

Valuing a Company Based on Its Revenues

By Charles Rotblut, CFA

Article Highlights

- Revenues are considered to be a “cleaner” measure for valuing a company because they are less impacted by accounting and financial structure decisions.
- Though the price-to-sales ratio does not include profits in its calculation, profit margins tie it to the price-earnings ratio.
- The justified price-to-sales ratio is an alternative revenue valuation measure that factors in profitability, the dividend payout and projected dividend growth.

Revenue-based valuations are considered to be among the “cleanest” of valuation methodologies.

This is because revenues are less impacted by accounting and financial structure decisions than earnings or book value. For this reason, proponents of revenue-based valuation measures argue that revenues are a better measure to use than earnings-based or shareholder equity-based measures.

There are two other big reasons revenue-based valuation methodologies have a following.

First, they are among the least likely of valuation measures to have a negative or otherwise unusable value. A loss or the expectation of a loss will cause earnings-based valuation ratios to turn negative. Total debt in excess of total assets will render the book value measures negative. Dividend valuation models don't work if a dividend is not paid. Cash flow models break down if a firm is using more cash than it brings in and is expected to maintain negative flows into the future.

As I write this in September 2014, there are 6,008 stocks with a price-to-sales (P/S) ratio in AAI's *Stock Investor Pro* fundamental stock screening and research database program. In contrast, there are only 3,774 stocks with a price-earnings (P/E) ratio, 5,665 with a price-to-book-value (P/B) ratio, and 3,199 with a price-to-cash-flow (P/CF) ratio. While yield technically exceeds the price-sales ratio in terms of the number of companies (7,063), there are only 2,555 companies



in the database with a yield greater than 0.0%.

Second, revenue-based valuation measures tend to be less volatile than earnings-based valuation measures. The denominator in a revenue-based valuation ratio is sales. (Revenues and sales can be used

interchangeably when discussing valuation ratios.) Since nothing else on the income statement affects this top-line number, it tends to be comparatively less volatile than earnings. Earnings, conversely, are impacted not only by changes in revenue, but also by fluctuations in margins, overhead costs, interest payments, depreciation and amortization, and tax rates. The larger number of influences makes earnings more volatile and, therefore, any valuation measure based on them is more volatile as well.

(Changes in share count also play a role in influencing valuation ratios. Any valuation method using numbers based on share counts will be increased by fewer shares outstanding—a smaller number of shares to divide revenues or earnings among—and reduced by more shares outstanding—a greater number of shares to divide revenues or earnings among. Changes in share counts alter the size of the slices cut from the sales, book value, cash flow or income pie, but not the size of the entire pie itself.)

Despite the arguments in favor of revenue-based valuation measures, they are less frequently used than other valuation measures. While the price-earnings ratio, and versions of it, is the most popular valuation measure, revenue-based

valuation methodologies should not be overlooked as a tool for assessing whether a company is cheap, fairly priced or expensive.

The aforementioned price-to-sales ratio is the most basic of the revenue-based valuation measures. It is calculated by using a very simple formula:

$$\text{current stock price} \div \text{sales per share}$$

Acceptable Ranges for the Price-to-Sales Ratio

A rule of thumb for the price-to-sales ratio is that a stock is cheap below a value of 1.0 and increasingly expensive as the ratio rises above 1.0. This is not a universally applicable rule, however, since price-to-sales ratios vary by industry and market conditions. Plus, profitability and dividend growth can also determine whether a higher or lower price-to-sales ratio is warranted, as I will explain.

The median price-to-sales ratio for all stocks within the *Stock Investor Pro* database is 2.0, as of mid-September 2014. The median is the midpoint valuation of all 6,008 companies with a price-to-sales ratio. The average, which is pulled upward by companies with extraordinarily high valuations, is 10.8.

There is a wide variance around these numbers. One influencing factor is the sector in which a company operates. Consumer cyclical is currently the cheapest sector, with a median price-to-sales ratio of 0.9 and an average of 2.8. At the other end of the spectrum is health care, with a price-to-sales ratio median of 4.3 and average of 41.1. Biotechnology and drug companies are the primary reason for the health care sector's high revenue-based valuation. The biotech industry group within the health care sector has a median price-to-sales ratio of 9.5 and an average of 65.6. Table 1 shows the median and average valuations for all sectors.

