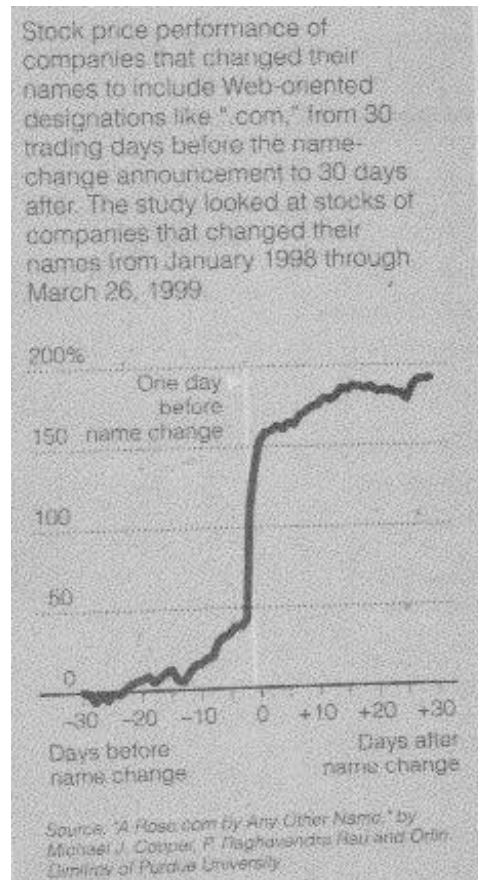




Value Enhancement: Back to Basics

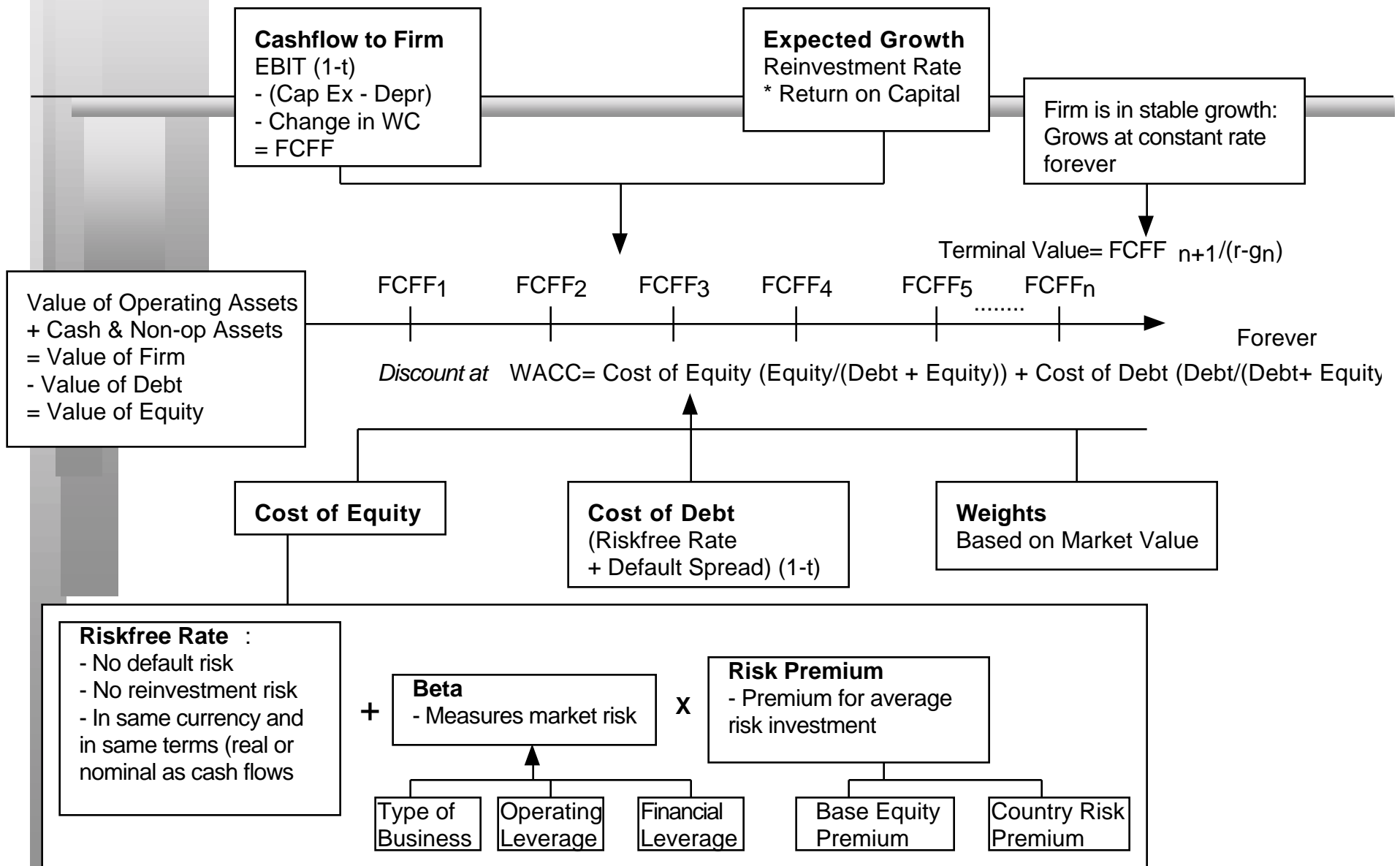
Price Enhancement versus Value Enhancement



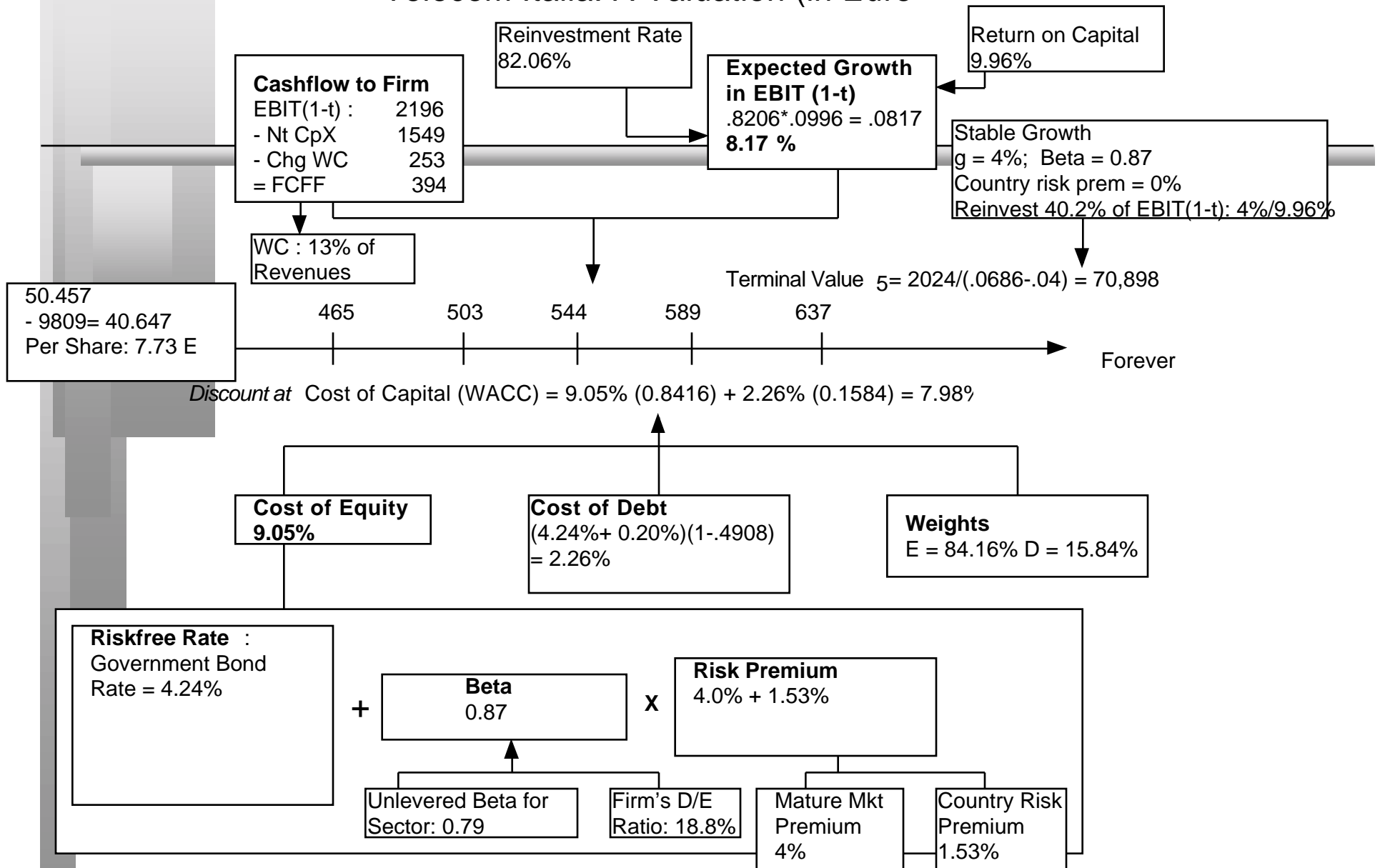
Discounted Cash Flow Valuation: The Steps

- Estimate the **discount rate** or rates to use in the valuation
 - Discount rate can be either a cost of equity (if doing equity valuation) or a cost of capital (if valuing the firm)
 - Discount rate can be in nominal terms or real terms, depending upon whether the cash flows are nominal or real
 - Discount rate can vary across time.
- Estimate the **current earnings and cash flows** on the asset, to either equity investors (CF to Equity) or to all claimholders (CF to Firm)
- Estimate the **future earnings and cash flows** on the asset being valued, generally by estimating an expected growth rate in earnings.
- Estimate **when** the firm will reach “**stable growth**” and what characteristics (risk & cash flow) it will have when it does.
- Choose the **right DCF model** for this asset and value it.

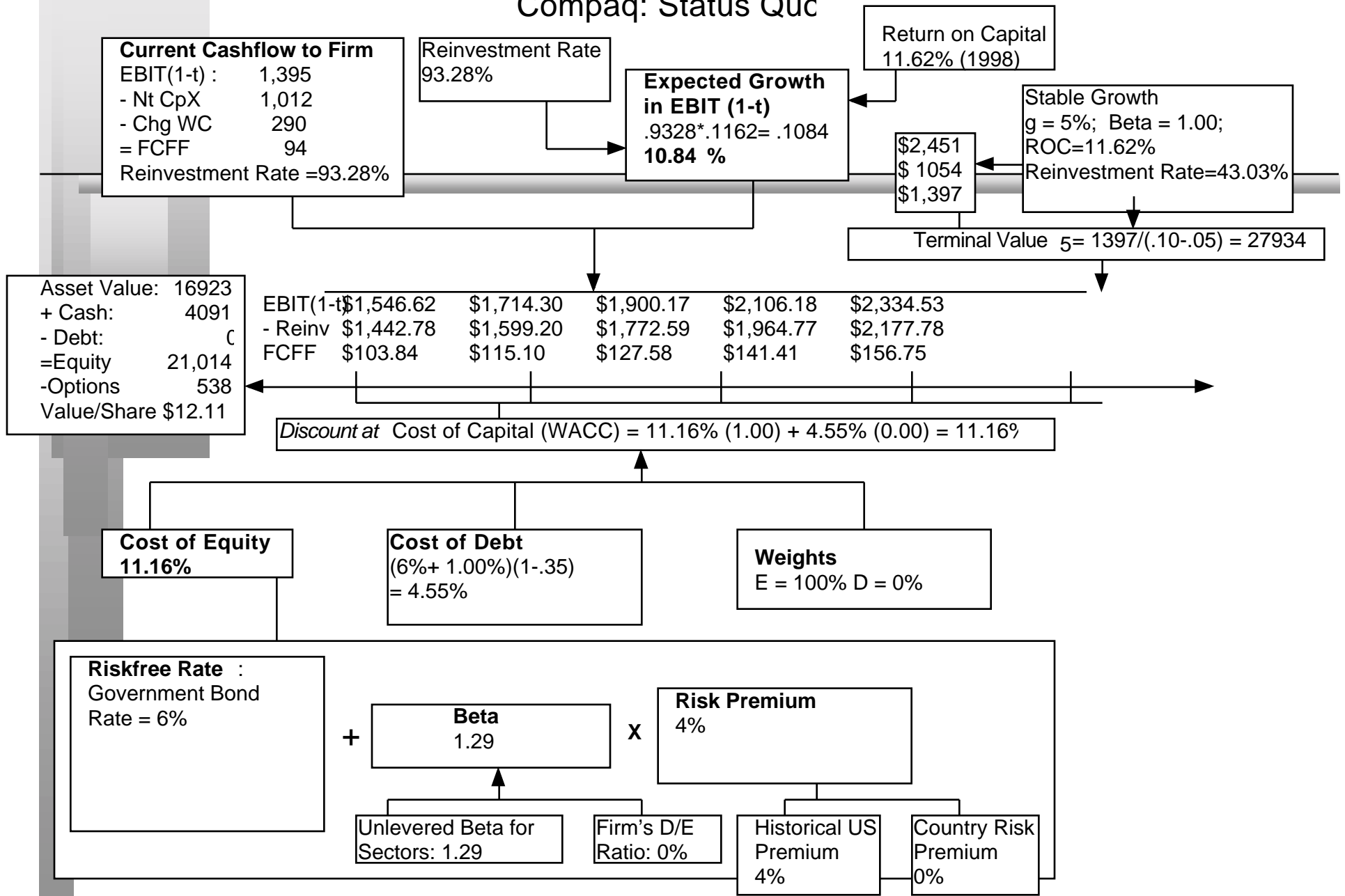
DISCOUNTED CASHFLOW VALUATION



Telecom Italia: A Valuation (in Euro)



