Corporate Finance: The Project

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Part I

CORPORATE GOVERNANCE ANALYSIS

The purpose of this section is to understand the relationship between managers and stockholders.

A. Managers and Stockholders

Due to the prevalent problems associated with agency issues, when analyzing a company it is important to understand the relationship between managers and stockholders. Information on the Chief Executive Officer and the Board of Directors allows us to discern that the incumbent managers of our oil companies are more focussed on the pursuit of self-interests than on maximizing shareholder value.

Chief Executive Officers:

	Amoco	Chevron	Mobil	Exxon	Texaco	Industry Average
Name	Laurence Fuller	Kenneth T. Derr	Lucio A. Noto	Lee R. Raymond	Peter I. Bijur	
Age	58	60	59	58	55	
Years at the Company	36	38	36	34	31	*29*
Years as CEO	6	9	4	4	1	
Studies	BSCE ’61 Cornell	BSME ’59, MBA ’60 Cornell	MBA ’62 Cornell	Ph.D. ‘63 U of Minnesota	MBA’66 Columbia	-----
CEO Compensation						
Salary rank out of 48 CEOs in Oil Industry	17	9	10	1	12	
Salary rank out of 800 CEOs	260	195	210	57	215	
Salary (thou)	$969	$1,154	$850	$1,550	$639	$641
Bonus (thou)	$917	$1,200	$650	$1,250	$939	$655
Other (thou)	$121	$1,533	$1,275	$638	$43	$338
Stock Gains (thou)	$956	-----	$884	$5,853	$1,969	
Total Compensation (thou)	$2,963	$3,887	$3,659	$9,291	$3,590	$2,383
Stock Ownership (% of Total)	0.02	0.02	0.02	0.06	0.03	0.08
Market Value (mil)	$6.8	$8.5	$9.5	$12.1	$6.9	$5.9

It is interesting to note that overall the CEOs have a long history with their respective companies averaging 29 years as employees and 4 years as CEOs. While it is likely that their years of inside experience amassed them sharp understandings of their companies it is difficult to gage their efforts in maximizing firm value. The power of the CEOs is certainly manifested by their large compensation packages averaging $4.678 mln in 1997 (which is twice the industry average of $2.383 mln). In fact, according to **Forbes** these CEOs rank in the top third of their industry (based on compensation) with Exxon, Chevron and Mobil ranking in the top 10. A further study comparing the compensations of 800 top executives again places them in the top third. Their power, however, does not emanate from their stockholdings that average only 0.03%. This separation of management and ownership detracts from the power stockholders have over the CEO and suggests little incentive for the CEOs to focus on increasing shareholder value.

Boards of Directors:

	Amoco	Chevron	Mobil	Exxon	Texaco
Number of Members	15	12	15	12	17
Insiders	2	2	4	2	2
CEO of other Companies?	6	9	5	5	6
Related Companies?	No	Yes	Yes	No	No

A review of the Boards of Directors provides only minimal clear and compelling evidence that managerial interests dominate. First, none of these companies are listed on Calper's 1997 or 1998 watch lists. Second, we are not aware of any actions by management where stockholder's interests were clearly violated such as greenmail, large increases in compensation while stock price was dropping, or the acceptance of low prices/rejection of high prices in takeover battles. Third, surprisingly, the Boards of Directors have very few insiders and are therefore less likely under the influence of the CEOs. For most boards, however, about half the members are CEOs at other organizations. Therefore, it is likely that their loyalties as board members of the oil companies will really depend on whether or not the oil company's CEO sits on the board of the company they manage. Because they sit on each other's boards, they are not truly independent monitors and cannot be fully protecting shareholders' interests. In addition these CEOs most probably will not have the time, information and interest in being involved with internal issues.

B. The Firms and Financial Markets:

	Amoco	Chevron	Mobil	Exxon	Texaco
Num. of Analysts	55	59	58	22	62
Analysts Recommendations (%)					
Buy	16.67	23.53	39.13	27.27	47.06
Hold	83.33	64.71	52.17	63.64	41.18
Sell	0.00	11.76	8.7	9.09	11.76
Daily Average Trading Volume ($mln)					
1998 (Jan.)	22.0	33.6	68.5	68.3	44.6
1997	17.0	29.4	69.9	70.3	35.96
1996	18.3	27.8	57.6	66.6	36.42
1995	14.1	20.0	48.4	52.6	25.37

We can infer from the fact that these oil companies are followed by a large number of analysts that they are more careful in their dealings with markets than industries followed by fewer analysts. The lower percentage of "sell" recommendations suggests that, although oil companies are well known and closely followed by the media, there is still the possibility of retaliation, which cause the release of biased information. However, there is a lot of information available in addition to that provided by the firms about themselves, which mitigates the aforementioned biased information.

C. The Firms and Society:

Companies in the highly regulated oil industry are conscience of their public image and potential negative press for failure to meet environmental restrictions. This is evident, not only by the emphasis these companies put on environmental efforts in their Annual Reports, but also by the contributions they make to environmental organizations and the publicity they demand for related awards or merits.

In the past couple of decades, particularly due to the rise in environmental awareness, society at large has been scrupulously monitoring these companies' activities. While over all, the EHS' (Environment, Health and Safety) continuos control keeps these companies in-line, there have been a number of questionable activities or irresponsible errors that created some tension between the oil industry and public.

Amoco: Amoco, aware of its environmental obligations, has incorporated societal concerns into its overall strategy. The company's objective (according to the Annual Report) is to integrate environment, health and safety considerations into the firm's everyday operations. It therefore introduced several projects to make health and safety information more accessible and more easy to understand. In addition, last year Amoco Foundation Inc. contributed more than $19 million to community and educational organizations in 27 countries. Amoco spent four years developing a new alternative fuel for diesel engines that has ultra-low emissions. In July 30th 1997, Amoco Corporation's refinery earned Star status under the Occupational Safety and Health Administration (OSHA) Voluntary Protection Program because of its top-notch employees and safety procedures. The refinery is one of just 260 industrial facilities nationwide, and the only in North Dakota, to be selected for the award that reduces its re-audit period for safety procedures to every third year instead of annually.

Chevron: Chevron too has earned a positive reputation despite some negative press. In 1997 Chevron received the National Health of the Land award presented by the Bureau of Land Management for the Eastern US for outstanding environmental practices. Additionally, the Wyoming Wildlife Federation named Chevron its 1996 Corporate Conservationist of the Year, citing its contributions to numerous projects including an air pollution study on Elk and deer refuge. Like Amoco, Chevron had one of its chemical plants acknowledged by the Occupational Safety and Health Administration for out standing safety processes. In fact, safety is such a priority that annually employees participate in dozens of drills to prepare for possible spills, fires and other emergencies. Also in 1996, Chevron reduced its sulfur oxide emissions at its NJ facility by about 200 tons per year. Overall, its SMART program (Save Money and Reduce Toxics) has cut hazardous waste disposal 60% since 1987.

Chevron also regularly contributes to many organizations, like to the Wildlife Fund in New Guinea, to develop sustainable plans for oil discovery. Its Rigs to Reef program (where decommissioned oil platforms are toppled) in the Gulf of Mexico supports three fourths of all commercial and sport fishing in the Gulf. Its own employees even volunteer helping restore parks (like Yosemite) and participating in West coast beach cleanups.

Chevron relationship with society has been strained due to negative press. For example, as recently as May 1997, Chevron spilled 25,000 gallons of oil into public waters in Pearl Harbor and had spilled 8 times that amount over the prior year. In 1996 it paid $700,000 in penalties for violating the sulfur oxide emissions regulation. Going back to 1993, one of its refineries paid a fine of $1.5 million, the largest assessed by the EPA in the last decade for a single facility, for illegally dumping pollutants and it was alleged to have leaked millions of gallons of oil into the ground beneath that facility. Also in 1993 one of its facilities was plagued with criticism over its toxic air emissions, as well as its discharge of toxic wastewater.

Mobil: Environmental groups have also praised Mobil, such as the Environmental, Health & Safety (EHS) for the steps it has taken “to reinforce its culture of operating safely and practicing sound environmental stewardship." Among its environmental actions, Mobil put into service the Raven, its second double-hulled enormous crude carrier and has two others are on order. Such vessels reduce the risk of spills caused by accidental groundings or collisions.

To heighten internal awareness, the company adopted a new policy entitled Mobil's Commitment to the Environment, Health & Safety, which spells out principles and commitments to ensure further improvement in Mobil's EHS performance. "The policy makes every Mobil employee and contractor responsible for protecting the environment and the health and safety of our people, our customers and the communities in which we work," said Dalgetty, the General Manager of the EHS. "No one can claim that these responsibilities are someone else's job."

The policy also serves as the foundation of the Mobil EHS Management System, which establishes certain expectations of how company facilities throughout the world must operate.

The system provides employees with a better understanding of how their actions affect EHS performance.

Exxon: Exxon experienced an oil spill disaster ten years ago and for along time had its name associated with environmental recklessness. By now the company has regained its strong reputation. It has been described in a recent EHS report as having the best performance ever in personnel safety (as measured by lost time incident rate), a 20% decline in operating incidents, and a Marine Vessel Oil Spill rate of less than 1/10 of a pint per gallon transported.

Texaco: As do the other oil companies, Texaco uses the EHS (Environmental, Health and Safety) Auditing Program. As a result, between 1989 and 1996, it reduced chemical releases by more than 80%, brought down incidents of leaks and spills to 37% and dropped the volume of the spills to only 20%. Additionally, in an effort to conserve resources and minimize waste Texaco began re-injecting into underground reservoirs the water used in oil production.

Part II

STOCKHOLDER ANALYSIS

The purpose of this section is to understand who are our companies' marginal investors.

	Amoco	**Chevron**	**Mobil**	**Exxon**	**Texaco**
Latest Public Offer	9/59	6/63	N/A.	2/70	9/66
Shares Offered	152,100	125,000 (split adj. 250,000)	N/A.	8.600.000	200,000
Share Price	42.5	$62.38 (split adj: $31.19)	N/A.	$45	$63.25
Type	Common	Common	N/A.	Common	Common

Insider trading net dollar value buys and sells as of 1/14/98 (1985 to present in dollars)

Date Lowest Activity	5/95 -2.02 MLN	10/96 -1.42 MLN	5/95 -4.12 MLN	2/98 -14.65 MLN	6/89 2.05 BLN
Date Highest Activity	8/95 639,400	4/96 19.30 MLN	11/95 924,540.00	8/93 320.65 MLN	1/88 197.75 MLN
Mean	261,099	958,226	-210,670	-2.39 MLN	-44.72 MLN
Most recent 45 days	0.00	0.00	0.00	-14.5 MLN	0.00

Institutional ownership

# of Buyers	373	403	518	571	364
# of Sellers	381	306	393	524	434
# of Holders	907	880	1,058	1,212	856
Shares Held	276.34 MLN	328.14 MLN	416.66 MLN	1.03 BLN	330.22 MLN
% Shares Outstanding	56.75	49.96	53.12	41.66	60.26
Shares Sold	12.97 MLN	26.63 MLN	3.68 MLN	35.67 MLN	20.71MLN
Top Institutional Holder	State ST BK&TST	Merrill Lynch Cap. MK	Vanguard G. Merrill Lynch	Vanguard G. Putnam Inv.	Capital Rsch. MGM
Percentage	6.74 (9/97)	4.77 (9/97)	0.65 (12/97)	0.65 (12/97)	5.35 (9/97)
# of Inst. Over 5%	1	0	0	0	1
Foreign Listings	USA Canada Germany Switzerland	USA Germany UK Switzerland	USA Germany Japan UK Canada Switzerland	USA UK Germany Japan Switzerland	USA Canada Switzerland Belgium UK

The various companies' stockholders are fairly dispersed with institutional owners holding around 40% of the oil companies' total stocks outstanding. The number of institutional investors owning greater than 5% of the outstanding shares are no more than 1 per company. This suggests that the marginal institutional investor is diversified. The remaining 60% of investors, who are not institutional, are most likely individuals who tend to prefer dividends (which will be explained further in sections VIII and IX). The following sections will evaluate the companies based upon models that rely on these assumptions.

