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The Multiples Approach to Valuation

Investment bankers have a strong preference for using multiples from comparable corporations, whatever the measuring tool they are using (such as EBITDA) to value corporations and other assets. Private equity firms often tout multiples expansion in terms of creating value with their portfolio companies. Indeed, multiple expansion --that is, taking a corporation private at a low valuation or multiple and subsequently taking the corporation public again a few years later at a higher valuation or multiple – as arbitrage. This note provides a brief introduction to using multiples as a valuation tool. While corporate finance textbooks devote minimal discussion to multiples analysis, it is important to understand why practitioners have adopted multiples valuation as a primary valuation tool, and how it relates to the basic discounted cash flow, or DCF. First, I revisit the perpetuity formula in this note in terms of calculating terminal values for a project or corporation, before discussing the concept of multiples valuation.

Terminal Value in the Context of a Corporation

The lecture note, *Using NPV to Make Investment Decisions*, contains a valuation example of a travel machine, as discussed by Jeff Bezos in Amazon's 2004 shareholder letter. For that example, we forecast cash flows over a seven-year period, and assumed the project terminates at the end of the seventh year. Alternatively, we could assume Amazon continues to invest in travel machines and generate cash flows beyond the seventh year, and thus calculate the value of the project beyond the seven-year forecast period. We often think of corporations as having perpetual lives, as they don't have maturity dates the way many projects do. An analyst can calculate year-to-year discounted cash flows when the firm is experiencing high or volatile growth, until the growth rate hits steady state. Afterwards, the analyst calculates the terminal value as of the end of the forecast period and then discounts back to the present date. This terminal value can take the form of a perpetuity formula, or a multiples valuation. This note describes both in turn.

We first analyze the case where the terminal value is calculated using the perpetuity formula. Consider a private equity firm looking to value a publicly-traded corporation which it intends to take private at a valuation of roughly $5 billion. The private equity firm plans to make numerous operating changes over the next few years which will substantially reduce operating expenses, as well as increase the trajectory of the company's revenue growth. These operational changes are expected to generate cash flows which will be volatile over the next several years. The private equity firm anticipates that after eight years, all the operational changes will have been implemented, at which time earnings growth will be relatively stable going forward. For purposes of valuing the target company, the private equity firm computes valuations over two different periods, the forecast period and the terminal value period. Given the expected high volatility of cash flows over the eight-year forecast period, they employ the DCF analysis to conduct the forecast-period valuation. A DCF analysis of the expected cash flows over the forecast period yields a value of $400 million, a relatively modest value compared to the intended take-out price of $5 billion. Consequently, the bulk of the value in the target company will be largely realized in the terminal value calculation.

Assume the expected cash flows in Year 8, the final year of the forecast period, are $480 million. Thereafter, the private equity firm expects the cash flows to stabilize and grow at an annual rate of 3.0%, in perpetuity. The private equity firm believes the cost of capital at the target company is 11.0%. Given these assumptions, we can value the terminal value via the perpetuity formula:

Eq. 1 $$V = \frac{E[CF]}{[r-g]} \qquad \$6.0 \text{ billion} = \frac{\$480 \text{ million}}{0.11-0.03}$$

The terminal value for the target firm is $6.0 billion, given the model's assumptions. But note that we can't add the $6.0 billion terminal value to the present value of $400 million, based on the cash flows over the forecast period. Rather, we need to first discount the terminal value of $6 billion to the current date:

Eq. 2 $$\$2.60 \text{ billion} = \frac{\$6.0 \text{ billion}}{1.11^8}$$

Year 9 is the first year of cash flows for the terminal value calculation. Therefore, it follows that the terminal value is as of Year 8. Thus, the discounting of the terminal value of $6 billion takes place over eight years, since the value of a perpetuity is as of the date one year prior to the first year of cash flows, using the perpetuity formula. As a result, the overall enterprise value of the target firm is $3.0 billion, the sum of the $400 million present value over the forecast period, and the $2.60 billion present value of the terminal value.