Compaq: Status Quc



The Paths to Value Creation

- Using the DCF framework, there are four basic ways in which the value of a firm can be enhanced:
 - The cash flows from existing assets to the firm can be increased, by either
 - increasing after-tax earnings from assets in place or
 - reducing reinvestment needs (net capital expenditures or working capital)
 - The expected growth rate in these cash flows can be increased by either
 - Increasing the rate of reinvestment in the firm
 - Improving the return on capital on those reinvestments
 - The length of the high growth period can be extended to allow for more years of high growth.
 - The cost of capital can be reduced by
 - Reducing the operating risk in investments/assets
 - Changing the financial mix
 - Changing the financing composition

A Basic Proposition

- For an action to affect the value of the firm, it has to
 - Affect current cash flows (or)
 - Affect future growth (or)
 - Affect the length of the high growth period (or)
 - Affect the discount rate (cost of capital)
- **Proposition 1: Actions that do not affect current cash flows, future growth, the length of the high growth period or the discount rate cannot affect value.**

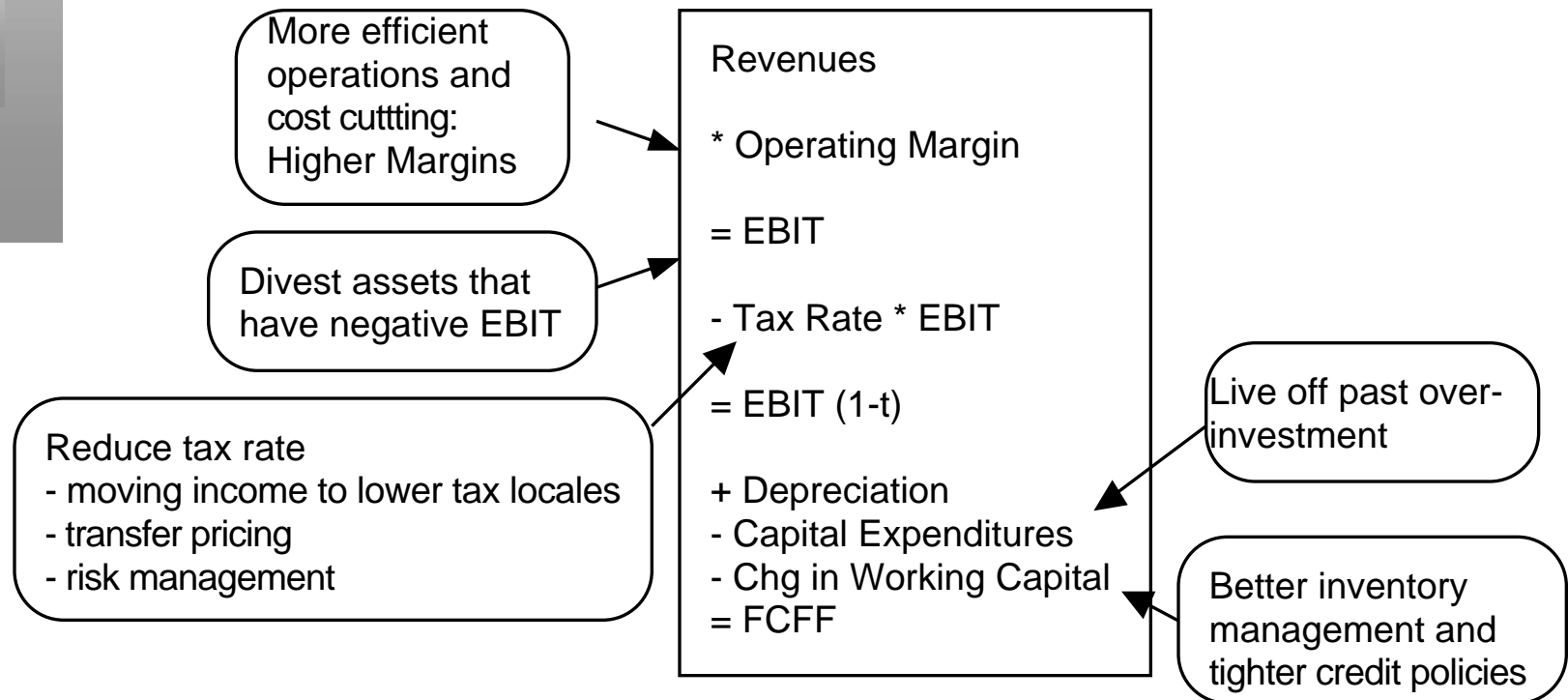
Value-Neutral Actions

- Stock splits and stock dividends change the number of units of equity in a firm, but cannot affect firm value since they do not affect cash flows, growth or risk.
- Accounting decisions that affect reported earnings but not cash flows should have no effect on value.
 - Changing inventory valuation methods from FIFO to LIFO or vice versa in financial reports but not for tax purposes
 - Changing the depreciation method used in financial reports (but not the tax books) from accelerated to straight line depreciation
 - Major non-cash restructuring charges that reduce reported earnings but are not tax deductible
 - Using pooling instead of purchase in acquisitions cannot change the value of a target firm.
- Decisions that create new securities on the existing assets of the firm (without altering the financial mix) such as tracking stock.

Value Creation 1: Increase Cash Flows from Assets in Place

- The assets in place for a firm reflect investments that have been made historically by the firm. To the extent that these investments were poorly made and/or poorly managed, it is possible that value can be increased by increasing the after-tax cash flows generated by these assets.
- The cash flows discounted in valuation are after taxes and reinvestment needs have been met:
$$\begin{aligned} & \text{EBIT} (1-t) \\ & - (\text{Capital Expenditures} - \text{Depreciation}) \\ & - \text{Change in Non-cash Working Capital} \\ & = \text{Free Cash Flow to Firm} \end{aligned}$$
- Proposition 2: A firm that can increase its current cash flows, without significantly impacting future growth or risk, will increase its value.

Ways of Increasing Cash Flows from Assets in Place



1.1.: Poor Investments: Should you divest?

- Every firm has at least a few investments in place that are poor investments, earning less than the cost of capital or even losing money.
- At first sight, it may seem that terminating or divesting these investments would increase value. That is not necessarily true, however, because that implicitly assumes that you get at least your capital back when you terminate a project.
- In reality, there are three values that we need to consider:
 - **Continuing Value:** This is the present value of the expected cash flows from continuing the investment through the end of its life.
 - **Salvage or Liquidation Value:** This is the net cash flow that the firm will receive if it terminated the project today.
 - **Divestiture Value:** This is the price that will be paid by the highest bidder for this investment.

Issue: To liquidate or not to liquidate

- Assume that you have been called to run Compaq and that its returns on its different businesses are as follows:

Business	Capital Invested	ROC	Cost of Capital
Mainframe	\$ 3 billion	5%	10%
PCs	\$ 2 billion	11%	11%
Service	\$ 1.5 billion	14%	9.5%
Internet	\$ 1 billion	22%*	14%

* Expected returns; current returns are negative

Which of these businesses should be divested?

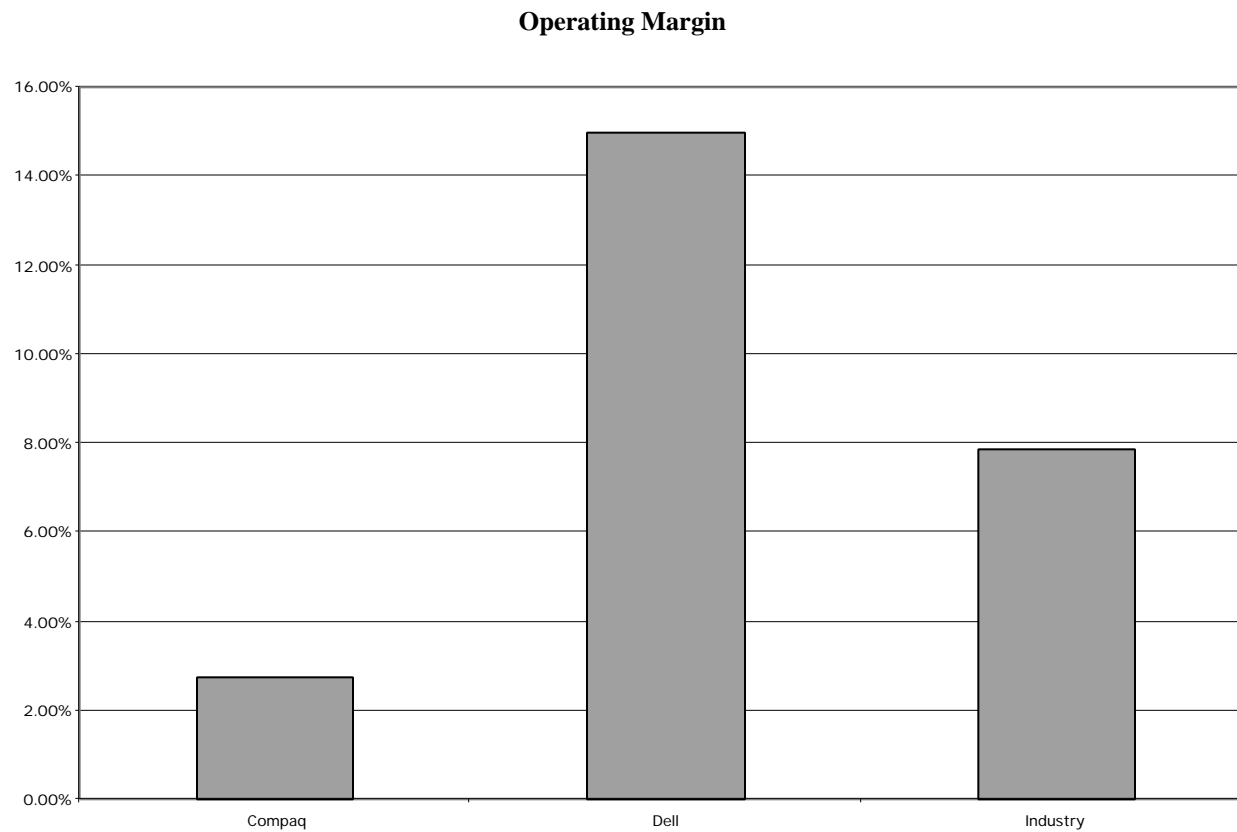
A Divestiture Decision Matrix

- Whether to continue, terminate or divest an investment will depend upon which of the three values - continuing, liquidation or divestiture - is the greatest.
- If the continuing value is the greatest, there can be no value created by terminating or liquidating this investment.
- If the liquidation or divestiture value is greater than the continuing value, the firm value will increase by the difference between the two values:
 - If liquidation is optimal: Liquidation Value - Continuing Value
 - If divestiture is optimal: Divestiture Value - Continuing Value

1.2: More Efficient Operations

- The operating income for a firm can be written as
Revenues
* Operating Margin
= EBIT
- The operating margin for a firm is a function of how efficiently it operates to produce the products and services that it sells. If a firm can reduce its costs, while generating similar revenues, it will increase its operating income and value.
- Cost cutting and layoffs comprise the first leg of value enhancement for most firms. Since they occur quickly and are tangible, the effect on earnings (and value) is immediate.
 - Not all cost cutting is value enhancing. If firms cut expenditures which are designed to create future growth (research and training expenses, for instance), they might report higher operating income but value might drop.