PART III

RISK PROFILE

*In this section we address the risk profile of the companies analyzed, compare it to the industry averages and calculate the hurdle rates for the firms***.**

I. - Market analysis of risk and return in the oil industry

1) Calculating Top-Down Betas:

For each company we ran a regression of the individual stocks monthly prices against the S&P 500 index for the period 1993 to 1998. The results of the regression on which we concentrated were the intercept (to calculate the Jensen's alpha), the slope (beta/risk), the R-squared (to understand how much of the risk is diversifiable) and the standard error of the Beta (to assess the validity of the top down prediction). The results are highlighted in the following table.

	Amoco	**Mobil**	**Texaco**	**Chevron**	**Exxon**
Jensen's alpha	-1.19%	4.94%	1.69%	4.28%	0.02%
Beta	0.50	0.54	0.46	0.55	0.74
R^2	12%	18%	11%	15%	38%
Stand. Error	0.16	0.15	0.17	0.17	0.13

a) <u>Intercept</u>: The intercepts of the regressions were compared with:

Risk-free rate x (1-Beta)

In this equation the risk-free rate is the short-term monthly risk free rate (0.41%) which yields a 5% rate on a yearly basis. The difference

[Intercept – R_f x (1-Beta)]

once annualized, gives us the Jensen's Alpha or the measure of the performance of each company's stock on a yearly basis. If positive, the stock performed better than expected by the market.

Our Jensen's alpha figures indicate that in general, the companies' stocks performed better than expected during the period of the regression. This reveals that the overall industry is experiencing a positive momentum and the market underestimates the returns on these stocks.

	Amoco	**Mobil**	**Texaco**	**Chevron**	**Exxon**
Jensen's alpha	-1.19%	4.94%	1.69%	4.28%	0.02%

b) Slope: The slope of the regressions gave us the beta of the companies (their risk level). The figures reveal that the firms analyzed are below average risk (Beta = 1). This is most probably due (as addressed later in the analysis) to steady earnings and low debt ratios.

	Amoco	**Mobil**	**Texaco**	**Chevron**	**Exxon**
Beta	0.50	0.54	0.46	0.55	0.74

c) R^2: The R^2 indicates that the greatest part of the risk faced by the companies comes from firm specific sources (which is diversifiable). This is somehow surprising as the fortunes of these companies depend on factors such as oil prices and general macroeconomics trends. It is also arguable however that the companies' operations involve high levels of risk of catastrophes (which is intrinsic to each firm's safety policies). The Exxon Valdez disaster is a concrete example possibly explaining the low values of the R^2.

	Amoco	**Mobil**	**Texaco**	**Chevron**	**Exxon**
R^2	12%	18%	11%	15%	38%

d) Standard Error: Finally, the standard errors of the betas are low enough to allow us to consider these figures reliable and therefore to use them in the analysis as we proceed further.

	Amoco	**Mobil**	**Texaco**	**Chevron**	**Exxon**
Stand. Error	0.16	0.15	0.17	0.17	0.13

2) Identifying the Financial Leverage Effect on Betas:

In order to understand the importance and role that financial leverage plays in assessing the level of risk of the companies, we calculated the value of the companies' unlevered betas.

For the calculation we used the market value of debt and equity in order to come up with the D/E ratio to apply in the formula:

Unlevered Beta = Levered Beta/[1+(1-marginal tax rate) x D/E]

The specific calculations for the market value of debt and equity are detailed in the section "Market value of debt and equity." We used a marginal tax rate of 35%, which was common across the companies. The values are:

	Amoco	**Mobil**	**Texaco**	**Chevron**	**Exxon**	**Ind. Avg.**
Unlevered Beta	0.46	0.49	0.39	.50	0.70	0.54
Market value D/E	13.11%	15.69%	27.11%	13.11%	9.56%	55%
Beta	0.50	0.54	0.46	0.55	0.74	0.74

As shown in the table, the companies' betas are generally lower than the industry average. This is probably due to the considerable sizes of the companies analyzed and to their mature stages. The difference between the unlevered and the levered betas shows that debt does not play an important role. Most of these companies' risks, in fact, are due to business-related factors and only a smaller portion to financial leverage (which is pretty low for the five companies compared to the industry average).

3) *Bottom-up Beta Estimate:*

Although the betas resulting from the regression are on average good estimates of the companies analyzed, because of the low standard errors we also calculated the betas using the bottom-up method. Most companies are not solely involved in the exploration and production of oil, refining and marketing. The production of chemicals and other operations (coal, coke, and power) represent a growing part of the overall businesses of these oil companies. We then proceeded to calculate the bottom up beta and compared it with the beta that resulted from the operation.

We divided the companies into their main businesses and calculated percentage weights based on each business unit's operating income.

Business Units	Average Unl. Beta	Amoco (% of NI)	Mobil (% of NI)	Texaco (% of NI)	Chevron (% of NI)	Exxon (% of NI)
Exploration and Production	0.55	64.4%	63.4%	75.8%	77.5%	50.0%
Refining	0.54	11.5%	27.4%	24.2%	14.14%	5.00%
Chemicals	0.65	24.1%	9.20%	0%	6.75%	33.00%
Cole and Coke	0.69	0%	0%	0%	1.61%	12%

The weighted (by the % of net income) averages of the unlevered betas allowed us to calculate the bottom-up betas by again levering the betas with the current market value D/E ratio of the individual companies. Let's compare the results with the top down beta figures.

	Amoco	Mobil	Texaco	Chevron	Exxon
Top down Beta	0.50	0.54	0.46	0.55	0.74
Bottom up Beta	0.62	0.61	0.64	0.60	0.64
Industry avg. Beta	0.74	0.74	0.74	0.74	0.74

The bottom-up beta estimates are higher than those of the top-down method (with the exception of Exxon that is equal to the industry average). However, as previously stated, the Top-Down Betas are reliable because the standard errors of the betas from the regressions are low and none of the companies restructured themselves substantially during the regression period. We therefore will stick with those estimates.

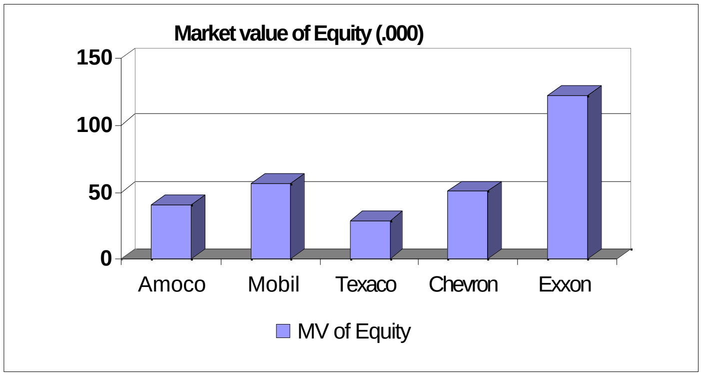
4) Market Value of Equity and Debt:

Before introducing the cost of capital analyses for our companies, we will explain the calculation and the significance of the market value of both equity and debt. These figures are the basis for the levered and unlevered beta computations of previous sections and for the final calculations of the costs of capital.

a) <u>Market value of equity</u>:

By multiplying the number of shares outstanding in the market at the end of the examined period and the market price of each stock for the same period, we calculated the market value of equity for each firm (in thousands of dollars).

	Amoco	Mobil	Texaco	Chevron	Exxon
Market value of equity	40,598	56,957	28,765	50,857	121,733



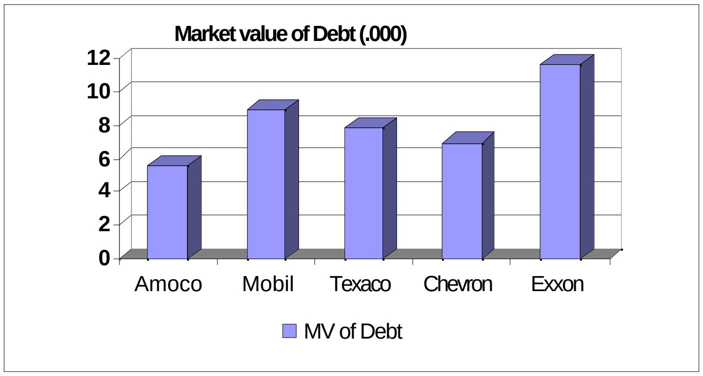
b) <u>Market value of debt:</u>

In order to estimate the market value of debt we needed the following data (in thousand of dollars) to apply the formula:

$$\text{MV of debt} = \text{Interest Expense} * \frac{(1-(1+i)^{\wedge(-n)})}{i} + \text{Book Value of Debt}/(1+i)^{\wedge n}$$

where "n" is the average maturity of the debt and "i" is the current before tax cost of debt.

	Amoco	Mobil	Texaco	Chevron	Exxon
Book Value of Debt	5,201	7,628	5,590	6,694	9,746
Current Int. Rate on Debt	6.2%	6.5%	6.8%	6.5%	6.2%
Avg. Bond Maturity (Yrs.)	8.33	8.92	14.8	11.5	8.2
Interest Expense	192	455	434	364	464
Market Value Of Debt (a)	4,372	7,260	6,083	6,304	8,863
PV of Operating Leases (b)	951	1,680	1,715	641	2,779
Total Market Value of Debt (a) + (b)	5,353	8,940	7,798	6,946	11,642



- The book value of debt is the sum of short term and long term borrowings, including any items highlighted in the notes of the financial statements such as "Throughput contracts" or "Take or pay contracts"
- The current cost of debt calculation is detailed in the next section ("Cost of Capital")
- The average maturity of the bonds is the weighted (by face value) average of the maturity of the current bonds outstanding
- The resulting market value of debt has to be supplemented by the present value of the operating leases. These charges were discounted at the above interest rate on debt.

We can now obtain the figures of the relative weight of equity and debt on the overall firm value in market terms:

	Amoco	**Mobil**	**Texaco**	**Chevron**	**Exxon**	**Ind. Avg.**
Market Value of Equity (a)	40,598	56,957	28,765	50,857	121,733	
Market Value of Debt (b)	5,353	8,940	7,798	6,946	11,642	
Firm Value (a) + (b)	45,951	65,897	36,563	57,803	133,375	
D/(D+E) = K_d	11.65%	13.57%	21.33%	12.01%	8.73%	18.33%
E/(D+E) = K_e	88.35%	86.43%	78.67%	87.99%	91.27%	

The industry average debt ratio is higher than that of most of the companies analyzed. Our interpretation is the same as when addressing the D/E ratios. Size and mature stage, as well as other reasons discussed in the capital structure section, justify the below industry average company figures in the above table.