There is a caveat to keep in mind regarding the target-firm valuation of $3.0 billion. This estimate is based on all the various assumptions as given, including the fact that the cash flows are expected to continue forever. In a statistical sense, the variability associated with the estimated valuation is likely very high. Suppose, for instance, that we believe the perpetual growth rate is 6% instead of 3%. The resulting valuation as of today would be $4.6 billion, over 50% greater than the $3.0 billion valuation. While any DCF analysis is highly dependent on the assumptions we base it on, the perpetuity formula is particularly sensitive to differences in discount rates and growth rates, given that the formula assumes cash flows will grow forever. A benefit of using multiples to value a corporation is that we don't have to rely on

estimating the various inputs such as discount rates and growth rates. Instead, they are already incorporated in the valuation of the comparable firm by the market, as we discuss below.

Using Multiples from Comparable Firms to Value Projects and Firms

Many, if not most, of us conduct valuations of our personal and business transactions at times using multiples in comparable transactions. For example, when we purchase a house, we search for prices of comparable houses to assess the value of the house we are thinking of buying. Obviously, for valuation purposes, the critical issue is finding a comparable house, since it is unlikely there is a house with identical features in the same neighborhood with a recent transacted price. Realtors tend to quote in terms of the square footage of the comparable house, and then adjust for differences in location, age of house, upgrades, lot size, etc. to derive a suitable comparable transaction price. Alternatively, we can compute a DCF analysis of the house we wish to purchase. But this analysis entails making numerous assumptions about the various costs and benefits associated with owning a house and the expected price at which we could sell the house at some future date. But how then do we come up with a reasonable estimate of the house's value, when selling the house in several years down the road? Given the expected long life of houses and the value of the underlying land, even small mistakes in the discount rate and growth rate can lead to large discrepancies in valuations.

To rely on prices of comparable houses – and of any goods and services -- as adequate measures of value, competitive price markets must be in force. The same principle applies to corporations and related assets. The value of a corporation is driven by market forces, at least in a competitive economy (which is now largely the case in most countries, rather than a price or valuation controlled by the state). Indeed, this concept is the basis for NPV as covered in the *Introduction to Corporate Finance* lecture note. That is, corporate managers purchase those assets and corporations which they believe are worth more than the purchase price, giving them a positive NPV.

Arbitrage is the underlying mechanism by which prices are set in asset markets. If two equivalent assets trade at the same time, albeit in different markets, they should trade at the same price, assuming competitive and efficient markets. Otherwise, arbitrageurs would be able to manufacture risk-free profits by purchasing the cheaper asset, and simultaneously shorting the more expensive asset. Indeed, this is how we think of an efficient market; that is, arbitrage opportunities do not exist in efficient markets. Even in financial markets which exhibit various levels of inefficiency, we can think of arbitrageurs working hard to push prices of related assets in line. In the market for real products and services, we can even think of corporations as acting as arbitrageurs, as the competitive pressure to maximize profits results in similar prices across products and services, assuming quality and other attributes are constant.

There is a direct link in using multiples from comparable firms versus traditional DCF analysis to value a corporation or asset. A simple rearrangement of Equation 1 showcases the link between these two valuation measures.

Eq. 3

$$\frac{V}{E[CF]} = \frac{1}{[r-g]}$$

This rearrangement of Equation 1 indicates that the value of each dollar of expected cash flow can be expressed by the inverse of the discount rate minus the growth rate. Hence, 1 / r -g gives us the cash flow multiple with respect to the total value of a corporation or of any asset. Intuitively, a higher discount rate has the affect of reducing the cash flow multiple, while a higher growth has the opposite effect.

