Estimating Capitalization Rates for the Excess Earnings Method Using Publicly Traded Comparables

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This paper presents a convenient method for identifying appropriate capitalization rates to use with the excess earnings method. Our approach allows the valuator to support his or her analysis with the use of objective market information. In many circumstances the two-rate excess earnings methods demonstrated in this paper provide more satisfactory results than the single rate PE method used with the same comparables.[1] We supply a down-loadable Excel spreadsheet that implements the formulas discussed below.

Business valuations and the comparable approach

Valuators often use information about companies that have actively traded stock in order to infer a reasonable value for a closely held business. In a 1996 survey of business valuators, Dukes, Bowlin and Ma find that approximately 40% of respondents obtained discount and capitalization rates by using E/P ratios of similar firms. Although it can be difficult to find firms that are highly similar across many points of comparison, the use of well-selected firms can dramatically improve a valuation study.

The excess earnings model -- what it is and how it works

The excess earnings model (EEM) is an earnings-based valuation model that rests on the assumptions that (a) the value of a firm is equal to its capitalized earning and (b) the earnings stream can be broken down into two components: a normal return on tangible net assets, and an "excess" amount. In EEM the term tangible net assets refers to the market value of cash, inventory, receivables, real estate, etc., net of all liabilities. Tangible net assets do not include goodwill, which consists of any additional factors that allow the firm to earn an abnormal return. EEM capitalizes each component of earnings at an appropriate rate -- a relatively low "normal rate" for the fairly predictable return on tangible net assets, and a relatively higher rate for the less predictable return on goodwill. The formal expression is

$$V = (E - (A * r_A) / r_G) + (r_A * A) / r_A \qquad (1)$$

where V is the value of the firm, E are the earnings, A is the value of tangible net ass and r_A and r_G are the rates of return on tangible net assets and goodwill, respectively[2]. For example, if a firm that had earnings (E) of $750,000 and net tangible assets (A) of $4,000,000 were to be valued using EEM, assuming $r_A = .07$ and $r_G = .15$ then its value (V) would equal

$$\begin{aligned} V &= ((750{,}000 - (4{,}000{,}000 * .07) / .15) + .07 * 4{,}000{,}000 / .07 \\ &= ((750{,}000 - 280{,}000) / .15) + 4{,}000{,}000 \\ &= \$7{,}133{,}333. \end{aligned}$$

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[1] For a discussion of valuations in general see Boatsman and Baskin. For a discussion of the PE method, see Alford.

[2] This expression is conveniently simplified to $V = (E - A / r_A) / r_G + A$. When the two r_A terms are removed from the formula the result could suggest that EEM is an asset-based model, but the earlier expression makes it clear that the model is rooted in the earnings stream of the firm.

Advantages of the model

EEM has several potential strengths compared to single rate valuation models, such as Earnings Capitalization or asset multipliers. The idea of breaking down earnings into two separate components is intuitively appealing, particularly in light of the growing importance of such intangible assets as human capital, brand names, research and development (R&D), and other kinds of goodwill. By separating the valuation problem into two parts -- the relatively easy task of valuing the contribution to earnings from tangible assets and the relatively difficult task of valuing the contribution to earnings from goodwill, EEM focuses attention on the factors that create value for a firm. As the IRS noted in its influential Revenue Ruling 59-60[3],

> In the final analysis, goodwill is based upon earning capacity. The presence of goodwill and its value, therefore, rests upon the excess of net earnings over and above a fair return on the net tangible assets.

A number of writers have criticized EEM. Mastracchio (1993) summarizes the principle criticisms of EEM, and notes that most of the problems discussed relate to (a) the difficulty of implementing the method (and, in particular, determining appropriate rates) and (b) the lack of empirical support, though not the underlying theoretical soundness of the model. Lippitt & Mastracchio (1995) addresses the first of these areas by demonstrating a technique for large-sample estimation of these rates using regression. Work by Mastracchio (1993) and Lippitt & Mastracchio (1996) addresses the second problem by providing empirical support that EEM is robust and accurate compared to Earnings Capitalization[4]. In the next two sections of this paper we show how the valuator can estimate rates for EEM using only one or two comparable firms. We illustrate the procedures using data on publicly traded firms from the Compustat database.

