sep-89	9,452	16.750	-	
31-Oct-89	9,452	15.750	-	
30-Nov-89	9,452	14.875	0.060	
29-Dec-89	9,452	13.625	-	
31-Jan-90	9,452	12.000	-	
28-Feb-90	9,452	13.625	0.130	
30-Mar-90	9,452	13.250	-	
30-Apr-90	9,452	13.000	-	
31-May-90	9,452	15.250	0.070	
29-Jun-90	9,452	14.000	-	
31-Jul-90	9,452	13.500	-	
31-Aug-90	9,452	11.375	0.070	
28-Sep-90	9,452	10.375	-	
31-Oct-90	9,452	9.750	-	
30-Nov-90	9,452	10.125	0.070	
31-Dec-90	9,437	10.250	-	
31-Jan-91	9,437	13.125	-	
28-Feb-91	9,437	16.125	0.070	
28-Mar-91	9,210	18.875	-	
30-Apr-91	9,210	17.500	-	
31-May-91	9,210	17.750	0.070	
28-Jun-91	9,452	17.000	-	
31-Jul-91	9,452	19.625	-	
30-Aug-91	9,452	20.625	0.070	
30-Sep-91	9,210	19.250	-	
31-Oct-91	9,210	20.375	-	
29-Nov-91	9,210	20.000	0.070	
31-Dec-91	9,220	27.750	-	
31-Jan-92	9,220	27.500	-	
28-Feb-92	9,220	28.500	0.180	
31-Mar-92	9,292	28.625	-	
30-Apr-92	9,292	21.500	-	
29-May-92	9,292	21.500	0.080	
30-Jun-92	9,292	21.000	-	
31-Jul-92	9,292	20.125	-	
31-Aug-92	9,292	19.625	0.080	
30-Sep-92	9,884	20.125	-	
30-Oct-92	9,884	21.000	-	
30-Nov-92	9,884	25.375	0.080	
31-Dec-92	9,884	24.750	-	
29-Jan-93	9,884	27.000	-	
26-Feb-93	9,884	26.000	0.220	
31-Mar-93	9,824	27.125	-	
30-Apr-93	9,824	25.125	-	
28-May-93	9,824	26.125	0.100	
30-Jun-93	10,315	28.875	1.443	
30-Jul-93	10,623	30.750	-	
31-Aug-93	10,623	35.000	0.100	
30-Sep-93	10,643	36.250	-	
29-Oct-93	10,643	35.875	-	

EXHIBIT 5
(Continued)

		Quick & Reilly		
Date	Shares	Price	Dividend	Stock Split
30-Nov-93	10,678	34.250	0.100	
31-Dec-93	11,212	35.750	1.788	
31-Jan-94	10,678	35.375	-	
28-Feb-94	11,238	28.375	0.270	
31-Mar-94	11,238	25.625	-	
29-Apr-94	11,238	26.375	-	
31-May-94	11,238	26.875	0.120	
30-Jun-94	11,168	25.375	-	
29-Jul-94	11,168	24.750	-	
31-Aug-94	11,121	29.250	0.120	
30-Sep-94	11,121	25.875	-	
31-Oct-94	11,111	25.750	-	
30-Nov-94	11,111	24.750	0.120	
30-Dec-94	11,111	28.375	-	
31-Jan-95	11,075	30.875	-	
28-Feb-95	11,075	35.000	0.290	
31-Mar-95	11,075	35.500	-	
28-Apr-95	11,075	40.625	-	
31-May-95	11,075	47.000	-	
30-Jun-95	16,613	36.625	0.150	3 for 2
31-Jul-95	16,613	38.500	-	
31-Aug-95	16,613	37.375	0.100	
29-Sep-95	16,613	45.875	-	
31-Oct-95	24,920	23.750	-	3 for 2
30-Nov-95	24,952	25.375	0.070	
29-Dec-95	24,952	20.500	-	
31-Jan-96	25,056	23.250	-	
29-Feb-96	25,056	26.250	0.080	
29-Mar-96	25,056	29.500	-	
30-Apr-96	25,056	30.500	-	
31-May-96	25,056	33.875	0.070	
28-Jun-96	25,056	32.500	-	
31-Jul-96	25,178	28.375	-	
30-Aug-96	25,178	29.250	0.080	
30-Sep-96	25,178	26.500	-	
31-Oct-96	25,178	26.250	-	
29-Nov-96	25,178	28.375	0.080	
31-Dec-96	25,178	29.875	-	
31-Jan-97	25,173	36.625	-	
28-Feb-97	25,173	35.000	0.190	
31-Mar-97	37,760	20.875	-	3 for 2
30-Apr-97	37,760	22.125	-	
30-May-97	37,760	23.000	0.060	
30-Jun-97	38,606	23.250	-	
31-Jul-97	38,664	26.250	-	
29-Aug-97	38,664	34.250	0.060	

		Waterhouse Investor Services		
Date	Shares	Price	Dividend	Stock Split
29-May-87	2,572	6.938	-	
30-Jun-87	2,572	8.000	-	
31-Jul-87	2,572	8.250	-	
31-Aug-87	2,572	7.500	-	

EXHIBIT 5
(Continued)

		Waterhouse Investor Services		
Date	Shares	Price	Dividend	Stock Split
30-Sep-87	2,572	8.000	-	
30-Oct-87	2,572	6.250	-	
30-Nov-87	2,572	6.000	-	
31-Dec-87	2,572	5.250	-	
29-Jan-88	2,572	4.500	-	
29-Feb-88	2,482	4.750	-	
31-Mar-88	2,482	6.000	-	
29-Apr-88	2,482	5.875	-	
31-May-88	2,482	6.250	-	
30-Jun-88	2,482	5.000	-	
29-Jul-88	2,482	3.500	-	
31-Aug-88	2,482	3.250	-	
30-Sep-88	2,482	4.000	-	
31-Oct-88	2,482	3.375	-	
30-Nov-88	2,482	3.500	-	
30-Dec-88	2,482	2.750	-	
31-Jan-89	2,482	3.750	-	
28-Feb-89	2,472	3.750	-	
31-Mar-89	2,472	4.750	-	
28-Apr-89	2,472	4.250	-	
31-May-89	2,420	5.000	-	
30-Jun-89	2,420	6.000	-	
31-Jul-89	2,420	6.000	-	
31-Aug-89	2,419	5.750	0.120	
29-Sep-89	2,419	5.625	-	
31-Oct-89	2,419	5.375	-	
30-Nov-89	2,417	5.000	-	
29-Dec-89	2,417	4.500	-	
31-Jan-90	2,417	4.375	-	
28-Feb-90	2,420	3.750	-	
30-Mar-90	2,420	4.250	-	
30-Apr-90	2,420	4.375	-	
31-May-90	2,572	4.250	-	
29-Jun-90	2,572	4.750	-	
31-Jul-90	2,572	4.625	-	
31-Aug-90	2,377	4.375	0.150	
28-Sep-90	2,377	4.250	-	
31-Oct-90	2,377	4.000	-	
30-Nov-90	2,370	3.750	-	
31-Dec-90	2,370	3.625	-	
31-Jan-91	2,370	3.750	-	
28-Feb-91	2,320	4.500	-	
28-Mar-91	2,320	6.125	-	
30-Apr-91	2,320	7.000	-	
31-May-91	2,320	8.250	-	
28-Jun-91	2,900	8.000	-	5 for 4
31-Jul-91	2,900	10.375	-	
30-Aug-91	2,943	10.750	0.160	
30-Sep-91	2,943	14.250	-	
31-Oct-91	2,943	14.000	-	
29-Nov-91	2,943	15.500	-	
31-Dec-91	2,943	27.500	-	
31-Jan-92	2,943	26.500	-	
28-Feb-92	4,415	21.750	-	3 for 2

EXHIBIT 5
(Continued)

Waterhouse Investor Services

Date	Shares	Price	Dividend	Stock Split
31-Mar-92	4,466	25.375	-	
30-Apr-92	4,466	20.625	-	
29-May-92	4,466	21.750	-	
30-Jun-92	4,466	17.125	-	
31-Jul-92	4,466	17.625	-	
31-Aug-92	4,466	13.750	0.200	
30-Sep-92	4,847	14.375	-	
30-Oct-92	4,847	15.625	-	
30-Nov-92	4,847	20.750	-	
31-Dec-92	4,847	20.500	-	
29-Jan-93	4,847	25.250	-	
26-Feb-93	4,847	24.375	-	
31-Mar-93	6,071	20.500	-	5 for 4
30-Apr-93	6,071	18.500	-	
28-May-93	6,071	27.250	-	
30-Jun-93	6,072	33.500	-	
30-Jul-93	6,072	33.000	-	
31-Aug-93	6,072	42.625	0.250	
30-Sep-93	6,072	50.125	-	
29-Oct-93	6,072	47.250	-	
30-Nov-93	9,108	25.750	-	3 for 2
31-Dec-93	9,150	21.250	-	
31-Jan-94	9,150	21.250	-	
28-Feb-94	9,150	20.500	-	
31-Mar-94	9,150	17.625	-	
29-Apr-94	9,150	16.000	-	
31-May-94	9,150	15.250	-	
30-Jun-94	9,150	13.375	-	
29-Jul-94	9,150	13.000	-	
31-Aug-94	9,150	17.000	0.200	
30-Sep-94	9,150	14.125	-	
31-Oct-94	9,150	16.125	-	
30-Nov-94	9,150	14.250	-	
30-Dec-94	9,154	12.250	-	
31-Jan-95	9,154	14.500	-	
28-Feb-95	9,154	17.375	-	
31-Mar-95	9,154	16.125	-	
28-Apr-95	9,154	15.625	-	
31-May-95	9,154	17.500	-	
30-Jun-95	9,154	23.000	-	
31-Jul-95	9,154	27.625	-	
31-Aug-95	9,154	28.625	0.250	
29-Sep-95	11,442	25.500	-	5 for 4
31-Oct-95	11,442	19.750	-	
30-Nov-95	11,442	19.750	-	
29-Dec-95	11,442	24.750	-	
31-Jan-96	11,452	23.625	-	
29-Feb-96	11,452	24.625	-	
29-Mar-96	11,452	33.375	-	
30-Apr-96	11,452	36.250	-	
31-May-96	11,458	36.625	-	
28-Jun-96	11,458	37.125	-	
31-Jul-96	11,501	37.625	-	
30-Aug-96	11,501	37.375	0.220	
30-Sep-96	11,501	37.875	-	

EXHIBIT 6   Stock Return Data for Investment Service Firms, Internet Firms, and the Aggregate Stock Market

Source: Center for Research on Security Prices, University of Chicago.

