DuPont Formula

The DuPont allows one to break up a single measure into several. Fundamentally, it's just cross-multiplication of units to get what you know you want to get.

For an *analogy*, if I said, "My car has a 15 gallon gas tank & my car gets 20 miles to the gallon, how far can I travel on a full tank of gas?"

Let's look at this problem algebraically: I want an answer in the form of miles per tank.

$$\frac{15 gallons}{\tan k} \bullet \frac{20 miles}{gallon} = 300 miles / \tan k$$

The gallons cancel out. The DuPont does essentially the same thing with financial ratios.

DuPont Formula, con't

The DuPont allows one to break up a single measure into several. Fundamentally, it's just cross-multiplication of units to get what you know you want to get.

(Profit Margin)(TA Turnover)(Equity multiplier)=ROE

However, let's work with just the first two ratios in the equation; the profit margin and TA turnover.

$$\frac{NI}{Sales} \bullet \frac{Sales}{TA} = \frac{NI}{TA} (ROA)$$

Net income/Sales = Profit Margin

Sales/TA=Total Asset Turnover,,,,,,provided sort of a measure of the utilization of your assets.

DuPont Formula, con't

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ROA is the Net Income available to shareholders divided by Total Assets. This provides a measure of how efficiently management is utilizing its investment in assets. Two firms, A & B, could have similar profit margins & sales levels, however, if firm B used twice the.amount of assets to produce the same sales level, B would have a lower ROA…(& by extension if they were similar firms, we would say A is run more efficiently than B)

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We must be very careful when comparing company's ROAs & other ratios. Companies that are in similar industry can be compared, however, when the companies are different types—caution is advised. For example, wouldn't we expect two vastly different ROAs for two companies—such as; A) an accounting firm, & B) an automobile manufacturer.

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Comparing the ROAs of two automobile manufacturers is a more meaningful comparison. ROAs of highly competitive (w/ public information available) industries, such as banking, are regularly printed in some business newspapers.

DuPont Formula, con't

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ROAs seem to be intuitively appealing—how much money did I clear on the assets I employed in my business?????

Examples are all over—Ever look for an obscure (or not widely demanded) item at a Walmart Store? Go to their garden department and look for parts for a two-year old (or the model before) lawn mower---bet it's not there!

They clearly understand that turnover, particularly inventory, is important.

Tying money up in unproductive (& un-earning) assets hurts ROA.

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ROAs seem to be intuitively appealing—how much money did I clear on the assets I employed in my business?????

ROEs (Return on common equity) is also appealing—the rate of return on stockholders' investment. Obviously as an investor I would want this number to be high!

Caveat::::: remember, we are working w/ accounting numbers and measures here……. For the accounting value of equity (includes retained earnings) we would want the highest net income on the smallest $s invested (-including $s the company held on our behalf—retained earnings).

DuPont Formula, con't

(Profit Margin)(TA Turnover)(Equity multiplier)=ROE

ROEs (Return on common equity) is also appealing—the rate of return on stockholders' investment.

The item that is ***not*** intuitively appealing is the equity multiplier.

Remember the balance sheet from the intro powerpoint?

Balance Sheet

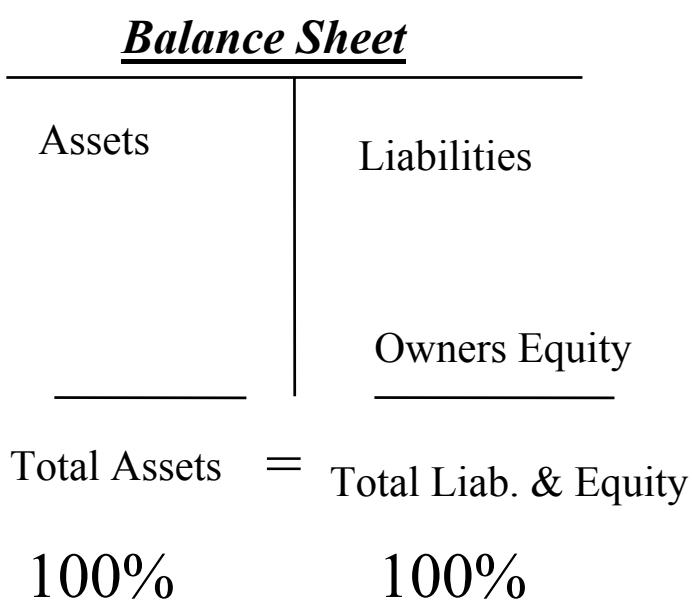
Assets	Liabilities
	Owners Equity
Total Assets =	Total Liab. & Equity
100%	100%

The left side of the balance sheet represents the investments in assets the company has made. They include cash, Account Receivable, inventory, work in process, raw materials, property, buildings, and equipment. These are the assets the company will hopefully use to make a decent return for its owners.

DuPont Formula, con't

(Profit Margin)(TA Turnover)(Equity multiplier)=ROE

The item that is ***not*** intuitively appealing is the equity multiplier. Remember the balance sheet from the intro powerpoint? There is a mix of debt & equity on the right side of the balance sheet.



