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Rethinking the Comparable Companies Valuation Method[1]

Abstract: This paper studies a commonly used method of valuing companies, the comparable companies method, also known as the method of multiples. We use an intuitive graphical presentation to show why the comparable companies method is arbitrary and imprecise. We then show how valuations can be significantly improved using regression analysis. Regression analysis is superior to the comparable companies method because, by using more of the available data and imposing fewer unreasonable assumptions, it is more accurate and can value more firms.

I. Introduction

The valuation of privately-held firms is a substantial and challenging problem. One method of valuation often used in practice is called the comparable companies method, also known as the method of multiples. In this method, the value of a firm is estimated using a handful of "comparable" companies. Some measure of a value-to-earnings ratio is calculated for each of the comparable companies. To estimate the firm's value, one simply multiplies the average of the ratio of the comparable firms by the firm's own earnings.

The comparable companies method of valuation is used in many different contexts. In mergers and acquisitions, analysts on both sides of the transaction often estimate the value of the target company using this method. It is also used in a variety of litigation contexts.[2] For instance, dissident shareholders may take legal action to dispute the price proposed for their shares in a merger. Another example occurs when settling disputes over economic damages and lost profits. The comparable companies method can be used to estimate the value of the plaintiff's firm "but-for" an alleged bad act.

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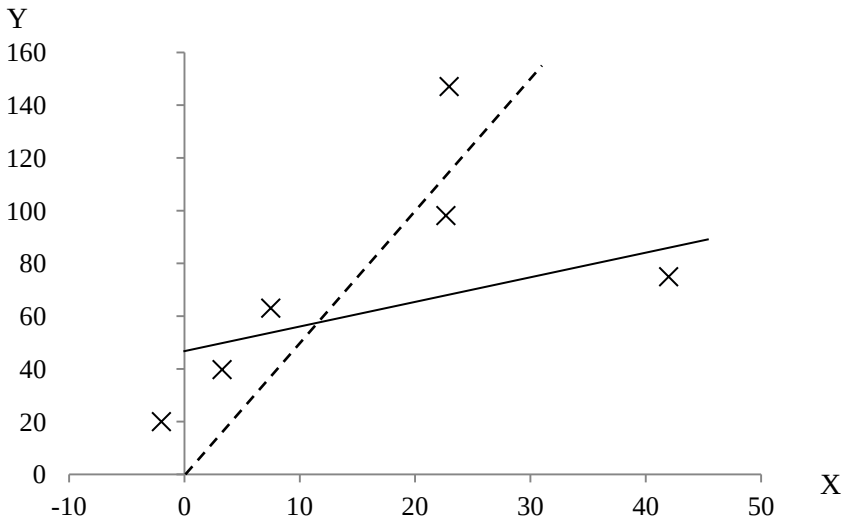
[2] See Weil, Wagner, and Frank (2001) for a more complete discussion.

The comparable companies method is also used when there is a taxable transaction involving a business. For instance, a business owner might give a family member shares in a private company as a gift or as an inheritance, and the value of the business must be estimated to calculate the beneficiary's gift or estate tax burden. Lastly, in the context of marital dissolutions, any family businesses must be accurately valued in order to reach a fair settlement.

In this paper, using real-world data and simple graphs, we examine the arbitrariness and imprecision of the CCV method and suggest a demonstrably superior alternative based on regression analysis. Using a simple empirical test we measure the accuracy of these two valuation methods. We show that the method based on regression analysis is superior to the comparable companies method because, by using more of the available data and imposing fewer unreasonable assumptions, it is more accurate and can value more firms. We value 250 public companies using these two methods and find that regression analysis generates more accurate predictions for approximately 85% of the firms. Moreover, we show that regression analysis can accurately value firms which the comparable companies method cannot.

Our main criticisms of the comparable companies method can be conveyed through a simple example. Presented with Figure 1, any student in a first-year, undergraduate statistics course should be able to estimate the relationship between the Y-variable plotted on the vertical axis and the X-variable plotted on the horizontal axis. That same student is likely to plot a linear relationship using Ordinary Least Squares that looks like the solid line in Figure 1 and warn you that, although this is the best she can do given the data, you should not place much credence in the relationship because you only gave her six observations. Now, if you instructed her to ignore the observation with the negative X-value and to assume the relationship between Y and X has to be strictly proportional, a good student would protest mightily that you now have only five observations and that Y is clearly not proportional to X and so the resulting relationship represented by the dashed line is nearly meaningless. In what follows, we explain that what our first year statistics student knows is worthless passes for analysis under the comparable companies approach to valuing companies.