EEM with two comparables

In the first example we assume that the valuator has two comparable firms and wishes to use information from them to estimate a set of appropriate rates. As the values of the two comparable firms are assumed to incorporate the same set of capitalization rates, the following two relationships hold:

$$V_1 = (E_1 - A_1 * r_A) / r_G + A_1$$
$$V_2 = (E_2 - A_2 * r_A) / r_G + A_2$$

where all terms are as defined above for equation (1) and the numerical subscripts refer to comparable firm #1 and comparable firm #2. Since the comparables are publicly traded, V (the market capitalization) can be observed. We assume that the valuator has sufficient information to determine appropriate values for A and E for each comparable firm.[5] Given this information about A, V and E for each comp, algebraic manipulation leads to following equations for r_A and r_G.

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[3] (IRS 59-60 Section 4.02 Par. (f))

[4] In order to measure the accuracy of EEM and other valuation methods the writers used publicly traded firms, for which a market value would be readily obtainable, as surrogates for a privately held business. See Boatsman and Baskin or Mastracchio and Lippitt for details. This finding is particularly interesting when one considers the IRS position in Revenue Ruling 68-609 that EEM should be used to value goodwill "only if there is no better basis available for making the determination". The empirical findings suggest that Earnings Capitalization does not provide a "better basis" than EEM.

[5] For a discussion of the adjustment process see Chapter 3 in Mastracchio (1991).

$$r_G = (A_1 * E_2 - A_2 * E_1) / (V_2 * A_1 - V_1 * A_2) \quad (2)$$

and

$$r_A = (E_2 - (V_2 - A_2) * r_G) / A_2 \quad (3)$$

Table 1 shows a spreadsheet that uses equations 2 & 3 above. For purposes of demonstration, three firms have been selected from a single 4-digit SIC industry[6]. Two of these firms have been designated as the comparable firms C1 and C2. The third firm is designated as the subject firm, for which we will estimate the value. The spreadsheet calculates values of r_A and r_G using the amounts V, A and E from C1 and C2. The value of the target firm is then estimated using these calculated rates in the EEM. For comparison purposes, the value of the target firm is also calculated using the PE ratio for each individual comp and for the average P/E of C1 and C2.

For each of these tables Value (V) is equal to the number of shares used for the primary EPS calculation times the price at the close of the fiscal year; Net Assets (A) equals the book value of common equity as of the end of the fiscal year and Earnings (E) is the Primary EPS (before extraordinary items) times the number of shares used for the primary EPS calculation. In practice, the valuator would make several adjustments to A (e.g. marking tangible net assets to market value) and E (normalizing earnings to reflect long run expected performance). We assume that the market share price of publicly traded firms is the "correct" value, which is a general assumption of any comparable approach to valuation and rests on the widely accepted notion that capital markets are efficient.

In Table 1, note that the market value of the target firm ($49.256 million) would be unknown in an actual valuation, but it is included here so that we can assess the accuracy of the various estimation procedures. Equations (2) and (3) lead to calculated rates for r_G and r_A of 11.5% and 7.3%, as shown in the table. These in turn were used with EEM to calculate an estimated value of $50.243 million for the target firm, which was about 2% greater than the actual market value of the target. For comparison purposes, the value of the firm was estimated using (1) the average PE ratio of C1 and C2 (PEAVE) (2) the PE ratio of C1 and (3) the PE ratio of C2. As shown, for this example the error percentages range from 5.5% to 17.4% for the single parameter PE approach.[7]

EEM with one comparable

In some circumstances the valuator may have information on only one comparable firm but still wishes to include the result of using EEM in his valuation study. In this case the following single comparable approach will allow him to estimate one of the two rates, given an estimate for the other. For example, if we have a reasonably good estimate of the normal return on assets in the industry, we can obtain an estimate of the required capitalization rate for excess earnings.[8] In

[6] 3812, manufacture of specialized measurement systems

[7] The facts in this example came from a large sample statistical study, and are used to illustrate application of the method. To simplify presentation we did not adjust the value of net assets for the comparables, which might have affected both the choice of comparables and the results shown. It is important to bear in mind that any valuation procedure that involves the use of comparables requires the valuator to use a considerable amount of judgement and knowledge about the appraisal subject and its industry.