Price-to-sales ratios near the height of the previous two bull markets and the bottom of previous two bear markets are shown in Table 2. The median price-to-sales ratio has varied consider-

ably over time, from 0.7 right near the end of the 2007–2009 bear market in February 2009 to 2.0 at press time. The average price-to-sales ratio has shown even greater variance, ranging from 13.7 near the height of the tech bubble in March 2000 to 3.0 near the end of the bear market that followed the bubble in February 2003.

Suggested ranges can also be found in some AAI Stock Screens. O'Shaughnessy Tiny Titans requires a price-to-sales ratio below 1.0. Other O'Shaughnessy screens, including Small-Cap Growth & Value and Growth require a price-to-sales ratio below 1.5. Lakonishok, Oberweis and Price-to-Sales screens all require a stock's price-to-sales ratio to be below its industry median. The Price-to-Sales screen also requires the ratio be below the stock's five-year average.

AAII's Model Shadow Stock Portfolio incorporates the price-to-sales ratio into its purchase rules. Qualifying stocks must have a price-to-sales ratio less than 1.2. This number is subject to change based on market conditions.

In "What Works on Wall Street" (Fourth Edition, 2012, McGraw Hill),

James O'Shaughnessy found that portfolios constructed of stocks whose price-to-sales ratios rank in the lowest four deciles outperformed a portfolio of all stocks by a full percentage point or better on an annualized basis. His analysis covered the period of January 1, 1964, through December 31, 2009.

In previous editions of his book, O'Shaughnessy described the price-to-sales ratio as the single best value factor. Data calculated for the fourth edition of his book, including two very bad years for the price-to-sales ratio in 2008 and 2009, caused him to change his mind. O'Shaughnessy now believes a composite of valuation ratios—that includes the price-to-sales ratio—works better than relying on any one single valuation ratio. (See "What Works: Key New Findings on Stock Selection" in the October 2013 *AAII Journal* for more about his revised methodology.)

Though the rule of thumb that a price-to-sales ratio below 1.0 indicates undervaluation is not one that can be universally applied in all situations, one thing should be clear: relatively cheaper price-to-sales ratios are better than relatively expensive price-to-sales ratios.

Table 1. Price-to-Sales Ratios by Sector

The standard deviation shows the variance in the price-to-sales ratios for each sector, while the high and low numbers show the extremes.

Sector	Price-to-Sales Ratio		Standard Deviation	Price-to-Sales Ratio		Sample Size*
	Median	Average		High	Low	
Basic Materials	1.2	8.1	37.4	470.7	0.0	395
Capital Goods	1.1	4.2	17.2	198.5	0.0	351
Conglomerates	1.4	2.7	3.2	10.4	0.5	7
Consumer Cyclical	0.9	2.8	8.3	73.5	0.0	256
Consumer Non-Cyclical	1.3	6.6	25.3	228.4	0.0	222
Energy	2.3	8.2	43.7	825.8	0.0	426
Financial	3.3	8.6	34.7	659.7	0.0	1,145
Health Care	4.3	41.1	126.2	980.7	0.1	644
Services	1.6	7.3	44.1	721.3	0.0	1,208
Technology	2.0	6.6	25.2	413.7	0.0	1,062
Transportation	1.6	3.5	7.8	70.6	0.0	144
Utilities	1.5	12.5	70.3	631.3	0.0	148

The ratios and standard deviation numbers are rounded to one decimal point and several of the low price-to-sales ratios are not meaningfully above 0.0.

*The number of companies in each sector with a current price-to-sales ratio.

Source: AAI's Stock Investor Pro/Thomson Reuters. Data as of September 12, 2014.

Table 2. Price-to-Sales Ratios Over Time

These are the price-to-sales ratio during the peaks of the past two bull markets and the bottom of the last two bear markets. The price-to-sales ratio at press time is included for comparative purposes.