Figure 1: Too Few Observations, Not Enough Freedom



II. Review of the Practitioner-Oriented Comparable Companies Valuation Literature

The group of comparable companies typically consists of a handful of firms from the same industry as the firm being valued. The market values of these peer group firms are known either because they are publicly traded companies or were recently valued in a market transaction.

The observed market value of the peer group firms used in the numerator of the ratios can be measured by the market value of their common stock outstanding (equity value) or by the market value of all their outstanding securities including debt (enterprise value). The denominator in ratios using equity value is commonly net income or free cash flow. In ratios using enterprise value, revenue, earnings before interest and taxes (EBIT) or earnings before interest, taxes, depreciation and amortization (EBITDA) are common. The comparable companies method implies that equity or enterprise value is a simple multiple of the measure of earnings, revenues or assets used. Table 1 lists some valuation multiples commonly referenced in the practitioner-oriented literature.[3]

[3] Sources checked include: Stowe et al (2002), pp. 179-246; Ibbotson Associates (2004), pp. 25-31; Cornell (1993), pp.56-98; Koller, Goedhart, and Wessels (2010), pp. 287-322; CFA® Program Curriculum (2009), Volume 3 pp. 269-275; Damodaran (2006), pp. 255-324.

Table 1: Commonly Used Multiples

$\frac{\text{Equity Value}}{\text{Net Income}}$	$\frac{\text{Equity Value}}{\text{Free Cash Flow}}$	$\frac{\text{Equity Value}}{\text{Book Value of Assets}}$
$\frac{\text{Enterprise Value}}{\text{Revenue}}$	$\frac{\text{Enterprise Value}}{\text{EBIT}}$	$\frac{\text{Enterprise Value}}{\text{EBITDA}}$

Equity multiples can be misleading if there is considerable variation in the amount of financial leverage across the peer group firms and between the peer group firms and the firm being valued, as they lead to different valuations for otherwise similar firms.[4] Enterprise value multiples are preferable to equity value multiples if there is substantial variation in financial leverage across the peer group firms and the firm being valued. If the enterprise value is being estimated, the scaling variable should be a cash flow available to both equity and debt – EBIT or EBITDA.

After the decision is made to use one or more of the multiples listed in Table 1 and the requisite data is collected, either some of the comparable firms or the target itself may have a negative or zero-value for the variable in the denominator. For example, the analyst may decide to value a firm based on enterprise value to EBITDA and equity to net income ratios for eight publicly traded firms but learn that two of the eight comparable firms have negative EBITDA and the subject firm has negative net income. The practitioner literature suggests dropping the two comparable companies with negative EBITDA values and abandoning the equity to net income multiple. [5] The standard comparable companies approach thus severely limits the data and methods available to an analyst resulting in unnecessarily imprecise and inaccurate estimates of value.

[4] For examples, see Koller, Goedhart, and Wessels (2010), p. 307, and Bader (2002), pp. 29-32. These issues are related to the original insights of Modigliani and Miller that the value of a firm should, as a first approximation, be independent of its capital structure. See Modigliani and Miller (1958), pp. 261-97, and Miller (1977), pp. 261-75.

[5] For examples see Koller, Goedhart, and Wessels (2010), p. 312, Exhibit 14.6, and Damodaran (2006), p. 260.

III. An Example

We present as an example a valuation which took place in a recent merger. On October 21, 2009, Equinix Inc. announced its intent to acquire Switch and Data Facilities Company, Inc. Both companies were involved in the internet exchange services industry. The companies filed a joint proxy statement on November 25, 2009 advising stock holders to vote for the merger. As is common in such proxy statements, the firms' financial advisors issued a "fairness opinion", in which they found the proposed deal to be "fair, from a financial point of view," to the stockholders.[6] The valuation analysis supporting the fairness opinion is included in the proxy statement.[7]

Raymond James acted as a financial advisor for the target. In determining the fairness of the transaction, Raymond James estimated the value of Switch and Data using a variety of methods, one of which was the comparable companies approach. In this analysis, Raymond James used four publicly traded companies. All were "data center collocation and interconnection providers". Equinix, the acquirer, was used as one of the comparable companies. Raymond James calculated enterprise value to revenues and adjusted EBITDA multiples for the four comparable companies over three time frames: the most recent twelve months for which data were available, and the 2009 and 2010 calendar years (both estimated). [8] Table 2, copied from the proxy statement, provides information about the ratios Raymond James calculated for the comparable companies.

