

If you have to settle for an approximation, try this...

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- For majority holdings, with full consolidation, convert the minority interest from book value to market value by applying a price to book ratio (based upon the sector average for the subsidiary) to the minority interest.
 - ▣ Estimated market value of minority interest = Minority interest on balance sheet * Price to Book ratio for sector (of subsidiary)
 - ▣ Subtract this from the estimated value of the consolidated firm to get to value of the equity in the parent company.
- For minority holdings in other companies, convert the book value of these holdings (which are reported on the balance sheet) into market value by multiplying by the price to book ratio of the sector(s). Add this value on to the value of the operating assets to arrive at total firm value.

Yahoo: A pricing game?

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100% of Yahoo! US Equity	+ 35% of Yahoo! Japan Equity	+ 22.1% of Alibaba Equity	- Loose Ends =	
EV/Sales* Sales = 0.63* \$4672 = \$2,948	EV/Sales* Sales = 7.91* \$3929 = \$31,075	EV/Sales* Sales = 12.18* \$7911 = \$96,331	Taxes due = \$4,011	Equity value= \$39,580 Per share = \$39.19
+ Cash = \$4,571	+ Cash = \$3,113	+ Cash = \$27963		
- Debt = \$1,591	- Debt = \$0	- Debt = \$6,670	Yahoo options \$298	