Year	Price-to-Sales Ratio		Standard Deviation	Price-to-Sales Ratio		Sample Size*
	Median	Average		High	Low	
March 2000	1.4	13.7	N/A	986.8	0.0	8,389
February 2003	0.9	3.0	18.6	644.5	0.0	7,164
September 2007	1.7	9.9	42.4	822.1	0.0	7,464
February 2009	0.7	5.3	29.1	955.5	0.0	7,262
September 2014	2.0	10.8	54.3	980.7	0.0	6,008

The ratios and standard deviation numbers are rounded to one decimal point and several of the low price-to-sales ratios are not meaningfully above 0.0.

*The number of companies in each sector with a current price-to-sales ratio.

Source: AAI's Stock Investor Pro/Thomson Reuters. Data as of March 31, 2000; February 28, 2003; September 28, 2007; February 27, 2009; and September 12, 2014.

The Sales Don't Equal Profits Caveat

There is an old joke about selling goods at a loss: "We'll make up for it in volume!" The line suggests a company can sell goods at a loss as long as volume is high enough. This joke can be applied to the price-to-sales ratio because, at its base level, the price-to-sales ratio ignores profits. It solely looks at the top line and the share price, and nothing else.

Criticisms against the price-to-sales ratio do have some legitimacy since sales do not equal profits. A company can boost sales simply by lowering prices. Say a product costs \$100 and commonly sells for \$110 (allowing for a 10% profit margin). A company can take market share from its competitors by selling the product for \$95. Everything else being equal, customers will flock to the company selling the product at the lower price, and this company's sales will grow.

This simple fact explains why either the share price should rise or the valuation as measured by the price-to-sales ratio should shrink even if profits are ignored in the valuation process. If sales are rising, then the denominator in the equation, sales, will grow if the share price remains unchanged. Mathematically, this make sense.

It is also a temporary occurrence.

A company can only operate at loss for so long before it goes bankrupt. Losing money on each product sold drains cash flow, which in turn inhibits the company's ability to pay suppliers and its employees. This, in turn, reduces sales, thereby reducing the denominator in the price-to-sales ratio. In such cases, the stock's price will be adjusted, most often in negative manner.

We saw this occur during the tech bubble of the late 1990s. Several Internet companies saw their share prices soar as they were valued based on projected revenues. When profits and cash flows failed to materialize, valuations dropped and many of these companies subsequently went out of business. (The companies didn't go out of business because of the low valuations; rather, the falling valuations represented a readjustment of investors' perception toward the riskiness of the companies and their profit potential.)

So while the price-to-sales ratio does not explicitly factor in earnings or cash flows, it does not ignore them either. The ratio is adjusted by the market based on current and expected future earnings and cash flow. This can be seen in the current valuation of Amazon.com Inc. (AMZN). The online company has an inconsistent record of realizing profits due to its large spending on expansion. As such, Amazon.com's

average price-to-sales ratio over the past seven years (as of September 12, 2014) is 1.8. Though not cheap, it is within the 55th percentile of all companies in the *Stock Investor Pro* universe, meaning nearly 45% of all other companies are commanding a higher average revenue-based valuation. This suggests investors, though hopeful about Amazon.com's future prospects, are factoring the lack of consistent profits into the valuation ratio.

Tying Revenues to Profitability

In his 1984 book "Super Stocks" (Dow Jones-Irwin), Kenneth Fisher described how the price-to-sales ratio can be tied to earnings and influence the price-earnings ratio as result. The link he used was profit margins. I'll use a version of his example to show how this works.

Let's assume a company realizes revenues of \$10 billion annually, has a market capitalization of \$10 billion and 100 million shares outstanding. Simple math will reveal sales per share of \$100 (\$10 billion in revenues ÷ 100 million shares) and a share price of \$100 (\$10 billion in market cap ÷ 100 million shares). The stock's price-to-sales ratio is 1.0 (\$100 share price ÷ \$100 sales per share).

If this company realizes a net profit margin of 10%, its net income will be \$1 billion (\$10 billion in revenues × 10% net profit margin). Dividing net income by shares outstanding tells us the company is earning \$10 per share. Go one step further and a price-earnings ratio of 10.0 is calculated (\$100 share price ÷ \$10 in earnings per share).