Table 2: Summary Statistics for Multiples Used In a Merger

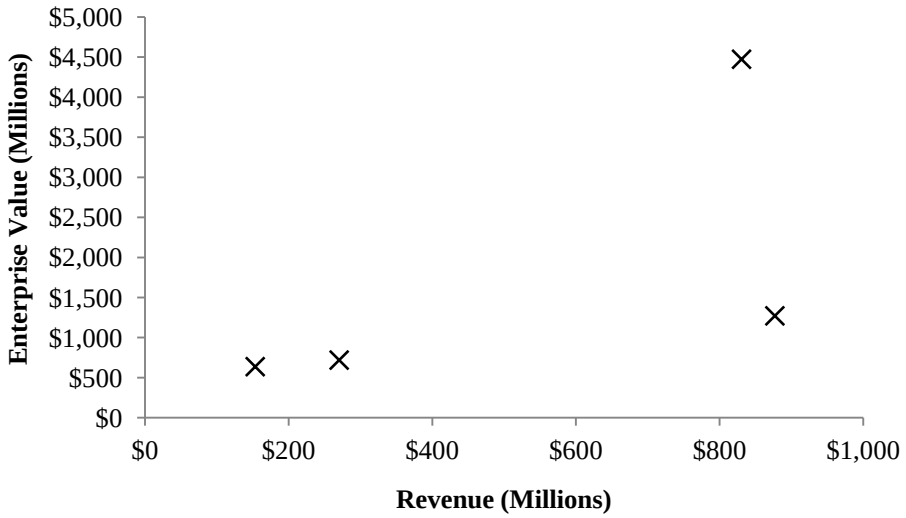
	Enterprise Value / Revenues			Enterprise Value / Adjusted EBITDA		
	Trailing 12 Months	2009E	2010E	Trailing 12 Months	2009E	2010E
Mean	3.7	3.4	2.9	11.0	9.9	8.2
Median	3.7	3.4	2.8	12.1	10.4	8.4
Minimum	1.5	1.5	1.5	6.3	6.5	6.1
Maximum	6.0	5.4	4.5	13.4	12.2	9.9
Merger Consideration	4.5	4.1	3.2	12.9	11.3	9.0

[6] See Cain and Dennis (2011) for a thorough discussion of the use of fairness opinions.
[7] The SEC filing can be found at:
www.sec.gov/Archives/edgar/data/1101239/000119312509242492/ds4.htm
[8] Adjusted EBITDA is earnings before interest, taxes, depreciation and amortization, plus stock-based compensation expense, extraordinary one-time expenses, and non-cash deferred rent expenses.

The first four rows list summary statistics. The last row, titled Merger Consideration, is included to help interpret these ratios in the context of the merger. The terms of the merger gave Switch and Data shareholders the choice between 0.19409 shares of Equinix common stock or $19.06 per share for each share of Switch and Data owned. The values in the last row are the multiples implied by the $19.06 value for shares of Switch and Data common stock. For instance, the value of 4.5 in the first column of the last row is found by first computing Switch and Data's enterprise value under the hypothesis that each share of common stock is worth $19.06, and then dividing by Switch and Data's actual revenue from the previous twelve months. The rest of the values in the last row are computed in a similar manner.

We can also display the information contained in Table 2 graphically.[9] Figure 2 plots enterprise value against revenue over the trailing twelve months for the comparable companies (i.e. the data in the first column in Table 2).

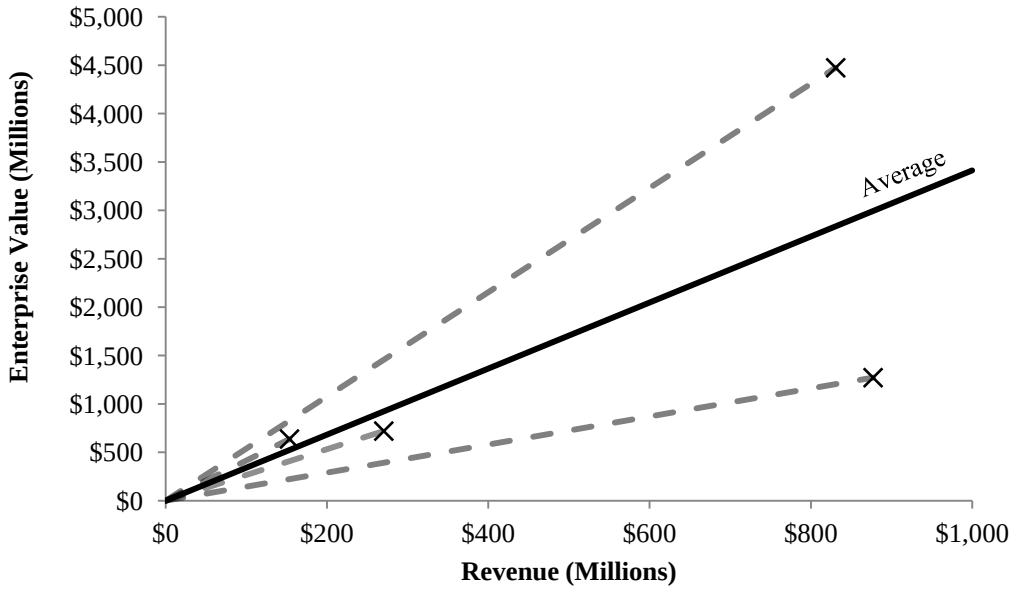
Figure 2: Enterprise Value and Revenue for the Comparable Companies