Date	A.G. Edwards	Bear Stearns	Lehman Bros	Meckler-media	Merrill Lynch	Morgan Stanley Dean Witter	Netscape	Paine Webber	Raymond James	Yahoo	VW NYSE, AMEX, & Nasdaq[a]	EW NYSE, AMEX, & Nasdaq[a]
31-Jan-84	0.026040				-0.013280			-0.042860	0.040000		-0.012910	0.005760
29-Feb-84	-0.111680				-0.167330			-0.175370	-0.102560		-0.039170	-0.053810
30-Mar-84	-0.042290				-0.019140			0.073300	-0.050000		0.013450	0.007100
30-Apr-84	0.012050				-0.011710			0.080510	-0.067670		0.002730	-0.019420
31-May-84	-0.017860				-0.044780			-0.113730	-0.072580		-0.052350	-0.050770
29-Jun-84	0.100610				0.119790			0.084960	-0.043480		0.023590	0.013800
31-Jul-84	0.016670				-0.076280			-0.090160	0.018180		-0.020350	-0.047450
31-Aug-84	0.178140				0.304570			0.189190	0.214290		0.112570	0.089620
28-Sep-84	-0.032710				-0.077820			-0.105300	-0.029410		0.000390	0.000270
31-Oct-84	0.024150				0.023630			0.029790	0.015150		0.000130	-0.020890
30-Nov-84	-0.066040				-0.091290			-0.041320	-0.179100		-0.010620	-0.031410
31-Dec-84	-0.017170				-0.013700			-0.046550	-0.054550		0.023790	0.005050
31-Jan-85	0.331610				0.277780			0.431820	0.430770		0.085730	0.122760
28-Feb-85	-0.007780				-0.023190			-0.022220	0.027030		0.017000	0.047140
29-Mar-85	-0.036860				-0.085820			0.026620	0.013160		-0.001930	-0.008530
30-Apr-85	-0.094260				-0.034290			-0.123810	-0.025970		-0.002180	-0.011290
31-May-85	0.085970				0.089360			0.065220	0.013330		0.055870	0.022930
28-Jun-85	0.102500				0.011720			-0.040140	0.039470		0.017190	0.003470
31-Jul-85	-0.064640				0.040930			-0.092530	0.017720		0.000540	0.019510
30-Aug-85	-0.036590				-0.052240			-0.038430	0.025000		-0.004800	-0.003410
30-Sep-85	-0.132490				-0.141730			-0.049180	-0.048780		-0.039650	-0.056140
31-Oct-85	0.088240				0.100920			0.008620	0.000000		0.044570	0.018960
29-Nov-85	0.099100	-0.103450			0.127500			0.197440	0.256410		0.069270	0.053270
31-Dec-85	0.141800	0.193590			0.022300			0.003580	0.015920		0.043060	0.029130
31-Jan-86	0.039710	0.156760			0.152730			0.107140	0.288890		0.009860	0.043400
28-Feb-86	0.149310	0.130840			0.036590			0.068390	0.103450		0.072840	0.062360
31-Mar-86	0.083990	0.128720			0.012230	0.051150		0.036360	0.171880		0.053880	0.047720
30-Apr-86	-0.086830	0.065640			-0.102720	0.013420		-0.137430	-0.100000		-0.008060	0.015840
30-May-86	0.026070	0.003620			-0.008080	-0.062910		0.051530	-0.007410		0.050810	0.036630
30-Jun-86	-0.066370	-0.168520			-0.054610	-0.070670		-0.116500	-0.040600		0.014300	0.008960
31-Jul-86	-0.067630	-0.141920			-0.039710	0.149050		-0.010990	-0.187500		-0.056990	-0.073610
29-Aug-86	0.104660	0.160310			0.145110	-0.119400		0.175930	0.038460		0.056390	0.022110
30-Sep-86	-0.094340	-0.145530			-0.052810	0.160830		-0.015590	-0.092590		-0.079140	-0.060490
31-Oct-86	0.151040	0.217050			0.195120	-0.030890		0.172690	0.081630		0.049440	0.024620
28-Nov-86	-0.022620	-0.057320			-0.074050			-0.075210	-0.056600		0.015170	-0.006280

EXHIBIT 6 (Continued)

Date	AG Edwards	Bear Stearns	Lehman Bros	Mecklermedia	Merrill Lynch	Morgan Stanley Dean Witter	Netscape	Paine Webber	Raymond James	Yahoo	VW NYSE, AMEX, & Nasdaq[a]	EW NYSE, AMEX, & Nasdaq[a]
31-Dec-86	-0.040740	-0.102160			-0.075950	-0.129190		-0.063200	-0.026800		-0.026540	-0.034530
30-Jan-87	0.334950	0.318180			0.198630	0.112910		0.178570	0.319590		0.128370	0.116820
27-Feb-87	0.000000	-0.022990			-0.015430	-0.048610		-0.033540	0.289060		0.047630	0.074950
31-Mar-87	0.044950	-0.024650			-0.002920	0.036500		-0.003500	0.261940		0.023240	0.033090
30-Apr-87	-0.122380	-0.121020			-0.152050	0.005280		-0.084210	-0.116400		-0.017130	-0.019610
29-May-87	-0.023900	-0.028990			-0.041380	0.020320		-0.061150	-0.101800		0.005220	0.000710
30-Jun-87	-0.104650	0.022090			0.010870	-0.003440		0.020490	-0.031200		0.043830	0.022010
31-Jul-87	0.073390	-0.007350			0.100360	0.023490		0.052210	-0.062070		0.044050	0.034700
31-Aug-87	0.027180	0.103700			0.032570	0.069370		0.023050	0.169120		0.037230	0.015590
30-Sep-87	-0.071130	0.080270			-0.031750	0.023730		-0.029960	-0.142640		-0.020740	-0.015510
30-Oct-87	-0.337840	-0.400000			-0.357380	-0.337560		-0.474900	-0.352940		-0.224870	-0.270850
30-Nov-87	-0.174420	-0.145830			-0.153060	-0.163930		-0.021760	-0.113640		-0.072900	-0.052300
31-Dec-87	0.033330	0.023900			0.091460	0.148460		-0.128790	-0.038460		0.070410	0.027940
29-Jan-88	0.080650	0.144580			0.072630	-0.019510		0.113040	0.137600		0.045340	0.078110
29-Feb-88	0.062390	0.157890			0.062500	0.168660		0.109690	-0.035290		0.051610	0.062010
31-Mar-88	-0.035460	-0.054550			-0.064360	0.055560		-0.078010	0.089270		-0.017060	0.034370
29-Apr-88	0.029410	0.019420			0.000000	0.106880		-0.038460	-0.067420		0.011000	0.015250
31-May-88	-0.042860	-0.085710			0.031750	-0.086240		0.032320	-0.048190		0.000940	-0.017020
30-Jun-88	0.159400	0.093750			0.113990	0.275100		0.070310	-0.008610		0.051390	0.048480
29-Jul-88	-0.006490	-0.067310			0.013950	0.004720		-0.036500	0.025640		-0.007180	0.000550
31-Aug-88	-0.039220	-0.041240			-0.050460	-0.015720		0.038180	-0.050000		-0.027940	-0.023710
30-Sep-88	0.084080	0.028670			0.039020	-0.003190		0.036760	0.017370		0.037280	0.018700
31-Oct-88	-0.006330	0.084210			0.051640	0.051280		-0.028370	0.157630		0.017650	-0.011780
30-Nov-88	-0.057320	0.029130			-0.049550	-0.036700		-0.065400	-0.069770		-0.016400	-0.036700
30-Dec-88	0.042970	-0.038100			-0.090050	0.053970		0.015750	0.105000		0.020800	0.019540
31-Jan-89	0.169930	0.178220			0.270830	0.078310		0.116280	0.193180		0.065940	0.063130
28-Feb-89	-0.044690	0.001010			-0.037190	0.032400		0.028060	0.051430		-0.016360	0.002790
31-Mar-89	-0.038830	0.025420			-0.047210	0.006110		-0.047620	-0.009090		0.021550	0.017030
28-Apr-89	-0.006130	-0.041320			0.040540	-0.055060		0.014290	0.018350		0.048530	0.030680
31-May-89	0.154320	0.068710			0.060610	0.137630		0.070700	0.090090		0.039650	0.027370
30-Jun-89	-0.003420	0.034190			-0.061730	-0.017010		-0.026490	0.069420		-0.004980	-0.008330
31-Jul-89	0.178380	0.107440			0.232460	0.110000		0.258500	0.147290		0.077720	0.031610
31-Aug-89	0.087160	0.034850			-0.039430	0.062610		0.016430	-0.013510		0.022280	0.019290
29-Sep-89	0.008270	-0.083970			-0.108210	-0.063830		-0.160430	0.009590		-0.001750	0.004470
31-Oct-89	-0.148150	-0.075000			-0.025100	-0.069580		-0.121020	-0.122450		-0.029380	-0.050950
30-Nov-89	0.103260	-0.034950			-0.086580	0.050940		-0.014200	0.015500		0.017850	-0.008220

EXHIBIT 6 (Continued)

Date	AG Edwards	Bear Stearns	Lehman Bros	Mecklermedia	Merrill Lynch	Morgan Stanley Dean Witter	Netscape	Paine Webber	Raymond James	Yahoo	VW NYSE, AMEX, & Nasdaq[a]	EW NYSE, AMEX, & Nasdaq[a]
29-Dec-89	-0.096750	0.009430			-0.004740	-0.071810		0.000000	-0.061070		0.018280	-0.012170
31-Jan-90	-0.115380	-0.028040			-0.133380	-0.077370		-0.037040	-0.012360		-0.070050	-0.045810
28-Feb-90	0.055900	0.060770			0.000000	0.029540		0.038770	0.148760		0.014980	0.015750
30-Mar-90	0.137410	-0.038460			-0.033330	0.008200		0.044780	0.075400		0.024150	0.022040
30-Apr-90	-0.104170	-0.020000			-0.034480	0.028460		-0.042860	-0.013420		-0.028160	-0.026720
29-May-90	0.203490	0.179290			0.138550	0.129220		0.119700	0.118910		0.088870	0.046650
29-Jun-90	-0.007920	-0.009170			-0.047920	0.024650		0.013420	-0.036590		-0.004300	0.005380
31-Jul-90	-0.058820	-0.083330			0.061110	-0.163230		-0.066230	0.000000		-0.009380	-0.027290
31-Aug-90	-0.081460	-0.097780			-0.132280	-0.068180		-0.113190	-0.101270		-0.091730	-0.109790
28-Sep-90	-0.268570	-0.142860			-0.091460	-0.121950		-0.096770	-0.116340		-0.053870	-0.080490
31-Oct-90	0.046880	-0.097220			-0.046980	-0.012630		-0.151790	-0.048000		-0.012420	-0.056330
30-Nov-90	0.119400	0.124920			0.107140	0.092780		0.126740	0.084030		0.065980	-0.036650
31-Dec-90	0.095730	0.125000			0.070970	0.025940		0.037740	0.144500		0.029540	-0.003870
31-Jan-91	0.202450	0.135800			0.186750	0.101150		0.054550	0.074830		0.049040	0.085250
28-Feb-91	0.168370	0.142610			0.172590	0.184870		0.319510	0.128840		0.075690	0.133650
28-Mar-91	0.136940	0.125000			0.218340	0.177300		0.197370	0.219240		0.028780	0.077820
30-Apr-91	0.019310	0.034190			0.089610	-0.015060		0.054950	0.270830		0.003350	0.031020
31-May-91	0.075760	0.094630			0.086090	0.087560		-0.041460	0.057380		0.040590	0.030340
28-Jun-91	-0.099720	-0.128000			-0.064020	-0.103110		-0.142080	0.063950		-0.044240	-0.034500
31-Jul-91	0.198820	0.110090			0.081430	0.161200		0.095540	-0.041090		0.046830	0.034920
30-Aug-91	0.025220	-0.014880			0.018180	0.029970		0.081630	0.034290		0.026910	0.028570
30-Sep-91	0.202900	0.016950			0.148810	0.063490		0.118920	0.038670		-0.011060	0.008670
31-Oct-91	0.076310	0.058330			0.072540	0.081290		0.202900	0.114260		0.017720	0.023860
29-Nov-91	-0.126870	-0.039760			-0.067630	0.016170		-0.152610	-0.125540		-0.037270	-0.025390
31-Dec-91	0.299660	0.182610			0.231770	0.197180		0.335070	0.217820		0.107040	0.036450
31-Jan-92	-0.056110	0.066180			0.031710	-0.110040		-0.016040	-0.165530		-0.001650	0.149480
28-Feb-92	-0.066430	0.080000			0.019650	-0.008850		0.080430	0.123540		0.013290	0.052010
31-Mar-92	-0.088760	0.077420			-0.015660	-0.013390		-0.045450	0.128840		-0.023680	-0.014120
30-Apr-92	-0.163220	-0.006990			-0.109090	-0.110860		-0.142860	-0.135510		0.013850	-0.032890
29-May-92	0.098700	0.006690			-0.004080	0.050690		0.049140	-0.086490		0.006520	0.005500
30-Jun-92	-0.078430	-0.022220			0.041240	-0.024330		0.023670	-0.014910		-0.019240	-0.039700
31-Jul-92	-0.006130	-0.045450			0.019800	0.097260		0.069360	0.066020		0.039930	0.027280
30-Aug-92	0.043460	-0.014290			0.020580	-0.075180		-0.135350	-0.071860		-0.020760	-0.024440
30-Sep-92	-0.071430	0.016260			0.020150	-0.051850		-0.106920	-0.113030		0.012420	0.011930
30-Oct-92	0.115380	0.024000			0.093830	0.031250		0.140850	0.116790		0.010900	0.016320
30-Nov-92	0.166670	0.100390			0.095710	0.075560		0.197280	0.209150		0.040190	0.067730