5) Cost of capital:

The cost of capital is the weighted average cost of equity (K_e) and cost of debt (K_d). We therefore address the calculation of K_e and K_d first and then conclude section III with our analysis of the weighted average costs of capital.

a) Cost of debt:

In order to estimate the costs of debt for the five companies we followed these steps: identify the bond ratings for the companies, determine the consequent spread and add the spread to the long-term risk free rate (which we established in the beginning as the 6%).

Following are the details for each company:

	Amoco	**Mobil**	**Texaco**	**Chevron**	**Exxon**
Bond Rating	AAA	AA	A+	AA	AAA
Spread (a)	0.20%	0.50%	0.80%	0.50%	0.20%
Risk Free Rate (b)	6%	6%	6%	6%	6%
Before Tax Cost of Debt (c) = (a) + (b)	6.20%	6.50%	6.80%	6.50%	6.20%
After-tax Cost of Debt (c) x (1- 35%)	**4.03%**	**4.22%**	**4.42%**	**4.22%**	**4.03%**

b) *Cost of equity:*

The cost of equity has various meanings. First, it represents the return that investors in the individual companies require in order to purchase the stock. Second, it establishes the hurdle rate that the company has to consider when evaluating the projects from an equity point of view (i.e. when the cash flows considered are cash flows to equity). Third and the main purpose of this section, the cost of equity is a fundamental input in the calculation of the cost of capital.

The cost of equity is:

Ke = Risk-free rate + Beta (Risk Premium)

We have come to the decision in the previous sections that the top-down beta from the regression is a valid estimate of the companies' risk level. The risk-free rate also has been established earlier as 6% for long-term investors and 5% for short-term investors. The risk premium used in the analysis is based on historical data revealing 5.5% premium as a reliable estimate for long-term time horizon and 8.41% for short-term time horizons. Once determined, the inputs for the cost of equity for the individual companies are summarized in the table below:

	Amoco	**Mobil**	**Texaco**	**Chevron**	**Exxon**
Beta	0.50	0.54	0.46	0.55	0.74
Short-term Cost of Equity (8.41% premium)	9.21%	9.54%	8.87%	9.62%	11.22%
Long-term Cost of Equity (5.5% premium)	**8.75%**	**8.97%**	**8.53%**	**9.02%**	**10.07%**

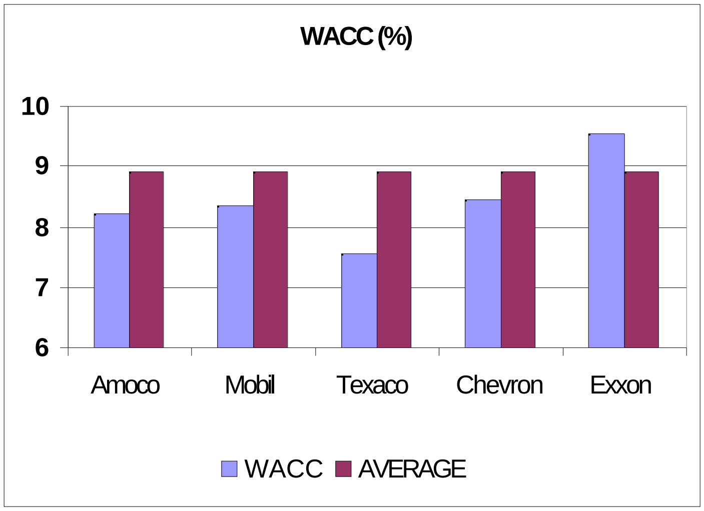
For the purpose of this analysis, to estimate the value of the companies analyzed, we will use the long-term cost of equity for the computation of the cost of capital. Exxon's higher cost of equity reflects a higher risk embedded in the company (underlined by the higher beta than its competitors). Because of its higher risk, investors require a higher return for Exxon than they do for other companies in the industry. At the same time, because the cost of financing the business with equity is more expensive, the projects that the company undertakes should yield higher returns than those of its competition. In summary, its hurdle rate is higher. The next session will address some industry comparisons.

c) *Weighted average cost of capital:*
We now have all the inputs to solve the following equation that gives us the cost of capital:

WACC = Ke (E/(D+E)) + Kd (D/(D+E))

Following are the details of the calculations and the industry averages for each of the inputs.

	Amoco	**Mobil**	**Texaco**	**Chevron**	**Exxon**	**Ind. Avg.**
Beta	0.50	0.54	0.46	0.55	0.74	0.74
Cost of Equity	8.75%	8.97%	8.53%	9.02%	10.07%	9.85%
E/(D+E)	88.35%	86.43%	78.67%	87.99%	91.27%	81.67%
After-tax Cost of Debt	4.03%	4.22%	4.42%	4.22%	4.03%	4.78%
D/(D+E)	11.65%	13.57%	21.33%	12.01%	8.73%	18.33%
WACC	**8.20%**	**8.34%**	**7.56%**	**8.45%**	**9.54%**	**8.92%**



All companies except for Exxon have a cost of financing their activities that is lower than the industry average. Exxon's higher beta again drives its cost of capital up compared to its competitors. The other companies' costs of capital are lower due to both their lower betas as well as their higher average debt ratios.

PART IV
INVESTMENT RETURN ANALYSIS

This section analyzes the quality of the firms' current projects and the managers' abilities to contribute to increasing the firms' values. We will also assess the quality of the companies' future projects by considering what characteristics the investments have within the industry.

This analysis relies on the valuation of the returns of the projects based on accounting methods. In particular the return on equity (ROE) and the return on capital (ROC), which we will define briefly, will be compared to the current cost of equity in the first case, and to the cost of capital in the second. This will enable us to determine whether the companies have excess returns over costs.

a)Characteristics of the projects in the industry: the business units that petroleum companies are typically involved in (identified in part 2) share some common characteristics, but at the same time retain some peculiarities that makes it worthwhile to consider them separately. The issues that we want to control which are related to the cash flows generated by the projects are: time horizon, predictability, external variables affecting the patterns of the flow and currency the cash flows are in.

Business Units	**Time Horizon**	**Predictability**	**External Variables**	**Currency**
Production and Exploration	Very long term	Difficult to predict and very high variability	Macro-economic trends, oil prices,	Could be any, but mainly US dollars
Refining and Marketing	Medium/long term	Predictable	Macro-economics trends, oil prices, oil substitutes as alternative source of energy industrial and capital goods sector trend	Mainly local currencies
Chemicals	Long term	Fairly predict	Industrial goods sector trends	Mainly US dollars

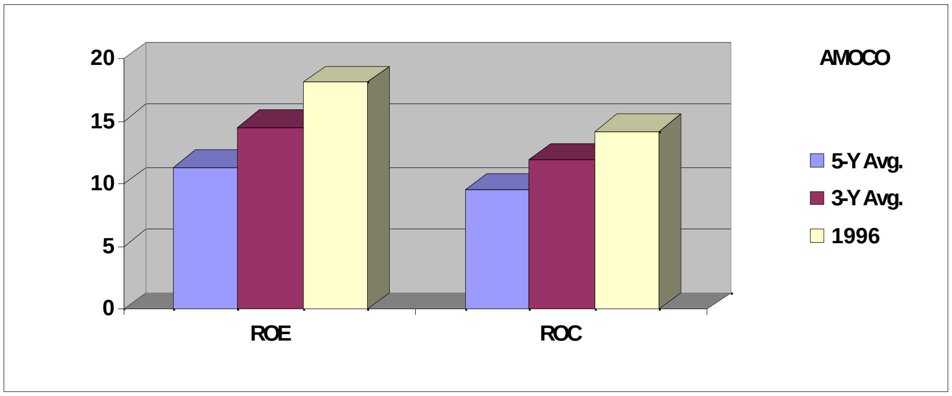
In general, the oil companies have a longer than average time horizon for their projects. The up front investments are usually very high (billions of dollars) and the cash flows are not very predictable. A positive note is that the companies hardly ever engage in projects that do not pertain to their core businesses. Their experience allows them to mitigate the variability of the return on these projects. This makes the cash flow patterns more predictable than the intrinsic nature of the projects would make us think.

b)ROE and ROC analysis: this analysis looks backward to evaluate the companies' past returns on the capital employed in the firms. The ROE tells us the amount of income the company was able to generate with the equity available. In a similar way, the ROC identifies how much return the company was able to generate from the capital employed. In order to have stronger explanatory power, these figures must be compared to the cost of equity (in case of the ROE) and to the cost of capital (in case of the ROC). If the returns are higher than the costs, the companies are able to generate excess returns possibly leading to increases in the firms' values. Before we look at the companies' specific data, some background information is important.

The ROE was calculated as Net Income divided by the average (of the last two years) book value of equity.

The ROC was calculated as EBIT x (1- tax rate of 35%) divided by the average (of the last two years) book value of the firm (debt + equity).

For some of the companies, the ROE and ROC were fairly stable over the past few years. For others they fluctuated a bit. For those firms where the figures were quite different in the last few years, we also looked at the average ROE and ROC in the last 3 and 5 years in order to obtain a measure that reflected past events. For the sake of simplicity, the cost of capital and cost of equity has been assumed to be equal to that of the latest period. Even with those fluctuations the companies provided, in general, excess return on their projects. The results are highlighted in the following graphs:


AMOCO
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ROE
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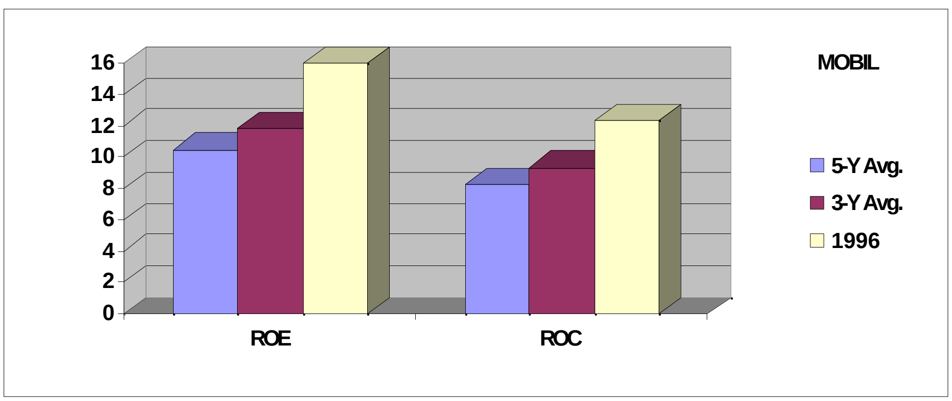
3-Y Avg.
1996