[8] As a practical matter, r_A is more likely to be known or easily estimated than r_G. There are many

addition, because of the nature of the excess earnings valuation model, errors on the estimation of one the rates will be to some extent offset by the estimation of the other. The following formula states that r_G can be found as the quotient of excess earnings and goodwill:

$$r_G = (E_C - A_C * r_A) / (V_C - A_C) \qquad (4)$$

where the subscript C denotes Earnings, Net Assets and Value for the comparable firm. Many pairs of values for r_A & r_G will satisfy the above equation. Of course, for any given value of r_A there is only one value of r_G that will allow the equation to hold. Many of the pairs of values for r_A & r_G can be eliminated from consideration due to one or more of the following practical considerations:

1. A minimum value of r_A should be in the neighborhood of 6% (the value shown in our table). This represents a slight risk premium over the recent average return for three-month treasury bills[9], a common benchmark for a risk free rate. Very low values of r_A are not consistent with the expectation that investing in business assets should yield a higher return than investing in riskless securities.
2. The capitalization rate for excess earnings should be greater than the normal return on net assets. General experience and a test of this model on a variety of firms, suggest that about a minimum 4% difference is appropriate.
3. For all potential comparables, earnings and net assets must be positive, and the firm's value has to be greater than the value of net assets (i.e. there has to be goodwill).

These restrictions on r_A & r_G will narrow the search for a pair of rates considerably.

Table 2 extends the example presented in table 1, to the one comparable case. Basing the calculations on C1, and using equation (4), the value of r_G is calculated for each assumed value of r_A within a wide range of values. The value of the target firm is then calculated for each pair of rates, using the excess earnings model. The percentage error of each estimate is shown in the final column. Note that as the assumed value of r_A is increased, the calculated value of r_G decreases, creating relative stability in the estimate of the value of the target firm.

If the guidelines are followed the one-comparable formula leads to a fairly reasonable set of estimated rates and valuations[10]. Only the first three rates for r_A and r_G (shown bolded) satisfy the requirements noted above, and thus only values in this range should be considered. As r_A increases to 7.5% the difference between r_A and r_G drops below 4%, and when r_A increases to 9.5% r_A is less than r_G. When r_A increases to 20% the calculated rate for r_G becomes low and negative – a clearly absurd result, caused by failure to follow the guidelines. The results in this table suggest

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opportunities in business life to observe rates of return on tangible assets, and readily available information about riskfree rates of return can be used with the build-up method to compute a plausible r_A. It is usually more difficult to come up with a plausible estimate of r_G, but there may be special circumstances in which the valuator feels that he has good and reliable information about r_G. In that case, the following expression can be used to solve for r_A:

$r_A = (E - ((V-A) r_G)) / A$

[9] See, for instance, the Federal Reserve Bank of Cleveland web site www.clev.frb.org/research for data on Treasury yields.

[10] An inappropriate set of rates calculated from the two-comparable formula would reflect a problem with either the selection of comparables or the proper adjustment of financial information. The valuator should have a basis for assuming that the comparables and target firm should all earn the same return on tangible assets and on goodwill.

that the value of the target firm lies between $49.449 million and $50.057 million, and for this example, EEM with one comparable results in an estimation error of less than 2%, regardless of which of the three reasonable values of r_A is chosen.

Conditions when the one comparable model is likely to produce results superior to the earnings capitalization approach include:

1. The valuator believes that both the target and the comparable firm have excess earnings and therefore goodwill.
2. The accounting rate of return (ARR) of the comparable is different than the ARR for the target. This would indicate differing proportions of normal earnings and excess earnings for the two firms, and therefore different blended rates of return. In other words, even if the two firms had the same rates on normal and excess earnings, they would have different PE ratios.

As a counterpoint to (2), note that when using earnings capitalization there are benefits to choosing a single comparable that has the same ARR as the target. Since both firms will have the same ratio of earnings to net assets and because the comparable should have the same rate of return on tangible and intangible assets, it stands to reason that the PE ratio (whose denominator term represents a blended return on all assets (tangible and intangible)) be the same for both target and comparable. Table 3 illustrates this idea and shows that EEM and the PE method result in the same single estimate of value when the ARR is the same for each firm. This analysis emphasizes the importance of considering as many factors as possible when selecting comparables for use in the PE approach, because two firms that have different ARR ratios may well differ in other important respects as well.

Conclusion

The methods described above provide the valuator with a practical tool that allows him to combine the benefits of the Excess Earnings model and the use of a small number of publicly traded comparables in business valuations. The spreadsheet titled EEComp.xls contains the formulas described above and has been protected so that the calculation cells cannot accidentally be written over. To use the spreadsheet, simply key in the appropriate values for E, V and A. The non-protected data entry cells are set up to display in blue characters, in order to distinguish these cells from those that contain formulas and labels.

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