Operating Margin for Compaq: A Comparison to the Industry



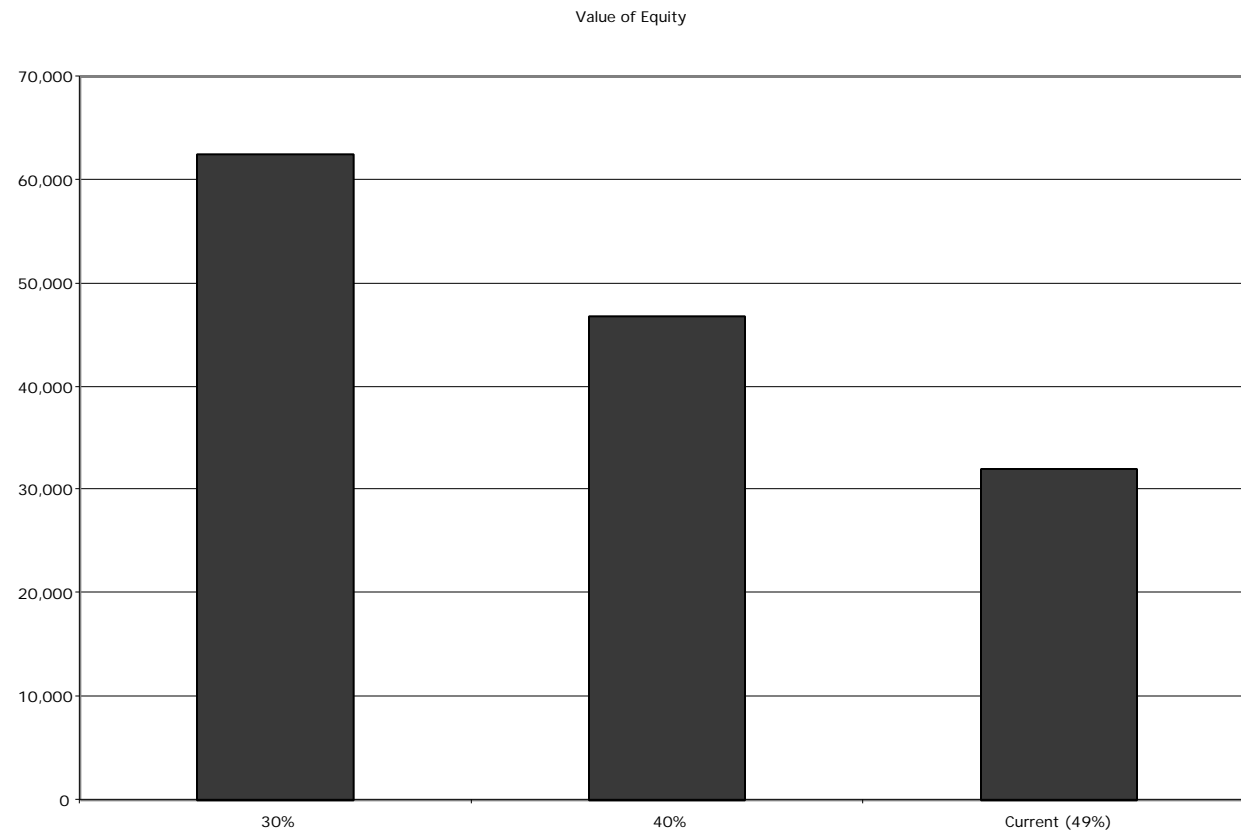
Issue : Operating Margins and R&D

- Assume that analysts focus on the traditional operating margin. Assume that Compaq improves its margin by cutting back on R&D expenses. Is this value creating?

1.3: The Tax Burden

- The value of a firm is the present value of its after-tax cash flows. Thus, any action that can reduce the tax burden on a firm over time, for a given operating income, will increase value.
- The tax rate of a firm can be reduced over time by doing any or all of the following:
 - Moving income from high-tax locales to low-tax or no-tax locales
 - Acquiring or Obtaining net operating loss carry forwards that can be used to shield future income
 - Using risk management to reduce the average tax rate paid over time on income
 - The marginal tax rate on income tends to rise, in most regimes, as income increases.
 - By using risk management to smooth income over time, firms can make their income more stable and reduce their exposure to the highest marginal tax rates.
 - By doing so, they can increase their value.

The Tax Effect: Telecom Italia



1.4: Reduce Net Capital Expenditures

- The net capital expenditures refers to the difference between capital expenditures and depreciation. The net capital expenditure is a cash outflow that reduces the free cash flow to the firm.
- Part of the net capital expenditure is designed to generate future growth, but part of it may be maintain assets in place
- If a firm can reduce its net capital expenditures on assets in place, it will increase value.
- During short periods, the capital expenditures can even be lower than depreciation for assets in place, creating a cash inflow from net capital expenditures.

1.5: Reduce Working Capital Needs

- The non-cash working capital in a firm can be measured as follows:
Accounts Receivable
+ Inventory
- Accounts Payable
= Non-cash Working Capital
- Increases in non-cash working capital represent cash outflows, while decreases represent cash inflows.
- Reducing the non-cash working capital needs of a firm, while keeping growth and risk constant, will increase its value.

The Cash Flow Effects of Working Capital: Telecom Italia

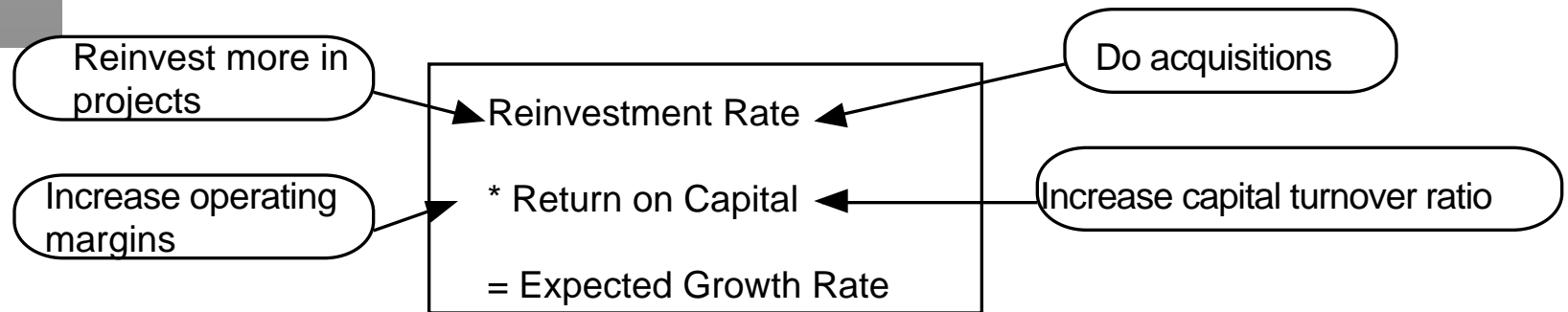
	1996	1997	Telecoms
Inventory	773	1092	
Accounts Receivable	6193	7017	
Accounts Payable	4624	5236	
Non-cash WC	2342	2873	
% of Sales	11.50%	12.99%	6.75%

- What was the effect of working capital on cash flows in 1997?
- How much would cash flows have changed if TI's working capital needs matched the industry average?

Value Creation 2: Increase Expected Growth

- Keeping all else constant, increasing the expected growth in earnings will increase the value of a firm.
- The expected growth in earnings of any firm is a function of two variables:
 - The amount that the firm reinvests in assets and projects
 - The quality of these investments

Value Enhancement through Growth



2.1: Increase the Reinvestment Rate

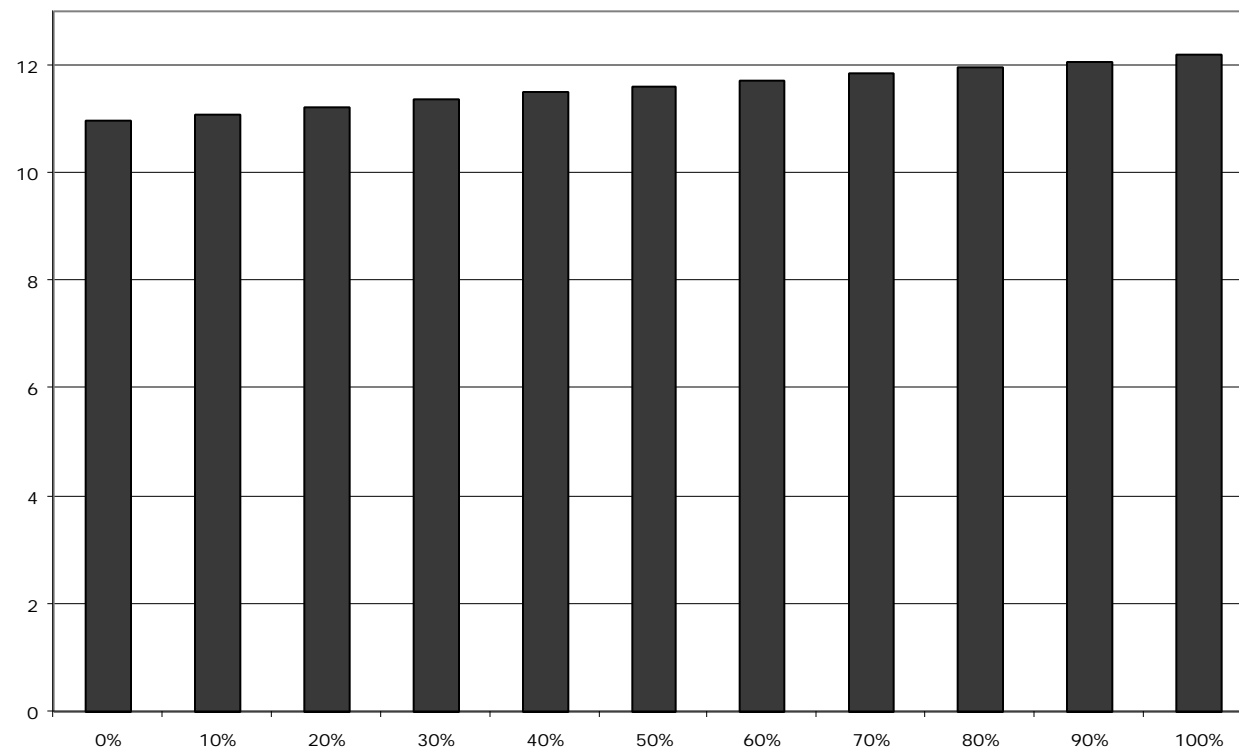
- Holding all else constant, increasing the reinvestment rate will increase the expected growth in earnings of a firm. Increasing the reinvestment rate will, however, reduce the cash flows of the firms. The net effect will determine whether value increases or decreases.
- As a general rule,
 - Increasing the reinvestment rate when the ROC is less than the cost of capital will reduce the value of the firm
 - Increasing the reinvestment rate when the ROC is greater than the cost of capital will increase the value of the firm

Reinvestment and Value Creation at Compaq

- Compaq, in 1998, had a return on capital of 11.62% and a cost of capital of 11.16%. It was reinvesting 93.28% of its earnings back into the firm. Was this reinvestment creating significant value?