[9] The proxy statement provides summary statistics of the ratios, but not the underlying data. We used Bloomberg to access the relevant data. Our multiples are slightly different than those reported in the proxy statement.

To represent the ratio of enterprise value to revenue graphically, we draw a line from the origin (the 0,0 point on the graph) to each data point on the graph identified with an X. The slope of a straight line is simply its "rise over run" so the slope of the line connecting the origin and the company's data point is equal to the ratio of the firm's enterprise value to revenue. These lines have been added to the graph in Figure 3.

Figure 3: Representing Multiples Graphically



The steepest line corresponds to the maximum multiple from Table 1 (6.0), while the flattest line corresponds to the minimum (1.5). The dark solid line labeled "Average" represents the mean multiple of the four comparable companies. The graph shows that the comparable companies are actually quite disparate. This is one reason the CCV method generates inaccurate predictions.

Using these multiples and estimates of revenue and adjusted EBITDA, Raymond James computed the implied estimates of the equity price per share of Switch and Data. These estimates are reported in Table 3.

Table 3: Estimates of Switch and Data's Value of Equity

	Enterprise Value / Revenue			Enterprise Value / Adjusted EBITDA		
	Trailing 12 Months	2009E	2010E	Trailing 12 Months	2009E	2010E
Mean	$14.89	$15.29	$16.55	$15.43	$16.14	$16.88
Median	$14.77	$14.90	$15.99	$17.57	$17.29	$17.40
Minimum	$2.98	$4.06	$5.82	$6.57	$8.84	$11.35
Maximum	$27.02	$27.33	$28.42	$20.00	$21.12	$21.39
Merger Consideration	$19.06	$19.06	$19.06	$19.06	$19.06	$19.06

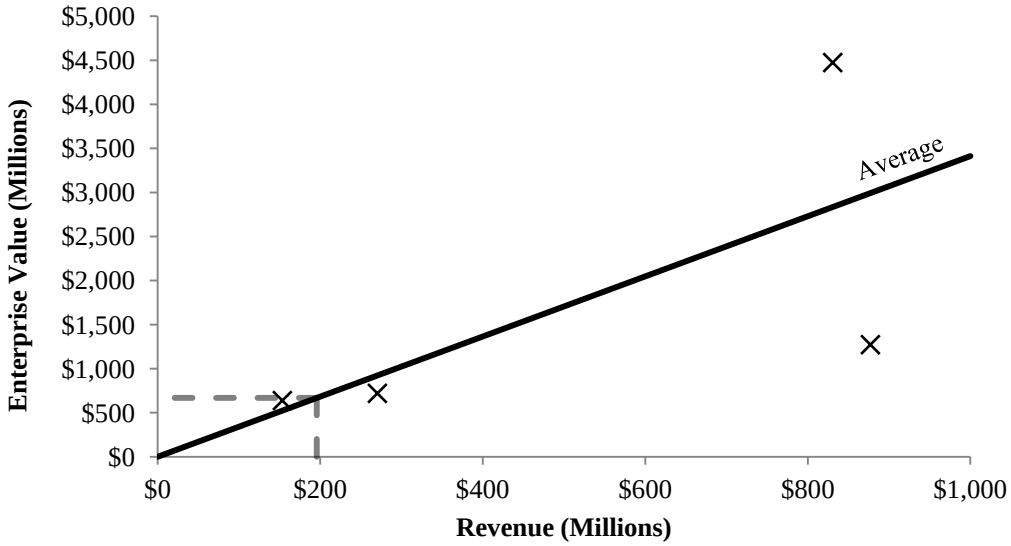
To compute the 14.89 value in the first column of the row titled "Mean", Switch and Data's revenue over the previous twelve months is multiplied by the mean multiple of 3.7, listed in Table 2, to get Switch and Data's estimated enterprise value of $725 million.[10] Subtracting debt, minority interest and preferred shares, and then adding cash, gives an estimate of Switch and Data's equity value. Dividing Switch and Data's equity value by the number of shares outstanding yields an estimate of the equity value per share of $14.89.