=Parent Equity = \$5,929	Equity = \$34,188 35% of value = \$11,966	Equity = \$117,623 22.1% of value = \$25,995		

3. Other Assets that have not been counted yet..

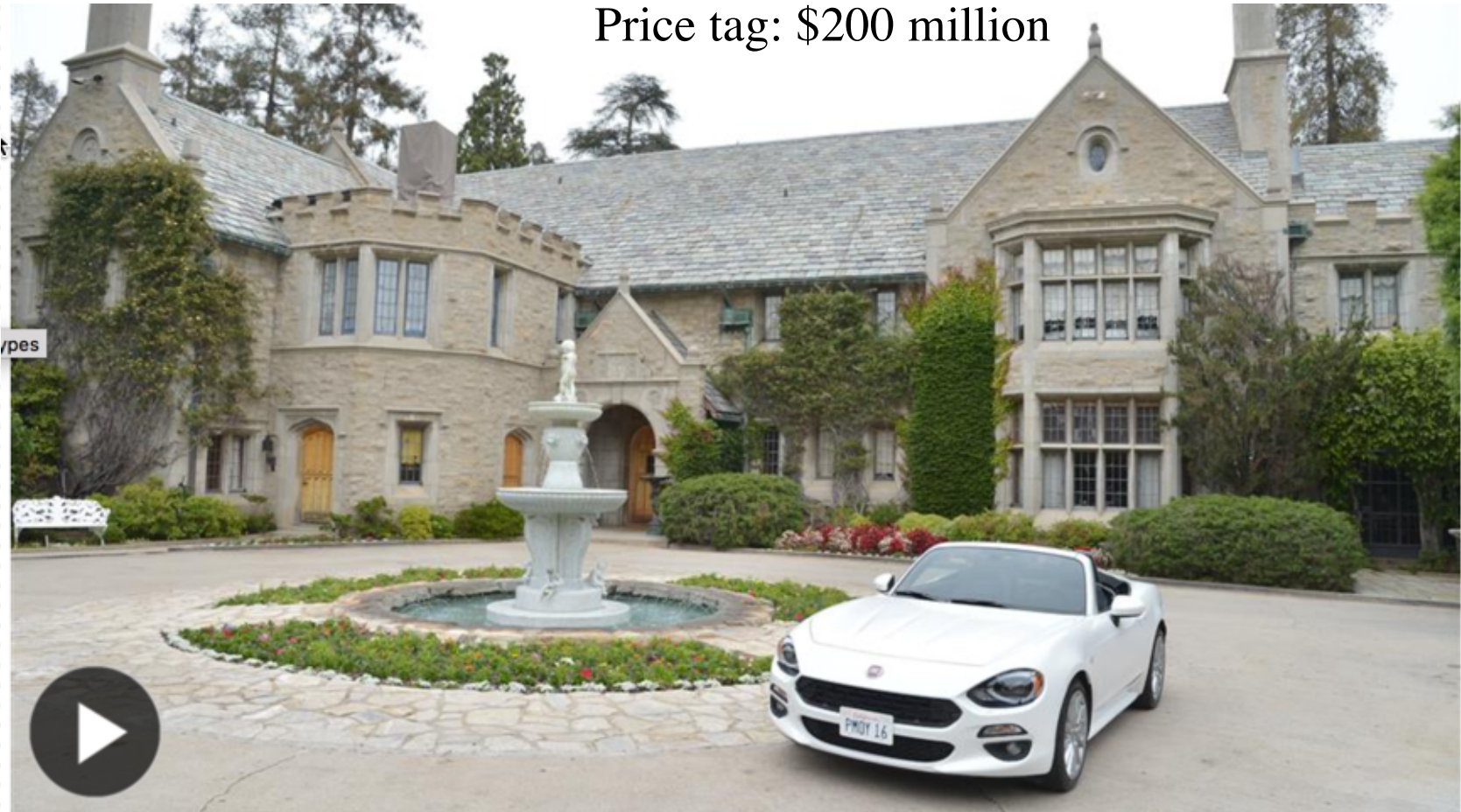
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- Assets that you should not be counting (or adding on to DCF values)
 - If an asset is contributing to your cashflows, you cannot count the market value of the asset in your value. Thus, you should not be counting the real estate on which your offices stand, the PP&E representing your factories and other productive assets, any values attached to brand names or customer lists and definitely no non-assets (such as goodwill).
- Assets that you can count (or add on to your DCF valuation)
 - Overfunded pension plans: If you have a defined benefit plan and your assets exceed your expected liabilities, you could consider the over funding with two caveats:
 - Collective bargaining agreements may prevent you from laying claim to these excess assets.
 - There are tax consequences. Often, withdrawals from pension plans get taxed at much higher rates.
 - Unutilized assets: If you have assets or property that are not being utilized to generate cash flows (vacant land, for example), you have not valued them yet. You can assess a market value for these assets and add them on to the value of the firm.