EXHIBIT 6 (Continued)

Date	A G Edwards	Bear Stearns	Lehman Bros	Mecklermedia	Merrill Lynch	Morgan Stanley Dean Witter	Netscape	Paine Webber	Raymond James	Yahoo	VW NYSE, AMEX, & Nasdaq[a]	EW NYSE, AMEX, & Nasdaq[a]
31-Dec-92	-0.063840	0.045110			-0.014490	0.051890		0.010360	-0.032430		0.017540	0.035650
29-Jan-93	0.089950	-0.014390			0.098740	0.015700		0.035900	0.137650		0.012330	0.066740
26-Feb-93	-0.019420	-0.005840			0.046650	0.022080		-0.054650	-0.137930		0.005450	-0.007910
31-Mar-93	0.080200	0.081480			0.045870	0.110500		0.089470	0.043660		0.025010	0.030880
30-Apr-93	-0.050690	0.089040			-0.010530	-0.064450		-0.072460	0.005490		-0.025510	-0.012760
28-May-93	-0.052430	0.133330			0.079430	0.102300		0.136460	0.038250		0.029420	0.037950
30-Jun-93	0.051550	0.050280			0.069310	0.051440		0.073730	0.003370		0.005130	0.011970
30-Jul-93	0.063730	0.026600			0.074070	0.019890		0.034330	-0.057890		-0.000760	0.014100
31-Aug-93	0.010140	0.039900			0.118970	0.179360		0.067220	0.154410		0.039340	0.040400
30-Sep-93	0.082570	0.042110			0.010310	0.049770		0.019530	0.087380		0.000610	0.025790
29-Oct-93	0.046610	-0.111110			-0.007400	-0.096260		-0.099620	-0.035710		0.018040	0.040090
30-Nov-93	-0.032390	0.018180			-0.063230	-0.084010		-0.088510	-0.027780		-0.017350	-0.024370
31-Dec-93	-0.032970	-0.016850			-0.074380	-0.013940		0.014080	-0.050000		0.019450	0.016120
31-Jan-94	0.016300	0.114290			0.073210	0.121910		0.097220	0.064960		0.031330	0.048920
28-Feb-94	-0.048130	-0.106670			-0.094710	-0.156850		-0.097050	-0.070920		-0.024090	-0.009490
31-Mar-94	-0.190340	-0.098270	-0.166670	-0.045050	-0.083080	-0.039400		-0.047010	-0.048550		-0.045740	-0.046020
29-Apr-94	-0.013990	0.083330	0.050000	0.000000	-0.010070	-0.037110		-0.007410	-0.040320		0.009830	-0.010820
31-May-94	0.071770	0.019820	0.039680	0.905660	0.063860	-0.025560		-0.007760	-0.003030		0.009500	-0.000270
30-Jun-94	-0.080000	-0.165640	-0.092310	-0.128710	-0.102560	-0.048120		-0.053030	-0.016950		-0.027380	-0.026570
29-Jul-94	0.014490	-0.051470	0.050850	-0.011360	0.046430	0.065930		0.032000	-0.068970		0.030410	0.015470
31-Aug-94	0.150000	0.141090	-0.037100	-0.275860	0.115490	0.155460		0.015190	0.185190		0.042830	0.036790
30-Sep-94	-0.086210	-0.123290	-0.008400	-0.031750	-0.147690	-0.109320		-0.115380	-0.026250		-0.018650	0.004500
31-Oct-94	0.013700	0.015630	0.152540	-0.311480	0.143830	0.052310		0.060870	-0.032260		0.014870	-0.002400
30-Nov-94	-0.060000	-0.029230	0.069120	-0.071430	-0.034920	-0.091010		-0.098690	-0.041670		-0.037070	-0.040570
30-Dec-94	0.043480	-0.016000	-0.006900	0.410260	-0.059210	-0.002110		0.100920	-0.026090		0.012750	-0.012860
31-Jan-95	0.020830	0.081300	0.083330	-0.181820	0.030910	0.019070		0.000000	0.095710		0.020550	0.027710
28-Feb-95	0.224900	0.136840	0.015380	0.155560	0.119450	0.120580		0.166330	0.163930		0.039620	0.027990
31-Mar-95	-0.016000	-0.013330	0.107590	0.730770	0.036550	0.004750		-0.071940	-0.023100		0.026970	0.018740
28-Apr-95	0.039770	0.114860	0.017140	0.566670	0.070590	0.031540		0.062020	0.014490		0.024880	0.025980
31-May-95	-0.010930	0.038180	0.064040	0.517730	0.038680	0.095320		0.160290	0.050000		0.034160	0.020500
30-Jun-95	0.000660	0.055560	-0.015870	0.411210	0.117020	0.077180		-0.044300	0.059320		0.030840	0.048690
31-Jul-95	0.088890	0.035090	-0.064520	-0.006620	0.057140	0.023720		0.086090	0.122580		0.040670	0.055180
31-Aug-95	-0.005100	-0.061020		0.126670	0.042970	0.038860		-0.055120	0.011490		0.009340	0.030380
29-Sep-95	0.098050	0.042420		-0.112430	0.084600	0.116550	0.262630	0.025970	-0.007270		0.036390	0.025990
31-Oct-95	-0.042250	-0.075580		-0.373330	-0.112000	-0.099790	0.408000	0.120250	-0.011490		-0.011150	-0.040580

EXHIBIT 6 (Continued)

Date	A G Edwards	Bear Stearns	Lehman Bros	Mecklermedia	Merrill Lynch	Morgan Stanley Dean Witter	Netscape	Paine Webber	Raymond James	Yahoo	VW NYSE, AMEX, & Nasdaq[a]	EW NYSE, AMEX, & Nasdaq[a]
30-Nov-95	0.065100	0.101890	0.042530	0.510640	0.004680	-0.008620	0.571020	0.011070	0.052330		0.042970	0.017200
29-Dec-95	-0.115740	-0.086210	-0.060770	-0.098590	-0.081080	-0.065220	0.005420	-0.101120	-0.056570		0.015400	0.009780
31-Jan-96	0.052360	0.157230	0.205880	-0.185550	0.120290	0.185740	0.181650	0.037500	0.035290		0.028090	0.033290
29-Feb-96	-0.034830	0.060870	-0.032200	-0.155880	0.013190	-0.015750	-0.379000	-0.036390	0.005680		0.016050	0.031540
29-Mar-96	0.032370	0.020620	0.080810	0.090910	0.054230	0.109330	-0.186270	0.106920	0.021240		0.011200	0.024120
30-Apr-96	-0.055280	0.015150	-0.051400	0.333330	-0.006170	-0.030290	0.469880	-0.051140	0.005560		0.025130	0.057330
31-May-96	0.090430	0.014180	-0.032510	0.156250	0.077430	-0.014930	0.115780	0.053650	0.005520	-0.058820	0.026720	0.061050
28-Jun-96	0.064780	-0.020730	0.010200	0.094590	0.005790	-0.007580	-0.085400	0.085710	0.001320	-0.250000	-0.007660	-0.030600
31-Jul-96	0.009220	-0.047620	-0.065660	-0.172840	-0.068330	-0.004070	-0.365460	-0.115790	-0.077350	-0.142860	-0.053390	-0.078620
30-Aug-96	0.022830	0.045560	-0.084320	0.044780	0.014490	-0.020510	-0.104430	-0.012140	0.119760	0.090280	0.032220	0.044770
30-Sep-96	0.045890	-0.005350	0.224850	0.028570	0.075510	0.041880	0.310950	0.018180	0.041500	0.082800	0.052990	0.028970
31-Oct-96	0.025750	0.016130	-0.028990	-0.034720	0.066410	0.013570	-0.045820	0.119050	0.005150	-0.070590	0.013940	-0.019970
29-Nov-96	0.046030	0.170370	0.161190	0.165470	0.146620	0.196520	0.262710	0.154260	0.164100	-0.031650	0.065730	0.024770
31-Dec-96	0.081120	0.013640	0.077250	-0.024690	0.015580	-0.049900	0.017900	0.041290	0.065550	-0.111110	-0.011350	-0.001420
31-Jan-97	0.011150	0.076230	0.007970	0.050630	0.032210	0.003500	-0.334070	0.280000	0.070540	0.992650	0.053040	0.061720
28-Feb-97	0.044120	0.055000	0.065140	0.337350	0.144730	0.105030	-0.231020	-0.089580	0.034880	-0.070250	-0.000880	-0.010430
31-Mar-97	-0.128730	-0.125000	-0.130110	-0.135140	-0.105470	-0.069310	0.032190	-0.134100	-0.050040	-0.134000	-0.044390	-0.047380
30-Apr-97	0.138210	0.161900	0.162390	0.062500	0.110920	0.077870	-0.099790	0.203540	0.108700	0.213330	0.042460	-0.021390
30-May-97	0.060710	0.070490	0.207650	-0.245100	0.115790	0.075250	0.092380	0.048530	0.176470	-0.054950	0.071250	0.085170
30-Jun-97	0.156360	0.051920	-0.012200	-0.012990	0.125000	0.046820	0.084570	-0.014080	-0.001640	0.093020	0.044200	0.044240
31-Jul-97	-0.011700	0.199270	0.231480	0.065790	0.181340	0.220960	0.144250	0.148210	0.057080	0.602840	0.076310	0.048620
29-Aug-97	-0.059170	-0.031440	-0.121600	-0.006170	-0.124050	-0.082240	0.085180	-0.043550	0.002160	0.053100	-0.036450	0.027020

[a] "VW (EW) NYSE, AMEX & Nasdaq" represents the value-weighted (equal-weighted) index of all U.S. publicly traded firms.