Figure 4 illustrates this application of the comparable companies approach. Switch and Data's estimated enterprise value is the point on the "Average" line directly above $195.8 million on the revenue axis.[11] The range of estimates generated by the comparable companies approach and reported in Table 3 is quite large and is reflected in the dispersion of the dotted lines in Figure 2. Using the lowest valuation ratio gives a per share equity value for Switch and Data of $2.98, while using the largest valuation ratio gives a per share value of $27.02. Given the number of shares outstanding, this range of multiple alone could have "justified" a transaction price ranging from $100 to $935 million. To put this range into perspective, the range itself is greater than the actual transaction price ($670 million).

[10] While information on Switch and Data's revenue over the twelve months prior to the merger is not publicly available, we estimate it at $195.8 million using data supplied in the proxy statement.

[11] Since we do not have access to the data Raymond James used, our multiple is slightly different than the value of 3.7 reported in Table 2, and hence our estimated value is slightly lower.

Figure 4: Estimated Enterprise Value



IV. Methodology

In this section, we describe a simple test of the accuracy of the comparable companies approach to valuation. We use Bloomberg to obtain financial data for 250 public firms in the three Standard Industry Classification (SIC) codes described in Table 4. We will value each of these firms, using other firms in the same industry as its comparables, and compare the accuracy of the different methods.

Our analysis will use two multiples: Enterprise-Value-to-EBITDA, and Enterprise-Value-to-Revenue. Enterprise value is calculated as of December 31, 2010. EBITDA and Revenue are measured over the 2010 calendar year. Since fiscal years can vary by firm, we collected quarterly data and aggregated the EBITDA and revenue data so that all firms are measured over the same time period.[12] We discarded 19 firms whose fiscal quarters do not align with the calendar quarters.

We define two samples for each multiple: the firms with positive multiples (the "Positive" sample), and all firms (the "Full Dataset" sample). The comparable companies

[12] Because of earnings revisions and corrections, the sum of the quarterly measures does not always equal the annual measures. Due to the firms' different fiscal years, it is not possible to use the updated annual measures for all firms. Our qualitative results do not change when using revised annual earnings where possible (i.e. the firms whose fiscal year ends on 12/31/2010.)

method is only used on the Positive sample, while the regression method is used on both samples. Table 4 provides information about the different samples we use by industry.

Table 4: Description of Industries and Samples

	EV/EBITDA		EV/Revenue	
	Positive Sample	Full Dataset Sample	Positive Sample	Full Dataset Sample
Pharmaceutical Preps (2834)	72	219	185	229
Perfumes & Cosmetics (2844)	7	11	12	12
Household Audio & Video (3651)	6	8	9	9

While all of firms within the same SIC code are in the same industry, they may nevertheless not be truly "comparable". For instance, in the pharmaceutical industry, long-established, multi-billion dollar firms like Pfizer and Johnson & Johnson should not be used to value young, small firms who have little revenue and who derive most of their value from potential future success. Therefore, in the Pharmaceutical industry, we limit the group of comparable firms to be those with similar enterprise values to the firm being valued. The results we present below use the next 10 larger firms, and the next 10 smaller firms (for a total of 20), as the group of comparable companies.[13]

The Comparable Companies Method

The comparable companies estimates are computed in the same manner as described earlier in this paper. For each firm in the sample, we compute the Enterprise-Value-to-EBITDA and Enterprise-Value-to-Revenue ratios for the comparable companies, average these ratios, and multiply the average peer company ratio by either the subject firm's EBITDA or Revenue .

The Regression Method

The original motivation for this paper came from an observation that the comparable companies method is in fact quite similar to running a regression on an extremely small sample of comparable firms, with the regression constant constrained to equal zero. Since there is no compelling reason that enterprise value must be directly

[13] We experimented with different size groups and found no substantive change in the qualitative results.

proportional to EBITDA or Revenue, we relax this constraint in our regression analysis. We model enterprise value as a linear function of the earnings variable: $EV = \alpha + \beta X + \varepsilon$, where EV is enterprise value, X is either EBITDA or Revenue, α and β are parameters to be estimated, and ε is the error term. We follow Liu, Nissim, and Thomas (2002) and scale both sides by enterprise value. This is done to correct for Heteroskedasticity, and, as explained in Baker and Ruback (1999), is likely to give more precise estimates. The equation we estimate is: $1 = \alpha \frac{1}{EV} + \beta \frac{X}{EV} + \frac{\varepsilon}{EV}$. We estimate this equation using ordinary least squares, which chooses values for α and β that minimize the sum of the squared differences between the actual and predicted enterprise values. The group of comparable firms is formed in the same way as in the comparable companies estimates. The estimate of enterprise value is computed as $\widehat{EV}_t = \hat{\alpha} + \hat{\beta} X_t$, where $\widehat{EV}_t$ is the target firm's predicted enterprise value, X_t is the value of the target's scaling variable, $\hat{\alpha}$ is the estimate of the constant, and $\hat{\beta}$ is the estimate of the slope coefficient.[14,15]