The Return Effect: Reinvestment Rate

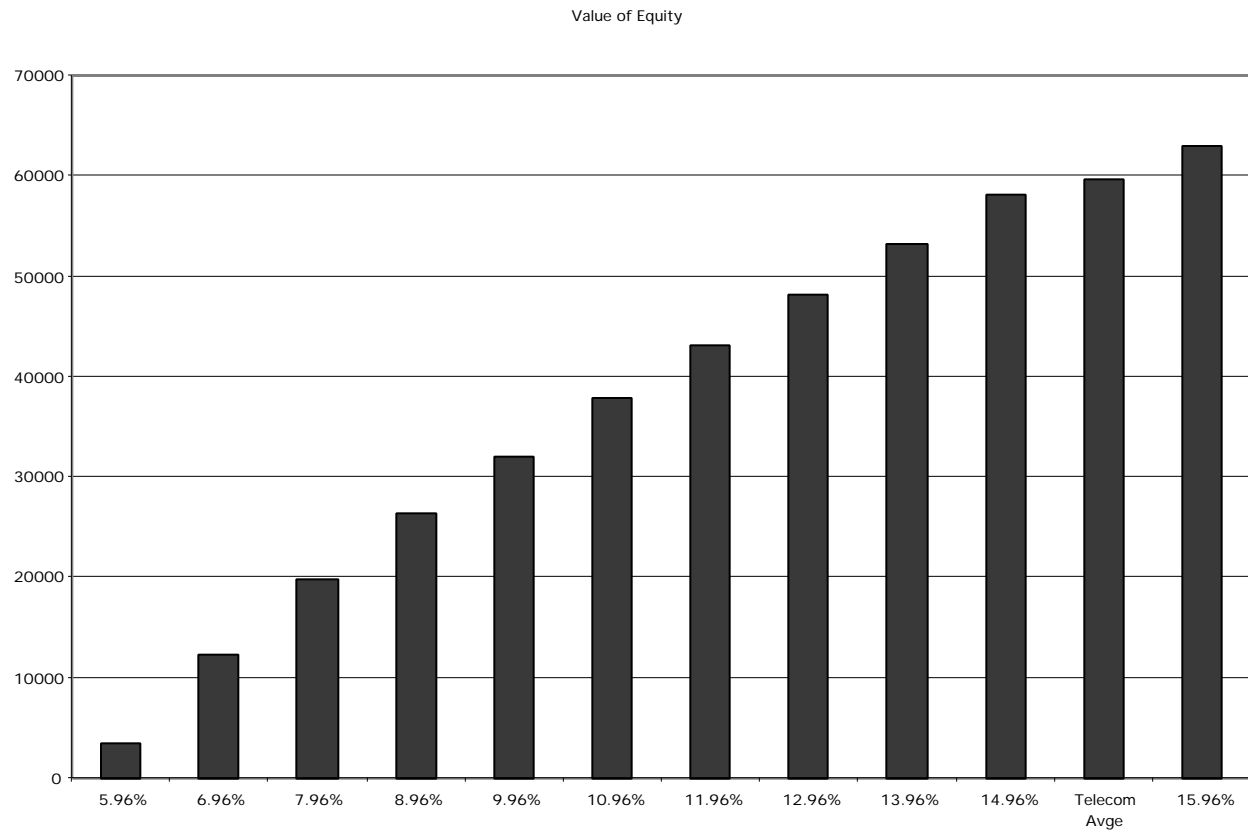
Compaq: Value/Share and Reinvestment Rate



2.2: Improve Quality of Investments

- If a firm can increase its return on capital on new projects, while holding the reinvestment rate constant, it will increase its firm value.
 - The firm's cost of capital still acts as a floor on the return on capital. If the return on capital is lower than the cost of capital, increasing the return on capital will reduce the amount of value destroyed but will not create value. The firm would be better off under those circumstances returning the cash to the owners of the business.
 - It is only when the return on capital exceeds the cost of capital, that the increase in value generated by the higher growth will more than offset the decrease in cash flows caused by reinvesting.
- This proposition might not hold, however, if the investments are in riskier projects, because the cost of capital will then increase.

Telecom Italia: Quality of Investments



2.3: Pricing Decisions, ROC and Expected Growth

- The return on capital on a project or firm can be written as:
$$\text{ROC} = \text{EBIT} (1-t) / \text{Sales} * \text{Sales} / \text{Capital}$$

= After-tax Operating Margin * Capital Turnover Ratio
- When firms increase prices for their products, they improve operating margins but reduce sales (and turnover ratios). The effects of the price/quantity decision can be captured in the return on capital. It provides a simple way of allowing firms to:
 - Choose between price leader and volume leader strategies
 - The strategy that maximizes value should be the better strategy
 - In analyzing these strategies, we should allow for a dynamic competitive environment where competitors react to the firm's pricing decisions.
 - Decide whether to change price policy in response to competitive pressure

2.4: The Role of Acquisitions and Divestitures

- An acquisition is just a large-scale project. All of the rules that apply to individual investments apply to acquisitions, as well. For an acquisition to create value, it has to
 - Generate a higher return on capital, after allowing for synergy and control factors, than the cost of capital.
 - Put another way, an acquisition will create value only if the present value of the cash flows on the acquired firm, inclusive of synergy and control benefits, exceeds the cost of the acquisitions
- A divestiture is the reverse of an acquisition, with a cash inflow now (from divesting the assets) followed by cash outflows (i.e., cash flows foregone on the divested asset) in the future. If the present value of the future cash outflows is less than the cash inflow today, the divestiture will increase value.
- A fair-price acquisition or divestiture is value neutral.

An Acquisition Choice

- Assume now that Telecom Italia has the opportunity to acquire a internet firm and that you compute the internal rate of return on this firm to 17.50%. TI has a cost of capital of 7.98%, but the cost of capital for firms in the high technology business is 20%. Is this a value enhancing acquisition?
- If it does not pass your financial test, can you make the argument that strategic considerations would lead you to override the financials and acquire the firm?

Value Creation 3: Increase Length of High Growth Period

- Every firm, at some point in the future, will become a stable growth firm, growing at a rate equal to or less than the economy in which it operates.
- The high growth period refers to the period over which a firm is able to sustain a growth rate greater than this “stable” growth rate.
- If a firm is able to increase the length of its high growth period, other things remaining equal, it will increase value.

High Growth and Barriers to Entry

- For firms to maintain high growth over a period, they have to earn excess returns. In a competitive market place, these excess returns should attract competitors who will erase these excess returns over time.
- Thus, for a firm to maintain high growth and excess returns over time, it has to create barriers to entry that allow it to maintain these excess returns.

3.1: The Brand Name Advantage

- Some firms are able to sustain above-normal returns and growth because they have well-recognized brand names that allow them to charge higher prices than their competitors and/or sell more than their competitors.
- Firms that are able to improve their brand name value over time can increase both their growth rate and the period over which they can expect to grow at rates above the stable growth rate, thus increasing value.

3.2: Patents and Legal Protection

- The most complete protection that a firm can have from competitive pressure is to own a patent, copyright or some other kind of legal protection allowing it to be the sole producer for an extended period.
- Note that patents only provide partial protection, since they cannot protect a firm against a competitive product that meets the same need but is not covered by the patent protection.
- Licenses and government-sanctioned monopolies also provide protection against competition. They may, however, come with restrictions on excess returns; utilities in the United States, for instance, are monopolies but are regulated when it comes to price increases and returns.

3.3: Switching Costs

- Another potential barrier to entry is the cost associated with switching from one firm's products to another.
- The greater the switching costs, the more difficult it is for competitors to come in and compete away excess returns.
- Firms that devise ways to increase the cost of switching from their products to competitors' products, while reducing the costs of switching from competitor products to their own will be able to increase their expected length of growth.

3.4: Cost Advantages

- There are a number of ways in which firms can establish a cost advantage over their competitors, and use this cost advantage as a barrier to entry:
 - In businesses, where scale can be used to reduce costs, economies of scale can give bigger firms advantages over smaller firms
 - Owning or having exclusive rights to a distribution system can provide firms with a cost advantage over its competitors.
 - Owning or having the rights to extract a natural resource which is in restricted supply (The undeveloped reserves of an oil or mining company, for instance)
- These cost advantages will show up in valuation in one of two ways:
 - The firm may charge the same price as its competitors, but have a much higher operating margin.
 - The firm may charge lower prices than its competitors and have a much higher capital turnover ratio.

Gauging Barriers to Entry

- Which of the following barriers to entry are most likely to work for Telecom Italia?
 - Brand Name
 - Patents and Legal Protection
 - Switching Costs
 - Cost Advantages
- What about for Compaq?
 - Brand Name
 - Patents and Legal Protection
 - Switching Costs
 - Cost Advantages

Value Creation 4: Reduce Cost of Capital

- The cost of capital for a firm can be written as:

$$\text{Cost of Capital} = k_e (E/(D+E)) + k_d (D/(D+E))$$

Where,

k_e = Cost of Equity for the firm

k_d = Borrowing rate (1 - tax rate)

- The cost of equity reflects the rate of return that equity investors in the firm would demand to compensate for risk, while the borrowing rate reflects the current long-term rate at which the firm can borrow, given current interest rates and its own default risk.
- The cash flows generated over time are discounted back to the present at the cost of capital. Holding the cash flows constant, reducing the cost of capital will increase the value of the firm.

Estimating Cost of Capital: Telecom Italia

■ Equity

- Cost of Equity = 4.24% + 0.87 (5.53%) = 9.05%
- Market Value of Equity = 9.92 E/share* 5255.13 = 52,110 Mil (84.16%)

■ Debt

- Cost of debt = 4.24% + 0.2% (default spread) = 4.44%
- Market Value of Debt = 9,809 Mil (15.84%)

■ Cost of Capital

$$\begin{aligned}\text{Cost of Capital} &= 10.36 \% (.8416) + 4.44\% (1 - .4908) (.1584) \\ &= 9.05\% (.8416) + 2.26\% (.1584) = 7.98\%\end{aligned}$$

Estimating Cost of Capital: Compaq

■ Equity

- Cost of Equity = $6\% + 1.29(4\%) = 11.16\%$
- Market Value of Equity = $23.38 * 1691 = \$ 39.5$ billion