Pioneer Petroleum Corporation

One of the critical problems confronting management and the board of Pioneer Petroleum Corporation in July 1991 was the determination of a minimum acceptable rate of return on new capital investments. The company's basic capital budgeting approach was to accept all proposed investments with a positive net present value when discounted at the appropriate cost of capital. At issue was how the appropriate discount rate would be determined.

The company was weighing two alternative approaches for determining a minimum rate of return: (1) a single cutoff rate based on the company's overall weighted average cost of capital, and (2) a system of multiple cutoff rates that reflected the risk-profit characteristics of the several businesses or economic sectors in which the company's subsidiaries operated. The issue had assumed increased importance because of management's decision to extend the use of the cutoff rate to the evaluation of existing operations and investments. It was planned to evaluate divisional managers on the basis of their net profits after the deduction of a charge for capital employed by the division.

Pioneer Petroleum had been formed in 1924 through the merger of several formerly independent firms operating in the oil refining, pipeline transportation, and industrial chemicals fields. Over the next 60 years, the company integrated vertically into exploration and production of crude oil and marketing refined petroleum products, and horizontally into plastics, agricultural chemicals, and real estate development. It was restructured in 1985 as a hydrocarbons-based company, concentrating on oil, gas, coal, and petrochemicals. Pioneer was one of the primary producers of Alaskan crude, and in 1990, Alaska provided 60% of Pioneer's domestic petroleum liquids production. Pioneer was also one of the lowest-cost refiners on the West Coast and had an extensive West Coast marketing network. Pioneer's Alaskan crude production provided all of the crude oil for its West Coast refining and marketing operations. This integration required collaboration and coordination among divisions to optimize overall performance and to decrease overall risk.

In 1990 total revenues exceeded $15.6 billion and net income was over $1.5 billion. (See Exhibit 1 for a financial summary of recent operations.) Volatile oil prices were a major concern for Pioneer. In 1990, for example the price of West Texas Intermediate crude during the first quarter was $21.80 per barrel, and it reached a low of about $15.50 in mid-June. With the Iraqi invasion of Kuwait, crude prices rose to more than $40 per barrel, but they fell to about $25 per barrel as the year ended. The average price of West Texas Intermediate crude during 1990 was about $24.50 per barrel. The management of Pioneer emphasized the importance of operational and financial flexibility to respond to these price swings.

Pioneer spent about $3.1 billion on capital expenditures in 1990 and forecasted capital expenditures of almost $4.5 billion in 1991. Some of these expenditures, like the addition of a sulfur recovery facility and the improvement of a coker, allowed the refineries to process the heavy Alaskan crude oil more efficiently. These types of investments had provided good returns, and the light product yield in Pioneer's refineries was substantially higher than the industry average. Pioneer also invested in exploration and development, as it replaced all its 1990 production with new reserves. Most of this

exploration was in the lower 48 states and the Gulf of Mexico. Investments were also directed to environmental projects, and Pioneer anticipated spending an additional $3 billion in the next 5 years to meet the new standards of the 1990 Clean Air Act amendments and the California Air Resources Board's regulations. These environmental regulations also provided opportunities for Pioneer to capitalize on its strengths. Pioneer's gasolines were among the cleanest burning in the industry, and its chemical unit produced about one-third of the world's supply of methyl tertiary butyl ether (MTBE), which was used to make cleaner-burning gasolines. The market for MTBE had been growing, and the new regulations were expected to lead to even higher growth. Also, Pioneer's SMOGMAN service centers specialized in state-required smog checks and related repairs.

Weighted Average Cost of Capital

The company's weighted average cost of capital was calculated in three steps: first, the expected future target proportions of debt and equity in the company's capital structure were estimated; second, costs were assigned to each of these capital components; third, a weighted average cost of capital was calculated on the basis of these proportions and costs (see Table A).

There was a general consensus in management on the future mix of debt and equity in Pioneer's capital structure. A firm policy had been adopted that debt should represent approximately 50% of total capital (defined as total debt plus book equity) to balance the competing objectives of enhancing the returns to shareholders and maintaining financial flexibility. The company was committed to using its dividend and stock repurchase program to maintain appropriate financial leverage. Cash dividends increased by 10% in both 1990 and 1991. Its debt was A rated.

Assigning an after-tax cost to debt was straightforward. Pioneer's investment bankers, Steven, Mitchell, O'Hara, forecasted early in 1990 that the company's future debt issues would require a coupon of 12%, assuming continuation of its debt policy and A rating. At a 34% tax rate, this represented a 7.9% after-tax cost.

The cost of equity had been more difficult to conceptualize or to estimate. After prolonged debate, Pioneer decided to use the current earnings yield on the stock as the cost of both new equity and retained earnings. Advocates pointed out that no dilution of earnings per share would occur if the company earned at least this return on new equity. With earnings per share estimated at $6.15 in 1990 and a market price of $63, cost of equity had been set at 10%.

Divisional Costs of Capital

The alternative proposed by the supporters of multiple cutoff rates in lieu of a single companywide rate involved determining the cost of capital for each division. The divisional rate would reflect the risks inherent in each of the economic sectors or industries

TABLE A **1990 Weighted Average Cost of Capital Calculation**

Source	Target Proportion of Future Capital Components	Estimated Future After-Tax Cost	Weighted Cost
Debt	.50	7.9%	4.0%
Equity	.50	10.0	5.0
			9.0%

in which the company's principal operating subsidiaries worked. For example, the divisional cost of capital for production and exploration was 20%, and the divisional cost of capital for transportation was 10%. All the other divisional rates fell within this range. The suggestion was that these multiple cutoff rates determined the minimum acceptable rate of return on proposed capital investments in each of the main operating areas of the company and represented the rate charged to each of the various profit centers for capital employed. However, there were still areas of ambiguity. For example, it was unclear whether all environmental projects would have the same discount rate or the discount rate corresponding to the division.

The divisional cost of capital would be calculated using a weighted average cost of capital approach for each operating sector. The calculations would follow three steps: first, an estimate would be made of the usual debt and equity proportions of independently financed firms operating in each sector. Several such independents competed against each of the company's affiliates. Second, the costs of debt and equity given these proportions and sectors would be estimated in accordance with the concepts followed by the company in estimating its own cost of capital. Third, these costs and proportions would be combined to determine the weighted average cost of capital, or minimum acceptable rate of return, for net present value discounting purposes in each sector.

These multiple hurdle or discount rates had been calculated for several periods in the past, and it invariably turned out that their weighted average, when weighted according to the company's relative investment in each sector, exceeded the company's actual overall average cost of capital. The difference was attributed to the fact that the divisional cost of capital overlooked the risk diversification benefits of many investments undertaken by Pioneer Petroleum. As compared to nonintegrated enterprises operating in any given branch, a vertically and horizontally integrated firm such as Pioneer Petroleum enjoyed some built-in asset diversification and important captive markets between certain of its vertically integrated parts. For example, the risks associated with a refinery investment by an integrated company like Pioneer Petroleum were much less than for an identical investment made by an independent. It was proposed that this diversification premium be allocated back and deducted from the multiple subsidiary discount rates as calculated previously in proportion to the relation between the investment in each subsidiary and the company's total assets.

The Management Discussion

As management and the board of Pioneer Petroleum began their latest review of the alternatives of using single or multiple minimum acceptable cutoff rates, the officers of the operating subsidiaries were asked to restate their positions.

Those supporting the use of a single target rate contended that the stockholders of Pioneer Petroleum expected the company to invest their funds in the highest return projects available. They suggested that, without exception, the affiliates backing multiple rates were those that were unable to compete effectively for new funds when measured against the corporate group's actual cost of capital. Furthermore, it was not obvious that the categories suggested by the advocates of multiple rates were very helpful in grouping projects according to their riskiness. For example, recent experience in tankers had been disastrous for many companies, and yet tanker investments would be initiated by the transportation division and would therefore be subjected to an unrealistically low hurdle rate.

The proponents of multiple divisional hurdle rates argued that a single companywide cost of capital subsidized the higher-risk divisions at the expense of the lower-risk divisions. Because the cost of capital was too high for the low-risk divisions, too few

low-risk investments were made. In the high-risk divisions too much investment occurred because the hurdle rate was too low. As evidence, proponents of multiple rates noted that Pioneer was the only major company that continued to invest heavily in exploration and development, and that it lagged behind its competitors in marketing and transportation investment. The proponents also argued that the companywide cost of capital was too low, and that investments should be required to earn at least as much as an investment in common stocks. The average return since 1980 on the S&P index of common stocks of 16.25% substantially exceeded the 9% companywide cost of capital (see Exhibit 2). If Pioneer was serious about competing over the long run in industries with such disparate risk-profit characteristics, it was absolutely essential to relate internal target rates of return to the individual businesses.

EXHIBIT 1 Financial Summary, 1983–1990

	1983	1984	1985	1986	1987	1988	1989	1990
Sales ($ millions)	$20,397	$20,268	$18,594	$12,687	$14,182	$15,259	$13,417	$15,646
Net income ($ millions)	1,133	326	(297)	428	923	1,211	1,542	1,555
Earnings per share	$ 3.38	$ 2.27	$ .86	$ 1.65	$ 3.41	$ 4.43	$ 5.59	$ 6.15
Dividends per share	1.75	1.50	1.20	2.00	2.00	2.00	2.20	2.45
Return on book equity	15.9%	13%	4.8%	11.4%	19.6%	21.2%	26.3%	25%
Beta								.8

EXHIBIT 2 Information on U.S. Capital Markets, 1980–1990

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Yields on newly issued Aa industrials	11.8%	14.0%	13.4%	11.9%	12.9%	11.4%	9.4%	9.7%	9.9%	9.5%	9.4%
Yields on 90-day T-bills	11.2	14.7	10.5	8.8	9.9	7.7	6.2	5.5	6.4	3.4	7.8
Realized returns on S&P 500 index of common stocks	32.4	-4.9	21.4	22.5	6.3	32.2	18.5	5.3	16.8	31.5	-3.2

Leveraged Betas and the Cost of Equity

A stock's expected return, its dividend yield plus expected price appreciation, is related to risk. Risk-averse investors must be compensated with higher expected returns for bearing risk. One source of risk is the financial risk incurred by shareholders in a firm that has debt in its capital structure. The objective of this note is to delineate a methodology for measuring the risk associated with financial leverage and estimating its impact on the cost of equity capital.

