



## II. Estimating Cash Flows

DCF Valuation

# Steps in Cash Flow Estimation

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- Estimate the current earnings of the firm
  - If looking at cash flows to equity, look at earnings after interest expenses - i.e. net income
  - If looking at cash flows to the firm, look at operating earnings after taxes
- Consider how much the firm invested to create future growth
  - If the investment is not expensed, it will be categorized as capital expenditures. To the extent that depreciation provides a cash flow, it will cover some of these expenditures.
  - Increasing working capital needs are also investments for future growth
- If looking at cash flows to equity, consider the cash flows from net debt issues (debt issued - debt repaid)

# Measuring Cash Flows

Cash flows can be measured to

## All claimholders in the firm

EBIT (1- tax rate)  
- ( Capital Expenditures - Depreciation)  
- Change in non-cash working capital  
= Free Cash Flow to Firm (FCFF)

## Just Equity Investors

Net Income  
- (Capital Expenditures - Depreciation)  
- Change in non-cash Working Capital  
- (Principal Repaid - New Debt Issues)  
- Preferred Dividend

Dividends  
+ Stock Buybacks

# Measuring Cash Flow to the Firm

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EBIT ( 1 - tax rate)

- (Capital Expenditures - Depreciation)

- Change in Working Capital

= Cash flow to the firm

- Where are the tax savings from interest payments in this cash flow?

# Earnings Checks

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- When estimating cash flows, we invariably start with accounting earnings. To the extent that we start with accounting earnings in a base year, it is worth considering the following questions:
  - Are there any one-time charges that might be depressing income in the base year or one-time earnings that might be increasing income in the base year?
  - Are the earnings negative, and if so, why?
  - Are there any financial or capital expenses intermingled with the operating expenses, and if so, how do we correct for them?

# One-Time Charges

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■ Assume that you are valuing a firm that is reporting a loss of \$ 500 million, due to a one-time charge of \$ 1 billion. What is the earnings you would use in your valuation?

- A loss of \$ 500 million
- A profit of \$ 500 million

Would your answer be any different if the firm had reported one-time losses like these once every five years?

- Yes
- No

## To get earnings right...

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- We need to normalize earnings, if the base year earnings are negative or abnormally low
- We need to adjust earnings to reflect the effects of the accounting treatment of
  - Some financing expenses as operating expenses
  - Some capital expenses as operating expenses

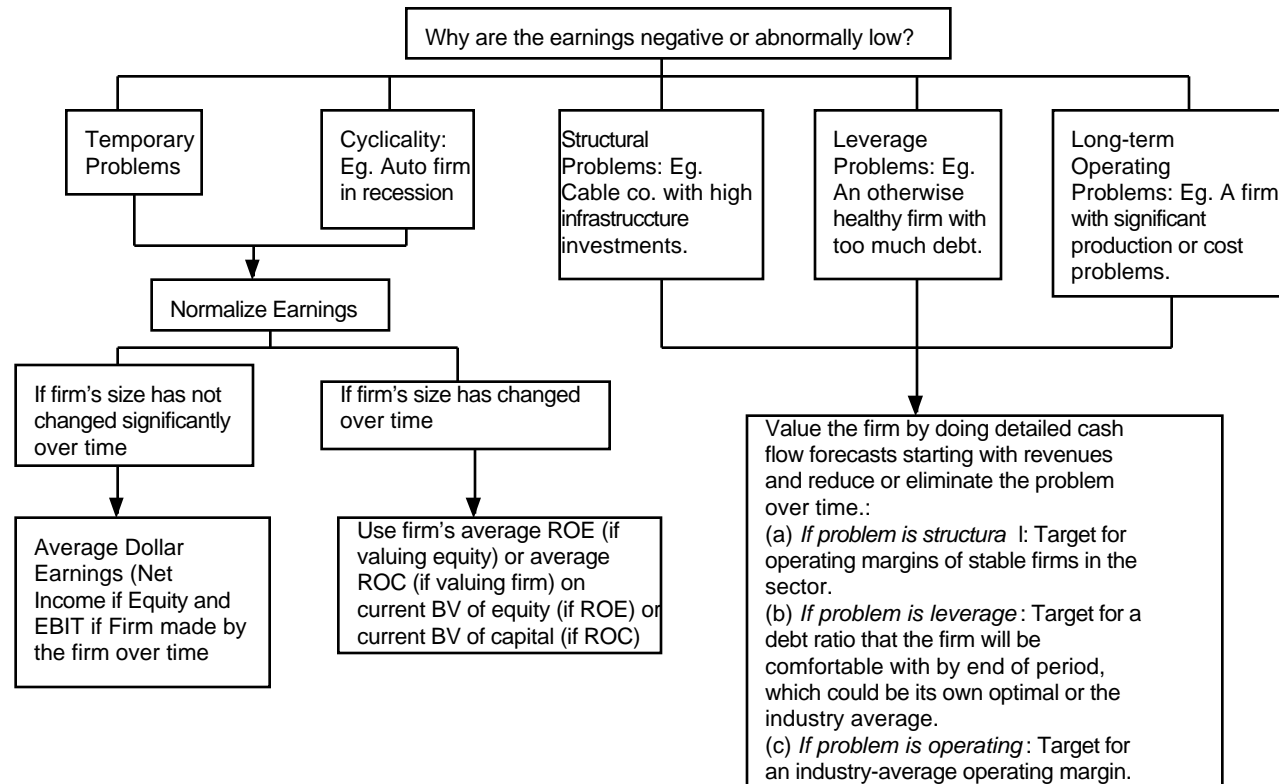
# Negative Earnings: Why they are a problem