MOBIL
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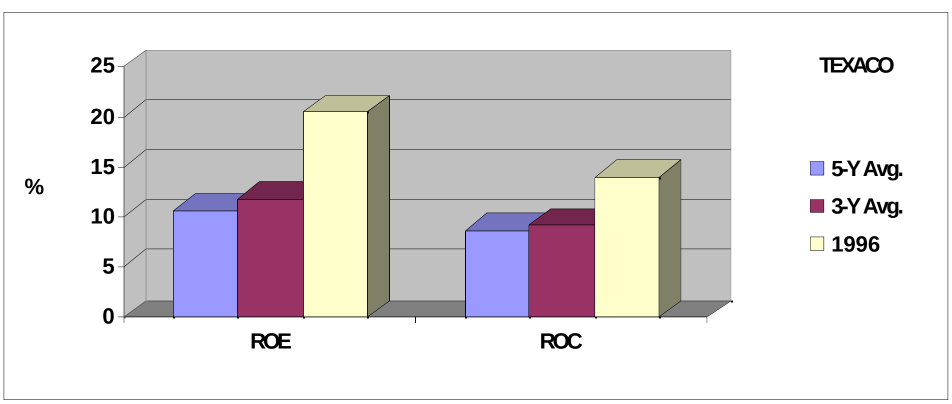
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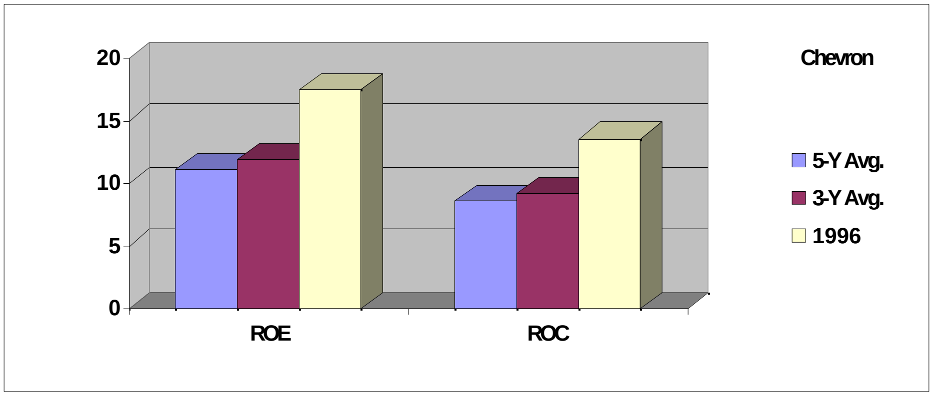
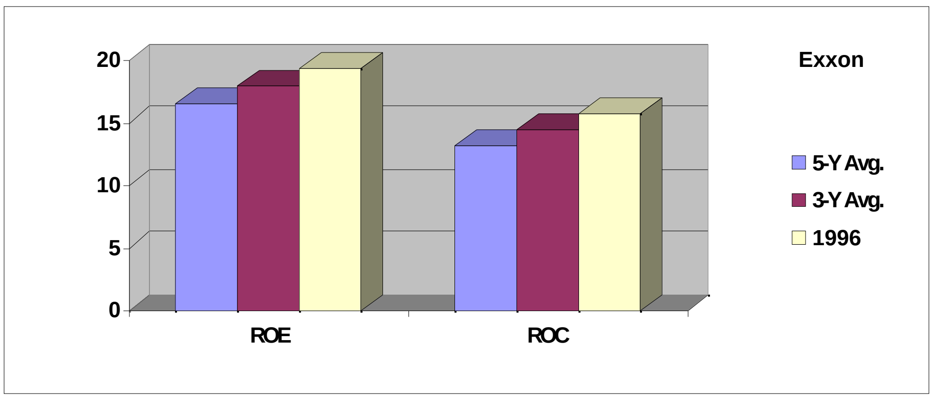




Firm	Amoco Current	Mobil Current	Texaco Current	Chevron Current	Exxon Current	Industry Average
ROE (a)	18.13%	15.99%	20.48%	18.16%	17.88%	15.40%
Cost of equity (b)	8.75%	8.97%	8.53%	9.02%	10.07%	9.85%
Excess return on equity (a) – (b)	9.38%	7.02%	11.90%	9.14%	7.81%	5.55%
ROC (c)	14.24%	12.30%	14.01%	13.62%	15.51%	22.46%
Cost of capital (d)	8.20%	8.34%	7.65%	8.45%	9.54%	8.92%
Excess return on capital (c) – (d)	6.04%	3.96%	6.36%	5.17%	5.97%	13.54%

It is clear from the numbers that all companies have been engaging in good projects. These projects are providing excess return both from the point of view of the stockholders (excess return on equity) as well as from the point of view of the entire firm (excess return on capital). With regards to the industry average, these companies provided a higher excess return in the latest period. However, over the last few years their returns are slightly low compared with industry returns. This could be due to the fact that the chosen companies are larger in terms of capital, assets, equity and debt than average. Although the earnings are also higher, they did not off set the denominator of the equation.

c) Converting the excess returns into monetary values: Once we have determined the excess returns (for the latest period) it is interesting to see how they contributed to increasing the value of the firms. This is the concept of Economic Value Added (EVA). It is calculated both in terms of equity (EVA for equity) and in terms of the entire firm value (EVA for firm).

The computation is:

EVA for equity = Excess Return on Equity x Book Value of Equity

EVA for the firm = Excess Return on Capital x Book Value of the Firm

For the companies analyzed the results follow:

	Amoco	Mobil	Texaco	Chevron	Exxon	Ind. Avg.
EVA Equity	1,551	1,301	1,177	1,312	3,399	398
EVA Firm	1,312	2,622	1,817	985	3,177	1,393

The industry itself, as already pointed out in previous sections, is experiencing good returns and strong earnings. This leads to the creation of a surplus from the companies' existing projects. The companies analyzed, being on average larger in size, experience an even larger surplus.

Although the accounting returns such as the ROE and ROC are good indicators of a company's ability to create value, they tend to look at the past performance rather than to future prospects. However, the companies are enjoying a trend of increasing ROEs and ROCs (as shown by the comparison of the latest year's figure and the average of the last four years). Such trends lead us to believe that the companies are picking better and better projects, and are able to generate higher returns from their resources today than in the past five years.

There are also a number of other reasons we believe the companies will continue to increase their value through good projects. In particular:

- ♦ The companies tend to engage in projects that strictly belong to their core businesses. This allows them to predict fairly easily the cash flow patterns and thereby reduce risk.
- ♦ Since there is a relatively small number of competitors in the integrated petroleum industry. Therefor the companies can enjoy higher margins and take advantage of the positive macroeconomic trend.
- ♦ The industry enjoys relatively high barriers to entry due to the high level of capital intensity of the businesses and of the scarce sources for the product.
- ♦ The companies are mature and stable in their cash flows and enjoy strong brand equities.
- ♦ The companies have access to various sources of capital to engage in interesting projects.

However, in order to reinforce the previous qualitative statements, we need the analysis of the following sections.

PART V
CAPITAL STRUCTURE CHOICES

The purpose of this section is to qualitatively analyze the existing financial mix and to assess the benefits and costs of debt. We included in debt the short-term debt, long-term debt and present value of any lease obligations whether operating or capital.

The debt of a company is classified in three categories: short-term debt, long-term debt and capital and operating leases. A short description of each debt component for the companies under analysis follows:

a) Short-term debt:
In general for all the companies analyzed the short-term debt consists of Notes Payables and Commercial Papers.

b) Long-term debt:
Amoco's long-term debt resides principally with two Amoco subsidiaries – Amoco Company and Amoco Canada. Amoco Company functions the principal holding company for substantially all of Amoco's petroleum and chemical operations, except Canadian petroleum operations and selected other activities. Amoco's foreign currency loans are in British Pounds and in Argentine Pesos.

Mobil has a large amount of Canadian dollar Eurobonds and UK Sterling Eurobonds; it also has debt in foreign currencies.

As of December 31st, 1996, Texaco was party to a revolving credit facility with commitments of $1.5 billion with a syndicate of U.S. and international banks, available as a support for issuance of the company's commercial papers, as well as for working capital and for other general corporate purposes. As stated in its Annual Report, Texaco seeks to maintain a balanced capital structure that will provide financial flexibility and support company's strategic objectives while achieving a low cost of capital. This is achieved by balancing the company's liquidity and interest rate exposure. These exposures are managed primarily through the use of long-term and short-term debt instruments, which are reported on the balance sheet. However, off-balance sheet derivative instruments, primarily swaps, are also use as a management tool in achieving the company's objectives. These instruments are used to manage identifiable exposures on a non-leveraged, non-speculative basis.

At year-end 1996, Chevron had $4,425 of committed credit facilities with banks worldwide, $1,800 of which had termination beyond year one. The facilities support Chevron's commercial paper borrowings. Interest on any borrowing under the agreement is based on either the London Interbank Offered Rate or the Reserve Adjusted Domestic Certificate of Deposit rate.

c) Operating and capital leases

Amoco leases various types of properties, including service stations, tankers, buildings, and railcars.

For Mobil and Chevron, certain leases include escalation provisions for adjusting prices that may require higher future rent payments. In this respect, Mobil does not expect that such rent increases, if any, will have a material effect on future earnings.

Exxon's leases cover drilling equipment, tankers, service stations and properties.

Millions $	**Amoco**	**Mobil**	**Texaco**	**Chevron**	**Exxon**
Operating Leases (NPV)	952	1,680	1,715	641	2,779
Capital Leases	76	335	145	338	45

Intuitive Analysis of the Advantages (benefits) and Disadvantages (costs) of Debt:

Advantages:

The five companies have the same marginal tax rate of 35%, so in terms of savings no company has an advantage over the other one. However, the current amount depreciated by each firm will make a difference in terms of tax savings. In this respect, Amoco has benefited by having a greater depreciation expense in relation to the company's book value. On the other hand, Chevron benefited least by the tax reductions due to its low current depreciation relative to its book value.

	Amoco	Mobil	Texaco	Chevron	Exxon
Current Depreciation / Firm BV	4.99%	4.13%	4.28%	3.83%	3.99%
Avg. Current Depreciation / BV	4.24%				

The table below shows that Exxon will be able to have more debt since Exxon's EBITDA in relation to the value of the firm is the highest in this comparison. This means that the company can face higher levels of debt. Overall, the five companies under analysis have similar EBITDA/Firm Values.

Adding to the analysis the figures for the Oil Sector, we see that only Texaco and Chevron are below the Oil Sector average (not a dramatic difference). Overall, it seems that in the Oil Sector the numbers for EBITDA/Firm Value are very stable and are around the sector average (11.77%).

	Amoco	Mobil	Texaco	Chevron	Exxon
EBITDA	5,875	8,153	4,005	6,209	17,709
Firm Value (Market Value)	45,951	65,897	36,563	57,803	133,375
EBITDA/Firm Value	**12.79%**	**12.37%**	**10.95%**	**10.74%**	**13.28%**
Oil Sector Average EBITDA/Firm	**11.77%**				

To continue with the comparison, all five companies are conservative, publicly own, with wide diverse stock holdings. They have large percentages of shares held by institutional investors suggesting that there is considerable separation between stockholders and managers. In this respect, taking on additional debt could add discipline to management. In the same line of reasoning all the five companies have high cash flows and low leverage that make managers not to use debt as a source of capital.