If we adjust the net profit margin, the price-earnings ratio will change. Lowering the net profit margin to 8% reduces net income to \$800 million and raises the price-earnings ratio to 12.5 (\$100 share price ÷ \$8.00 in earnings per share). Raising the net profit margin to 12% increases net income to \$1.2 million and lowers the price-earnings ratio to 8.3.

The link between profit margins, the price-to-sales ratio and the price-

earnings ratio is revealing. For any given stock, the implied price-to-sales ratio or the implied price-earnings ratio can be calculated if you know what the profit margin is. A price-to-sales ratio of 1.0 and a profit margin of 5% imply a price-earnings ratio of 20. A price-earnings ratio of 10 and a profit margin of 20% imply a price-to-sales ratio of 2.0. If the price-earnings ratio is high but the price-to-sales ratio is low, then investors may be anticipating higher profit growth in the future. If the price-to-sales ratio is high but the price-earnings ratio is low, investors may be concerned that the current profit margins are unsustainable. In either case, be sure to investigate the reason behind the mismatch.

Justified Price-to-Sales Ratio

There is a more advanced way to factor profitability into a revenue-based valuation methodology; it is what the CFA Institute calls the justified price-to-sales ratio. In his book “Investment Valuation” (John Wiley & Sons, 2012), New York University professor Aswath Damodaran describes the price-to-sales ratio as being “extracted” from the constant dividend growth model. The formula is:

$$[(E/S) \times (1 - b)(1 + g)] \div (k - g)$$

Where:

E = earnings

S = sales (E/S equals the net profit margin)

b = retention ratio (1 - b equals the dividend payout ratio)

k = required rate of return (k must be greater than g)

g = growth rate of dividends

Joe Lan discussed the constant growth dividend model in the March 2014 *AII Journal* (“Calculating Intrinsic Value with the Dividend Growth Model”). For the sake of continuity, I’ll also use Microsoft Corp. (MSFT) as an example for showing how the justified price-to-sales ratio works.

Using the data in *Stock Investor Pro* as of September 12, 2014, Microsoft

has a 25.4% net profit margin, a payout ratio (dividends divided by earnings) of 42.1% and a long-term projected earnings growth rate of 7.5%. If we assume the payout ratio will remain steady, the projected long-term earnings growth rate can be used as a proxy for projected dividend growth. The required rate of return can be calculated from the capital asset pricing model (CAPM), which Lan also used in his March article. The CAPM is:

$$\text{risk-free rate} + (\text{market risk premium} \times \text{beta for equity})$$

The CAPM calculates the required return an investor should demand given a stock’s relative volatility, as measured by its beta. According to the 2014 Ibbotson SBBI Classic yearbook, large-cap stocks realized a long-term annualized return of 10.1% between 1926 and 2013. Long-term government bonds realized a 5.5% annualized return over the same period. The market premium is difference of the two numbers, or 4.6% (10.1% – 5.5%). *Stock Investor Pro* lists Microsoft’s beta as 0.96. Plugging these numbers into CAPM gives us:

$$\begin{aligned} k &= 5.5\% + (4.6\% \times 0.96) \\ &= 5.5\% + 4.4\% \\ &= 9.9\% \end{aligned}$$

Now that we have the required rate of the return, we can determine what Microsoft’s price-to-sales ratio should be based on its profitability and dividend growth. (Percentages have been converted into decimals.)

$$\begin{aligned} \text{price-to-sales} &= [\text{net profit margin} \times \text{payout ratio} \times (1 + g)] \div (k - g) \\ &= [0.254 \times 0.421 \times (1 + 0.075)] \div (0.099 - 0.075) \\ &= [0.254 \times 0.421 \times 1.075] \div 0.024 \\ &= 0.115 \div 0.024 \\ &= 4.8 \text{ (rounded)} \end{aligned}$$

This formula suggests the justifiable price-sales ratio for Microsoft is 4.8. The stock closed Friday, September

12, 2014, with a price-sales ratio of 4.4. On this basis, Microsoft appears to be undervalued. Keep in mind the assumptions used when using a measure such as the justified price-to-sales ratio. Changes to any of the inputs will alter the output. Thus, while the justified price-to-sales ratio is helpful for determining whether the current price-to-sales ratio is reasonable based on current profit margins, dividend payouts and projected dividend growth, it is just an estimate.