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- When earnings are negative, you cannot start with that number in the base year and expect to grow yourself out of the problem.
- The key to valuation, when earnings are negative, is to somehow work with the numbers until the earnings become positive. Exactly how this is done will depend upon why the earnings are negative in the first place.
- In fact, this applies even if your earnings are positive but lower than normal.

# A Framework for Dealing with Negative Earnings

## A Framework for Analyzing Companies with Negative or Abnormally Low Earnings



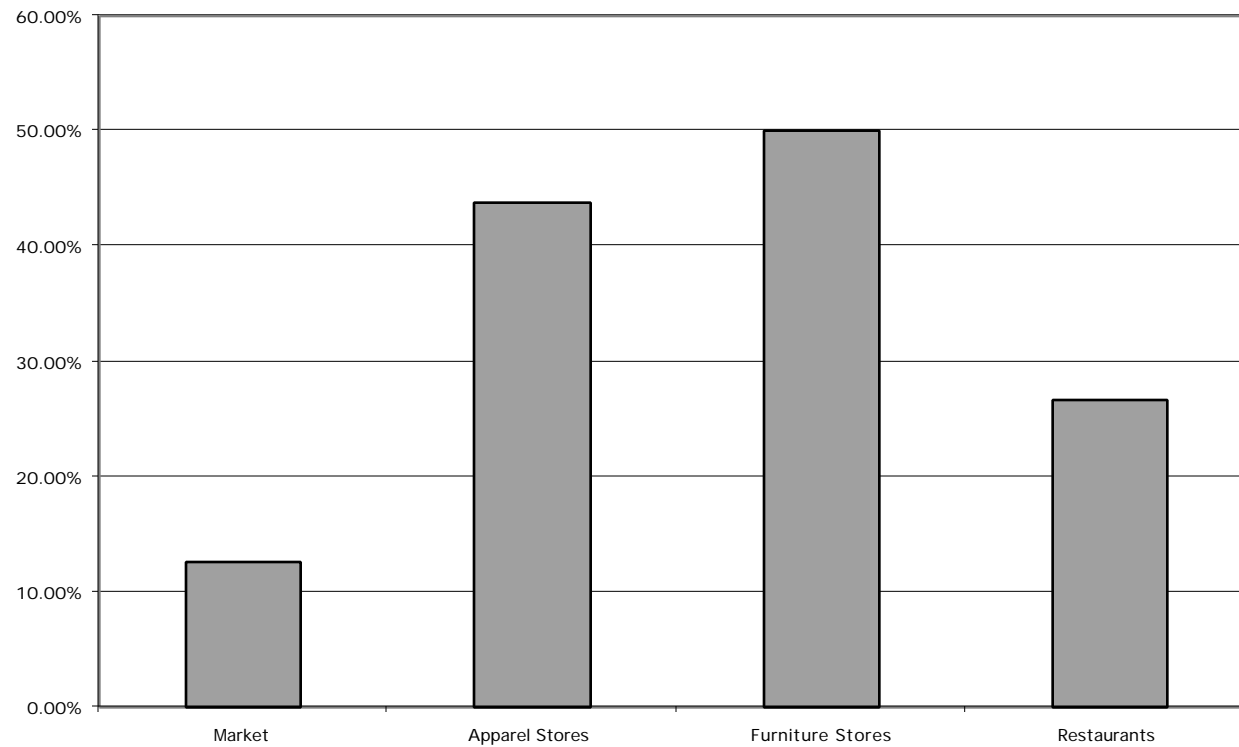
# Correcting Accounting Earnings

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- *The Operating Lease Adjustment:* While accounting convention treats operating leases as operating expenses, they are really financial expenses and need to be reclassified as such. This has no effect on equity earnings but does change the operating earnings
- *The R & D Adjustment:* Since R&D is a capital expenditure (rather than an operating expense), the operating income has to be adjusted to reflect its treatment.

# The Magnitude of Operating Leases

Operating Lease expenses as % of Operating Income



# Dealing with Operating Lease Expenses

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- Operating Lease Expenses are treated as operating expenses in computing operating income. In reality, operating lease expenses should be treated as financing expenses, with the following adjustments to earnings and capital:
- Debt Value of Operating Leases = PV of Operating Lease Expenses at the pre-tax cost of debt
- Adjusted Operating Earnings
  - Adjusted Operating Earnings = Operating Earnings + Operating Lease Expenses - Depreciation on Leased Asset
  - As an approximation, this works:  
Adjusted Operating Earnings = Operating Earnings + Pre-tax cost of Debt \* PV of Operating Leases.

# Operating Leases at The Home Depot in 1998

- The pre-tax cost of debt at the Home Depot is 6.25%

Yr	Operating Lease Expense	Present Value
1	\$ 294	\$ 277
2	\$ 291	\$ 258
3	\$ 264	\$ 220
4	\$ 245	\$ 192
5	\$ 236	\$ 174
6-15	\$ 270	\$ 1,450 (PV of 10-yr annuity)