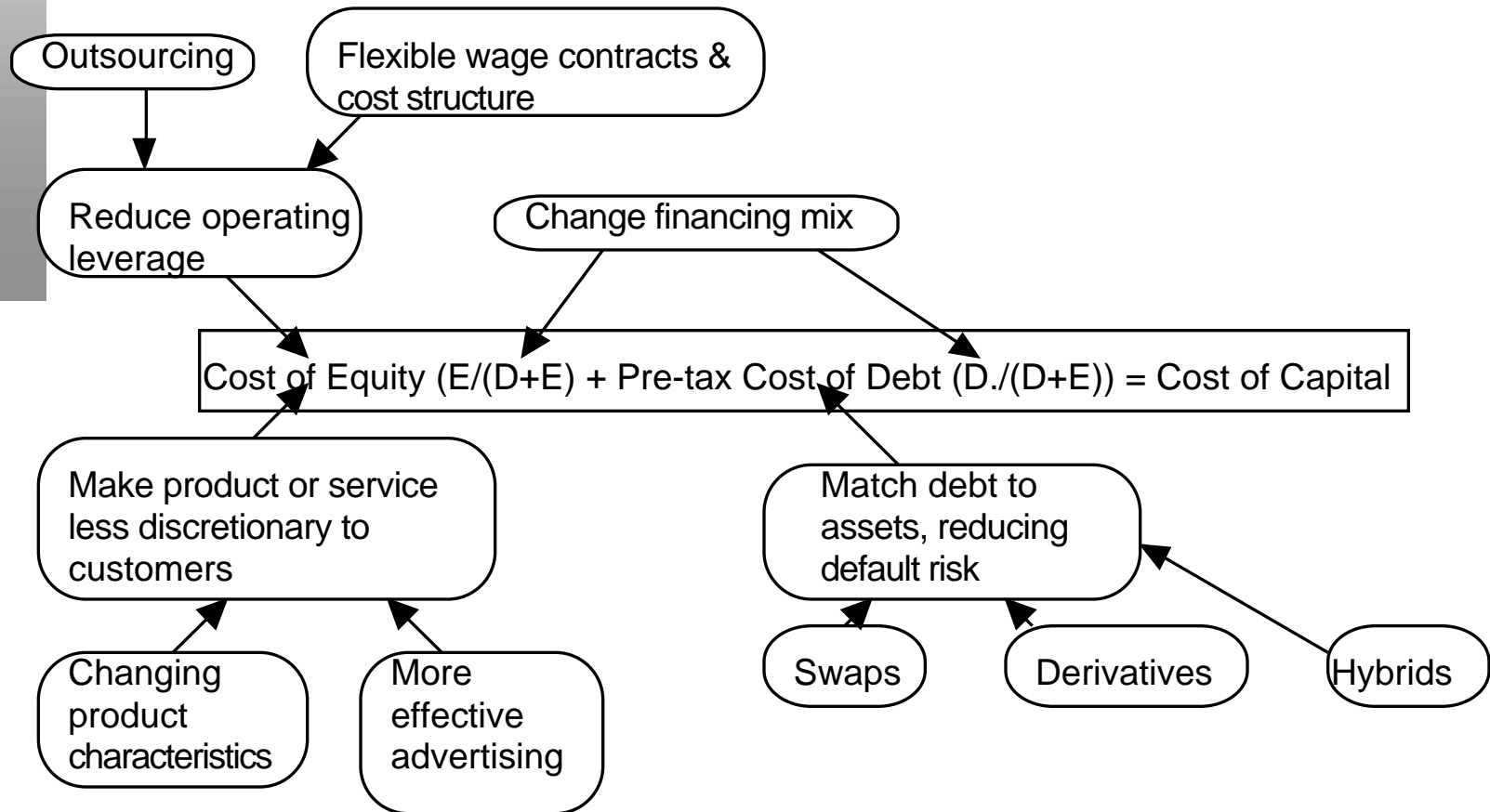
■ Debt

- Cost of debt = $6\% + 1\%$ (default spread) = 7%
- Market Value of Debt = 0

■ Cost of Capital

$$\text{Cost of Capital} = 11.16\% (1.00) + 7\% (1 - .35) (0.00) = 11.16\%$$

Reducing Cost of Capital



4.1: Reduce Operating Risk

- Both the cost of equity and cost of debt of a firm are affected by the operating risk of the business or businesses in which it operates. In the case of equity, only that portion of the operating risk that is not diversifiable will affect value.
- The operating risk of a firm is a direct function of the kinds of products or services it provides, and the degree to which these products or services are discretionary to the customer. The more discretionary they are, the greater the operating risk faced by the firm.
- Firms can reduce their operating risk by making their products and services less discretionary. Advertising clearly plays a role, but coming up with new uses for a product/service may be another.

4.2: Reduce Operating Leverage

- The operating leverage of a firm measures the proportion of its costs that are fixed. Other things remaining equal, the greater the proportion of the costs of a firm that are fixed, the higher its cost of capital will be.
- Reducing the proportion of the costs that are fixed will make firms much less risky and reduce their cost of capital. This can be accomplished in a number of different ways:
 - By using outside contractors for some services; if business does not measure up, the firm is not stuck with the costs of providing this service.
 - By tying expenses to revenues; in particular, with wage contracts tying wages paid to revenues made will reduce the proportion of the costs that are fixed.

4.3: Changing Financial Mix

- The third approach to reducing the cost of capital is to change the mix of debt and equity used to finance the firm.
- Debt is always cheaper than equity, partly because lenders bear less risk and partly because of the tax advantage associated with debt.
- Taking on debt increases the risk (and the cost) of both debt (by increasing the probability of bankruptcy) and equity (by making earnings to equity investors more volatile).
- The net effect will determine whether the cost of capital will increase or decrease if the firm takes on more debt.

Telecom Italia: Optimal Debt Ratio

Debt Ratio	Beta	Cost of Equity	Bond Rating	Interest rate on debt	Tax Rate	Cost of Debt (after-tax)	WACC	Firm Value (G)
0%	0.79	8.63%	AAA	4.54%	49.08%	2.31%	8.63%	\$45,598
10%	0.84	8.88%	AAA	4.54%	49.08%	2.31%	8.22%	\$54,659
20%	0.89	9.19%	A+	5.24%	49.08%	2.67%	7.89%	\$65,095
30%	0.97	9.59%	A-	5.74%	49.08%	2.92%	7.59%	\$77,927
40%	1.06	10.12%	BB	6.74%	49.08%	3.43%	7.45%	\$86,035
50%	1.20	10.87%	B-	9.24%	49.08%	4.71%	7.79%	\$68,933
60%	1.40	11.98%	CCC	10.24%	49.08%	5.21%	7.92%	\$63,772
70%	1.87	14.60%	CC	11.74%	41.76%	6.84%	9.17%	\$37,267
80%	2.94	20.50%	C	13.24%	32.40%	8.95%	11.26%	\$20,942
90%	5.88	36.76%	C	13.24%	28.80%	9.43%	12.16%	\$17,340

Compaq: Optimal Capital Structure

Debt Ratio	Beta	Cost of Equity	Bond Rating	Interest rate on debt	Tax Rate	Cost of Debt (after-tax)	WACC	Firm Value (G)
0%	1.29	11.16%	AAA	6.30%	35.00%	4.10%	11.16%	\$38,893
10%	1.38	11.53%	AA	6.70%	35.00%	4.36%	10.81%	\$41,848
20%	1.50	12.00%	BBB	8.00%	35.00%	5.20%	10.64%	\$43,525
30%	1.65	12.60%	B-	11.00%	35.00%	7.15%	10.96%	\$40,528
40%	1.85	13.40%	CCC	12.00%	35.00%	7.80%	11.16%	\$38,912
50%	2.28	15.12%	C	15.00%	23.18%	11.52%	13.32%	\$26,715
60%	2.85	17.40%	C	15.00%	19.32%	12.10%	14.22%	\$23,535
70%	3.80	21.21%	C	15.00%	16.56%	12.52%	15.12%	\$20,984
80%	5.70	28.81%	C	15.00%	14.49%	12.83%	16.02%	\$18,890
90%	11.40	51.62%	C	15.00%	12.88%	13.07%	16.92%	\$17,141

4.4: Changing Financing Type

- The fundamental principle in designing the financing of a firm is to ensure that the cash flows on the debt should match as closely as possible the cash flows on the asset.
- By matching cash flows on debt to cash flows on the asset, a firm reduces its risk of default and increases its capacity to carry debt, which, in turn, reduces its cost of capital, and increases value.
- Firms which mismatch cash flows on debt and cash flows on assets by using
 - Short term debt to finance long term assets
 - Dollar debt to finance non-dollar assets
 - Floating rate debt to finance assets whose cash flows are negatively or not affected by inflationwill end up with higher default risk, higher costs of capital and lower firm value.

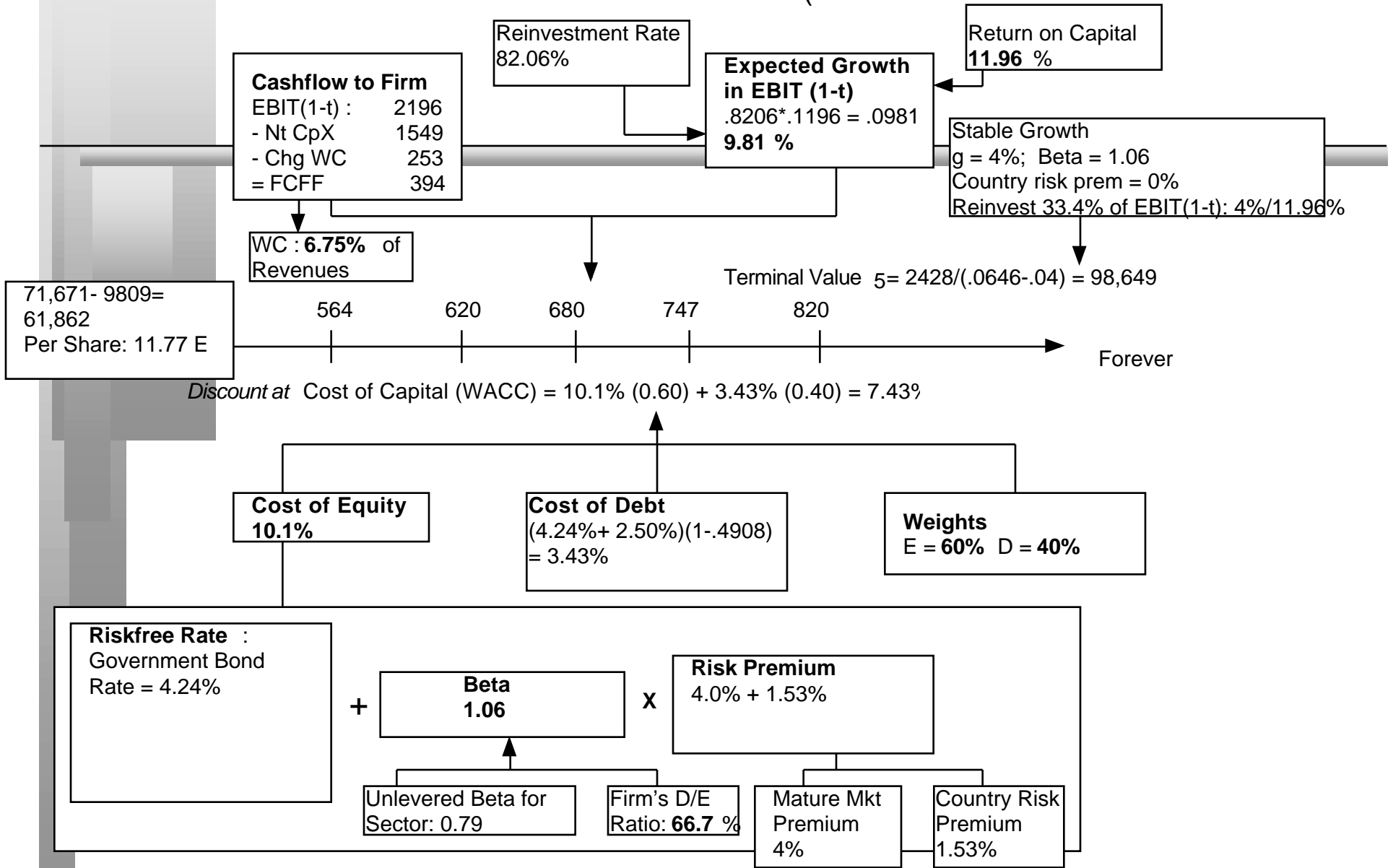
Financing Details

- What would the cash flows on a project for Telecom Italia look like in terms of
 - Project life?:
 - Cash Flow Patterns?:
 - Growth?:
 - Currency?:
- Now what kind of debt would be best to finance such a project?
- If I told you that Telecom Italia has only short to medium term Lira debt on its books, what action could you take to enhance value?

The Value Enhancement Chain

	<i>Gimme'</i>	<i>Odds on.</i>	<i>Could work if..</i>
<i>Assets in Place</i>	<ol style="list-style-type: none"> 1. Divest assets/projects with Divestiture Value > Continuing Value 2. Terminate projects with Liquidation Value > Continuing Value 3. Eliminate operating expenses that generate no current revenues and no growth. 	<ol style="list-style-type: none"> 1. Reduce net working capital requirements, by reducing inventory and accounts receivable, or by increasing accounts payable. 2. Reduce capital maintenance expenditures on assets in place. 	<ol style="list-style-type: none"> 1. Change pricing strategy to maximize the product of profit margins and turnover ratio.
<i>Expected Growth</i>	Eliminate new capital expenditures that are expected to earn less than the cost of capital	Increase reinvestment rate or marginal return on capital or both in firm's existing businesses.	Increase reinvestment rate or marginal return on capital or both in new businesses.
<i>Length of High Growth Period</i>	If any of the firm's products or services can be patented and protected, do so	Use economies of scale or cost advantages to create higher return on capital.	<ol style="list-style-type: none"> 1. Build up brand name 2. Increase the cost of switching from product and reduce cost of switching to it.
<i>Cost of Financing</i>	<ol style="list-style-type: none"> 1. Use swaps and derivatives to match debt more closely to firm's assets 2. Recapitalize to move the firm towards its optimal debt ratio. 	<ol style="list-style-type: none"> 1. Change financing type and use innovative securities to reflect the types of assets being financed 2. Use the optimal financing mix to finance new investments. 3. Make cost structure more flexible to reduce operating leverage. 	Reduce the operating risk of the firm, by making products less discretionary to customers.