Financial Leverage and Risk

The presence of debt in a firm's capital structure has an impact on the risk borne by its shareholders. In the absence of debt, shareholders are subjected only to basic business or operating risk. This business risk is determined by factors such as the volatility of a firm's sales and its level of operating leverage. As compensation for incurring business risk, investors require a premium in excess of the return they could earn on a riskless security such as a Treasury bill. Thus, in the absence of financial leverage, a stock's expected return can be thought of as the risk-free rate plus a premium for business risk.

The addition of debt to a firm's capital structure increases the risk borne by its shareholders. One course of additional risk is the increased risk of financial distress (e.g., bankruptcy). A second source is the effect of financial leverage on the volatility of shareholders' returns. The fixed obligations associated with debt amplify the variations in a firm's operating cash flows. The result is a more volatile stream of shareholders' returns. For investors to hold the shares of firms with debt in their capital structures, they must be compensated for the additional risk generated by financial leverage. The additional risk premium associated with the presence of debt in a firm's capital structure is the financial risk premium.

The expected return on a firm's stock is the risk-free rate plus a premium for risk:

$$\text{Expected return} = \text{Risk-free rate} + \text{Risk premium}$$

The risk premium consists of a premium for business risk and a premium for financial risk:

$$\text{Expected return} = \frac{\text{Risk-free}}{\text{rate}} + \frac{\text{Business risk}}{\text{premium}} + \frac{\text{Financial risk}}{\text{premium}}$$

This relation can be expressed in symbols:

$$R_S = R_F + BRP + FRP$$

Thus, the expected return on a firm's stock can be decomposed into three components. These components are: (1) the return on a riskless security, R_F; (2) a premium reflecting the firm's basic business (or operating) risk in the absence of financial leverage, BRP; and (3) a premium for the additional risk created by the existence of debt in a firm's capital structure, FRP. This relation is illustrated graphically in Exhibit 1. The capital asset pricing model (CAPM) provides a methodology for measuring these risk premiums and estimating the impact of financial leverage on expected returns.

The Effect of Financial Leverage on Beta

The CAPM is an idealized representation of the manner in which capital markets price securities and thereby determine expected returns.[1] Since the CAPM models the risk/expected return trade-off in the capital markets, it can be used to examine the impact of financial leverage on expected returns.

In the CAPM, systematic (or market-related) risk is the only risk relevant in the pricing of securities and the determination of expected returns. Systematic risk is measured by beta (β). The CAPM provides a measure of a stock's risk premium employing beta, which facilitates the estimation of the stock's expected return. In general,

$$R_S = R_F + \text{Risk premium}$$

If the CAPM correctly describes market behavior,

$$R_S = R_F + \beta (R_M - R_F)$$

A stock's expected return is equal to the risk-free rate, R_F, plus a premium for risk. With the CAPM, the risk premium is beta times the expected return on the market, R_M, minus the risk-free rate. This basic CAPM expression is known as the security market line, the SML.

If a firm has no debt in its capital structure, the stock's risk premium consists solely of a business risk premium. The stock's beta therefore reflects the systematic risk inherent in the firm's basic business operations. With no financial leverage, this beta is the stock's unlevered beta, β^U. This unlevered beta is the beta the stock would have if the firm had no debt in its capital structure.

The presence of debt in a firm's capital structure results in additional risk. The systematic risk inherent in the firm's basic business operations is amplified by financial leverage. With financial leverage, the beta on a firm's stock reflects both business and financial risk. This beta is called a levered beta, β^L. Employing a levered beta in the CAPM expression, the SML measures both the business risk premium and the financial risk premium. The beta published by various investment advisory services reflects *both* the business and the financial risk experienced during the time period over which the beta was determined.

Under the assumptions of the CAPM there is a simple relation between levered and unlevered betas:

$$\beta^L = \beta^U(1 + D/E)$$

Alternatively,

$$\beta^U = \frac{\beta^L}{1 + D/E}$$

A stock's levered beta is equal to its unlevered beta multiplied by a factor that includes the firm's ratio of debt to equity, D/E. Therefore, a stock's beta (and its expected return) increases as its debt ratio increases. The increase in beta reflects the additional systematic risk generated by financial leverage. The resulting increase in expected return reflects the increase in the financial risk premium required by investors as compensation for additional risk.[2]

[1] For a more complete description of the CAPM, see the note "Diversification, the Capital Asset Pricing Model, and the Cost of Equity Capital."

[2] This relation is only valid when the firm's debt does not have any systematic risk. It would be inappropriate to use this approach when the firm has risky debt outstanding.

These results can be employed to estimate the impact on expected return of a change in a firm's capital structure. The approach is illustrated in Exhibit 2. Assuming the firm currently employs debt in its capital structure, its observed beta will be the levered beta associated with its current ratio of debt to equity. The beta the stock would have if the firm changed its debt ratio can be estimated by a two-step procedure. The first step involves unlevering the stock's beta. Given its current debt ratio, D/E, and its current beta, β^L, its unlevered beta, β^U, can be calculated from the foregoing equation. The second step consists of relevering the stock's beta to reflect a change in capital structure. Given β^U and the new hypothetical debt ratio, D/E, the other equation presented can be used to calculate the stock's new levered beta, β^L. This levered beta is an estimate of the beta the stock would have if the debt ratio changed to that employed in the second stage of the procedure. The resulting estimate of beta can then be plugged into the familiar CAPM expression presented earlier, the security market line, to estimate the stock's expected return associated with the proposed debt ratio.

An example of levering and unlevering beta and expected return is presented in Exhibit 3 for General Electric (GE). An increase in GE's ratio of debt to equity from approximately .05 to .33 would result in an increase in its beta from 1.15 to 1.46. The increase in financial risk would result in an increase in the financial risk premium required by investors. Therefore, the estimated expected return on GE's stock rises from about 14% to roughly 16%. Similarly, a decrease in GE's debt ratio would decrease its beta and expected return.

The Decomposition of Expected Return into the Risk-Free Rate, Business Risk Premium, and Financial Risk Premium

The CAPM can be employed to decompose a stock's expected return into its basic components. This can be accomplished by combining the equation relating levered and unlevered beta and the basic CAPM expression, the SML. The general and CAPM versions of this decomposition are

$$\text{Expected return} = \frac{\text{Risk-free}}{\text{rate}} + \frac{\text{Business risk}}{\text{premium}} + \frac{\text{Financial risk}}{\text{premium}}$$

$$R_S = R_F + \beta^U(R_M - R_F) + \beta^U(D/E)(R_M - R_F)$$

Alternatively,

$$R_S = R_F + \beta^U(R_M - R_F) + (\beta^L - \beta^U)(R_M - R_F)$$

Thus, the expected return on a stock can be decomposed into (1) the risk-free rate, (2) a business risk premium preset with no debt in the firm's capital structure (i.e., $D/E = 0$), and (3) the additional risk premium created by the existence of debt in the capital structure. With no debt in a firm's capital structure, the expected return on its stock consists only of the first two components. The effects of financial leverage are captured entirely in the third component. With the CAPM, this third component, the financial risk premium, is simply the increase in its beta, $\beta^L - \beta^U$, caused by financial leverage, multiplied by the risk premium on the market as a whole, $R_M - R_F$. Additional debt amplifies the systematic risk inherent in a firm's basic business operations and drives up the beta and expected return on its stock.

The example presented in Exhibit 4 demonstrates the use of these concepts to decompose the expected returns on two stocks, Procter & Gamble (P&G) and Colgate-Palmolive. P&G's business (or operating) risk is somewhat greater than Colgate's. Colgate's unlevered beta is .88. versus .92 for P&G, leading to a business risk premium of

6.16% for Colgate compared with 6.44% for P&G. Colgate's basic business risk is amplified by the higher level of debt in its capital structure, however, resulting in a financial risk premium which is roughly .70 percentage points more than P&G's. Thus, Colgate's overall risk premium—business risk premium plus financial risk premium—is actually larger than P&G's. Consequently, Colgate's levered beta and the expected return on its stock reflect its higher level of business and financial risk relative to P&G.

An example of the decomposition of the expected return on GE's stock at different debt ratios is presented in Exhibit 5. Note that changing the firm's debt ratio affects only its financial risk premium. As expected, the financial risk premium, the levered beta, and the expected return on GE's stock all increase with additional financial leverage.

Application to Corporate Finance

The CAPM facilitates the examination of the impact of financial leverage on expected returns. It therefore has an important application to corporate finance. A firm's cost of equity capital, k_E, is the expected (or required) return on the firm's stock. If the firm cannot expect to earn at least k_E on the equity-financed portion of its investments, funds should be returned to its shareholders, who can earn k_E on other securities of the same risk level in the financial marketplace. The CAPM can be used by financial managers to obtain an estimate of k_E and to examine the impact on k_E of financial leverage.

A firm's cost of equity capital is by definition the expected return on its stock. Since the basic CAPM expression, the security market line, yields estimates of expected returns, it can also be used to estimate costs of equity capital. Similarly, the CAPM concepts and techniques relating expected returns and financial leverage can be applied in examining the impact of financial leverage on the cost of equity capital. *The results presented earlier can be applied directly simply by recognizing that R_S, a stock's expected return, is equal to k_E, its cost of equity capital.*

To apply these concepts requires as inputs the risk-free rate, R_F, the expected return on the market as a whole, R_M, the stock's beta, and the ratio of debt to equity, D/E. As with any CAPM application, R_F can be estimated as the return on Treasury bills or bonds, and R_M can be estimated as the expected return on the Standard and Poor's Index of 500 Stocks. Betas can be estimated by linear regression and are also published by various investment advisory services. In estimating the debt ratio, the CAPM approach assumes that market values of debt and equity are employed. By definition, market values reflect the current values of debt and equity. In contrast, book values represent values prevailing in the past when the securities were issued. In addition, betas are themselves market-determined variables. Nevertheless, for convenience, book value debt ratios are often used in practice.

To examine the relation between the cost of equity capital and financial leverage, the estimated inputs are simply plugged into the equations presented earlier. The resulting expected returns are, by definition, costs of equity capital. The approach demonstrates that a firm's cost of equity is positively related to the level of debt in its capital structure, and the increment to the cost of equity generated by financial leverage can be estimated in the manner described earlier.

Conclusion

The capital asset pricing model is based upon extremely simple and clearly unrealistic assumptions. Empirical studies demonstrate that, consistent with the CAPM, there is a strong relation between stock returns and risk as measured by beta. Studies also generally

support the relation between returns and financial leverage posited by the CAPM. However, these studies are by no means conclusive in establishing the validity of the CAPM. The application of the CAPM is also limited by problems associated with the model's inputs. Use of the model requires ad hoc estimates of several inputs, and the betas employed are subject to substantial estimation errors.

Thus, the CAPM should not be viewed as a wholly reliable method of estimating the cost of equity and examining the impact of financial leverage. However, in view of the deficiencies in alternative approaches, the CAPM represents a useful tool that managers may apply to an inherently difficult area of corporate finance. Finally, an alternative approach relating expected returns and financial leverage is outlined briefly in the Appendix.