Present Value of Operating Leases = \$ 2,571

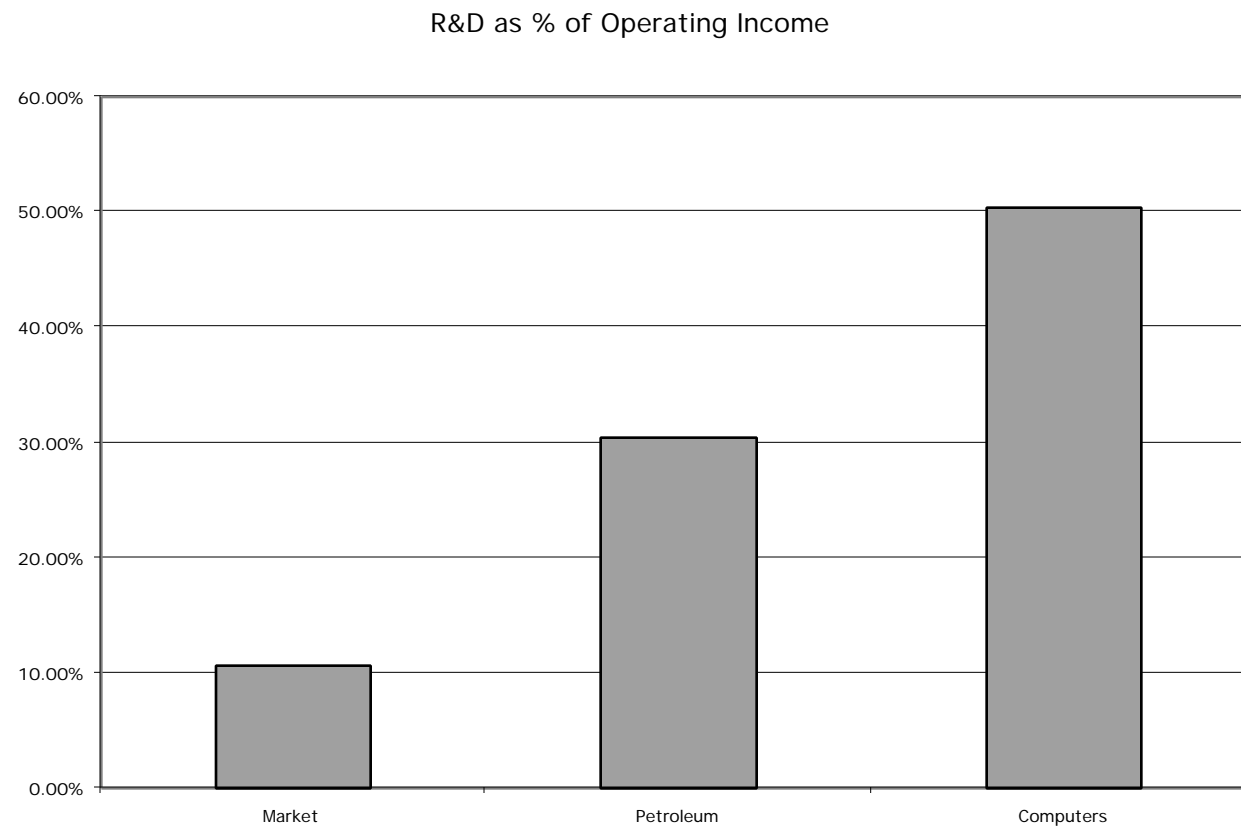
- Debt outstanding at the Home Depot = \$1,205 + \$2,571 = \$3,776 mil  
(The Home Depot has other debt outstanding of \$1,205 million)
- Adjusted Operating Income = \$2,016 + 2,571 (.0625) = \$2,177 mil

# The Effects of Capitalizing Operating Leases

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- *Debt* : will increase, leading to an increase in debt ratios used in the cost of capital and levered beta calculation
- *Operating income*: will increase, since operating leases will now be before the imputed interest on the operating lease expense
- *Net income*: will be unaffected since it is after both operating and financial expenses anyway
- *Return on Capital* will generally decrease since the increase in operating income will be proportionately lower than the increase in book capital invested

# The Magnitude of R&D Expenses



# R&D Expenses: Operating or Capital Expenses

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- Accounting standards require us to consider R&D as an operating expense even though it is designed to generate future growth. It is more logical to treat it as capital expenditures.
- To capitalize R&D,
  - Specify an amortizable life for R&D (2 - 10 years)
  - Collect past R&D expenses for as long as the amortizable life