Consider the cash flow multiple for Coca-Cola. At the end of 2020, the enterprise value of Coca-Cola is $271.4 billion and the pro forma cash flow for 2021 is $9.3 billion. Consequently, Coca-Cola's cash flow multiple is 29.2 as of December 2020. The cost of capital for Coca-Cola is 6.2% as of December 2020, using the Capital Asset Pricing Model (CAPM).[1] Given the 6.2% cost of capital, the implied growth rate for future cash flows into perpetuity at Coca-Cola is 2.8%. If we assume a higher (or lower) cost of capital for Coca-Cola, the implied growth rate is higher (or lower) than 2.8% annually. Assuming the cost of capital exceeds 3.4%, which is a low estimate since Treasury bonds were yielding about 2.0% in December 2020, then Coca-Cola cash flows are expected to grow annually into perpetuity.

Overall, we can think of a high multiple as reflective of either a high expected growth rate in cash flows, or a low cost of capital, or both. And in cases where the multiple is on the low side, the implied expected growth rate of the cash flows can even be negative. For example, the textbook industry has been hit hard over the past several years. First, companies like Amazon and EBay have matched up buyers and sellers of used textbooks, thus reducing the overall demand for new textbooks. Second, the rental textbook market is a rapidly growing phenomenon, again reducing demand for new textbooks. Third, the continuing transformation from print to digital is lowering textbook prices substantially. All three factors put considerable pressure on the profits of textbook corporations.

Houghton Mifflin Harcourt is a publicly-traded textbook publisher with an enterprise value of $923 million as of December 2020. The 2021 pro forma cash flow is $102 million as of December 2020, and thus has a cash flow multiple of 9.0, far lower than Coca Cola's multiple of 29.2. Assuming a cost of capital of 8.1% for Houghton Mifflin Harcourt, the implied growth rate in the future cash flows into perpetuity is negative, at -7.3%. In other words, the stock market agrees with the standard logic and perception that textbook publishers are on the decline, as opposed to being a growth story.

How can we employ cash flow multiples to value other corporations and assets? Platinum Equity, a private equity firm, purchased the publisher McGraw Hill in 2021 from Apollo Capital, another private equity firm. Based on the expected annual cash flows of $490 million at the beginning of 2021, the 9.0 cash flow multiple from Houghton Mifflin Harcourt suggests a valuation of $4.4 billion. Interestingly, Platinum Equity paid $4.5 billion for McGraw Hill, roughly the same amount indicated by the cash flow multiples valuation. Of course, it seems reasonable to use Houghton Mifflin Harcourt as the comparable publishing

[1] See *The Cost of Capital* lecture note for a detailed discussion of using the CAPM to estimate the cost of capital.

firm given that these two firms directly compete in the textbook market, and the firms have similar future growth rates in cash flows, and a similar cost of capital.

Whether valuing a corporation using DCF analysis or applying a cash flow multiple from a comparable firm, the focus in both types of analyses is on cash flows over the entire future life of the corporation. The difference is that with the multiples approach, we do not explicitly calculate an expected growth rate, or the cost of capital. Rather, these factors are embedded in the multiple of the comparable firm. That is, the multiples approach is one of relative valuation. Indeed, the multiples approach to valuation assumes that the market does a good job of valuing firms in general. In other words, if we use Houghton Mifflin Harcourt's cash flow multiple to value McGraw Hill, we are making the strong assumption that the stock market is efficient and provides the correct valuation for Houghton Mifflin Harcourt. Practitioners often conduct both types of valuation analyses, using the multiples valuation approach as a check on the DCF valuation model. A more cynical view, (which is sometimes correct), is that practitioners use the multiples approach first to obtain the value of the target firm, and then engineer the NPV valuation to deliver a similar answer.

While in theory the cash-flow multiple from a comparable firm should mimic traditional DCF valuation. a shortcoming in actual practice is that cash flows can be very lumpy and vary considerably year-to-year across firms. Recall the analysis of the travel machine project as described in Amazon's 2004 letter to shareholders. The analysis computes the net income for the Amazon travel machine project and then converts the net income to cash flows as follows:

	After-tax Profits
+	Depreciation
-	CAPX
-	Change in NWC
=	Cash Flow

The cash-flow pattern for the travel machines was highly variable on a year-to-year basis, due to the large CAPX of the additional machines that were purchased in years 2-4. The expected cash flow was even negative in the first three years of operations, swinging from -$470 million in Year 3 to $385 million in Year 4. If the Amazon travel-machine project was a publicly-traded security, it would not be possible to use its cash-flow multiple in the early years to value a related project or firm. Even for large and relatively stable firms such as Coca-Cola, the cash flow may be out of line with the normal trend line in the year used to calculate the multiple, because of an extraordinary amount of depreciation, CAPX, or a change in NWC.