Disadvantages:

Since all five companies have cash flows related to the price of oil, a disadvantage of taking debt relates to their capacities to pay back debt with future cash flows. While we did not find any oil company that went bankrupt in the past 10 years due to a decrease in the price of oil, the bankruptcy costs are still latent and are something management must consider at the time they take on debt. To understand this reasoning we pose a question that might help to clarify this issue: how well did oil companies pay their debt last January, when the oil price went down to $13 per barrel (1997 oil prices: $23 per barrel)? Companies can hedge their positions when they have expectations. However, price shocks like the one last January, cannot be expected and cannot be hedged.

The five companies are paying large dividends. This means that they are reducing the agency cost by giving back money to the stockholders.

Oil companies in general are companies that need flexibility to expand. Their projects are expensive and are long-term, (examples of oil projects include pipelines, refineries, exploration, petrochemical and chemical plants, distribution, and retail gas stations). Therefore, taking on too much debt for one particular project can hinder their abilities to take on future projects if the companies used all their borrowing capacity on the earlier projects.

To conclude, since all of the five companies are large corporations and have diverse stockholding, managers are not very responsive to stockholders. Therefore, taking on debt would be a good form of discipline for the managers. However, the nature of the oil projects and their uncertainties regarding future cash flows, make us recommend a cautious course of action when thinking of taking on debt. In addition, too much leveraging of these companies will deeply hurt their flexibility to develop future projects.

Ability to Service Debt

FCFF Analysis

	Amoco	**Mobil**	**Texaco**	**Chevron**	**Exxon**
Free Cash Flow to the Firm	808	1,388	874	2,378	7,327

The five companies show large free cash flows to the firms that can be used to service their debts. This is somewhat of a disadvantage because managers could relax on the cushion provided by the free cash flows, thus taking bad projects.

The table below shows the operating cash flows for each company during the last 10 years. The variability of the change in operating income shows that Exxon is the most stable company in terms of its operating income. This suggests that Exxon is the company that will have the least uncertainty on future cash, guarantying its ability to better serve future debt commitments and to take on more debt.

Operating Cash Flows	**Amoco**	**Mobil**	**Texaco**	**Chevron**	**Exxon**
1996	4,788	6,352	3,762	5,797	12,829
1995	3,809	5,024	2,122	4,075	13,847
1994	4,329	5,362	2,859	2,896	9,852
1993	3,491	5,620	2,362	4,221	11,503
1992	3,020	4,117	2,675	3,914	9,611
1991	3,264	4,894	2,699	3,278	10,942
1990	4,888	4,421	2,519	4,727	10,646
1989	4,054	4,652	1,489	3,046	7,915
1988	4,312	4,029	-58	2,987	10,554
1987	4,156	3,013	2,465		5,787
Variability in Operating Income	**55%**	**34%**	**57%**	**32%**	**23%**

PART VI
OPTIMAL CAPITAL STRUCTURE

The objective of this section is to come up with the optimal financing mix for each firm.

This was first done on a quantitative basis using the Minimization of Cost of Capital Approach. After the model determined the optimal financing mix, we built constraints to determine the costs of maintaining a determined credit rating classification.

Since the results of this optimization could be biased by a latest unusual good or bad year, we ran the same model using a conservative level of EBITDA for each company.

As the results of the quantitative analysis could be way off what is considered normal for the industry, we enriched our analysis by using a comparative analysis between the firms under analysis and the oil sector and with the total market as a whole.

1. The Cost of Capital Approach:

The current cost of equity, after tax cost of debt, and cost of capital for the firms under analysis are (these numbers were calculated in section III):

	Amoco	**Mobil**	**Texaco**	**Chevron**	**Exxon**
Cost of Equity	8.75%	8.97%	8.53%	9.03%	10.07%
After-tax Cost of Debt	4.03%	4.23%	4.42%	4.23%	4.03%
Kd	11.65%	13.57%	21.33%	11.66%	8.73%
Ke	88.35%	86.43%	78.67%	88.34%	91.27%
Rating	AAA	AA	A+	AA	AAA
Stock Price	$83.375	$72.190	$54.375	$77.440	$49.000
Cost of Capital	8.20%	8.34%	7.65%	8.45%	9.54%
MV Firm (millions)	$45,951	65,897	$36,563	$57,593	$133,374

The optimization process:

Cost of Capital at different financing mixes:

	Optimal Cost of Capital				
Debt Ratio	**Amoco**	**Mobil**	**Texaco**	**Chevron**	**Exxon**
0.0%	8.53%	8.72%	8.15%	8.79%	9.83%
10.0%	8.25%	8.43%	7.88%	8.49%	9.50%
20.0%	8.04%	8.17%	7.71%	8.27%	9.21%
30.0%	7.88%	8.00%	**7.64%**	8.11%	9.04%
40.0%	**7.81%**	**7.82%**	7.66%	**8.08%**	8.85%
50.0%	8.10%	7.84%	8.35%	8.31%	**8.76%**
60.0%	8.69%	7.86%	8.39%	8.60%	9.42%
70.0%	8.72%	8.52%	9.47%	8.91%	9.70%
80.0%	9.18%	8.88%	11.32%	9.26%	9.75%
90.0%	10.63%	8.90%	12.07%	10.72%	10.91%%

Therefore, the optimal ratios and values without constraints for each firm are:

	Optimal Ratios				
Firm	**Amoco**	**Mobil**	**Texaco**	**Chevron**	**Exxon**
AT Cost of Debt*	5.20%	4.71%	4.71%	5.20%	5.20%
Cost of Equity	9.77%	9.90%	8.62%	9.99%	12.32%
Kd	43%	40%	25%	40%	50%
Ke	57%	60%	75%	60%	50%
Rating	BB	A-	A-	BB	BB
Cost of Capital	7.81%	7.82%	7.64%	8.08%	8.76%
Value of Firm (1)	$48,265	$69,780	$36,624	$60,369	$145,272
Value of Firm (2)	$56,533	$77,014	$3,860	$65,709	$160,422
Stock Price (1)	$88.120	$78.240	$54.490	$81.660	$53.790
Stock Price (2)	$105.09	$87.410	$54.930	$89.790	$59.4890

* The optimal debt ratios and values were calculated with more precision than the 10% ranges.
(1): Assumes no growth.
(2): Assumes growth.

Summary of Important Results:

To have a better assessment of the changes that have to be done on each firm to go from the current situation to the optimal:

		Amoco	Mobil	Texaco	Chevron	Exxon
Debt Ratio	Current	11.65%	13.57%	21.33%	11.66%	8.73%
	Optimal	43%	40%	25%	40%	50%
Rating	Current	AAA	AA	A+	AA	AAA
	Optimal	BB	A-	A-	BB	BB
Cost of Capital	Current	8.20%	8.34%	7.65%	8.45%	9.54%
	Optimal	7.81%	7.82%	7.64%	8.08%	8.76%
Stock Price (1)	Current	$83.375	$72.190	$54.375	$77.440	$49.000
	Optimal	$88.120	$78.240	$54.490	$81.660	$53.790

(1): Assumes no growth.

This table helps to assess the nature of the changes that must be done in the current financing mixes to reach the optimal levels.

In the cases of Amoco and Exxon using the higher optimal debt ratios have a strong downside effect on the credit rating of these companies. The likely increases in the stock prices of these companies are over 6% (without an assumption of growth).

On the other hand, Texaco, which currently has a debt ratio very close to its optimal level, does not require a major change in its financing mix. Even though Texaco will probably experience a reduction on its credit rating, the increase on its stock price is not as attractive as is the case for the other companies.

2. Building Constraints into the process:

From the previous table it can be seen that maintaining the current level of financing mix could represent considerable costs to the firm. To represent the cost that would have to be incurred to achieve or maintain a certain level of credit rating, we calculated:

The cost for each company to maintain its current credit rating will be:

	Amoco	Mobil	Texaco	Chevron	Exxon
Optimal Value	$48,265	$69,780	$36,624	$60,369	$145,272
- Current Value	($45,951)	($65,898)	($35,518)	($57,593)	($133,374)
Difference	$2,314	$3,882	$1,105	$2,776	$11,898

As shown, it is costly to maintain the current credit rating and therefore this decision should not be biased by subjective factors like the ego of management in a well-rated company (since the value of the firm is maximized at a lower rating level).

3. Sensitivity Analysis (The downside EBITDA):

Since the calculations of the previous optimal ratios were based on the latest available EBITDA, the whole process of optimization could lead to biased results if this value (the EBITDA) was abnormally high or low.

To make sure that the results of our process are robust, we repeated the optimization process but used a conservative level of EBITDA (EBITDA*). This EBITDA* was calculated for each company using the following formula:

EBITDA* = EBITDA– S(EBITDA)*EBITDA

Where,
EBITDA: is the latest available level of EBITDA
S(EBITDA): is the standard deviation of EBITDA for the last 5 years.

The optimal ratios for each company changed to:

	Amoco	**Mobil**	**Texaco**	**Chevron**	**Exxon**
EBITDA	$5,875	$8,153	$4,005	$3,993	$17,709
S(EBITDA)	22%	13%	16%	72%	9.92%
EBITDA*	$4,578	$7,103	$3,377	$2,886	$15,952
Optimal Debt Ratio	43%	40%	25%	40%	50%
New Optimal Debt Ratio	20%	40%	25%	33%	50%

After comparing the optimal ratio (using EBITDA) with the optimal ratio using a normalized EBITDA, we conclude that the majority of the results are robust to changes in the level of EBITDA. Only Amoco experienced an impressive decrease on its financing mix with the inclusion of the normalized EBITDA.

4. Relative and Regression Analysis:

Our analysis of the optimal financing mix will not be complete if we do not take into account the levels of debt of companies in the oil sector and the market levels as a whole. Since a quantitative process does not always make sense, a comparative analysis is always recommended to increase the level of confidence of the results of the quantitative technique.

a) Relative Analysis; Sector Analysis:

1. Comparison with the average market debt ratio (MV) of the sector:

	Amoco	**Mobil**	**Texaco**	**Chevron**	**Exxon**	**Petroleum Producers Integrated (*)**
Current Debt Ratio	11.65%	13.57%	21.33%	11.66%	8.73%	27.59%
Optimal Debt Ratio	43%	40%	25%	40%	50%	27.59%

(*) Source: Damodaran

From this table, it is noticeable that Texaco's current and optimal levels are very close to the sector average. Some of the optimal levels of debt require a considerable increase in the financial leverage of the firms. That is specially the case of Exxon, Amoco and Chevron.

As almost all of the optimal debt ratios are above the sector average, we would like to compare these results with the entire market.