  - Sum up the unamortized R&D over the period. (Thus, if the amortizable life is 5 years, the research asset can be obtained by adding up 1/5th of the R&D expense from five years ago, 2/5th of the R&D expense from four years ago...:

## Capitalizing R&D Expenses: Cisco

- R & D was assumed to have a 5-year life.

Year	R&D Expense	Unamortized portion	Amortization this year	
1999 (current)	1594.00	1.00	1594.00	
1998	1026.00	0.80	820.80	\$205.20
1997	698.00	0.60	418.80	\$139.60
1996	399.00	0.40	159.60	\$79.80
1995	211.00	0.20	42.20	\$42.20
1994	89.00	0.00	0.00	\$17.80
Total			\$ 3,035.40	\$ 484.60

Value of research asset = \$ 3,035.4 million

Amortization of research asset in 1998 = \$ 484.6 million

Adjustment to Operating Income = \$ 1,594 million - 484.6 million = 1,109.4 million

# The Effect of Capitalizing R&D

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- Operating Income will generally increase, though it depends upon whether R&D is growing or not. If it is flat, there will be no effect since the amortization will offset the R&D added back. The faster R&D is growing the more operating income will be affected.
- Net income will increase proportionately, depending again upon how fast R&D is growing
- Book value of equity (and capital) will increase by the capitalized Research asset
- Capital expenditures will increase by the amount of R&D; Depreciation will increase by the amortization of the research asset; For all firms, the net cap ex will increase by the same amount as the after-tax operating income.

