

Understanding the Fundamentals of Price-to-Revenue Multipliers

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The price-to-revenue multiplier is a popular valuation multiple, especially for service firms such as accounting practices or insurance companies. Mechanically, valuing a company using a price-to-revenue multiple is relatively straightforward (i.e. multiply the underlying revenue of the subject company by the revenue multiplier to derive an indication of value). However, proper application of the price-to-revenue multiplier is more complicated than the simple mathematics suggest, as profit margins have a significant theoretical impact on the size of the price-to-revenue multiplier.

To understand this concept, let's first begin with the basic formula for valuing a business:

$$\text{Price} = \text{EBIT} * (1 - T) * P / (Kw - G)$$

Where:

EBIT = Earnings before interest and tax (next year)

T = Effective corporate tax rate

P = Free cash flow payout ratio (i.e. after-tax free cash flow as % of after-tax EBIT)

Kw = Weighted average cost of capital

G = Long-term sustainable growth rate

This formula is effectively the Gordon Growth Model using after-tax free cash flow instead of dividends. The valuation formula essentially equates the value of a business to the present value of its expected after-tax cash flows. Dividing both sides by Revenue we discover that the price-to-revenue multiplier is simply:

$$\text{Price / Revenue} = \text{EBIT} \cdot (1-t) \cdot p / (\text{Revenue} \cdot (\text{Kw}-g))$$

Notice, that $\text{EBIT} \cdot (1-t) / \text{Revenue}$ is the after-tax profit margin of a business. Therefore, defining this variable as M, the equation above simplifies to the following:

$$\text{Price / Revenue} = M \cdot p / (\text{Kw}-G)$$

Where:

M = After-tax profit margin (next year)

p = Free cash flow payout ratio

Kw = Weighted Average Cost of Capital

G = Long-Term Growth

This formula indicates that the price-to-revenue multiplier is influenced by the following factors:

1. After-Tax Profit Margin
2. Free cash flow payout ratio
3. Weighted Average Cost of Capital
4. Long-Term Expected Growth

Factors 2-4 essentially impact every valuation multiple. Factor 1 (i.e. after-tax profit margin), however, is a variable that is unique to the price-to-revenue multiplier. In effect, the after-tax profit margin is the theoretical fundamental variable that drives the variation in price-to-revenue multiples, holding all else constant. The formula shows that a firm with a high after-tax profit margin will command a higher price-to-revenue multiplier than that of a firm with a low-after-tax profit margin.

By way of example, consider a firm that is expected to generate an after-tax profit margin of 15%. The free cash flow payout ratio is 50%. The cost of capital is 10% and the expected long-term growth rate is 5%. Under these assumptions, a price-to-revenue multiplier is computed as follows:

$$\text{Price-to-revenue} = 15\% \cdot 50\% / (10\% - 5\%) = 1.5x$$

Now, consider a firm that generates 10% after-tax profit margin. Under these assumptions, the price-to-revenue multiplier is computed as follows:*

$$\text{Price-to-Revenue} = 10\% \cdot 50\% / (10\% - 5\%) = 1.0x$$

As one can see, the price-to-revenue multiple is lower in the second example due to the company's lower after-tax profit margin. In fact, since risk and growth are the same, the entire differential can be explained by the ratio of profit margins (i.e. $1.5x * (10\%/15\%) = 1.0x$)

Since after-tax profit margins influence the price-to-revenue multiplier, appraisers should be cognizant of differences in after-tax profit margins when relying upon them in the market approach. For example, suppose the appraiser generates a sample of market transactions with a median price-to-revenue multiplier of 2.0x. The appraiser also notes that the median after-tax profit margin of the underlying companies is 10%. The appraiser is now valuing a similar business, whose profit margin is only 5%. This business generates \$10 million in sales. If the appraiser relied upon the sample of transactions without adjustment the appraiser would value the company at \$20 million (i.e. $2.0x * \$10$ million). However, this would overvalue the subject company due to differences in after-tax profit margins. In fact, assuming the risk and long-term growth of the businesses was comparable, the appropriate price-to-revenue multiple for the subject business is actually 1.0x sales (i.e. $2.0x * 5\%/10\%$) due to its lower profit margin. Therefore, the correct value for this business is \$10 million vs. the \$20 million that one would obtain relying upon the unadjusted price-to-revenue multiples of the guidelines. The discrepancy is entirely attributable to differences in the after-tax profit margin.

This article demonstrates that the price-to-revenue multiple is influenced by the after-tax profit margin. In particular, a firm with a high after-tax profit margin will command a higher price-to-revenue multiple than that of a firm with a low after-tax profit margin, holding all else constant. If appraisers utilize price-to-revenue multipliers in the valuation of a business, they should focus on differences in the profit margin. If significant differences exist, then appropriate adjustment should be made to the multiples in order to derive a proper estimate of value, as failure to adjust the multiple for differences in profit-margins can lead to an erroneous conclusions of value.

*Theoretically speaking, the adjustment would be even greater than that described above because a lower-after profit margin, holding all else constant, would lower the return on equity and, therefore, the long-term sustainable growth rate of the business. I have assumed for illustrative purposes that the reduction in profit margin would be offset by improvements in asset efficiency such that the long-term growth rate would remain unchanged. If this assumption is violated than the appraiser should adjust the multiple for differences in growth as well.

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