Comparing the Comparable Companies and Regression Methods

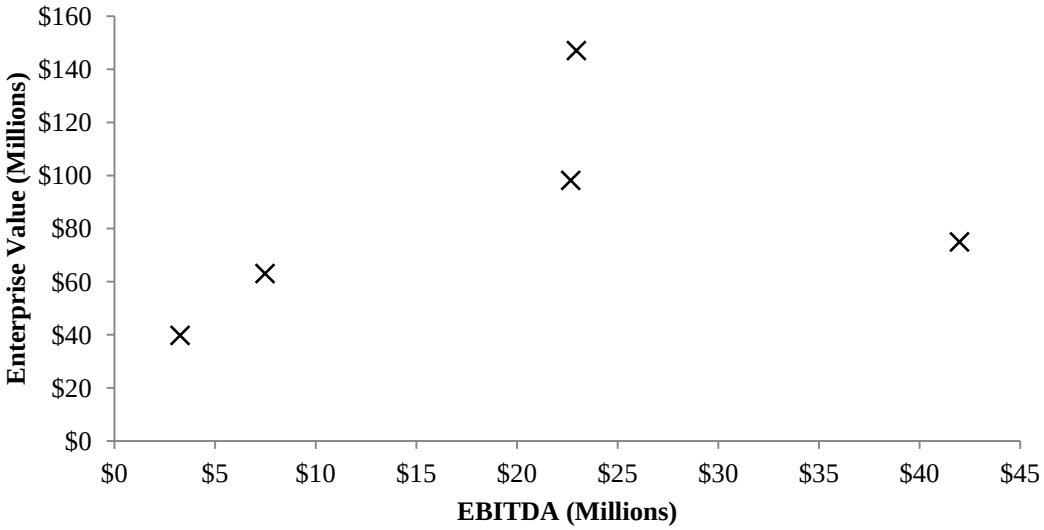
To measure accuracy, we compute the absolute percentage error of each estimate. The absolute percentage error is defined as the absolute value of the difference between the estimated value and the true value, divided by the true value.

Before stating our results, it is useful to see how the two estimation techniques differ graphically. We will show how the comparable companies and regression analysis methods estimate the value of Astex Pharmaceuticals, Inc. For expository purposes, the group of comparable companies is limited to five firms of similar value from the same SIC code (2834). This example was chosen from our dataset because it nicely illustrates the problems with the comparable companies method and shows how the regression method can improve the valuation. Figure 5 plots enterprise value and EBITDA for the five comparable companies.

[14] A similar model omitting the constant was also estimated. As expected, this model, which effectively restricts the constant to be zero, performed worse than the unconstrained model.

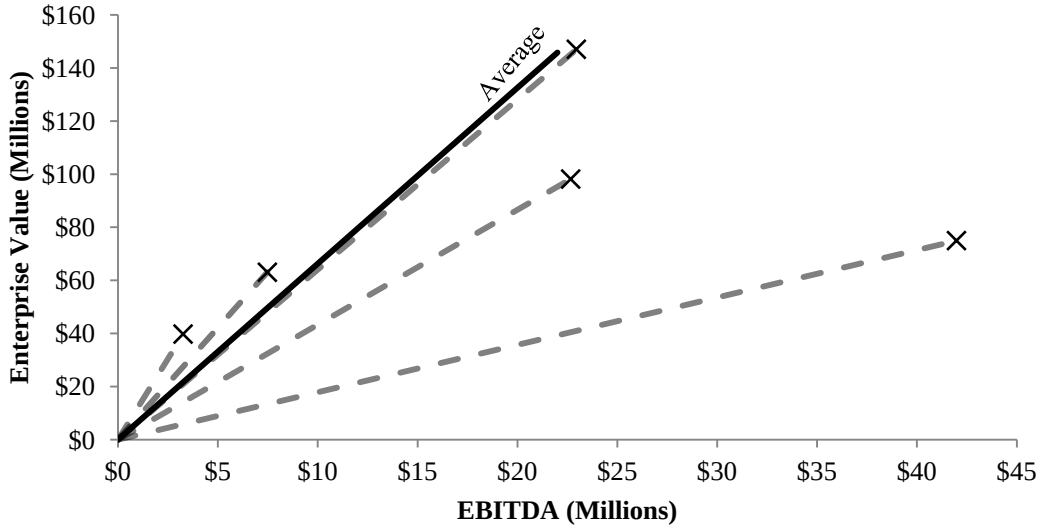
[15]Extending the model to incorporate more than one measure of earnings as an explanatory variable does not improve estimates. The problem is that the earnings variables are highly correlated, which leads to "multicollinearity" in the explanatory variables. As explained in Greene (2003), the variance of the estimated slope coefficients becomes very large when the explanatory variables are highly correlated. When this is the case, the predicted values become very inaccurate.