Appendix

The CAPM methodology described in this note incorporates the implicit assumption that the firm's cost of debt is equal to the risk-free rate. An alternative approach that relaxes this restrictive assumption is presented in this Appendix. This more general approach examines the relation between the cost of equity capital and financial leverage. This relation expressed in cost of equity terms is

$$k_E^L = k_E^U + (k_E^U - k_D)\, D/E$$

where

k_E^L = levered cost of equity capital
k_E^U = unlevered cost of equity
k_D = cost of debt
D/E = ratio of debt to equity

In this equation k_E^U is the cost of equity if the firm has no debt in its capital structure. Therefore, k_E^U reflects the risk-free rate and a premium for business risk. The second term on the right-hand side of the equation captures the impact of financial leverage—the financial risk premium. With additional debt, the increase in the levered cost of equity is related to the difference between the unlevered cost of equity and the cost of debt. Solving for k_E^U, the equation becomes

$$k_E^U = \frac{k_E^L + k_D(D/E)}{1 + D/E}$$

Thus, given estimates of k_E^L, k_D, and D/E, the firm's unlevered cost of equity, k_E^U, can be calculated. The value of k_D will change with the degree of leverage in the firm's capital structure. Thus, the schedule of debt cost versus leverage must be known to estimate a new equity capital cost at a new debt ratio. To estimate the levered cost of equity associated with some new debt ratio, k_E^U, the new k_D, and the proposed D/E can be used as inputs in the previous equation.

This alternative approach can be employed in a manner analogous to that described previously. The equations can be manipulated to yield estimates of the cost of equity associated with various debt ratios and to decompose the cost of equity into its components. The advantage of this approach is that it is not tied exclusively to the assumptions of the CAPM. Specifically, it avoids the assumption that the firm's cost of debt is the risk-free rate. The advantage of the CAPM approach is the simple methodology it provides for levering and unlevering betas.

EXHIBIT 1
The Relation between a Firm's Financial Leverage and the Expected Return on Its Stock
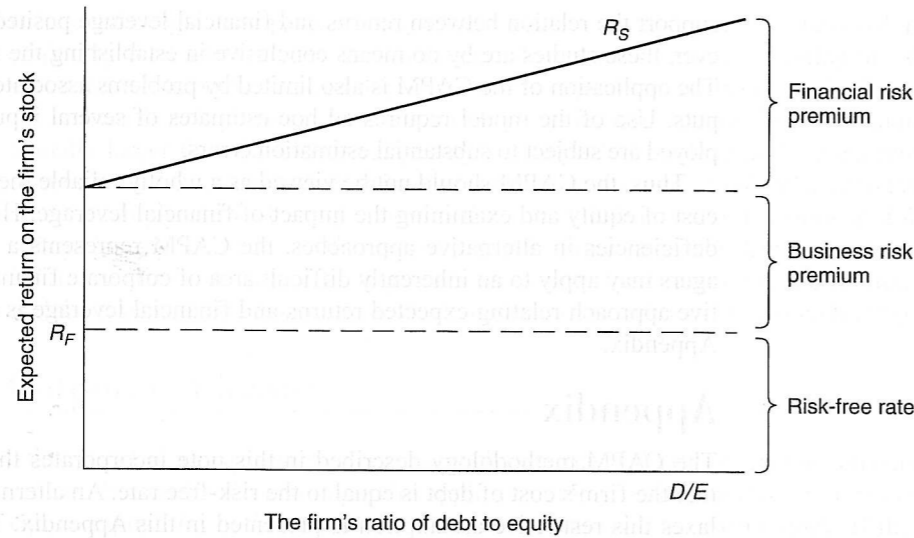
EXHIBIT 2
The Relation of Expected Return and Financial Leverage with the CAPM

Definitions:
R_S = stock's expected return
R_M = expected return on the market
D/E = firm's ratio of debt to equity
β^L = (levered) beta on the stock of a firm if $D/E > 0$
β^U = (unlevered) beta on the stock of the same firm if $D/E = 0$

CAPM equations:
Security market line (SML): $R_S = R_F + \beta(R_M - R_F)$
Levering beta: $\beta^L = \beta^U(1 + D/E)$

Unlevering beta: $\beta^U = \dfrac{\beta^L}{1 + D/E}$

To estimate the impact of a change in capital structure:
Step 1: Estimate the unlevered beta.
   Given: current D/E and current estimated β^L.
   Unlever the beta by solving: $\beta^U = \dfrac{\beta^L}{1 + D/E}$
Step 2: Estimate the levered beta associated with the new D/E.
   Given: β^U from Step 1 and the new D/E.
   Lever the beta by solving: $\beta^L = \beta^U(1 + D/E)$

The estimated beta for the new debt ratio is then used in the SML equation to estimate the expected return associated with the new D/E.

EXHIBIT 3   **Sample Analysis of the Impact on Expected Return of Financial Leverage with the CAPM, General Electric Company**

Assumptions:
$R_M = 13\%$; $R_F = 6\%$
GE's current $D/E = .05$
Current $\beta^L_{GE} = 1.15$
Unlevering GE's beta:

$$\beta^U_{GE} = \frac{\beta^L_{GE}}{1 + D/E} = \frac{1.15}{1 + 0.5} = 1.10$$

CAPM:

Equations:	Levering Beta	Security Market Line (SML)
	$\beta^L_{GE} = \beta^U_{GE}(1 + D/E)$	$R_S = R_F + \beta_{GE}(R_M - R_F)$
Example:		
Proposed $D/E = 0.50$	$\beta^L_{GE} = 1.10(1 + 50) = 1.65$	$R_S = 6\% + 1.65(13\% - 6\%) = 17.6\%$

Summary results:

Debt Ratio	GE's Beta	GE's Expected Return, R_S
Currently, $D/E = .05$	1.15	14.0%
Unlevered, $D/E = 0$	1.10	13.7%
Proposed, $D/E = .33$	1.46	16.2%
Proposed, $D/E = .50$	1.65	17.6%

EXHIBIT 4   Sample Decomposition of Expected Return, Procter & Gamble Company and Colgate-Palmolive Company

	Procter & Gamble	Colgate-Palmolive
Unlevering betas:		
Debt ratio	$D/E = .14$	$D/E = .31$
Levered beta	$\beta^L_{PG} = 1.05$	$\beta^L_{CG} = 1.15$
To unlever beta	$\beta^U = \dfrac{\beta^L}{1 + D/E}$	
Unlevered beta	$\beta^U_{PG} = .92$	$\beta^U_{CP} = .88$

Expected return calculation and decomposition:
Assumptions: $R_M = 13\%$; $R_F = 6\%$
Definitions: BRP = business risk premium; FRP = financial risk premium

	Procter & Gamble	Colgate-Palmolive
Expected return decomposition:	$R_{PG} = R_F + \beta^U_{PG}(R_M - R_F) + (\beta^L_{PG} - \beta^U_{PG})(R_M - R_F)$	$R_{CP} = R_F + \beta^U_{CP}(R_M - R_F) + (\beta^L_{CP} - \beta^U_{CP})(R_M - R_F)$
Substituting assumed values:	$R_{PG} = 6\% + .92(13\% - 6\%) + (1.05 - .92)(13\% - 6\%)$	$R_{CP} = 6\% + .88(13\% - 6\%) + (1.15 - .88)(13\% - 6\%)$
Results:	$13.35\% = 6\% + 6.44\% + .91\%$	$14.05\% = 6\% + 6.16\% + 1.89\%$
	$R_{PG} = R_F + BRP_{PG} + FRP_{PG}$	$R_{CP} = R_F + BRP_{CP} + FRP_{CP}$

EXHIBIT 5
Sample Decomposition of Expected Return at Various Debt Ratios, General Electric Company

From Exhibit 3:		
	Debt Ratio	**GE's Beta**
Assumptions:		
$R_M = 13\%$	Currently, $D/E = .05$	$\beta^L_{GE} = 1.15$
$R_F = 6\%$	Unlevered, $D/E = 0$	$\beta^U_{GE} = 1.10$
	Proposed, $D/E = .33$	$\beta^L_{GE} = 1.46$
	Proposed, $D/E = .50$	$\beta^L_{GE} = 1.65$

Expected return decomposition:

$$R_{GE} = R_F + BRP_{GE} + FRP_{GE}$$
$$R_{GE} = R_F + \beta^U_{GE}(R_M - R_F) + (\beta^L_{GE} - \beta^U_{GE})(R_M - R_F)$$

Example:
Proposed
$D/E = .50$
$$R_{GE} = 6\% + 1.10(13\% - 6\%) + (1.65 - 1.10)(13\% - 6\%)$$
$$17.55\% = 6\% + 7.70\% + 3.85\%$$

Summary results:

Debt Ratio	$R_{GE} = R_F + BRP_{GE} + FRP_{GE}$
Currently, $D/E = .05$	$14.05\% = 6\% + 7.70\% + .35\%$
Unlevered, $D/E = 0$	$13.70\% = 6\% + 7.70\% + 0\%$
Proposed, $D/E = .33$	$16.22\% = 6\% + 7.70\% + 2.52\%$
Proposed, $D/E = .50$	$17.55\% = 6\% + 7.70\% + 3.85$

Marriott Corporation: The Cost of Capital (Abridged)

In April 1988, Dan Cohrs, vice president of project finance at the Marriott Corporation, was preparing his annual recommendations for the hurdle rates at each of the firm's three divisions. Investment projects at Marriott were selected by discounting the appropriate cash flows by the appropriate hurdle rate for each division.

In 1987, Marriott's sales grew by 24% and its return on equity (ROE) stood at 22%. Sales and earnings per share had doubled over the previous 4 years, and the operating strategy was aimed at continuing this trend. Marriott's 1987 annual report stated:

> We intend to remain a premier growth company. This means aggressively developing appropriate opportunities within our chosen lines of business—lodging, contract services, and related businesses. In each of these areas, our goal is to be the preferred employer, the preferred provider, and the most profitable company.

Cohrs recognized that the divisional hurdle rates at Marriott would have a significant impact on the firm's financial and operating strategies. As a rule of thumb, increasing the hurdle rate by 1% (for example, from 12% to 12.12%), decreased the present value of project inflows by 1%. Because costs remained roughly fixed, these changes in the value of inflows translated into changes in the net present value of projects. Figure I shows the substantial impact of hurdle rates on the anticipated net present value of projects. If hurdle rates increased, Marriott's growth would be reduced, as once profitable projects would no longer meet the hurdle rates. Conversely, if hurdle rates decreased, Marriott's growth would accelerate.

Marriott also considered using the hurdle rates to determine incentive compensation. Annual incentive compensation constituted a significant portion of total compensation, ranging from 30% to 50% of base pay. Criteria for bonus awards depended on specific job responsibilities but often included the earnings level, the ability of managers to meet budgets, and overall corporate performance. There was some interest, however, in basing the incentive compensation, in part, on a comparison of the divisional return on net assets and the market-based divisional hurdle rate. The compensation plan would then reflect hurdle rates, making managers more sensitive to Marriott's financial strategy and capital market conditions.