## What tax rate?

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- The tax rate that you should use in computing the after-tax operating income should be
  - ❑ The effective tax rate in the financial statements (taxes paid/Taxable income)
  - ❑ The tax rate based upon taxes paid and EBIT (taxes paid/EBIT)
  - ❑ The marginal tax rate
  - ❑ None of the above
  - ❑ Any of the above, as long as you compute your after-tax cost of debt using the same tax rate

## The Right Tax Rate to Use

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- The choice really is between the effective and the marginal tax rate. In doing projections, it is far safer to use the marginal tax rate since the effective tax rate is really a reflection of the difference between the accounting and the tax books.
- By using the marginal tax rate, we tend to understate the after-tax operating income in the earlier years, but the after-tax tax operating income is more accurate in later years
- If you choose to use the effective tax rate, adjust the tax rate towards the marginal tax rate over time.

## A Tax Rate for a Money Losing Firm

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- Assume that you are trying to estimate the after-tax operating income for a firm with \$ 1 billion in net operating losses carried forward. This firm is expected to have operating income of \$ 500 million each year for the next 3 years, and the marginal tax rate on income for all firms that make money is 40%. Estimate the after-tax operating income each year for the next 3 years.

	Year 1	Year 2	Year 3
EBIT	500	500	500
Taxes			
EBIT (1-t)			
Tax rate			

# Net Capital Expenditures

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- Net capital expenditures represent the difference between capital expenditures and depreciation. Depreciation is a cash inflow that pays for some or a lot (or sometimes all of) the capital expenditures.
- In general, the net capital expenditures will be a function of how fast a firm is growing or expecting to grow. High growth firms will have much higher net capital expenditures than low growth firms.
- Assumptions about net capital expenditures can therefore never be made independently of assumptions about growth in the future.

## Capital expenditures should include

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- Research and development expenses, once they have been re-categorized as capital expenses. The adjusted net cap ex will be

Adjusted Net Capital Expenditures = Net Capital Expenditures + Current year's R&D expenses - Amortization of Research Asset

- Acquisitions of other firms, since these are like capital expenditures. The adjusted net cap ex will be

Adjusted Net Cap Ex = Net Capital Expenditures + Acquisitions of other firms - Amortization of such acquisitions

Two caveats:

1. Most firms do not do acquisitions every year. Hence, a normalized measure of acquisitions (looking at an average over time) should be used
2. The best place to find acquisitions is in the statement of cash flows, usually categorized under other investment activities

## Cisco's Acquisitions: 1999

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Acquired	Method of Acquisition	Price Paid
GeoTel	Pooling	\$1,344
Fibex	Pooling	\$318
Sentient	Pooling	\$103
American Internent	Purchase	\$58
Summa Four	Purchase	\$129
Clarity Wireless	Purchase	\$153
Selsius Systems	Purchase	\$134
PipeLinks	Purchase	\$118
Amteva Tech	Purchase	\$159
		<b>\$2,516</b>

## Cisco's Net Capital Expenditures in 1999

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Cap Expenditures (from statement of CF)	= \$ 584 mil
- Depreciation (from statement of CF)	= \$ 486 mil
Net Cap Ex (from statement of CF)	= \$ 98 mil
+ R & D expense	= \$ 3,035 mil
- Amortization of R&D	= \$ 485 mil
+ Acquisitions	= \$ 2,516 mil
Adjusted Net Capital Expenditures	= \$3,723 mil

(Amortization was included in the depreciation number)

# Working Capital Investments

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- In accounting terms, the working capital is the difference between current assets (inventory, cash and accounts receivable) and current liabilities (accounts payables, short term debt and debt due within the next year)
- A cleaner definition of working capital from a cash flow perspective is the difference between non-cash current assets (inventory and accounts receivable) and non-debt current liabilities (accounts payable)
- Any investment in this measure of working capital ties up cash. Therefore, any increases (decreases) in working capital will reduce (increase) cash flows in that period.
- When forecasting future growth, it is important to forecast the effects of such growth on working capital needs, and building these effects into the cash flows.