Telecom Italia: Restructured (in Euro)



Compaq: Restructured

Current Cashflow to Firm
 EBIT(1-t) : 1,395
 - Nt CpX 1012
 - Chg WC 290
 = FCFF 94
 Reinvestment Rate = 93.28%

Reinvestment Rate
 93.28% (1998)

Expected Growth in EBIT (1-t)
 $.9328 \times 1976 = .1843$
18.43%

Return on Capital
 19.76%

Stable Growth
 $g = 5\%$; $\text{Beta} = 1.00$;
 $\text{ROC} = 19.76\%$
 Reinvestment Rate = 25.30%

Terminal Value $5 = 5942 / (.0904 - .05) = 147,070$

Firm Value: 54895
 + Cash: 4091
 - Debt: C
 = Equity 58448
 - Options 538
 Value/Share \$34.56

EBIT(1-t)	\$1,653	\$1,957	\$2,318	\$2,745	\$3,251	\$3,851	\$4,560	\$5,401	\$6,397	\$7,576
- Reinv	\$1,542	\$1,826	\$2,162	\$2,561	\$3,033	\$3,592	\$4,254	\$5,038	\$5,967	\$7,067
FCFF	\$111	\$131	\$156	\$184	\$218	\$259	\$306	\$363	\$429	\$509

Discount at Cost of Capital (WACC) = 12.50% (0.80) + 5.20% (0.20) = 10.64%

Cost of Equity
 12.00%

Cost of Debt
 $(6\% + 2\%)(1 - .35)$
 = 5.20%

Weights
 E = 80% D = 20%

Riskfree Rate :
 Government Bond
 Rate = 6%

+ **Beta**
 1.50

x **Risk Premium**
 4.00%

Unlevered Beta for Sectors: 1.29

Firm's D/E Ratio: 0.00%

Mature risk premium 4%

Country Risk Premium 0.00%

Alternative Approaches to Value Enhancement

- *Maximize a variable that is correlated with the value of the firm. There are several choices for such a variable. It could be*
 - an accounting variable, such as **earnings or return on investment**
 - a marketing variable, such as **market share**
 - a cash flow variable, such as cash flow return on investment (CFROI)
 - a risk-adjusted cash flow variable, such as Economic Value Added (EVA)
- **The advantages of using these variables are that they**
 - Are often simpler and easier to use than DCF value.
- **The disadvantage is that the**
 - Simplicity comes at a cost; these variables are not perfectly correlated with DCF value.

Economic Value Added (EVA) and CFROI

- The Economic Value Added (EVA) is a measure of surplus value created on an investment.
 - Define the return on capital (ROC) to be the “true” cash flow return on capital earned on an investment.
 - Define the cost of capital as the weighted average of the costs of the different financing instruments used to finance the investment.

$$\text{EVA} = (\text{Return on Capital} - \text{Cost of Capital}) (\text{Capital Invested in Project})$$

- The CFROI is a measure of the cash flow return made on capital
$$\text{CFROI} = (\text{Adjusted EBIT} (1-t) + \text{Depreciation \& Other Non-cash Charges}) / \text{Capital Invested}$$

In Practice: Measuring Capital Invested

- Many firms use the book value of capital invested as their measure of capital invested. To the degree that book value reflects accounting choices made over time, this may not be true.
- In cases where firms alter their capital invested through their operating decisions (for example, by using operating leases), the capital and the after-tax operating income have to be adjusted to reflect true capital invested.

In Practice: Measuring Return on Capital

- Again, the accounting definition of return on capital may not reflect the economic return on capital.
- In particular, the operating income has to be cleansed of any expenses which are really capital expenses (in the sense that they create future value). One example would be R& D.
- The operating income also has to be cleansed of any cosmetic or temporary effects.

In Practice: Measuring Cost of Capital

- DCF valuation assumes that cost of capital is calculated using market values of debt and equity.
- If it assumed that both assets in place and future growth are financed using the market value mix, the EVA should also be calculated using the market value.
- If instead, the entire debt is assumed to be carried by assets in place, the book value debt ratio will be used to calculate cost of capital. Implicit then is the assumption that as the firm grows, its debt ratio will approach its book value debt ratio.

Estimating Nestle's EVA in 1995: Return on Capital

■ Return on Capital

- After-tax Operating Income = 5665 Million Sfr (1 - .3351)
= 3767 Million Sfr
- Capital in Assets in Place 1994 = BV of Equity + BV of Debt
= 17774 + (4180 + 7546) = 29,500 Million Sf
- Return on Capital = $3767 / 29,500 = 12.77\%$

Nestle's Cost of Capital

- Cost of Equity = $4.5\% + 0.99 (5.5\%) = 10\%$
 - Cost of Debt = $4.75\% (1 - .3351) = 3.16\%$
 - Market Value of Equity = 56650 Million
 - Value of Debt = $4180 + 7546 = 11,726$ Million Sfr
- Cost of Capital = $10\% (56650/68376) + 3.16\% (11726/68376) = 8.85\%$

Estimating EVA for Nestle

- Capital Invested = 29500 Million Sfr
- Return on Capital = 12.77%
- Cost of Capital = 8.85%
- Economic Value Added in 1995 = $(.1277 - .0885) (29,500 \text{ Million Sfr})$
= 1154.50 Million Sfr

Discussion Issue

- Assume now that the Book Value at Nestle had been understated at 14,750 Million. Assuming the Operating Income remains the same, estimate the EVA.

EVA for Nestle in U.S. Dollar Terms

- Capital Invested = \$ 19,963 Million (29,500 Million Sfr converted at \$ 0.6767/franc)
- Return on Capital = 12.77%
- Cost of Capital = 11.21% (Effect of higher inflation and long bond rate)
- Economic Value Added in 1995 = $(.1277 - .1121) (\$ 19,963 \text{ Million}) = \$ 311 \text{ Million}$
- In Swiss Franc Terms, this works out to approximately Sfr 467 Million

EVA for Growth Companies

- For companies, divisions or projects which make significant infrastructure investments, with long gestation periods, the current EVA may not be a good indicator of the quality of investments.

Estimating Tsingtao's EVA in 1996

- Tsingtao Brewery, a Chinese Beer manufacturer, has made significant capital investments in the last two years, and plans to increase its exports over time. Using 1996 numbers, Tsingtao had the following fundamentals:
 - Return on Capital = 1.28%
 - Cost of Capital = 15.51%
 - Capital Invested = 3,015 million CC
- Economic Value Added in 1996 = - 429 million CC

Discussion Issue: Reading the EVA

- Tsingtao had a negative EVA of – 429 million in 1996. Assuming that the book value of capital, operating income and cost of capital are correctly measured, which of the following are implied by this EVA?
 - The firm has invested in poor projects
 - The firm has inferior management
 - The firm is currently earning less on its projects than it should be earning, given its cost of capital.
- What does this tell you about the current EVA of high growth firms and projects which make large investments up front on the expectations of high growth later on?
 - The measured EVA will generally be very positive
 - The measured EVA will generally be very negative

Things to Note about EVA

- EVA is a measure of dollar surplus value, not the percentage difference in returns.
- It is closest in both theory and construct to the net present value of a project in capital budgeting, as opposed to the IRR.
- The value of a firm, in DCF terms, can be written in terms of the EVA of projects in place and the present value of the EVA of future projects.

An Equity EVA

- When capital is difficult to measure, and leverage is not a choice variable (because of regulations or standard practice), the economic value added can be stated in equity terms
- Equity EVA = (ROE - Cost of Equity) (Equity Invested)
 - Equity Invested : This is supposed to measure the equity invested in projects in place. It is usually measured using the book value of equity, with adjustments made.
 - Return on Equity: This is supposed to measure the return made on the equity invested in projects in place. It is usually measured by dividing the net income by the book value of equity
 - Cost of Equity: This is supposed to measure the cost of equity for the project, division or firm, for which the EVA is being measured.

J.P. Morgan's Equity EVA: 1996

- Equity Invested at the end of 1995 = \$ 10,451 Million
- Net Income Earned in 1996 = \$ 1,574 Million
- Cost of Equity for 1996 = $7\% + 0.94 (5.5\%) = 12.17\%$
 - I used the riskfree rate from the start of 1996
- Equity EVA for J.P. Morgan = $\$ 1574 \text{ Million} - (\$10,451 \text{ Million})(.1217) = \$ 303 \text{ Million}$

Increasing Equity EVA at J.P. Morgan

- Assume now that you are the CEO of J.P. Morgan and that your compensation next year will depend upon whether you increase the EVA or not. What are the three ways in which you can increase your EVA?

Divisional EVA

- When EVA is computed at the division level, the computation requires that
 - book value be estimated at the divisional level. Since firms do not maintain balance sheets at divisional levels, this will involve allocation mechanisms
 - income be estimated at the divisional level. Again, allocation of fixed headquarters expenses becomes an issue
 - cost of equity and capital be estimated at the divisional level
- The initial estimates of EVA are likely to reflect the allocation mechanisms used and the mistakes made in those allocations
- Changes in EVA over time are more useful measures than the initial EVA estimates themselves

Things to Note about EVA

- EVA is a measure of dollar surplus value, not the percentage difference in returns.
- It is closest in both theory and construct to the net present value of a project in capital budgeting, as opposed to the IRR.
- The value of a firm, in DCF terms, can be written in terms of the EVA of projects in place and the present value of the EVA of future projects.

DCF Value and NPV

Value of Firm

= Value of Assets in Place + Value of Future Growth

= (Investment in Existing Assets + $NPV_{\text{Assets in Place}}$) + NPV of all future projects

$$= (I + NPV_{\text{Assets in Place}}) + \sum_{j=1}^{j=N} NPV_j$$

where there are expected to be N projects yielding surplus value (or excess returns) in the future and I is the capital invested in assets in place (which might or might not be equal to the book value of these assets).

DCF Valuation, NPV and EVA

$$\begin{aligned}
 \text{Value of Firm} &= (I + \text{NPV}_{\text{Assets in Place}}) + \sum_{j=1}^{j=N} \text{NPV}_j \\
 &= I_A + \sum_{t=1}^{t=n} \frac{(\text{ROC} - \text{WACC}) I_A}{(1 + \text{WACC})^t} + \sum_{j=1}^{j=N} \sum_{t=1}^{t=n} \frac{(\text{ROC} - \text{WACC}) I_j}{(1 + \text{WACC})^t} \\
 &= I_A + \sum_{t=1}^{t=n} \frac{(\text{ROC} - \text{WACC}) I_A}{(1 + \text{WACC})^t} + \sum_{j=1}^{j=N} \sum_{t=j}^{t=jn} \frac{(\text{ROC} - \text{WACC}) I_j}{(1 + \text{WACC})^t} \\
 &= I_A + \sum_{t=1}^{t=n} \frac{\text{EVA}_A}{(1 + \text{WACC})^t} + \sum_{j=1}^{j=N} \sum_{t=j}^{t=jn} \frac{\text{EVA}_j}{(1 + \text{WACC})^t}
 \end{aligned}$$

Firm Value = Capital Invested in Assets in Place + PV of EVA from Assets in Place + Sum of PV of EVA from new projects

A Simple Illustration

- Assume that you have a firm with
 - $I_A = 100$
 - $ROC_A = 15\%$
 - $WACC_A = 10\%$
 - $WACC_{\text{New Projects}} = 10\%$
- In each year 1-5, assume that $I = 10$ (Investments are at beginning of each year)
- $ROC_{\text{New Projects}} = 15\%$
- Assume that all of these projects will have infinite lives.
- After year 5, assume that
 - Investments will grow at 5% a year forever
 - ROC on projects will be equal to the cost of capital (10%)

Firm Value using EVA Approach

Capital Invested in Assets in Place	= \$ 100
EVA from Assets in Place = $(.15 - .10)(100)/.10$	= \$ 50
+ PV of EVA from New Investments in Year 1 = $[(.15 - .10)(10)/.10]$	= \$ 5
+ PV of EVA from New Investments in Year 2 = $[(.15 - .10)(10)/.10]/1.1$	= \$ 4.55
+ PV of EVA from New Investments in Year 3 = $[(.15 - .10)(10)/.10]/1.1^2$	= \$ 4.13
+ PV of EVA from New Investments in Year 4 = $[(.15 - .10)(10)/.10]/1.1^3$	= \$ 3.76
+ PV of EVA from New Investments in Year 5 = $[(.15 - .10)(10)/.10]/1.1^4$	= \$ 3.42
Value of Firm	= \$ 170.85