Company Background

Marriott Corporation began in 1927 with J. Willard Marriott's root beer stand. Over the next 60 years, the business grew into one of the leading lodging and food service companies in the United States. Marriott's 1987 profits were $223 million on sales of $6.5 billion. See Exhibit 1 for a summary of Marriott's financial history.

Marriott had three major lines of business: lodging, contract services, and restaurants. Exhibit 2 summarizes its line-of-business data. Lodging operations included 361 hotels,

FIGURE I
Typical Hotel Profit and Hurdle Rates

Source: Casewriter's estimates.
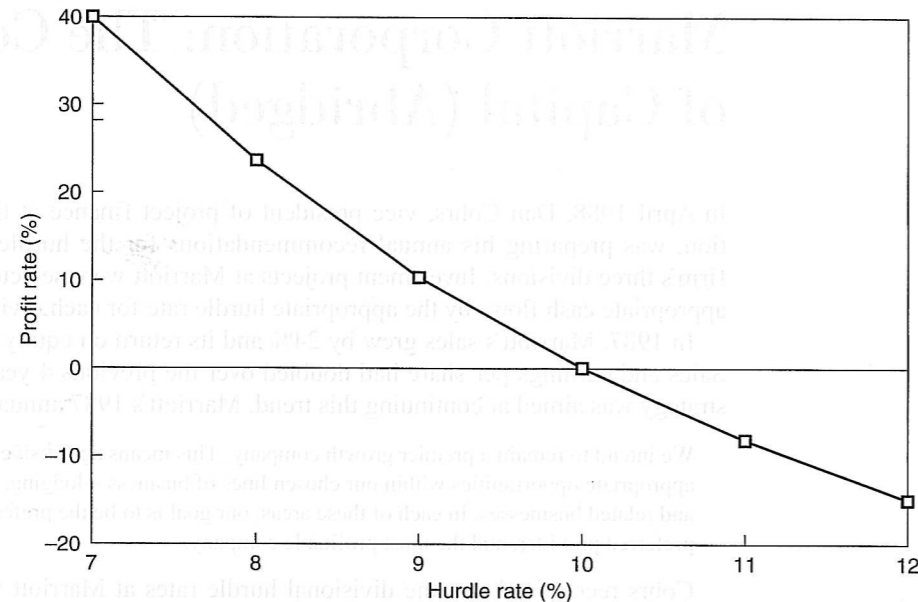
Note: Profit rate for a hotel is its net present value divided by its cost.

with more than 100,000 rooms in total. Hotels ranged from the full-service, high-quality Marriott hotels and suites to the moderately priced Fairfield Inn. Lodging generated 41% of 1987 sales and 51% of profits.

Contract services provided food and services management to health-care and educational institutions and corporations. It also provided airline catering and airline services through its Marriott In-Flite Services and Host International operations. Contract services generated 46% of 1987 sales and 33% of profits.

Marriott's restaurants included Bob's Big Boy, Roy Rogers, and Hot Shoppes. Restaurants provided 13% of 1987 sales and 16% of profits.

Financial Strategy

The four key elements of Marriott's financial strategy were:

- Manage rather than own hotel assets.
- Invest in projects that increase shareholder value.
- Optimize the use of debt in the capital structure.
- Repurchase undervalued shares.

Manage Rather Than Own Hotel Assets

In 1987, Marriott developed more than $1 billion worth of hotel properties, making it one of the ten largest commercial real estate developers in the United States. With a fully integrated development process, Marriott identified markets, created development plans, designed projects, and evaluated potential profitability.

After development, the company sold the hotel assets to limited partners, while retaining operating control as the general partner under a long-term management contract. Management fees typically equaled 3% of revenues plus 20% of the profits before depreciation and debt service. The 3% of revenues usually covered the overhead cost of managing the hotel. Marriott's 20% of profits before depreciation and debt service

often required it to stand aside until investors earned a prespecified return. Marriott also guaranteed a portion of the partnership's debt. During 1987, 3 Marriott hotels and 70 Courtyard hotels were syndicated for $890 million. In total, the company operated about $7 billion worth of syndicated hotels.

Invest in Projects That Increase Shareholder Value

The company used discounted cash flow techniques to evaluate potential investments. The hurdle rate assigned to a specific project was based on market interest rates, project risk, and estimates of risk premiums. Cash flow forecasts incorporated standard companywide assumptions that instilled some consistency across projects. As one Marriott executive put it:

> Our projects are like a lot of similar little boxes. This similarity disciplines the pro forma analysis. There are corporate macro data on inflation, margins, project lives, terminal values, percent of sales required to remodel, and so on. Projects are audited throughout their lives to check and update these standard pro forma template assumptions. Divisional managers still have discretion over unit-specific assumptions, but they must conform to the corporate templates.

Optimize the Use of Debt in the Capital Structure

Marriott determined the amount of debt in its capital structure by focusing on its ability to service its debt. It used an interest-coverage target instead of a target debt-to-equity ratio. In 1987, Marriott had about $2.5 billion of debt, 59% of its total capital.

Repurchase Undervalued Shares

Marriott regularly calculated a "warranted equity value" for its common shares and was committed to repurchasing its stock whenever its market price fell substantially below that value. The warranted equity value was calculated by discounting the firm's equity cash flows by its equity cost of capital. It was checked by comparing Marriott's stock price with that of comparable companies using price/earnings ratios for each business and by valuing each business under alternative ownership structures, such as a leveraged buyout. Marriott had more confidence in its measure of warranted value than in the day-to-day market price of its stock. A gap between warranted value and market price, therefore, usually triggered repurchases instead of a revision in the warranted value by, for example, revising the hurdle rate. Furthermore, the company believed that repurchases of shares below warranted equity value were a better use of its cash flow and debt capacity than acquisitions or owning real estate. In 1987, Marriott repurchased 13.6 million shares of its common stock for $429 million.

The Cost of Capital

Marriott measured the opportunity cost of capital for investments of similar risk using the weighted average cost of capital (WACC):

$$\text{WACC} = (1 - \tau)\bar{r}_D(D/V) + \bar{r}_E(E/V)$$

where D and E are the market value of the debt and equity, respectively, $\bar{r}_D$ is the pretax cost of debt, $\bar{r}_E$ is the after-tax cost of equity, and V is the value of the firm. $(V = D + E)$, and τ is the corporate tax rate. Marriott used this approach to determine the cost of capital for the corporation as a whole and for each division.

To determine the opportunity cost of capital, Marriott required three inputs: debt capacity, debt cost, and equity cost consistent with the amount of debt. The cost of capital varied across the three divisions because all three of the cost-of-capital inputs could differ for each division. The cost of capital for each division was updated annually.

TABLE A
Market-Value Target Leverage Ratios and Credit Spreads for Marriott and Its Divisions

	Debt Percentage in Capital	Fraction of Debt at Floating	Fraction of Debt at Fixed	Debt Rate Premium Above Government
Marriott	60%	40%	60%	1.30%
Lodging	74	50	50	1.10
Contract services	40	40	60	1.40
Restaurants	42	25	75	1.80

TABLE B
U.S. Government Interest Rates, April 1988

Maturity	Rate
30-year	8.95%
10-year	8.72
1-year	6.90

Debt Capacity and the Cost of Debt

Marriott applied its coverage-based financing policy to each of its divisions. It also determined for each division the fraction of debt that should be floating-rate debt based on the sensitivity of the division's cash flows to interest rate changes. The interest rate on floating-rate debt changed as interest rates changed. If cash flows increased as the interest rate increased, using floating-rate debt expanded debt capacity.

In April 1988, Marriott's unsecured debt was A rated. As a high-quality corporate risk, Marriott could expect to pay a spread above the current government bond rates. It based the debt cost for each division on an estimate of the division's debt cost as an independent company. The spread between the debt rate and the government bond rate varied by division because of differences in risk. Table A provides the market-value target leverage rates, the fraction of the debt at floating rate, the fraction at fixed rates, and the credit spread for Marriott as a whole and for each division. The credit spread was the debt rate premium above the government rate required to induce investors to lend money to Marriott.

Because lodging assets, like hotels, had long useful lives, Marriott used the cost of long-term debt for its lodging cost-of-capital calculations. It used shorter-term debt as the cost of debt for its restaurant and contract services divisions because those assets had shorter useful lives.

Table B lists the interest rates on fixed-rate U.S. government securities in April 1988.

The Cost of Equity

Marriott recognized that meeting its financial strategy of embarking only on projects that increased shareholder values meant that it had to use its shareholders' measure of equity costs. Marriott used the capital asset pricing model (CAPM) to estimate the cost of equity. The CAPM, originally developed by John Lintner and William Sharpe in the early 1960s, had gained wide acceptance among financial professionals. According to the CAPM, the cost of equity, or equivalently, the expected return for equity, was determined as

$$\text{Expected return} = R = \text{Risk-free rate} + \beta \times (\text{Risk premium})$$

where the risk premium is the difference between the expected return on the market portfolio and the riskless rate.

The key insight in the CAPM was that risk should be measured relative to a fully diversified portfolio of risky assets such as common stocks. The simple adage "Don't put all your eggs in one basket" dictated that investors could minimize their risks by holding assets in fully diversified portfolios. An asset's risk was not measured as its individual risk. Instead, the asset's contribution to the risk of a fully diversified or market portfolio was what mattered. This risk, usually called systematic risk, was measured by the beta coefficient (β).

Betas could be calculated from historical data on common stock returns using simple linear regression analysis. Marriott's beta, calculated using monthly stock returns during the 1983–1987 period, was 1.11.

Two problems limited the use of the historical estimates of beta in calculating the hurdle rates for projects. First, corporations generally had multiple lines of business. A company's beta, therefore, was a weighted average of the betas of its different lines of business. Second, leverage affected beta. Adding debt to a firm increased its equity beta even if the riskiness of the firm's assets remained unchanged, because the safest cash flows went to the debt holders. As debt increased, the cash flows remaining for stockholders became more risky. The historical beta of a firm, therefore, had to be interpreted and adjusted before it could be used as a project's beta, unless the project had the same risk and the same leverage as the firm overall.

Exhibit 3 contains the beta, leverage, and other related information for Marriott and comparable companies in the lodging and restaurant businesses.

To select the appropriate risk premium to use in the hurdle rate calculations, Mr. Cohrs examined a variety of data on the stock and bond markets. Exhibit 4 provides historical information on the holding-period returns on government and corporate bonds and the S&P 500 Composite Index of common stocks. Holding-period returns were the returns realized by the security holder, including any cash payment (e.g., dividends for common stocks, coupons for bonds) received by the holder plus any capital gain or loss on the security. As examples, the 5.23% holding-period return for the S&P 500 Composite Index of common stocks in 1987 was the sum of the dividend yield of 3.20% and the capital gain of 2.03%. The –2.69% holding-period return for the index of long-term U.S. government bonds in 1987 was the sum of the coupon yield of 7.96% and a capital gain of –10.65%.[1]

Exhibit 5 provides statistics on the spread between the S&P 500 Composite returns and the holding-period returns on Treasury bills, U.S. government bonds, and high-grade, long-term corporate bonds.

Mr. Cohrs was concerned about the correct time interval to measure these averages, especially given the high returns and volatility of the bond markets shown in Exhibits 4 and 5.