# Working Capital: General Propositions

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- Changes in non-cash working capital from year to year tend to be volatile. A far better estimate of non-cash working capital needs, looking forward, can be estimated by looking at non-cash working capital as a proportion of revenues
- Some firms have negative non-cash working capital. Assuming that this will continue into the future will generate positive cash flows for the firm. While this is indeed feasible for a period of time, it is not forever. Thus, it is better that non-cash working capital needs be set to zero, when it is negative.

## Volatile Working Capital?

	<i>Amazon</i>	<i>Cisco</i>	<i>Motorola</i>
Revenues	\$ 1,640	\$12,154	\$30,931
Non-cash WC	-419	-404	2547
<b>% of Revenues</b>	<b>-25.53%</b>	<b>-3.32%</b>	<b>8.23%</b>
Change from last year \$	(309)	(\$700)	(\$829)
<b>Average: last 3 years</b>	<b>-15.16%</b>	<b>-3.16%</b>	<b>8.91%</b>
<b>Average: industry</b>	<b>8.71%</b>	<b>-2.71%</b>	<b>7.04%</b>
<i>Assumption in Valuation</i>			
WC as % of Revenue	3.00%	0.00%	8.23%

# Dividends and Cash Flows to Equity

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- In the strictest sense, the only cash flow that an investor will receive from an equity investment in a publicly traded firm is the dividend that will be paid on the stock.
- Actual dividends, however, are set by the managers of the firm and may be much lower than the potential dividends (that could have been paid out)
  - managers are conservative and try to smooth out dividends
  - managers like to hold on to cash to meet unforeseen future contingencies and investment opportunities
- When actual dividends are less than potential dividends, using a model that focuses only on dividends will under state the true value of the equity in a firm.

# Measuring Potential Dividends

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- Some analysts assume that the earnings of a firm represent its potential dividends. This cannot be true for several reasons:
  - Earnings are not cash flows, since there are both non-cash revenues and expenses in the earnings calculation
  - Even if earnings were cash flows, a firm that paid its earnings out as dividends would not be investing in new assets and thus could not grow
  - Valuation models, where earnings are discounted back to the present, will over estimate the value of the equity in the firm
- The potential dividends of a firm are the cash flows left over after the firm has made any “investments” it needs to make to create future growth and net debt repayments (debt repayments - new debt issues)
  - The common categorization of capital expenditures into discretionary and non-discretionary loses its basis when there is future growth built into the valuation.

# Estimating Cash Flows: FCFE

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- Cash flows to Equity for a Levered Firm

Net Income

- (Capital Expenditures - Depreciation)
  - Changes in non-cash Working Capital
  - (Principal Repayments - New Debt Issues)
- = Free Cash flow to Equity

- I have ignored preferred dividends. If preferred stock exist, preferred dividends will also need to be netted out

# Estimating FCFE when Leverage is Stable

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Net Income

-  $(1 - \tau_c)$  (Capital Expenditures - Depreciation)