There are two basic ways to handle the lumpiness that is often exhibited with cash flow estimates. The first method is to normalize the respective depreciation, CAPX, or change in NWC estimates, which generate

the high volatility associated with the cash flow estimates, whether for the comparable firm or the firm being valued. The second method, and that which is typically employed, is to go above the cash-flow line and use a profit measure which is usually less volatile than cash flows. One popular measure of choice is Earnings Before Interest, Taxes, and Depreciation (or EBITDA), as it tends to be closely related to cash flows, and yet benefits from being less volatile.

An important consideration with using an EBITDA multiple as a substitute for a cash-flow multiple is that the comparable firm(s) has the same relation between EBITDA and cash flow as the firm being valued. If in Eq. 1, we replace E(CF) with E(EBITDA), we add a new term, Cash-Flow Conversion, which is the ratio between EBITDA and cash flow:

Eq. 4
$$\frac{V}{E[EBDITA]} = \text{Cash-Flow Conversion}\,\frac{1}{[r-g]}$$

Our working assumption is that the Cash Flow Conversion, which represents an adjustment for depreciation, taxes, CAPX, and changes in NWC, is largely the same for the target firm as it is for the comparable firm(s). And to the extent that the ratio is not roughly the same, one can adjust EBITDA to reflect these differences. Private equity firms tend to employ EBITDA multiples in part because they focus on mature firms which don't tend to exhibit unusually high growth. But if the private equity firm is looking at a target with super-high growth, the EBITDA might be negative, just like the cash flow. In this instance, one might even employ a revenue multiple, or forecast cash flows over a long period until the cash flows are expected to stabilize.

Multiple Expansion (Arbitrage or Not?)

The beginning of this lecture note made a reference to multiples expansion. Suppose a private equity firm takes a target company private at an EBITDA multiple of 8.4, and a few years later returns to the public market via an IPO at an EBITDA multiple of 10.7. The private equity firm will likely make numerous references to the 2.3 increase in the EBITDA multiple as multiples expansion, and perhaps even refer to it as multiples arbitrage.

There are various ways in which multiples expansion can occur. We know that based on the perpetuity formula, multiples are based on growth rates and discount rates. Thus, firms with high expected growth rates and/or low discount rates will tend to have higher multiples. We saw this earlier in looking at Coca-Cola versus Houghton Mifflin Harcourt. Consequently, if management succeeds in making decisions which increase the expected growth rate of the cash flows, or EBITDA, over several years, the multiple will expand, reflecting the increased value of the corporation. Of course, it is also possible that the multiple expansion to the corporation is driven by market sentiment for the relevant sector, something that is largely unrelated to the respective managerial decisions. Multiples expansions via discount rates are generally due to overall market forces rather than to managerial action.

I have found over the years that board directors and CEOs like high multiple businesses. They often speak optimistically of morphing into a business model with a higher multiple than their current company. Consider a software consulting firm which provides customized solutions. This firm will have a lower multiple than a software company that uses a SaaS, or software as a service subscription model which is highly scalable and has recurring revenue. SaaS subscription firms are popular and enjoy relatively high valuations. But the transition is often costly and doesn't necessarily maximize shareholder wealth for all firms. Once a firm makes the transition to a SaaS subscription model, it tends to enjoy a higher multiple after the fact. However, the cost of the transition and the reduction in short term earnings during the transition period may in fact reduce shareholder wealth. Stated differently, some firms operate low-multiple businesses and other firms operate high-multiple businesses to maximize shareholder wealth.