The right side of the balance sheet represents where the company has raised its money in order to purchase the assets on the left hand side. Usually there is a mix of debt and equity (equity represents the shareholders' or owners' ownership)

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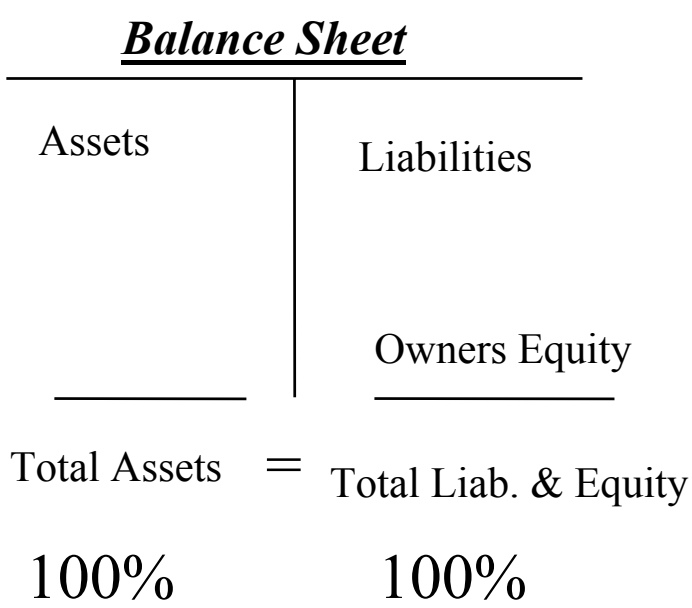


The total of debt & equity is equal to total assets & total debt & equity is equal to 100% of total assets.

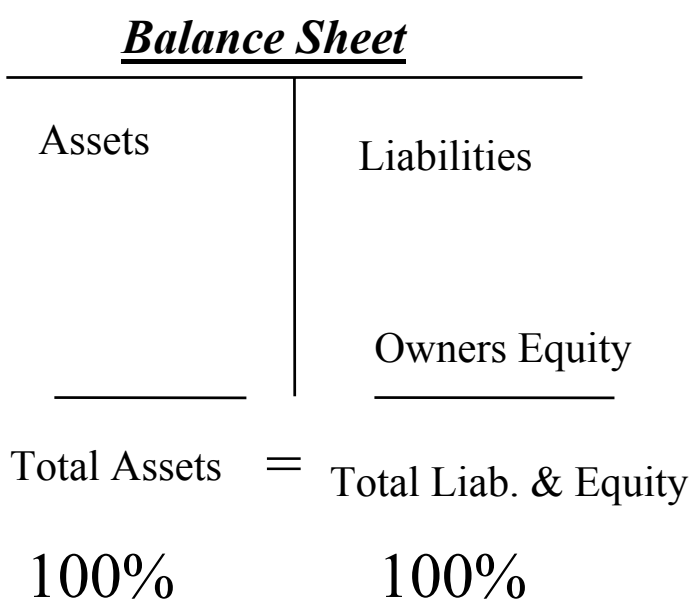
The most common question is "What percentage of the capital structure is debt? or equity?"

DuPont Formula, con't

(Profit Margin)(TA Turnover)(Equity multiplier)=ROE

The item that is ***not*** intuitively appealing is the equity multiplier.

The debt ratio equals the debt/TA or debt/(Total liab + equity), since the Total Assets [TA] = Total Liab + equity.



We'll end up with a percentage for the debt ratio. Since the equity makes up the part of the the capital structure that is not debt, then the % of equity has to be the part that isn't debt.

If debt ratio = 40%, then the equity-capital ratio = 1-.4 = 60%

If we have the equity-capital ratio or the debt ratio we can derive the other.

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To get the equity multiplier, we need the inverse of the equity-capital ratio, or 1/EC,,,,,,or 1/.6 = 1.667 equity multiplier!!!

Balance Sheet

Assets	Liabilities
	Owners Equity
Total Assets =	Total Liab. & Equity
100%	100%

The equity multiplier is defined as total assets divided by equity (remember TA=Tot Liab + equity)

Now you can find the equity multiplier given the debt level or ratio, or equity-capital ratio,,,,,,, & complete the extended DuPont formula……..

DuPont Formula, con't

(Profit Margin)(TA Turnover)(Equity multiplier)=ROE

The item that is ***not*** intuitively appealing is the equity multiplier.

Now, let's factor in the equity multiplier now that it has been defined……

$$\frac{NI}{Sales} \bullet \frac{Sales}{TA} \bullet \frac{TA}{Equ} = \frac{NI}{Equ} (ROE)$$

As an example, let's say Firm A & B are similar firms in the same industry—also we'll say they are approximately the same size. Firms A & B both have sales of $10,000,000 and assets of $2,000,000. Firm A has a Net Income Avail. To Shareholders of $500,000, and Firm B has a Net Income of $400,000. Firm A has a debt ratio of 25% and Firm B has a debt ratio of 50%. Calculate ROA & ROE using the DuPont formula.

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$$A: \frac{500{,}000}{10{,}000{,}000} \bullet \frac{10{,}000{,}000}{2{,}000{,}000} = 25\%(ROA)$$

$$B: \frac{400{,}000}{10{,}000{,}000} \bullet \frac{10{,}000{,}000}{2{,}000{,}000} = 20\%(ROA)$$

A is earning a higher return on its employed assets. Now let's look At the equity multiplier & ROE→

DuPont Formula, con't

(Profit Margin)(TA Turnover)(Equity multiplier)=ROE

Firm A has a debt ratio of 25% and Firm B has a debt ratio of 50%.

Calculate ROA & ROE using the DuPont formula.

Firm A: Debt ratio of 25%, means that Equity Capital ratio is 75% & the Equity multiplier = 1/.75 = 1.3333 (TA=2MM, Equity=1.5MM)

Firm B: Debt ratio of 50% means equity-capital ratio of 50% & the Equity multiplier = 1/.5 = 2.0 (TA=2MM, Equity=1MM

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$$B: \frac{400{,}000}{10{,}000{,}000} \bullet \frac{10{,}000{,}000}{2{,}000{,}000} = 20\%(ROA) \bullet \frac{2{,}000{,}000}{1{,}000{,}000} = 40\%(ROE)$$

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Notice that the ROE really depends on two quite different aspects of a firm—the operations of the firm (ROA) and the financing of the firm (Equity Multiplier).