-  $(1 - \tau_c)$  Working Capital Needs

= Free Cash flow to Equity

= Debt/Capital Ratio

For this firm,

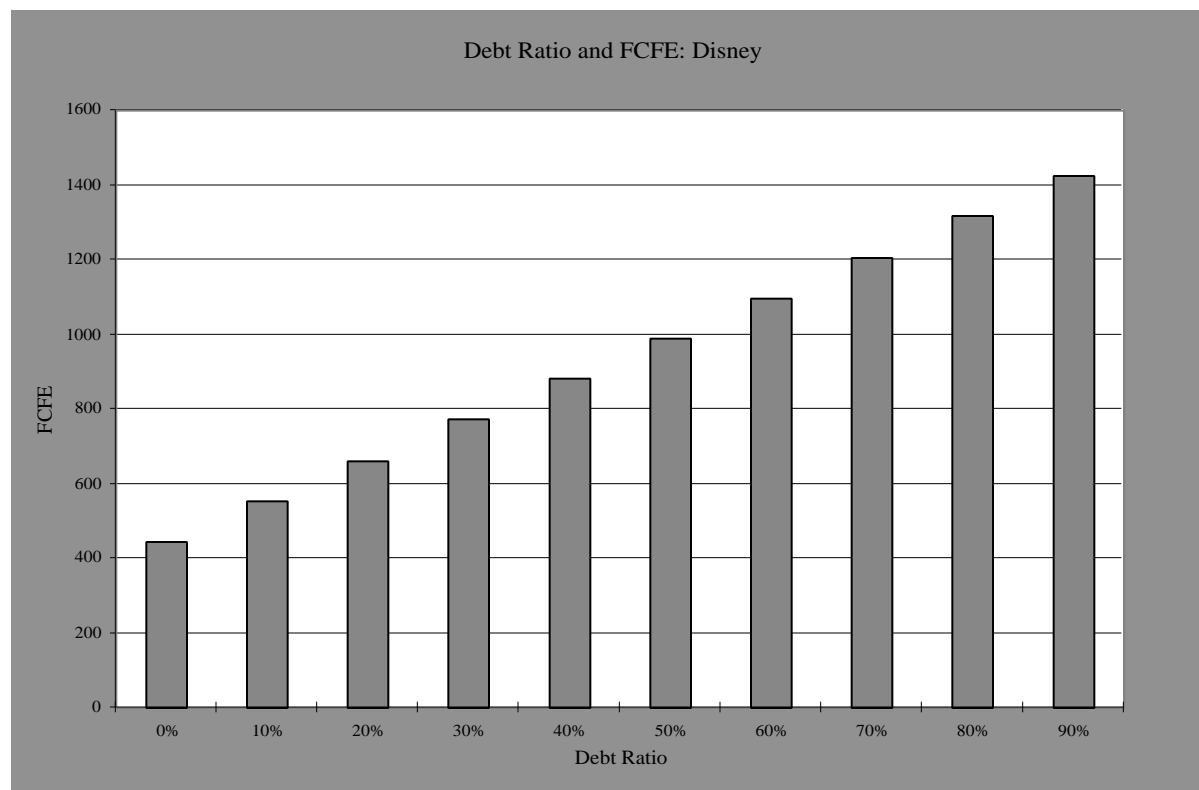
- Proceeds from new debt issues = Principal Repayments +  $d$  (Capital Expenditures - Depreciation + Working Capital Needs)
- In computing FCFE, the book value debt to capital ratio should be used when looking back in time but can be replaced with the market value debt to capital ratio, looking forward.