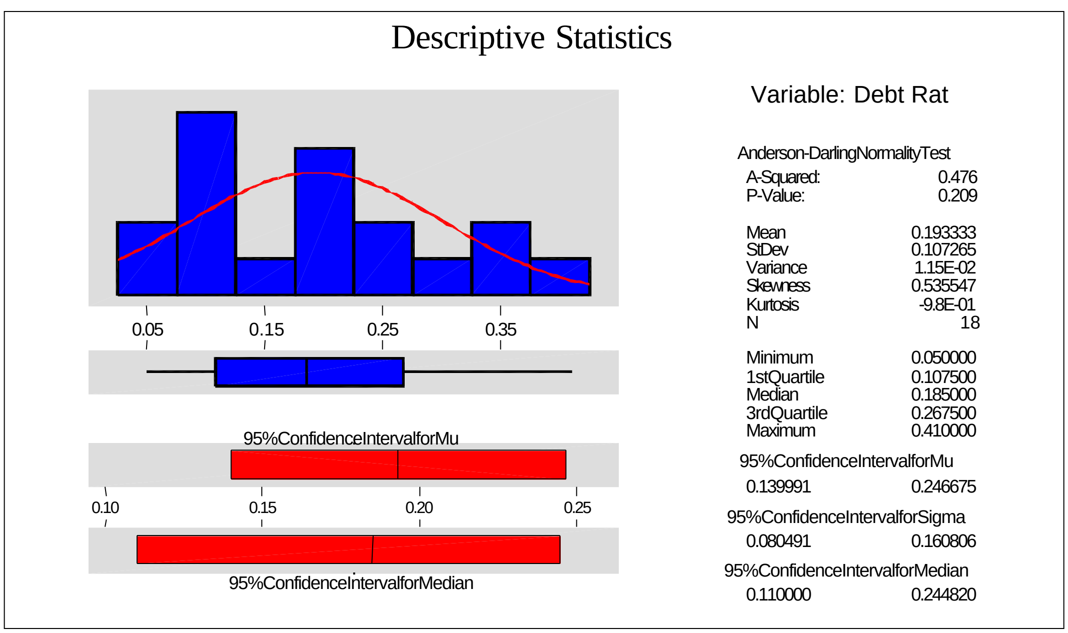
For the relative analysis (oil sector) we also took the market and book value of 18 companies in the oil sector.

Some of the ratios are:

Firm	BV Debt Ratio	MV Debt Ratio
Pennzoil	53.67%	40.83%
Occidental Petroleum	6.96%	33.33%
Coastal Corp.	53.03%	36.71%
National Fuel Gas	17.78%	31.51%
USX-Marathon Group	32.28%	23.66%
Unocal Corp.	44.11%	18.70%
Atlantic Richfield	65.90%	19.35%
Phillips Petroleum	39.60%	19.35%
Fina Inc.	25.78%	25.37%
Texaco	**25.14%**	**18.03%**
Chevron	**25.69%**	**10.71%**
Amoco	**25.12%**	**12.28%**
Mobil	**45.97%**	**10.71%**
Amerada Hess	43.35%	17.36%
Adams Resources & Energy	34.96%	9.91%
Exxon Corp.	**35.51%**	**6.54%**
Royal Dutch	14.49%	8.26%
Brown (Tom) Inc.	19.86%	4.76%
Average	33.84%	19.30%

Source: Bloomberg (RV)

To have a better assessment of the Market Value of Debt, we did a descriptive analysis of the Debt Ratio (MV) for the 18 companies:



From the table above we see that

- The average Debt Ratio (MV) is: 19.33%
- Standard Deviation: 10.7% signaling a relative high diversity in the financing mix decisions of the management of the firms across the sector.

Even though the distribution looks a little spread, the companies under analysis are between the first and the third quartiles.

<u>b) Regression Analysis; Sector Analysis:</u>

We ran a regression for the oil producing sector (18 companies) and came up with the following specification for the Debt ratio in market value terms:

Debt Ratio MV: 0.32 - 0.039*Effective Tax Rate - 0.00966*EBITDA/Value -0.070*Sigma(OI)

T-test: (2.59) (-0.24) (-1.14) (-0.64)

R^2: 9.70%

N: 18 companies

As shown, the results are not very exciting. The t-tests show that the coefficients are not statistically significant. Moreover, the signs of EBITDA/Value and Tax Rate do not make no much sense.

Besides the bad results of the regression, using the specific values of each firm we came up with the following predicted debt ratios:

Firm*	**Amoco**	**Mobil**	**Texaco**	**Chevron**	**Exxon**
Tax Rate	28%	49%	20%	41%	33%
EBITDA/Value	11.01%	10.98%	9.74%	10.96%	9.35%
Sigma(OI)	9%	12%	22%	12%	7%
Predicted Debt Ratio	30.17%	29.14%	29.59%	29.46%	30.13%

(*) Numbers may vary with respect to previous tables because we took Bloomberg values for this part of the analysis.

Because of the poor results of the regression, one should be careful not to place too much emphasis on these results.

As almost all of the optimal debt ratios are above the sector average, we would like to compare these results against the entire market. This is done in the next section.

c) Regression Analysis; Market Analysis:

For a broader comparison, we extended our analysis to include all firms listed in the US markets. The regression used is:

Debt Ratio = 0.2370 –0.1854 PRVAR + 0.1407CLSH + 1.3959 CAXP – 0.6483 FCP

Where,
PRVAR: Is the standard deviation of the firm value (over 10 years)
CLSH: Closely held shares as a percentage of outstanding shares
CAXP: Capital Expenditures over Book value of Capital
FCP: Free Cash Flow to Firm/ Market Value of Equity

	Amoco	**Mobil**	**Texaco**	**Chevron**	**Exxon**
PRVAR	11.88%	8.99%	7.79%	12.15%	4.34%
CLSH	2%	2%	3%	2%	6%
CAXP	8.51%	7.54%	7.92%	5.92%	13.53%
FCP	2.15%	1.76%	1.66%	3.64%	4.62%
Predicted Debt Ratio	32.66%	31.70%	32.66%	27.63%	39.63%

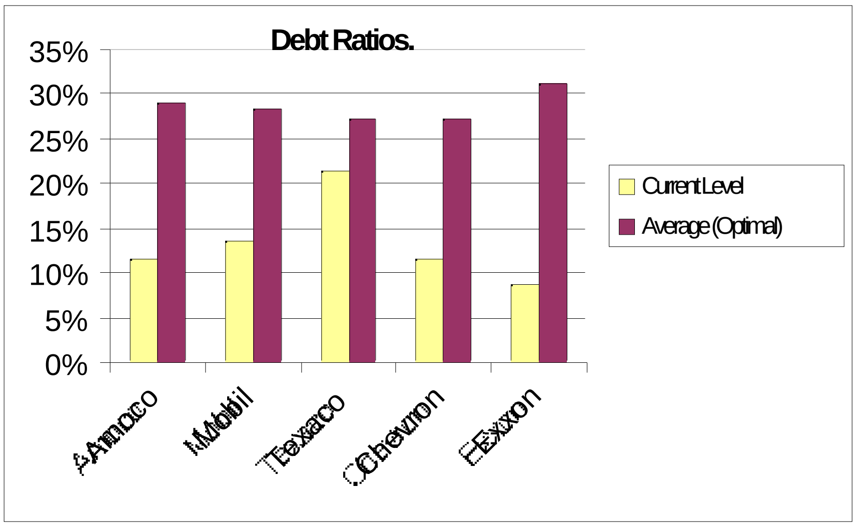
The debt ratio for Chevron is driven down by its high volatility of Firm Market Value and by the low level of Capital expenditures in comparison with the rest of the firms.

Summary of results of the debt ratio analysis:

	Amoco	**Mobil**	**Texaco**	**Chevron**	**Exxon**
Current Level	11.65%	13.57%	21.33%	11.66%	8.73%
COC Approach	43.00%	40.00%	25.00%	40.00%	50.00%
Sector Ratio	27.59%	27.59%	27.59%	27.59%	27.59%
Sector Regression	30.17%	29.14%	29.59%	29.46%	30.13%
Market Regression	32.66%	31.70%	32.66%	27.63%	39.63%
Average	**29.01%**	**28.40%**	**27.23%**	**27.27%**	**31.22%**

Since the results of the different approaches vary, we think that the debt ratios of these companies should move toward the average debt ratios, which are more consistent with the market and sector levels. Extreme moves out of sector and market standards are difficult to justify even if you are using the COC approach.

The following graph summarizes the movement from the current debt ratio to the average optimal debt ratio:



The most dramatic changes are for Exxon and Amoco. The lowest required change is for Texaco. No matter what type of approach is used, all firms, with the exception of Texaco, seem to be well below the recommended debt ratio levels.

Finally, we would like to say that even though the analysis objectively (by various techniques) shows that the companies should increase their levels of debt, this decision is largely subject to the idiosyncratic characteristics of the management of each company. It most likely would be difficult to change their minds. Moreover, the reduction of the credit rating on companies like Amoco and Exxon would be dramatic (from AAA to BB) and extremely difficult to justify to claim-holders.

PART VII
MECHANICS OF MOVING TO THE OPTIMAL LEVEL

The purpose of this section is to determine how fast these companies should move towards their optimal financing mix and what should be the general characteristics of the new debt issued.

This section does not suggest that the companies actually move to the optimal, because such a decision includes a lot of subjectivity. Therefore, we will only recommend, according to the characteristics of each company, a possible path to achieve the new optimal debt structure.

1. The Immediacy Question: To answer this question we present a summary table:

	Amoco	**Mobil**	**Texaco**	**Chevron**	**Exxon**
Current Level Debt	11.65%	13.57%	21.33%	11.66%	8.73%
Optimal Level (Average)	30.01%	28.40%	27.23%	27.27%	31.22%
Cost of Equity*	8.75%	8.97%	8.53%	9.03%	10.07%
ROE	18.13%	15.99%	20.4%	9.14%	17.25%
Cost of Capital*	8.20%	8.34%	7.65%	8.45%	9.54%
ROC	14.24%	12.30%	14%	5.17%	15.10%
Market Value*	$35,245	65,897	$36,563	$57,593	$133,374

(*) 1996 Levels

- ♦ From the table above, it can be said that these companies are large in market value terms (all over $30,000 million).
- ♦ In terms of the earnings performance of these companies:

  * All of them had excess accounting returns to the stockholders over the corresponding hurdle rates (ROE > COE).

  * All of them (except Chevron) also had excess returns to the firm (all claim holders), i.e. ROC > COC.

Based on this analysis we conclude that none of these companies are possible targets for hostile takeovers. Therefore, the recommended path tells us that these firms should continue to take new good projects and increase their debt ratios on a consistent but not quick or rushed basis.

Moving to the optimal level will require taking good projects and alter in the financing mix (increasing the level of debt to converge to the optimal). It is important though to determine what will be the structure of the debt.

2. The Right Financing Mix:

a) Intuitive Analysis:

In part III, we defined the type of projects that these companies will most probably to take.

Therefore, we consider that the right structure of the debt should be:

- Since the projects taken by these companies clearly have long-term lives, we recommend that a considerable part of the debt should be long-term debt.
- Part of the debt should be short-term to hedge the variability of the price of the oil and its effect on the operating income and as a way to maintain flexibility for refinancing long-term debt.
- To maintain flexibility, some of the debt should be floating rate debt (much of these companies already have floating rate debt on their books or take swap contracts).
- Since political instability of the main oil producers is always a threat on this sector, some type of option could be attached to the debt making it more attractive to the bondholders. For example, if a war breaks out and oil prices go down, the bondholder could have the right to put the bonds (sell them back to the issuer at a pre-determined price).
- Since these companies are sensitive to the price of oil and other commodities, a link of the debt to the performance of commodities indexes like the Commodity Research Bureau (CRB) or directly to the price of oil would attach an attractive value to the bonds. For example, the floating coupon rate of a bond could be defined as the return of the CRB index over the last six months. This would create a floating rate debt linked to the commodity sector.
- Some of the debt should be issued in foreign currency. The currency will depend on the currency the cash flows of the projects.

b) Quantitative Analysis:

One way to look for the debt characteristics is to assess the sensitivity of the firm values and EBITDA to different macro economic variables. We ran regressions for each company on an individual basis, but the results were not satisfactory (strange signs of the coefficients, low levels of significance of the coefficients, etc.). As a way to deal with this problem, we calculated the averages for the firms under analysis (Value of Firm and EBITDA). The results of the regressions follow.