An Uncounted Asset?

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Price tag: \$200 million



The longtime home of Playboy magazine founder Hugh Hefner is to be sold to Daren Metropoulos, a principal at private-equity firm Metropoulos & Co. PHOTO: GETTY IMAGES

4. A Discount for Complexity: An Experiment

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	Company A	Company B
Operating Income	\$ 1 billion	\$ 1 billion
Tax rate	40%	40%
ROIC	10%	10%
Expected Growth	5%	5%
Cost of capital	8%	8%
Business Mix	Single	Multiple
Holdings	Simple	Complex
Accounting	Transparent	Opaque
Which firm would you value more highly?		

Measuring Complexity: Volume of Data in Financial Statements

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<i>Company</i>	<i>Number of pages in last 10Q</i>	<i>Number of pages in last 10K</i>
General Electric	65	410
Microsoft	63	218
Wal-mart	38	244
Exxon Mobil	86	332
Pfizer	171	460
Citigroup	252	1026
Intel	69	215
AIG	164	720
Johnson & Johnson	63	218
IBM	85	353

Measuring Complexity: A Complexity Score

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Item	Factors	Follow-up Question	Answer	Weighting factor	Hyundai Heavy Score
Operating Income	1. Multiple Businesses	Number of businesses (with more than 10% of revenues) =	3	2.00	6
	2. One-time income and expenses	Percent of operating income =	5%	10.00	0.5
	3. Income from unspecified sources	Percent of operating income =	15%	10.00	1.5
	4. Items in income statement that are volatile	Percent of operating income =	20%	5.00	1
Tax Rate	1. Income from multiple locales	Percent of revenues from non-domestic locales =	75%	3.00	2.25
	2. Different tax and reporting books	Yes or No	No	Yes=3	0
	3. Headquarters in tax havens	Yes or No	No	Yes=3	0
	4. Volatile effective tax rate	Yes or No	Yes	Yes=2	2
Capital Expenditures	1. Volatile capital expenditures	Yes or No	Yes	Yes=2	2
	2. Frequent and large acquisitions	Yes or No	No	Yes=4	0
	3. Stock payment for acquisitions and investments	Yes or No	No	Yes=4	0
	4. Volatile working capital items	Yes or No	Yes	Yes=2	2
Working capital	1. Unspecified current assets and current liabilities	Yes or No	Yes	Yes=3	3
	2. Substantial stock buybacks	Yes or No	No	Yes=3	0
	3. Changing return on capital over time	Is your return on capital volatile?	Yes	Yes=5	5
	4. Unsustainably high return	Is your firm's ROC much higher than industry average?	Yes	Yes=5	5
Expected Growth rate	1. Multiple businesses	Number of businesses (more than 10% of revenues) =	3	1.00	3
	2. Operations in emerging markets	Percent of revenues=	50%	5.00	2.5
	3. Is the debt market traded?	Yes or No	No	No=2	2
	4. Does the company have a rating?	Yes or No	No	No=2	2
	5. Does the company have off-balance sheet debt?	Yes or No	No	Yes=5	0
Cost of capital	Minority holdings as percent of book assets	Minority holdings as percent of book assets	30%	20.00	6
	Consolidation of subsidiaries	Minority interest as percent of book value of equity	20%	20.00	4
	Shares with different voting rights	Does the firm have shares with different voting rights?	No	Yes = 10	0
	Equity options outstanding	Options outstanding as percent of shares	0%	10.00	0
Complexity Score =					49.75

Dealing with Complexity

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- In Discounted Cashflow Valuation
 - ▣ The Aggressive Analyst: Trust the firm to tell the truth and value the firm based upon the firm's statements about their value.
 - ▣ The Conservative Analyst: Don't value what you cannot see.
 - ▣ The Compromise: Adjust the value for complexity
 - Adjust cash flows for complexity
 - Adjust the discount rate for complexity
 - Adjust the expected growth rate/ length of growth period
 - Value the firm and then discount value for complexity
- In relative valuation
 - ▣ In a relative valuation, you may be able to assess the price that the market is charging for complexity:
 - ▣ With the hundred largest market cap firms, for instance:
$$\text{PBV} = 0.65 + 15.31 \text{ ROE} - 0.55 \text{ Beta} + 3.04 \text{ Expected growth rate} - 0.003 \text{ \# Pages in 10K}$$

5. Be circumspect about defining debt for cost of capital purposes...

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- General Rule: Debt generally has the following characteristics:
 - ▣ Commitment to make fixed payments in the future
 - ▣ The fixed payments are tax deductible
 - ▣ Failure to make the payments can lead to either default or loss of control of the firm to the party to whom payments are due.
- Defined as such, debt should include
 - ▣ All interest bearing liabilities, short term as well as long term
 - ▣ All leases, operating as well as capital
- Debt should not include
 - ▣ Accounts payable or supplier credit
- Be wary of your conservative impulses which will tell you to count everything as debt. That will push up the debt ratio and lead you to understate your cost of capital.

Book Value or Market Value

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- You are valuing a distressed telecom company and have arrived at an estimate of \$ 1 billion for the enterprise value (using a discounted cash flow valuation). The company has \$ 1 billion in face value of debt outstanding but the debt is trading at 50% of face value (because of the distress). What is the value of the equity to you as an investor?
 - a. The equity is worth nothing (EV minus Face Value of Debt)
 - b. The equity is worth \$ 500 million (EV minus Market Value of Debt)
- Would your answer be different if you were told that the liquidation value of the assets of the firm today is \$1.2 billion and that you were planning to liquidate the firm today?