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[1]Cash payments are assumed to be invested in the respective securities monthly.

EXHIBIT 1 Financial History of Marriott Corporation (millions of dollars except per share amounts)

Source: Company reports.

	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Summary of Operations										
Sales	$1,174.1	$1,426.0	$1,633.9	$1,905.7	$2,458.9	$2,950.5	$3,524.9	$4,241.7	$5,266.5	$6,522.2
Earnings before interest expense and income taxes	107.1	133.5	150.3	173.3	205.5	247.9	297.7	371.3	420.5	489.4
Interest expense	23.7	27.8	46.8	52.0	71.8	62.8	61.6	75.6	60.3	90.5
Income before income taxes	83.5	105.6	103.5	121.3	133.7	185.1	236.1	295.7	360.2	398.9
Income taxes	35.4	43.8	40.6	45.2	50.2	76.7	100.8	128.3	168.5	175.9
Income from continuing operations[a]	48.1	61.8	62.9	76.1	83.5	108.4	135.3	167.4	191.7	223.0
Net income	54.3	71.0	72.0	86.1	94.3	115.2	139.8	167.4	191.7	223.0
Funds provided from cont. operations[b]	101.2	117.5	125.8	160.8	203.6	272.7	322.5	372.3	430.3	472.8
Capitalization and Returns										
Total assets	$1,000.3	$1,080.4	$1,214.3	$1,454.9	$2,062.6	$2,501.4	$2,904.7	$3,663.8	$4,579.3	$5,370.5
Total capital[c]	826.9	891.9	977.7	1,167.5	1,634.5	2,007.5	2,330.7	2,861.4	3,561.8	4,247.8
Long-term debt	309.9	365.3	536.6	607.7	889.3	1,071.6	1,115.3	1,192.3	1,662.8	2,498.8
Percent to total capital	37.5%	41.0%	54.9%	52.1%	54.4%	53.4%	47.9%	41.7%	46.7%	58.8%
Shareholders' equity	418.7	413.5	311.5	421.7	516.0	628.2	675.6	848.5	991.0	810.8
Per Share and Other Data										
Earnings per share										
Continuing operations[a]	$ .25	$ .34	$ .45	$ .57	$ .61	$ .78	$ 1.00	$ 1.24	$ 1.40	$ 1.67
Net income	.29	.39	.52	.64	.69	.83	1.04	1.24	1.40	1.67
Cash dividends	.026	.034	.042	.051	.063	.076	.093	.113	.136	.17
Shareholders' equity	2.28	2.58	2.49	3.22	3.89	4.67	5.25	6.48	7.59	6.82
Market price at year-end	2.43	3.48	6.35	7.18	11.70	14.25	14.70	21.58	29.75	30.00
Shares outstanding (in millions)	183.6	160.5	125.3	130.8	132.8	134.4	128.8	131.0	130.6	118.8
Return on avg. shareholders' equity	13.9%	17.0%	23.8%	23.4%	20.0%	20.0%	22.1%	22.1%	20.6%	22.2%

[a]The company's theme park operations were discontinued in 1984.
[b]Funds provided from continuing operations consist of income from continuing operations plus depreciation, deferred income taxes, and other items not currently affecting working capital.
[c]Total capital represents total assets less current liabilities.

EXHIBIT 2 Financial Summary by Business Segment 1982–1987 (millions of dollars)

Source: Company reports.

	1982	1983	1984	1985	1986	1987
Lodging						
Sales	$1,091.7	$1,320.5	$1,640.8	$1,898.4	$2,233.1	$2,673.3
Operating profits	132.6	139.7	161.2	185.8	215.7	263.9
Identifiable assets	909.7	1,264.6	1,786.3	2,108.9	2,236.7	2,777.4
Depreciation	22.7	27.4	31.3	32.4	37.1	43.9
Capital expenditures	371.5	377.2	366.4	808.3	966.6	1,241.9
Contract Services						
Sales	$ 819.8	$ 950.6	$1,111.3	$1,586.3	$2,236.1	$2,969.0
Operating profit	51.0	71.1	86.8	118.6	154.9	170.6
Identifiable assets	373.3	391.6	403.9	624.4	1,070.2	1,237.7
Depreciation	22.9	26.1	28.9	40.2	61.1	75.3
Capital expenditures	127.7	43.8	55.6	125.9	448.7	112.7
Restaurants						
Sales	$ 547.4	$ 679.4	$ 707.0	$ 757.0	$ 797.3	$ 879.9
Operating profit	48.5	63.8	79.7	78.2	79.1	82.4
Identifiable assets	452.2	483.0	496.7	582.6	562.3	467.6
Depreciation	25.1	31.8	35.5	34.8	38.1	42.1
Capital expenditures	199.6	65.0	72.3	128.4	64.0	79.6

EXHIBIT 3   Information on Comparable Hotel and Restaurant Companies

Source: Casewriter estimates.

Company and Nature of Business	Arithmetic Average Return[a]	Equity Beta[b]	Market Leverage[c]	1987 Revenues ($ billions)
Marriott Corporation (Owns, operates, and manages hotels, restaurants, and airline and institutional food services)	10.57%	1.11	41%	6.52
Hotels				
Hilton Hotels Corporation (Owns, manages, and licenses hotels; operates casinos)	17.16	0.76	14	0.77
Holiday Corporation (Owns, manages, and licenses hotels and restaurants; operates casinos)	32.89	1.35	79	1.66
La Quinta Motor Inns (Owns, operates, and licenses motor inns)	–5.19	0.89	69	0.17
Ramada Inns, Inc. (Owns and operates hotels and restaurants)	10.57	1.36	65	0.75
Restaurants				
Church's Fried Chicken (Owns and franchises restaurants and gaming businesses)	1.79	1.45	4	0.39
Collins Foods International (Operates Kentucky Fried Chicken franchise and moderately priced restaurants)	24.32	1.45	10	0.57
Frisch's Restaurants (Operates and franchises restaurants)	45.83	0.57	6	0.14
Luby's Cafeterias (Operates cafeterias)	15.50	0.76	1	0.23
McDonald's (Operates, franchises, and services restaurants)	23.93	0.94	23	4.89
Wendy's International (Operates, franchises, and services restaurants)	7.76	1.32	21	1.05

[a]Calculated over the period 1983–1987.
[b]Estimated using 5 years of monthly data over the 1983–1987 period.
[c]Book value of debt divided by the sum of the book value of debt plus the market value of equity.

EXHIBIT 4
Annual Holding-Period Returns for Selected Securities and Market Indexes, 1926–1987

Source: Casewriter estimates based on data from the University of Chicago's Center for Research in Security Prices.

Years	Arithmetic Average	Standard Deviation
Short-Term Treasury Bills		
1926–1987	3.54%	0.94%
1926–1950	1.01	0.40
1951–1975	3.67	0.56
1976–1980	7.80	0.83
1981–1985	10.32	0.75
1986	6.16	0.19
1987	5.46	0.22
Long-Term U.S. Government Bond Returns		
1926–1987	4.58%	7.58%
1926–1950	4.14	4.17
1951–1975	2.39	6.45
1976–1980	1.95	11.15
1980–1985	17.85	14.26
1986	24.44	17.30
1987	–2.69	10.28
Long-Term, High-Grade Corporate Bond Returns		
1926–1987	5.24%	6.97%
1926–1950	4.82	3.45
1951–1975	3.05	6.04
1976–1980	2.70	10.87
1981–1985	18.96	14.17
1986	19.85	8.19
1987	–0.27	9.64
Standard and Poor's 500 Composite Stock Index Returns		
1926–1987	12.01	20.55
1926–1950	10.90	27.18
1951–1975	11.87	13.57
1976–1980	14.81	14.60
1981–1985	15.49	13.92
1986	18.47	17.94
1987	5.23	30.50

EXHIBIT 5
Spreads between
S&P 500 Composite
Returns and Bond
Rates, 1926–1987

Source: Casewriter estimates based on data from the University of Chicago's Center for Research in Security Prices.

Years	Arithmetic Average	Standard Deviation
Spread between S&P 500 Composite Returns and Short-Term U.S. Treasury Bill Returns		
1926–1987	8.47%	20.60%
1926–1950	9.89	27.18
1951–1975	8.20	13.71
1976–1980	7.01	14.60
1981–1985	5.17	14.15
1986	12.31	17.92
1987	-0.23	30.61
Spread between S&P 500 Composite Returns and Long-Term U.S. Government Bond Returns		
1926–1987	7.43%	20.78%
1926–1950	6.76	26.94
1951–1975	9.48	14.35
1976–1980	12.86	15.58
1981–1985	-2.36	13.70
1986	-5.97	14.76
1987	7.92	35.35
Spread between S&P 500 Composite Returns and Long-Term, High-Grade Corporate Bonds		
1926–1987	6.77%	20.31%
1926–1950	6.06	26.70
1951–1975	8.82	13.15
1976–1980	12.11	15.84
1981–1985	-3.47	13.59
1986	-1.38	14.72
1987	5.50	34.06

Lex Service PLC—Cost of Capital

On November 25, 1993, the directors of Lex Service PLC received a memorandum from G. Lionel Harvey, the company's deputy chief executive, concerning the approaching board meeting on December 2. Attached to the memo was a report by the L.E.K. Partnership, a London-based consulting firm, concerning Lex's cost of capital. The report and its implications for management were to be discussed at this board meeting.

Recent developments at Lex had focused top management's attention on the company's capital budgeting procedures and its cost of capital. Between 1991 and 1993, various sales of subsidiaries and other assets had provided Lex with more than £340 million of funds. During this same period, approximately £132.5 million of this amount had been used to pay for a string of new acquisitions in the automotive distribution and leasing businesses.[1] Since Lex employed discounted cash flow analysis to help evaluate the worth of its investment opportunities, the question of what rate of return to demand on its investments had come squarely to the forefront as it implemented its acquisition program.

Company Background

At the time of its public incorporation in 1928, what was then known as Lex Garages Limited consisted of a single garage located on the corner of Lexington and Brewer streets in London. More than 60 years later, Lex Service PLC had become the leading company in automotive distribution and leasing in the United Kingdom. In 1992, Lex earned £90 million on total revenues of £911 million, and had total assets of £420 million. In 1993, the company expected to earn in excess of £80 million on revenues of approximately £1.2 billion. Recent financial statements are provided in Exhibits 1 and 2.

Originally an operator of a small group of parking garages and petrol stations, in 1945 Lex began to expand its automotive activities through a series of acquisitions of companies holding distribution franchises for various British, European, and American car manufacturers. Perhaps the most significant acquisition was made in the late 1950s, when Lex obtained from the Volvo Car Corporation the exclusive franchise to import and distribute Volvo cars in the United Kingdom. Over the next few decades this importership came to be regarded as one of the ultimate success stories within the U.K. automotive industry. In the early 1970s, Lex began to diversify into other service businesses in the United Kingdom, marking its second series of acquisitions. These areas of business included transportation and leasing, as well as hotel management from which it subsequently withdrew.

[1]Most of the balance was used to repay about £197 million of debt, leaving the company with very little financial leverage as it approached the end of 1993.