Market Value (dependent variable)*	**Coefficient**	**T-statistic**	**R^2**
Long term rate	-2.17	-1.04	13.40%
GNP	0.87	0.42	2.50%
Dollar	0.631	1.26	18.50%
Inflation	1.02	0.43	2.60%
Oil	0.067	0.54	4.70%

* All variables correspond to year over year changes for the last ten years.

EBITDA (dependent variable)*	**Coefficient**	**T-statistic**	**R^2**
Long-term rate	2.92	0.73	7.00%
GNP	1.58	0.41	2.40%
Dollar	-0.984	-1.03	13.10%
Inflation	8.81	3.00	56.30%
Oil	0.253	1.19	19.20%

* All variables correspond to year over year changes for the last ten years.

The results shown in the two tables above show that even using averages, values still are not too satisfactory. The coefficients are all (except EBITDA versus Inflation) non-significant and the R^2 s are very low.

Nevertheless, now the signs are more consistent. For example:

- The GNP coefficient for both equations is positive indicating that the companies are cyclical.

- The oil coefficient is positive related to both dependent variables (Change in Value of the firm and EBITDA), indicating a consistent relationship between the price of the commodity and the results and the values of the firms.
- The inflation coefficient against EBITDA is positive indicating that a portion of the debt should be floating rate debt. The negative coefficient of inflation against the Firm seems to indicate that the effect of the increases in discount rates offset the positive effect of inflation on EBITDA, muting effect on value.
- We feel that the duration of the firms (the coefficient of Long-term rate against change in firm value) is too low (only 2.17 years) considering the lives of the projects to be financed.

The results of the quantitative analysis should be considered with caution because the parameters are not significant and the data is very noisy. We feel that the amount of data could be expanded (more years should be incorporated to the analysis). Unfortunately, the information to expand the data was not easy to find and we recommend doing it for further analysis.

As a relative analysis, we calculated the average maturity of the long-term debt of the firms under analysis. This average is approximately 10 years (10.07 years). We feel that this average maturity is more consistent with the type of cash flows that are going to be financed by the debt. Of course, the average duration of this average will be a little lower than 10 years (by definition of duration), probably somewhere between 7 to 9 years depending on the characteristics of the debt.

Overall Recommendations on Financing Mix:

Based on the previous analysis, we recommend that the new debt of these companies should have:

- An average maturity of 10 years (implying an average duration between 7 to 9 years).
- A mix of currencies that match as good as possible the cash flows of the projects conducted in foreign currencies.
- A mix of fixed and floating rate debt.
- The floating rate debt could be tied to the commodity market performance (as explained above).

PART VIII
DIVIDEND POLICY

The purpose of this section is to analyze how much the firm has returned to stockholders in the past, and to assess from a qualitative perspective whether it should return more or less.

Summary of Averages (see **Exhibit VIII** at the same of this section for more detail):

	Amoco	Mobil	Texaco	Chevron	Exxon	Industry	Market
Dividend Yield % Average	3.90%	4.05%	4.62%	3.96%	4.24%	4.41%	1.84%
Dividend Payout % Average	67.38%	66.93%	84.31%	79.75%	65.38%	53.61%	30.87%

Dividends Policy and Industry Comparison:

We compared the companies' dividend yields and payout ratios to the averages of the petroleum-integrated companies and to the overall market. The five companies under analysis have paid dividends during the past ten years. The only company that had not bought back stock in recent years was Texaco (1991 and 1992). Since the five companies are major participants in the industry, the industry averages reflect their dividend yield ratios as well as their dividend payout ratios. The comparison with the market shows that these companies have paid more than the market average and their dividend yields were also much greater than those of the market.

In particular, the five companies have had high and fairly steady earnings, and the projects undertaken have been within their core businesses. Consequently, each company could afford to pay high dividends. These companies needs for financial flexibility have been warranted by their low financial leverage. However, these companies do need flexibility since the industry is diversified (distribution, pipelines, marketing, exploration, production, chemicals, petrochemicals, petroleum services, transportation, service stations) and there are a lot of investment opportunities in the oil sector. In this respect, the companies should be cautious with their dividend policies so that they will have cash available to continue investing in good projects (since a good project in the oil sector might be worth several billions of dollars).

Additionally, stock prices had not been affected by the dividend policy, but rather by macroeconomic trends and by changes in oil prices. Stockholder expectations on the firms are driven by oil price expectations rather than by the dividend policies of these companies. Future cash flows are more related to oil price expectations than to dividend policy. Therefore, the need to signal financial markets is not achieved through dividend policy.

Again, for the five companies, the individual stockholder (not the institutional investor) seems to be less well off investors who like dividends. This is evidenced by the fact that the five companies paid higher dividends compared to the market average and their yields were much higher than market average yields.

Summary of Conclusions:

Dividend Yield	Similar to that of the industry average Much higher than that of the market average
Dividend Payout	Higher than the industry average Much higher than the market average
Signaling Incentives	These companies do not need to use dividend policy to signal incentives
Type of Stockholders	Less well off investors who like dividends
Effects on Flexibility	High dividends affect the flexibility due the nature of the oil projects

Exhibit VIII (1)

Historical Dividend Policy

- Amoco

	Dec-1996	Dec-1995	Dec-1994	Dec-1993	Dec-1992
Dividend Paid (M$)	1,287	1,197	1,092	1,092	1,091
Stock buyback	39	704	41	32	29
Total cash to stockholders	1,326	1,901	1,133	1,124	1,120
Dividend Yield %	3.22	3.36	3.72	4.16	4.51
Dividend Payout %	45.41	64.29	61.04	60.00	128.35

Averages: Dividend Yield = 3.9%
Dividend Payout = 67.38%

- Mobil

	Dec-1996	Dec-1995	Dec-1994	Dec-1993	Dec-1992
Dividends Paid	1,601	1,490	1,411	1,357	1,336
Stock buyback	281	289	263	154	16
Total cash to Stockholders	1,882	1,779	1,674	1,511	1,352
Dividend Yield %	3.21%	3.24%	4.04%	4.11%	5.07%
Dividend Payout %	53.16%	61.81%	79.54%	64.10%	102.24%
Avg. Dividends Paid	$ 1,261.60				

Average: Dividend Yield = 4.05%
Dividend Payout = 66.93%

- Texaco

	Dec-1996	Dec-1995	Dec-1994	Dec-1993	Dec-1992
Dividend paid	917	892	921	929	927
Stock buyback	159	4	648	0	0
Total cash to Stockholders	1,076	896	1,569	929	927
Dividend Yield %	3.36	4.08	5.34	4.94	5.36
Dividend Payout %	43.83	124.55	93.47	71.5	88.18

Average: Dividend Yield = 4.62%
Dividend Payout = 84.31%

- Chevron

	Dec-96	Dec-95	Dec-94	Dec-93	Dec-92
Dividends Paid	1,358	1,255	1,206	1,139	1,115
Stock buyback	4	4	5	4	382
Total cash to Stockholders	$1,362	$1,259	$1,211	$1,143	$1,497
Dividend Yield %	3.20	3.68	4.15	4.02	4.75
Dividend Payout %	52.09%	134.95%	71.23%	90.04%	50.45%

Average: Dividend Yield = 3.96%
Dividend Payout = 79.75%

- Exxon

	Dec-1996	Dec-1995	Dec-1994	Dec-1993	Dec-1992
Dividends paid	3,920	3,765	3,659	3,630	3,832
Stock buyback	1,139	628	220	323	358
Total cash to stockholders	5,059	4,393	3,879	3,953	4,190
Dividend Yield %	3.18	3.73	4.79	4.56	4.63
Dividend Payout %	51.66	57.74	71.19	68.08	73.59
Dividend Yield %	3.18	3.73	4.79	4.56	4.63

Average: Dividend Yield = 4.24%
Dividend Payout = 65.38%

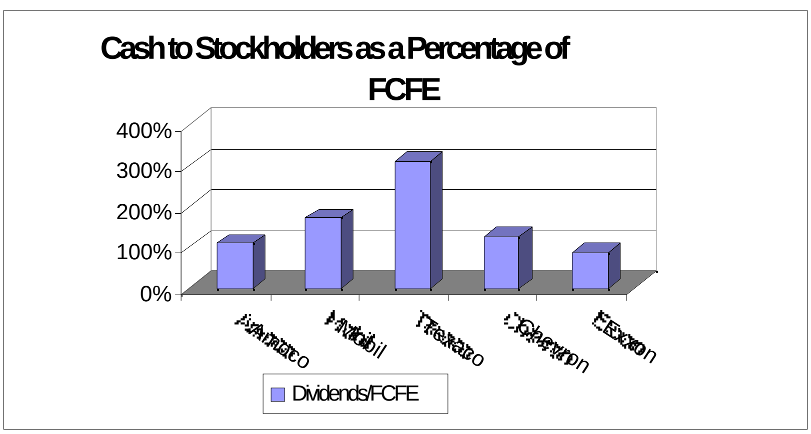
PART IX
DIVIDEND POLICY: A FRAMEWORK

The purpose of this section is to assess how much the firm could have returned to stockholders and whether it should be returning more or less.

1. Affordable Dividends:

In order to determine the amount the companies could have paid in dividends, we have estimated the average Free Cash Flow to Equity (FCFE) for every company and compared it to the cash returned to stockholders through dividends and stock buybacks. To calculate the FCFE for each company, we took into account the average debt ratio of each firm.

Company	Average FCFE	Avg. Dividends & Stock Buybacks	Difference
Amoco	$ 1,215.84	$ 1,320.80	($ 104.96)
Mobil	$ 955.06	$ 1,639.60	($ 684.54)
Texaco	$ 319.19	$ 984.00	($ 664.81)
Chevron	$ 993.96	$ 1,229.67	($ 235.71)
Exxon	$ 4,025.32	$ 3,491.00	$ 534.32



Based on the graphs we see that Amoco, Mobil, Chevron and especially Texaco returned more cash to their stockholders than they could afford. On the other hand, Exxon had more conservative dividend policies.

Texaco is the most extreme case regarding the payment of dividends. On average, the cash returned from this company represented 308% of its Free Cash Flow to Equity, $665 more than what it should have paid out. On the other hand, Exxon only paid 87% back to its stockholders, keeping $534 to reinvest in the business.

In general, paying more than what the companies can afford is not sustainable over a long period of time.