Factoring Debt into a Revenue-Based Valuation

Solely looking at sales does not tell you anything about the balance sheet. Two companies with similar price-to-sales ratios can have vastly different levels of debt on their respective balance sheets. Some analysts like to get around this issue by looking at an alternative to the price-to-sales ratio: enterprise value to sales. Rather than solely relying on the market value of a company’s equity (meaning the stock price), the enterprise-value-to-sales ratio includes both the company’s equity and its debt in the numerator.

Stock Investor Pro calculates enterprise value as:

$$\text{market cap (historical)} + \text{short-term debt} + \text{long-term debt} + \text{minority interest} + \text{preferred equity} - \text{cash}$$

Enterprise value is sometimes referred to a company’s theoretical takeover price. In the event of a buyout, an acquirer would have to take on the company’s debt, but would pocket its cash. Since the debt would need to be paid, enterprise value more accurately reflects what the actual value of a company is to a would-be buyer. (A buyer often pays more than enterprise value as a sweetener to get shareholders of the company being acquired to agree to the merger.)

The enterprise-value-to-sales ratio simply substitutes enterprise value for stock price. Here is the formula:

$$\text{enterprise value} \div \text{sales}$$

Enterprise value is shown in *Stock Investor Pro* for the entire company. If the enterprise value for the entire company is used, total revenues should be used as well. If sales per share is used, the enterprise value should be divided by the number of shares outstanding.

Conclusion

Revenue-based valuation methodologies can be a useful tool for determining if a stock is inexpensive, fairly priced or expensive. Because these measures are less commonly used, they

may lead you to stocks whose bargain valuations have not been uncovered by other investors.

Like any valuation measure, other factors should be considered, including profitability, to ensure the stock truly is a bargain and is not cheap for a reason. ▲

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Stock Strategies

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CR: If I remember correctly, you don't think that conventional bonds themselves offer as much diversification as people think. You think people should look outside a traditional domestic stock/domestic bond allocation.

RA: Exactly. We liken the classic way of investing to a two-pillar model—mainstream stocks and mainstream bonds, with a little dabbling around the fringes. But it makes so much more

sense to build a third pillar—assets that have higher yield, higher growth or both. Assets that are diversified, not very highly correlated with your mainstream stocks and bonds. Assets that are positively correlated with inflation. Because if inflation reignites, mainstream stocks and bonds will struggle. It's going to be a real disappointment. So I look on the notion of building that

third pillar as the most important thing an investor can do for their long-term prosperity. ▲

Bonus audio of Charles' interview with Rob Arnott can be accessed through the online version of this article on AAIL.com. Arnott gives advice on creating stock screens and reveals the investing lessons he has learned throughout his career.

Robert "Rob" Arnott is the chairman and chief executive officer of Research Affiliates, which specializes in smart beta and asset allocation strategies. Find out more at www.aail.com/authors/robert-arnott. Charles Rotblut, CFA, is a vice president at AAIL and editor of the AAIL Journal. Find out more about Charles at www.aail.com/authors/charles-rotblut and follow him on Twitter at twitter.com/CharlesRAAIL.

Financial Planning

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F. Each year, the investment results will show either a gain or a loss. A gain large enough to cover the policy's expenses will increase the death benefit because the cash value shows a gain. A loss will reduce the cash value and likewise the death benefit. As this is going on, I check the ratio (from step C). A variable universal life policy with positive compound earnings will be close to the cash-value-to-death-benefit ratio, or it could be higher. Being higher is no problem.

However, if the cash-value-to-death-benefit percentage is below the calculated ratio because of a market crash, after conferring with the agent and client it is usually decided to wait a year or a few years to see if gains will correct the low percentage. If it remains low, the death benefit can be reduced to bring the percentage back into line with the calculated ratio. This step is the key to eliminating, as much as is possible, the risk of a policy lapsing.

This variable universal life methodology allows the death benefits to increase as long as compound earnings are high enough to cover the policy's expenses. It also provides a release valve by reducing the death benefit to keep it properly funded during periods when the compound earnings have not covered the policy expenses or when they are negative.

Clients who are not willing to set variable universal life policies up in this manner should forgo participation in these products. ▲

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