# Estimating FCFE: Disney

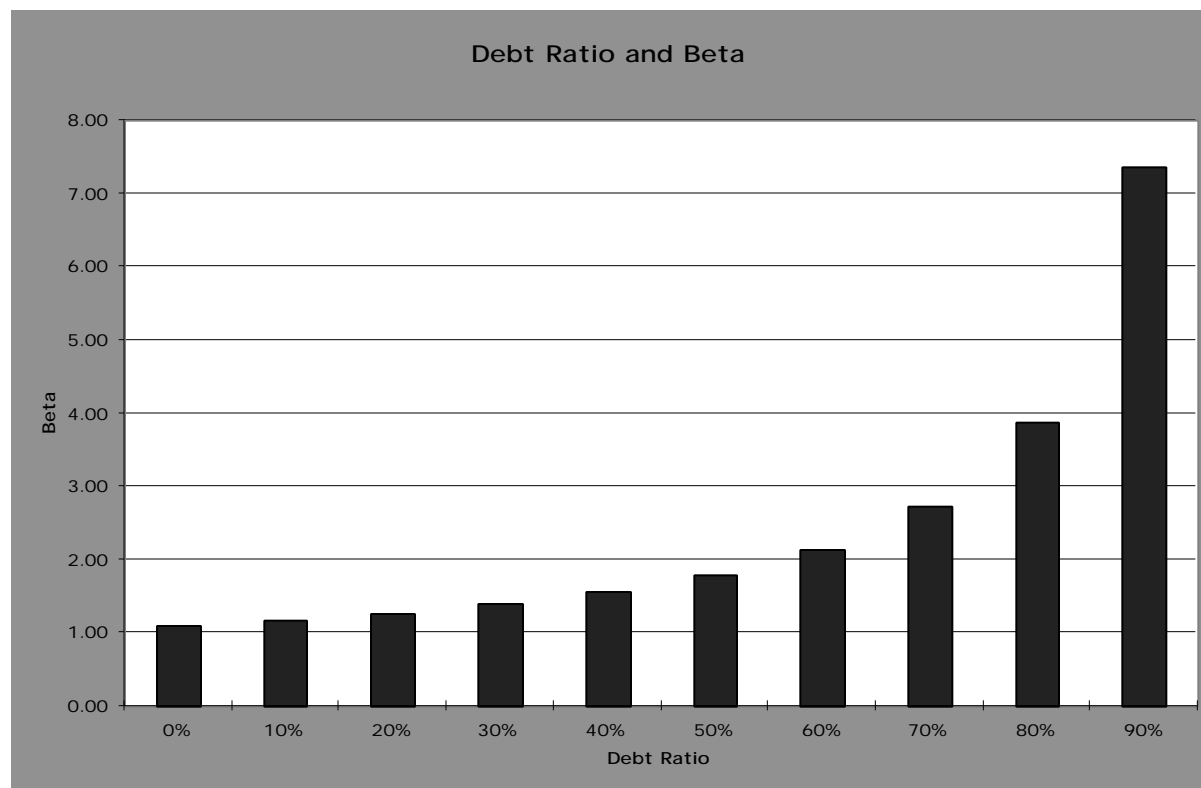
- Net Income=\$ 1533 Million
- Capital spending = \$ 1,746 Million
- Depreciation per Share = \$ 1,134 Million
- Non-cash Working capital Change = \$ 477 Million
- Debt to Capital Ratio = 23.83%
- Estimating FCFE (1997):

Net Income	\$1,533 Mil
- (Cap. Exp - Depr)*(1-DR)	\$465.90
Chg. Working Capital*(1-DR)	\$363.33
<b>= Free CF to Equity</b>	<b>\$ 704 Million</b>
<b>Dividends Paid</b>	<b>\$ 345 Million</b>

# FCFE and Leverage: Is this a free lunch?



# FCFE and Leverage: The Other Shoe Drops



# Leverage, FCFE and Value

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- In a discounted cash flow model, increasing the debt/equity ratio will generally increase the expected free cash flows to equity investors over future time periods and also the cost of equity applied in discounting these cash flows. Which of the following statements relating leverage to value would you subscribe to?
  - ❑ Increasing leverage will increase value because the cash flow effects will dominate the discount rate effects
  - ❑ Increasing leverage will decrease value because the risk effect will be greater than the cash flow effects
  - ❑ Increasing leverage will not affect value because the risk effect will exactly offset the cash flow effect
  - ❑ Any of the above, depending upon what company you are looking at and where it is in terms of current leverage

# Estimating FCFE: Brahma

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- Net Income (1996) = 325 Million BR
- Capital spending (1996) = 396 Million
- Depreciation (1996) = 183 Million BR
- Chg in Non-cash Working capital Change (1996) = 12 Million BR
- Debt Ratio = 43.48%
- Estimating FCFE (1996):

Earnings per Share	325.00 Million BR
- (Cap Ex-Depr) (1-DR) = (396-183)(1-.4348) =	120.39 Million BR
- Change in Non-cash WC (1-DR) = 12 (1-.4348) =	6.78 Million BR
<b>Free Cashflow to Equity</b>	<b>197.83 Million Br</b>

<b>Dividends Paid</b>	<b>232.00 Million BR</b>
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