Firm Value using DCF Valuation: Estimating FCFF

	<i>Base Year</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>Term. Year</i>
EBIT (1-t) : Assets in Place	\$ 15.00	\$ 15.00	\$ 15.00	\$ 15.00	\$ 15.00	\$ 15.00	
EBIT(1-t) :Investments- Yr 1		\$ 1.50	\$ 1.50	\$ 1.50	\$ 1.50	\$ 1.50	
EBIT(1-t) :Investments- Yr 2			\$ 1.50	\$ 1.50	\$ 1.50	\$ 1.50	
EBIT(1-t): Investments - Yr 3				\$ 1.50	\$ 1.50	\$ 1.50	
EBIT(1-t): Investments - Yr 4					\$ 1.50	\$ 1.50	
EBIT(1-t): Investments- Yr 5						\$ 1.50	
Total EBIT(1-t)		\$ 16.50	\$ 18.00	\$ 19.50	\$ 21.00	\$ 22.50	\$ 23.63
- Net Capital Expenditures	\$10.00	\$ 10.00	\$ 10.00	\$ 10.00	\$ 10.00	\$ 11.25	\$ 11.81
FCFF		\$ 6.50	\$ 8.00	\$ 9.50	\$ 11.00	\$ 11.25	\$ 11.81

Firm Value: Cost of Capital and Capital Invested

Assets in Place	\$ 100.00						
New Investment	\$ 10.00	\$ 10.00	\$ 10.00	\$ 10.00	\$ 10.00	\$ 11.25	
Cumulative New Investment	\$ 10.00	\$ 20.00	\$ 30.00	\$ 40.00	\$ 50.00		
Cumulative Total Investment	\$ 110.00	\$ 120.00	\$ 130.00	\$ 140.00	\$ 150.00		
Return on Capital	15%	15%	15%	15%	15%	15%	10%
Cost of Capital	10%	10%	10%	10%	10%	10%	10%

Firm Value: Present Value of FCFF

Year	0	1	2	3	4	5	Term Year
FCFF		\$ 6.50	\$ 8.00	\$ 9.50	\$ 11.00	\$ 11.25	\$ 11.81
PV of FCFF	(\$10)	\$ 5.91	\$ 6.61	\$ 7.14	\$ 7.51	\$ 6.99	
Terminal Value						\$ 236.25	
PV of Terminal Value						\$ 146.69	
Value of Firm	\$170.85						

Implications

- Growth, by itself, does not create value. It is growth, with investment in excess return projects, that creates value.
 - The growth of 5% a year after year 5 creates no additional value.
- The “market value added”, which is defined to be the excess of market value over capital invested is a function of the excess value created.
 - In the example above, the market value of \$ 170.85 million exceeds the book value of \$ 100 million, because the return on capital is 5% higher than the cost of capital.

EVA Valuation of Nestle

	0	1	2	3	4	5	Term. Year
Return on Capital	12.77%	12.77%	12.77%	12.77%	12.77%	12.77%	12.77%
Cost of Capital	8.85%	8.85%	8.85%	8.85%	8.85%	8.85%	8.85%
EBIT(1-t)	3,766.66Fr	4,066.46Fr	4,390.06Fr	4,739.37Fr	5,116.40Fr	5,523.38Fr	5,689.08Fr
WACC(Capital)	2,612.06Fr	2,819.97Fr	3,044.38Fr	3,286.61Fr	3,548.07Fr	3,830.29Fr	3,945.20Fr
EVA	1,154.60Fr	1,246.49Fr	1,345.69Fr	1,452.76Fr	1,568.33Fr	1,693.08Fr	1,743.88Fr
PV of EVA		1,145.10Fr	1,135.67Fr	1,126.30Fr	1,117.00Fr	1,107.76Fr	
						29,787.18Fr	
PV of EVA =	25,121.24Fr						PV of 1693.08 Fr growing at 3% a year
Value of Assets in Place =	29,500.00Fr						
Value of Firm =	54,621.24Fr						
Value of Debt =	11,726.00Fr						
Value of Equity =	42,895.24Fr						
Value Per Share =	1,088.16Fr						

Discussion Issue

- What would the firm value be if the book value of the assets were understated at 14,750 Mil Sfr?
- What if the valuation were done in dollars?
- Would the value be much lower?

DCF Valuation of Nestle

	0	1	2	3	4	5	Terminal Year
EBIT (1-t)	0.00Fr	4,066.46Fr	4,390.06Fr	4,739.37Fr	5,116.40Fr	5,523.38Fr	5,689.08Fr
+ Deprec'n	2,305.00Fr	2,488.02Fr	2,685.58Fr	2,898.83Fr	3,129.00Fr	1,273.99Fr	1,350.42Fr
- Cap Ex	3,898.00Fr	4,207.51Fr	4,541.60Fr	4,902.22Fr	5,291.48Fr	2,154.45Fr	2,283.71Fr
- Change in WC	755.00Fr	814.95Fr	879.66Fr	949.51Fr	1,024.90Fr	417.29Fr	442.33Fr
FCFF	-2,348.00Fr	1,532.02Fr	1,654.38Fr	1,786.46Fr	1,929.03Fr	4,225.62Fr	4,313.46Fr
Terminal Value						151,113.54Fr	
WACC	8.85%	8.85%	8.85%	8.85%	8.85%	8.85%	8.85%
PV of FCFF	-2,348.00Fr	1,407.40Fr	1,396.19Fr	1,385.02Fr	1,373.90Fr	51,406.74Fr	
Value of Firm =	54,621.24Fr						
Value of Debt =	11,726.00Fr						
Value of Equity =	42,895.24Fr						
Value Per Share =	1,088.16Fr						

In summary ...

- Both EVA and Discounted Cash Flow Valuation should provide us with the same estimate for the value of a firm.
- In their full forms, the information that is required for both approaches is exactly the same - expected cash flows over time and costs of capital over time.
- A policy of maximizing the present value of economic value added over time should be the equivalent of a policy of maximizing firm value.

Year-by-year EVA Changes

- Firms are often evaluated based upon year-to-year changes in EVA rather than the present value of EVA over time.
- The advantage of this comparison is that it is simple and does not require the making of forecasts about future earnings potential.
- Another advantage is that it can be broken down by any unit - person, division etc., as long as one is willing to assign capital and allocate earnings across these same units.
- While it is simpler than DCF valuation, using year-by-year EVA changes comes at a cost. In particular, it is entirely possible that a firm which focuses on increasing EVA on a year-to-year basis may end up being less valuable.

Year-to-Year EVA Changes: Nestle

	0	1	2	3	4	5	Term. Year
Return on Capital	12.77%	12.77%	12.77%	12.77%	12.77%	12.77%	12.77%
Cost of Capital	8.85%	8.85%	8.85%	8.85%	8.85%	8.85%	8.85%
EBIT(1-t)	3,766.66Fr	4,066.46Fr	4,390.06Fr	4,739.37Fr	5,116.40Fr	5,523.38Fr	5,689.08Fr
WACC(Capital)	2,612.06Fr	2,819.97Fr	3,044.38Fr	3,286.61Fr	3,548.07Fr	3,830.29Fr	3,945.20Fr
EVA	1,154.60Fr	1,246.49Fr	1,345.69Fr	1,452.76Fr	1,568.33Fr	1,693.08Fr	1,743.88Fr
PV of EVA		1,145.10Fr	1,135.67Fr	1,126.30Fr	1,117.00Fr	1,107.76Fr	
						29,787.18Fr	
PV of EVA =	25,121.24Fr						PV of 590.67 Fr growing at 3% a year
Value of Assets in Place =	29,500.00Fr						
Value of Firm =	54,621.24Fr						
Value of Debt =	11,726.00Fr						
Value of Equity	42,895.24Fr						
Value per Share =	1088.16Fr						

Discussion Issues

- In the above example, Nestle is expected to increase its EVA from 1154.50 Million Sfr in 1995 to 1246 Million Sfr in 1996.
- Assume that you are the analyst following Nestle and it announces a restructuring which will increase its EVA next year beyond 1246 million Sfr.
- Does it follow that the value of Nestle as a firm will increase?

When Increasing EVA on year-to-year basis may result in lower Firm Value

- 1. If the increase in EVA on a year-to-year basis has been accomplished at the expense of the EVA of future projects. In this case, the gain from the EVA in the current year may be more than offset by the present value of the loss of EVA from the future periods.
 - For example, in the Nestle example above assume that the return on capital on year 1 projects increases to 13.27% (from the existing 12.77%), while the cost of capital on these projects stays at 8.85%. If this increase in value does not affect the EVA on future projects, the value of the firm will increase.
 - If, however, this increase in EVA in year 1 is accomplished by reducing the return on capital on future projects to 12.27%, the firm value will actually decrease.

Firm Value and EVA tradeoffs over time

	0	1	2	3	4	5	Term. Year	
Return on Capital	12.77%	13.27%	12.27%	12.27%	12.27%	12.27%	12.27%	
Cost of Capital	8.85%	8.85%	8.85%	8.85%	8.85%	8.85%	8.85%	
EBIT(1-t)	3,766.66Fr	4,078.24Fr	4,389.21Fr	4,724.88Fr	5,087.20Fr	5,478.29Fr	5,642.64Fr	
WACC(Capital)	2,612.06Fr	2,819.97Fr	3,044.38Fr	3,286.61Fr	3,548.07Fr	3,830.29Fr	3,948.89Fr	
EVA	1,154.60Fr	1,258.27Fr	1,344.84Fr	1,438.28Fr	1,539.13Fr	1,648.00Fr	1,693.75Fr	
PV of EVA		1,155.92Fr	1,134.95Fr	1,115.07Fr	1,096.20Fr	1,078.27Fr		
						28,930.98Fr		
PV of EVA =	24,509.62Fr						PV of 590.67 Fr growing at 3% a year	
Value of Assets in Place =	29,500.00Fr							
Value of Firm =	54,009.62Fr							
Value of Debt =	11,726.00Fr							
Value of Equity =	42,283.62Fr							
Value Per Share =	1,072.64Fr							

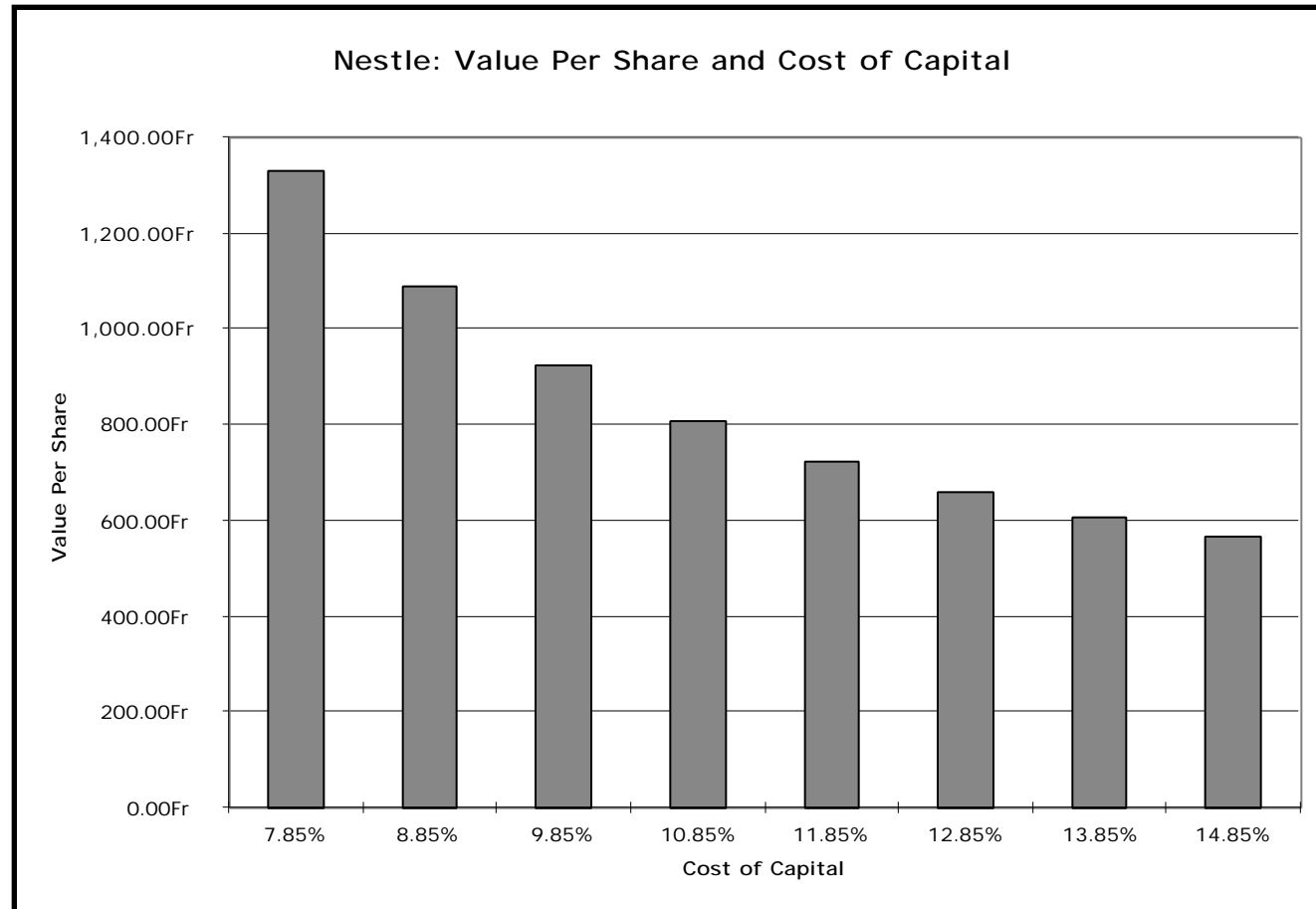
EVA and Risk

- 2. When the increase in EVA is accompanied by an increase in the cost of capital, either because of higher operational risk or changes in financial leverage, the firm value may decrease even as EVA increases.
 - For instance, in the example above, assume that the spread stays at 3.91% on all future projects but the cost of capital increases to 9.85% for these projects (from 8.85%). The value of the firm will drop.