But you should consider other potential liabilities when getting to equity value

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- If you have under funded pension fund or health care plans, you should consider the under funding at this stage in getting to the value of equity.
 - ▣ If you do so, you should not double count by also including a cash flow line item reflecting cash you would need to set aside to meet the unfunded obligation.
 - ▣ You should not be counting these items as debt in your cost of capital calculations....
- If you have contingent liabilities - for example, a potential liability from a lawsuit that has not been decided - you should consider the expected value of these contingent liabilities
 - ▣ $\text{Value of contingent liability} = \text{Probability that the liability will occur} * \text{Expected value of liability}$

6. Equity to Employees: Effect on Value

- In recent years, firms have turned to giving employees (and especially top managers) equity option or restricted stock packages as part of compensation. If they are options, they usually are long term and on volatile stocks. If restricted stock, the restrictions are usually on trading.
- These equity compensation packages are clearly valuable and the question becomes how best to deal with them in valuation.
- Two key issues with employee options:
 - How do options or restricted stock granted in the past affect equity value per share today?
 - How do expected grants of either in the future affect equity value today?

The Easier Problem: Restricted Stock Grants

- When employee compensation takes the form of restricted stock grants, the solution is relatively simple.
- To account for restricted stock grants in the past, make sure that you count the restricted stock that have already been granted in shares outstanding today. That will reduce your value per share.
- To account for expected stock grants in the future, estimate the value of these grants as a percent of revenue and forecast that as expense as part of compensation expenses. That will reduce future income and cash flows.

The Bigger Challenge: Employee Options

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- It is true that options can increase the number of shares outstanding but dilution per se is not the problem.
- Options affect equity value at exercise because
 - ▣ Shares are issued at below the prevailing market price. Options get exercised only when they are in the money.
 - ▣ Alternatively, the company can use cashflows that would have been available to equity investors to buy back shares which are then used to meet option exercise. The lower cashflows reduce equity value.
- Options affect equity value before exercise because we have to build in the expectation that there is a probability of and a cost to exercise.

A simple example...

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- XYZ company has \$ 100 million in free cashflows to the firm, growing 3% a year in perpetuity and a cost of capital of 8%. It has 100 million shares outstanding and \$ 1 billion in debt. Its value can be written as follows:

Value of firm = $100 / (.08 - .03)$	= 2000
Debt	= 1000
= Equity	= 1000
Value per share	= $1000 / 100 = \$10$

- XYZ decides to give 10 million options at the money (with a strike price of \$10) to its CEO. What effect will this have on the value of equity per share?
 - a. None. The options are not in-the-money.
 - b. Decrease by 10%, since the number of shares could increase by 10 million
 - c. Decrease by less than 10%. The options will bring in cash into the firm but they have time value.

I. The Diluted Share Count Approach

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- The simplest way of dealing with options is to try to adjust the denominator for shares that will become outstanding if the options get exercised. In the example cited, this would imply the following:

Value of firm = $100 / (.08 - .03)$ = 2000

Debt = 1000

= Equity = 1000

Number of diluted shares = 110

Value per share = $1000 / 110 = \$9.09$

- The diluted approach fails to consider that exercising options will bring in cash into the firm. Consequently, they will overestimate the impact of options and understate the value of equity per share.

II. The Treasury Stock Approach

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- The treasury stock approach adds the proceeds from the exercise of options to the value of the equity before dividing by the diluted number of shares outstanding.
- In the example cited, this would imply the following:

Value of firm = $100 / (.08-.03)$	= 2000
Debt	= 1000
= Equity	= 1000
Number of diluted shares	= 110
Proceeds from option exercise	= $10 * 10 = 100$
Value per share	= $(1000 + 100) / 110 = \$ 10$
- The treasury stock approach fails to consider the time premium on the options. The treasury stock approach also has problems with out-of-the-money options. If considered, they can increase the value of equity per share. If ignored, they are treated as non-existent.