Figure 5: Enterprise Value and EBITDA for the Comparable Companies



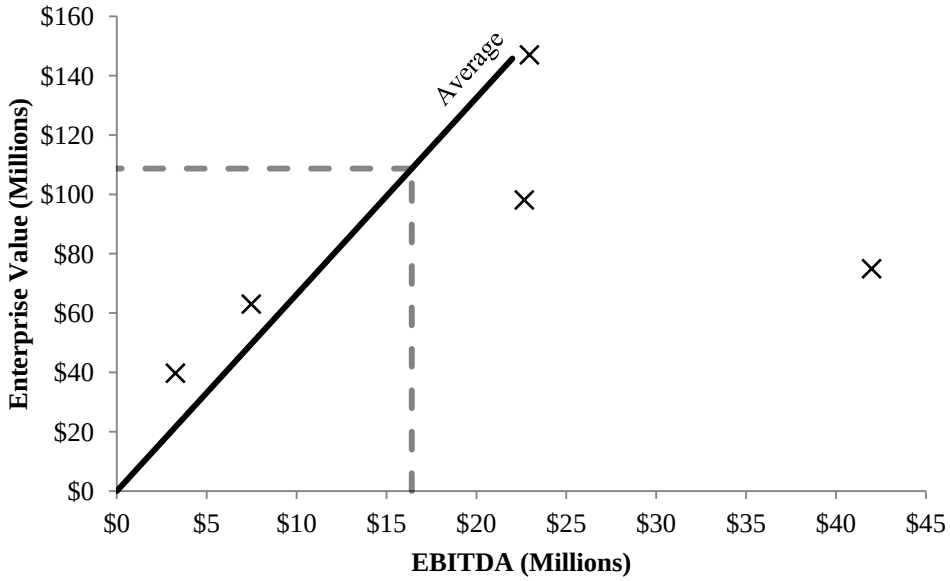
The enterprise-value-to-EBITDA multiples for these five firms can be represented graphically by drawing a line from the origin to the data point for each firm. These multiples, along with the average, are shown in Figure 6.

Figure 6: Representing Multiples Graphically



Astex's approximately $110 million estimated enterprise value, computed by multiplying the mean of the comparable companies' multiples by the Astex's $16.4 million EBITDA, is illustrated in Figure 7.

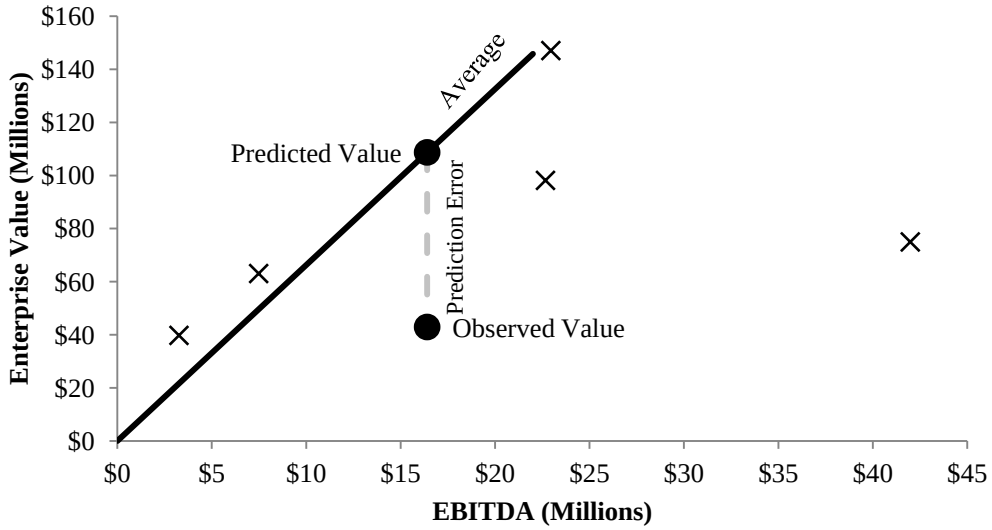
Figure 7: Graphical Representation of the CCV Estimate



Some of the practitioner-oriented literature suggests using the median of the multiples in addition to, and sometimes instead of, the mean. To use the median multiple graphically, we would simply use the firm with the median slope to predict the target's value instead of drawing a new line with the average (mean) slope.