2. Management Trust and Changing Dividend Policy:

Company	ROE	COE	Difference	ROC	WACC	Difference
Amoco	18.13 %	8.75 %	9.38 %	14.24 %	8.20 %	6.04 %
Mobil	15.99 %	8.97 %	7.02 %	12.30 %	8.34 %	3.96 %
Texaco	20.4 %	8.53 %	11.87 %	14.00 %	7.65 %	6.35 %
Chevron	18.16 %	9.03 %	9.13 %	13.62 %	8.45 %	5.17 %
Exxon	17.25 %	10.07 %	7.18 %	15.10 %	9.49 %	5.61 %

To calculate the excess return of the projects to the firm and equity investors, we used the average ROE and ROC over the last five years and compared it with the last available Cost of Equity and Weighted Average Capital Cost for each company.

Overall, managers in these firms have been taking on good projects. The good earnings ratios obtained won the stockholders trust in their companies' management. This suggests that fewer dividends should be paid in order to take keep on taking good projects. The investments made during the period of analysis earned more than the rates required by equity investors. Regarding the Economic Value Added for these firms, we observe that the trend is to deliver returns to equity investors that exceed the required rate of return. Exxon has the highest EVA for equity ($3,152.32 million), while Texaco has the lowest of $1,177.50 million, which is still high compared to the industry average of $397.74. According to these results, the management of the firms should have the flexibility and possibility to choose dividend policies most suited to their companies. The analysis reveals that, in the cases of Amoco, Chevron and especially Mobil, these companies have been paying more dividends than they could afford. A change in policy is required, cutting down dividends and reinvesting more in projects in their core businesses.

3. Dividend Sector Comparisons:

Company	Dividend Yield	Dividend Yield (Sector)	Difference	Payout Ratio	Payout Ratio (Sector)	Difference
Amoco	3.90 %	2.27 %	1.63 %	67.38 %	32.25 %	35.13 %
Mobil	4.05 %	2.31 %	1.74 %	66.93 %	32.58 %	34.35 %
Texaco	4.62 %	1.87 %	2.75 %	84.31 %	28.24 %	56.07 %
Chevron	3.96 %	2.57 %	1.39 %	79.75 %	35.25 %	44.50 %
Exxon	4.24 %	2.74 %	1.50 %	65.40 %	36.92 %	28.48 %

The dividend yield and payout ratios for the sector were calculated taking into account the weight that each company had in the Petroleum Integrated and Producing sector.

These values suggest that the firms' dividend yields and payout ratios are high relative to the sector, with Texaco paying more dividends relative to its earnings. Its payout ratio reaches 84.31%, which is above the sector average by 56.07%. Regarding the dividend yield, Texaco is also paying the most to its stockholders (given the high amount of dividends paid when compared to its current stock price of $54).

4. Comparison to the Market:

We used the following regression equations for dividend yields and payout ratios:

Payout = 0.3410 - 0.2109 β + 0.0000033 Mkt.Cap.+ 0.0274 Debt Ratio + 0.1825 ROE – 0.0167 NCEX/TA

R^2 = 7.04%

Yield = 0.0189 - 0.0121 β + 0.00000016 Mkt.Cap.+ 0.0056 Debt Ratio + 0.0094 ROE – 0.0028 NCEX/TA

R^2 = 10.02%

Where: β = Beta of stock
Mkt. Cap. = Market Value of Equity + Book Value of Debt
Debt Ratio = Book Value of Debt / Mkt. Cap.

ROE = Return on Equity in 1996
NCEX/TA = (Capital Expenditures – Depreciation) / Total Assets

The regression does not have good explanatory power because it explains only 7% to 10% of the differences in dividend measures.

Plugging in the values for each company we obtain the following results:

Company	Dividend Yield	Dividend Yield (Reg.)	Difference	Payout Ratio	Payout Ratio (Reg.)	Difference
Amoco	3.90 %	2.24 %	1.66 %	67.38 %	40.20 %	27.18 %
Mobil	4.05 %	2.47 %	1.58 %	66.93 %	47.19 %	19.74 %
Texaco	4.62 %	2.15 %	2.47 %	84.31 %	39.83 %	44.48 %
Chevron	3.96 %	2.37 %	1.59 %	79.75 %	45.07 %	34.68 %
Exxon	4.24 %	3.30 %	0.94 %	65.40 %	65.23 %	0.17 %

*Reg. = Regression output

A common trend is that the five companies are paying more dividends than the average company in the market. Exxon is the only company that is near the market benchmark, exceeding it by only 0.17%. Texaco, on the other hand, is paying too many dividends as indicated by its Payout Ratio of 84.31% and Dividend Yield of 4.62%.

To conclude, Exxon is the only company with the flexibility to increase its dividend payments, given that its average Free Cash Flow to Equity permits it. In the cases of Amoco, Mobil, Texaco and Chevron, their dividend policies should be reviewed and adjusted to the real cash outflows that they can afford.

X. VALUATION

In this final section, our objective is to merge all the analysis conducted in parts 1-9.

The previous sections allowed us to determine the fundamental inputs and assumptions for the final evaluation of the companies examined in this project. We hereby present the single steps and the findings of the valuations.

1. *Choosing the Right Model:*

The three main inputs needed to conduct the valuation of the five companies are:

Growth rate

Type of cash flow

Discount rate

a) Growth rate

The expected growth in earnings per share (EPS) is the basis on which we estimated the companies' growth potential. If this figure results considerably higher than the expected growth of the overall economy (stable growth of 6%), the company is expected to experience a two-stage growth pattern. This pattern consists of a growth equal to the expected growth in EPS for the first five years and a stable growth of 6% forever after. In the period of high growth the discount used in the evaluation is the current cost of capital or equity (depending on the model used) of each firm. In the period of stable the discount rate employed reflects the beta of a large stable mature company (Beta =1), and the capital expenditure assumed in the cash flow computation must offset the level of depreciation. This is the case of Exxon; its current EPS growth rate is around 7.56%, thus we have assumed this high growth for the first five years and then a period of stabilization at a rate of 6%.

For all other companies, we chose a stable growth model based on their current EPS growth, which is close to the nominal one estimated for the economy. In the case of these companies we assume that their Betas will move towards the industry average which is 0.74. Two more reasons justify this choice. Firstly, all this companies are large in size and are in a mature stage; secondly, although the industry enjoys high barriers to entry, the number of projects available are limited and of large scale. These characteristics lead us to believe that assuming a stable growth from year one is a reliable prediction for the valuation.

The table below illustrated the inputs for the EPS growth computation. The expected growth in EPS is given by the retention ration (1-Pay-out ratio) multiplied by the ROE.

	Amoco	**Mobil**	**Texaco**	**Chevron**	**Exxon**
ROE	18.13%	15.99%	20.48%	18.16%	17.88%
(1-Payout)	35.71%	18.27%	24.02%	28.77%	42.26%
EPS growth	6.47%	2.92%	4.92%	5.22%	7.56%

b) Type of cash flow

The cash flow to the firm, cash flow to equity and dividends were the options we had when we chose the type of cash flow to utilize in the valuation. For all the companies analyzed, except for Amoco, the amount paid in dividends was distant from the free cash flow to equity. As a consequence, the cash flow to equity is a more reliable signal of the company's actual performance than dividends. In addition, we expect the companies' leverage to remain stable. This assumption led us to utilize the cash flow to equity for our valuation over both dividends and cash flow to the firm.

The cash flow to the firm is computed as:

Net income
- (Capital Expenditure-Depreciation)*(1-Debt ratio)
- (Change in Working Capital)*(1-Debt ratio)

= Free Cash Flow to Equity

The table below summarizes the free cash flow to equity computation for the first year. This is the base value on which the growth rate calculated above is applied.

Company	Amoco	Mobil	Texaco	Chevron	Exxon
Debt Ratio	Discount Dividend Model	13.57 %	21.33 %	11.66 %	8.73 %
EPS		$ 3.76	$ 3.81	$ 3.97	$ 3.02
Net Cap Ex *(1-DR)		$ 1.97	$ 2.14	$ 1.62	$ 0.69
Changes in WC*(1-DR)		($ 0.26)	$ 0.54	$ 0.86	($ 0.52)
FCFE		$ 2.04	$ 1.13	$ 1.49	$2.85

c) Discount rate

Because of the type of cash flow used, the cost of equity is the appropriate discount rate. Just as a reminder here are the firms' cost of equity.

Company	Amoco	Mobil	Texaco	Chevron	Exxon
Cost of Equity	8.75 %	8.97 %	8.53 %	9.02 %	10.07 %

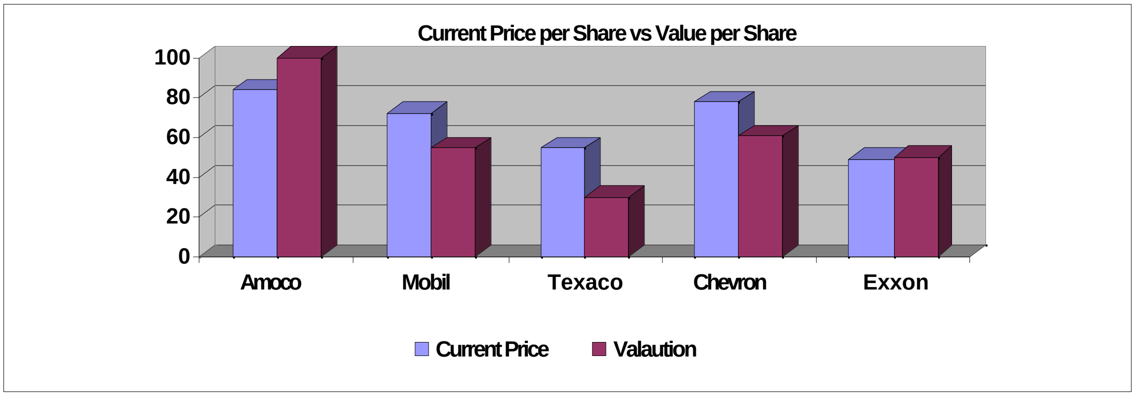
In summary, here are the model used to value the different firms.

Company	Model Used
Amoco	Stable growth, Dividends
Mobil	Stable growth, FCFE
Texaco	Stable growth, FCFE
Chevron	Stable growth, FCFE
Exxon	2 stage growth, FCFE

2. Valuation:

We then calculated the present value of the Free Cash Flow to Equity for all the companies except Amoco for which the valuation was made after discounting to the present the value of the dividends.

Company	Current Stock Price	Value of Stock	Situation
Amoco	$ 83.38	$ 99.83	Undervalued
Mobil	$ 72.19	$ 54.63	Overvalued
Texaco	$ 54.38	$ 30.26	Overvalued
Chevron	$ 77.44	$ 60.56	Overvalued
Exxon	$ 49.00	$ 49.69	Correctly valued



As a general trend we observe that all the companies with the exception of Exxon and Amoco are highly over valued. The latter represents a great investment opportunity given its huge upside potential. The juicy dividends paid by the rest of companies and the expectations generated by them may be a reason why the valuation differs so much from the current value. An adjustment in dividend policy for these three companies may discourage investors to take position in these stocks, driving their prices to a more accurate level and giving the chance to invest a bigger amount of cash in new projects. At the end this can generate a sustained and explainable increase in the value of the stock.