III. Option Value Drag

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- Step 1: Value the firm, using discounted cash flow or other valuation models.
- Step 2: Subtract out the value of the outstanding debt to arrive at the value of equity. Alternatively, skip step 1 and estimate the value of equity directly.
- Step 3: Subtract out the market value (or estimated market value) of other equity claims:
 - Value of Warrants = Market Price per Warrant * Number of Warrants
: Alternatively estimate the value using option pricing model
 - Value of Conversion Option = Market Value of Convertible Bonds - Value of Straight Debt Portion of Convertible Bonds
 - Value of employee Options: Value using the average exercise price and maturity.
- Step 4: Divide the remaining value of equity by the number of shares outstanding to get value per share.

Valuing Equity Options issued by firms... The Dilution Problem

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- Option pricing models can be used to value employee options with four caveats –
 - ▣ Employee options are long term, making the assumptions about constant variance and constant dividend yields much shakier,
 - ▣ Employee options result in stock dilution, and
 - ▣ Employee options are often exercised before expiration, making it dangerous to use European option pricing models.
 - ▣ Employee options cannot be exercised until the employee is vested.
- These problems can be partially alleviated by using an option pricing model, allowing for shifts in variance and early exercise, and factoring in the dilution effect. The resulting value can be adjusted for the probability that the employee will not be vested.

Valuing Employee Options

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- To value employee options, you need the following inputs into the option valuation model:
 - ▣ Stock Price = \$ 10, Adjusted for dilution = \$9.58
 - ▣ Strike Price = \$ 10
 - ▣ Maturity = 10 years (Can reduce to reflect early exercise)
 - ▣ Standard deviation in stock price = 40%
 - ▣ Riskless Rate = 4%
- Using a dilution-adjusted Black Scholes model, we arrive at the following inputs:
 - ▣ $N(d1) = 0.8199$
 - ▣ $N(d2) = 0.3624$
 - ▣ Value per call = $\$ 9.58 (0.8199) - \$10 e^{-(0.04)(10)}(0.3624) = \5.42

Value of Equity to Value of Equity per share

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- Using the value per call of \$5.42, we can now estimate the value of equity per share after the option grant:

Value of firm = $100 / (.08 - .03)$	= 2000
Debt	= 1000
= Equity	= 1000
Value of options granted	= \$ 54.2
= Value of Equity in stock	= \$945.8
/ Number of shares outstanding	/ 100
= Value per share	= \$ 9.46

- Note that this approach yields a higher value than the diluted share count approach (which ignores exercise proceeds) and a lower value than the treasury stock approach (which ignores the time premium on the options)

To tax adjust or not to tax adjust...

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- In the example above, we have assumed that the options do not provide any tax advantages. To the extent that the exercise of the options creates tax advantages, the actual cost of the options will be lower by the tax savings.
- One simple adjustment is to multiply the value of the options by $(1 - \text{tax rate})$ to get an after-tax option cost.

Option grants in the future...

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- Assume now that this firm intends to continue granting options each year to its top management as part of compensation. These expected option grants will also affect value.
- The simplest mechanism for bringing in future option grants into the analysis is to do the following:
 - ▣ Estimate the value of options granted each year over the last few years as a percent of revenues.
 - ▣ Forecast out the value of option grants as a percent of revenues into future years, allowing for the fact that as revenues get larger, option grants as a percent of revenues will become smaller.
 - ▣ Consider this line item as part of operating expenses each year. This will reduce the operating margin and cashflow each year.

When options affect equity value per share the most...

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- Option grants affect value more
 - ▣ The lower the strike price is set relative to the stock price
 - ▣ The longer the term to maturity of the option
 - ▣ The more volatile the stock price
- The effect on value will be magnified if companies are allowed to revisit option grants and reset the exercise price if the stock price moves down.