Nestle's Value at a 9.95 % Cost of Capital

	0	1	2	3	4	5	Term. Year	
Return on Capital	12.77%	13.77%	13.77%	13.77%	13.77%	13.77%	13.77%	
Cost of Capital	8.85%	9.85%	9.85%	9.85%	9.85%	9.85%	9.85%	
EBIT(1-t)	3,766.66Fr	4,089.94Fr	4,438.89Fr	4,815.55Fr	5,222.11Fr	5,660.96Fr	5,830.79Fr	
WACC(Capital)	2,612.06Fr	2,843.45Fr	3,093.20Fr	3,362.79Fr	3,653.78Fr	3,967.88Fr	4,384.43Fr	
EVA	1,154.60Fr	1,246.49Fr	1,345.69Fr	1,452.76Fr	1,568.33Fr	1,693.08Fr	1,446.36Fr	
PV of EVA		1,134.68Fr	1,115.09Fr	1,095.82Fr	1,076.88Fr	1,058.25Fr		
						21,101.04Fr		
PV of EVA =	18,669.84Fr						PV of 590.67 Fr growing	
							at 3% a year	
Value of Assets in Place =	29,500.00Fr							
Value of Firm =	48,169.84Fr							
Value of Debt =	11,726.00Fr							
Value of Equity =	36,443.84Fr							
Value Per Share =	924.50Fr							

EVA: The Risk Effect



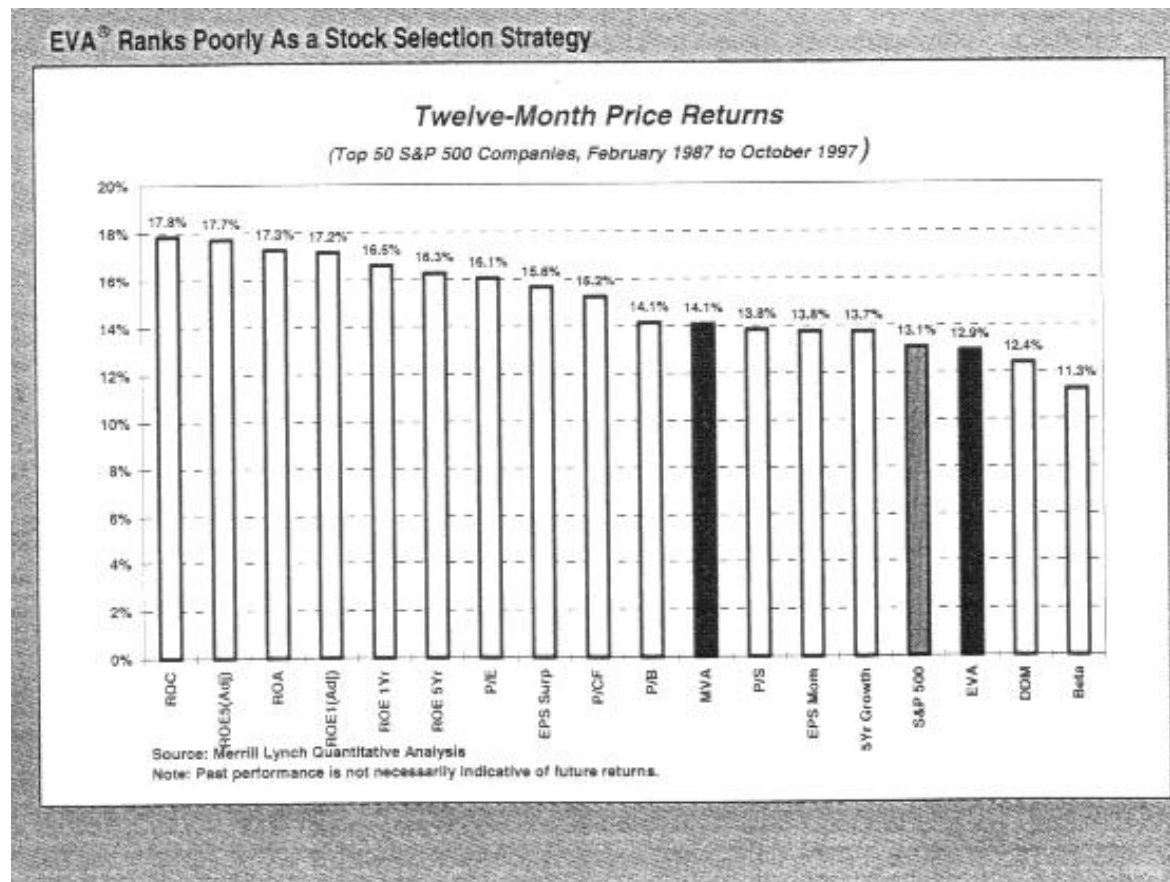
Advantages of EVA

1. EVA is closely related to NPV. It is closest in spirit to corporate finance theory that argues that the value of the firm will increase if you take positive NPV projects.
2. It avoids the problems associated with approaches that focus on percentage spreads - between ROE and Cost of Equity and ROC and Cost of Capital. These approaches may lead firms with high ROE to turn away good projects to avoid lowering their percentage spreads.
3. It makes top managers responsible for a measure that they have more control over - the return on capital and the cost of capital are affected by their decisions - rather than one that they feel they cannot control as well - the market price per share.
4. It is influenced by all of the decisions that managers have to make within a firm - the investment decisions and dividend decisions affect the return on capital and the financing decision affects the WACC.

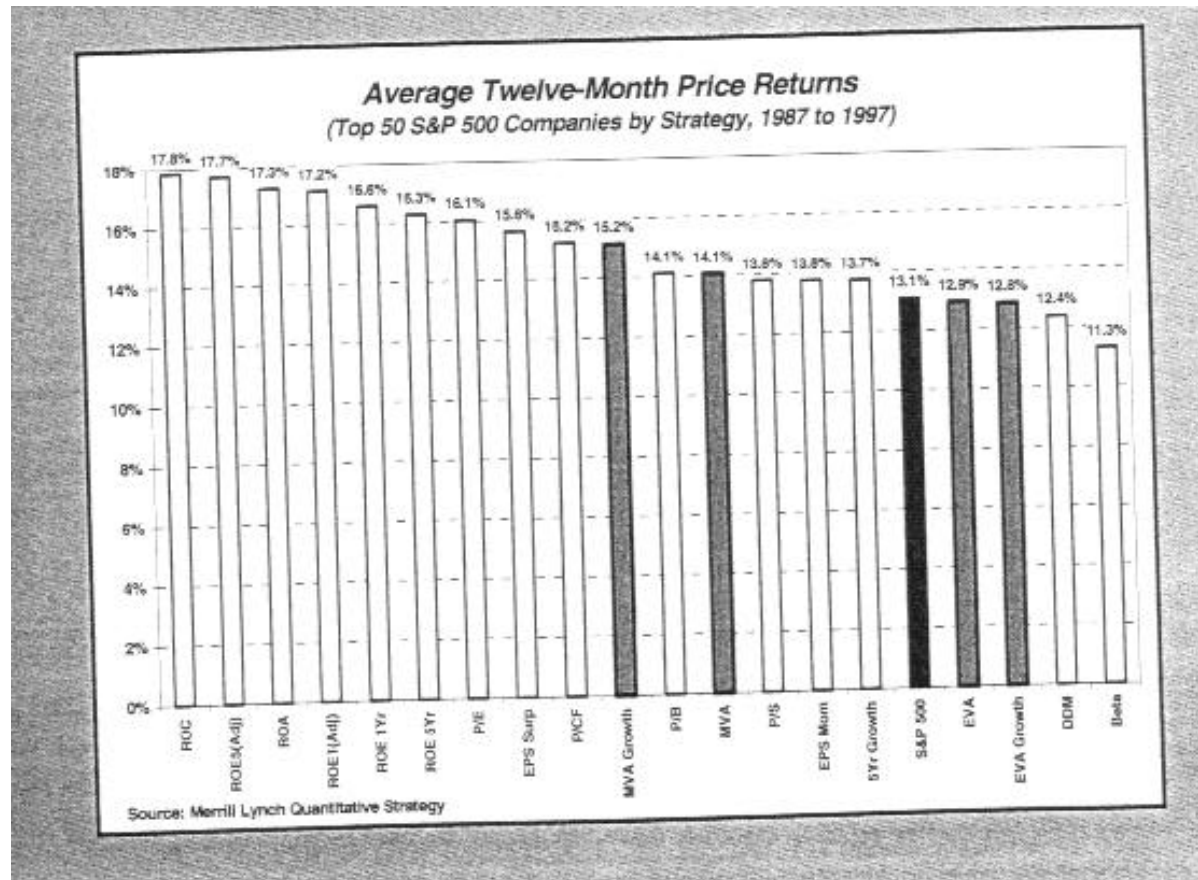
EVA and Changes in Market Value

- The relationship between EVA and Market Value Changes is more complicated than the one between EVA and Firm Value.
- The market value of a firm reflects not only the Expected EVA of Assets in Place but also the Expected EVA from Future Projects
- To the extent that the actual economic value added is smaller than the expected EVA the market value can decrease even though the EVA is higher.

High EVA companies do not earn excess returns



Increases in EVA do not create excess returns



Implications of Findings

- This does not imply that increasing EVA is bad from a corporate finance standpoint. In fact, given a choice between delivering a “below-expectation” EVA and no EVA at all, the firm should deliver the “below-expectation” EVA.
- It does suggest that the correlation between increasing year-to-year EVA and market value will be weaker for firms with high anticipated growth (and excess returns) than for firms with low or no anticipated growth.
- It does suggest also that “investment strategies” based upon EVA have to be carefully constructed, especially for firms where there is an expectation built into prices of “high” surplus returns.

When focusing on year-to-year EVA changes has least side effects

1. Most or all of the assets of the firm are already in place; i.e, very little or none of the value of the firm is expected to come from future growth.
 - [This minimizes the risk that increases in current EVA come at the expense of future EVA]
2. The leverage is stable and the cost of capital cannot be altered easily by the investment decisions made by the firm.
 - [This minimizes the risk that the higher EVA is accompanied by an increase in the cost of capital]
3. The firm is in a sector where investors anticipate little or not surplus returns; i.e., firms in this sector are expected to earn their cost of capital.
 - [This minimizes the risk that the increase in EVA is less than what the market expected it to be, leading to a drop in the market price.]

When focusing on year-to-year EVA changes can be dangerous

1. High growth firms, where the bulk of the value can be attributed to future growth.
2. Firms where neither the leverage nor the risk profile of the firm is stable, and can be changed by actions taken by the firm.
3. Firms where the current market value has imputed in it expectations of significant surplus value or excess return projects in the future.

Note that all of these problems can be avoided if we restate the objective as maximizing the present value of EVA over time. If we do so, however, some of the perceived advantages of EVA - its simplicity and observability - disappear.