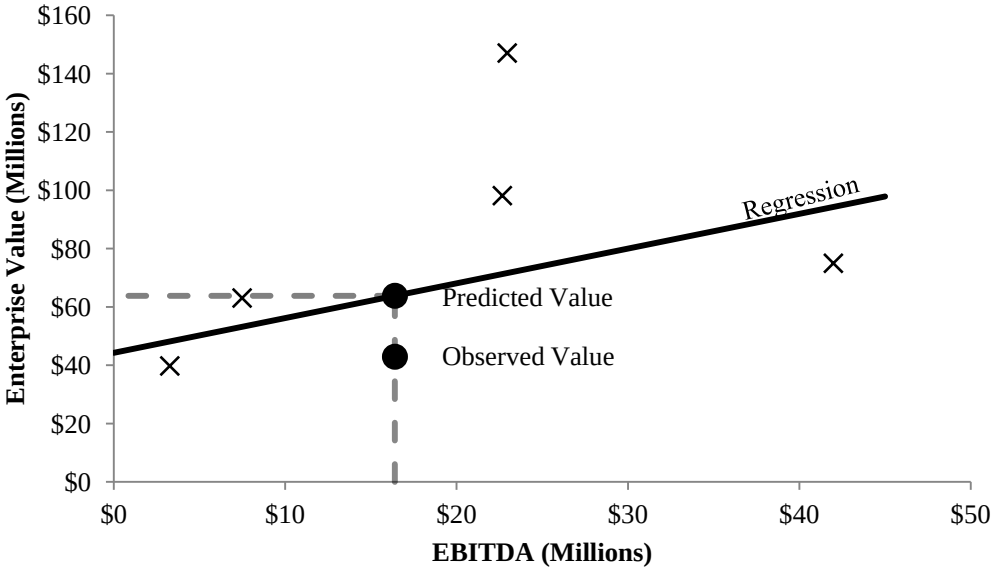
In Figure 8 we plot the predicted enterprise value against the observed enterprise value. The prediction error is the vertical distance between the two points. In order to turn this into a percentage error, we would simply divide the prediction error by the observed enterprise value of the firm. In this case, the predicted value is $108.8 million, while the observed enterprise value of Astex Pharmaceuticals is $42.9 million. This corresponds to a percentage error of more than 150%. If we use the median multiple, the estimated enterprise value is $105.2 million, giving a percentage error of 145.3%.

Figure 8: CCV Prediction Error



Regression analysis, on the other hand, fits a line to the data in order to minimize the sum of the squared prediction errors. The prediction line for the regression for the valuation of Astex is shown in Figure 9. To compute the estimated value, we multiply Astex's $16.4 million EBITDA by the estimated 1.19 slope coefficient and add the estimated 44.25 constant. The predicted value and error are also shown in Figure 9.

Figure 9: Regression Analysis Predicted Values and Prediction Error



The estimate obtained from regression analysis is $63.8 million, which corresponds to a prediction error of 48.7%. This is much lower than the comparable companies estimates percentage error of over 150%.

V. Results

In this section we present the results of our empirical analysis. There are three ways in which regression analysis is superior to the comparable companies method. First, regression analysis is more accurate when it is constrained to use the same data as the comparable companies method. Second, it is able to take advantage of more data than the comparable companies method, and its estimates improve when using this data. Third, regression analysis can value firms which the comparable companies method cannot.

Table 5 provides summary statistics of the absolute percentage errors obtained from our different estimation methods. Three estimation techniques are used in this table: the comparable companies method with both the mean and median multiple, and regression analysis. All valuations in this table are on firms from the Positive sample, using only firms from the Positive sample as comparables. The table is split into two parts because results are reported when both EBITDA and revenue are used as explanatory variables.

Table 5: Absolute Percentage Errors of Comparable Companies and Regression Estimates

EBITDA as the Explanatory Variable

Estimation Method	Absolute Percentage Error	
	Mean	Median
CCV – Mean	389.3%	107.0%
CCV – Median	102.1%	64.3%
Regression	55.5%	39.7%

Revenue as the Explanatory Variable

Estimation Method	Absolute Percentage Error	
	Mean	Median
CCV – Mean	11,641.8%	1,016.4%
CCV – Median	11,217.7%	957.5%
Regression	31.7%	9.0%

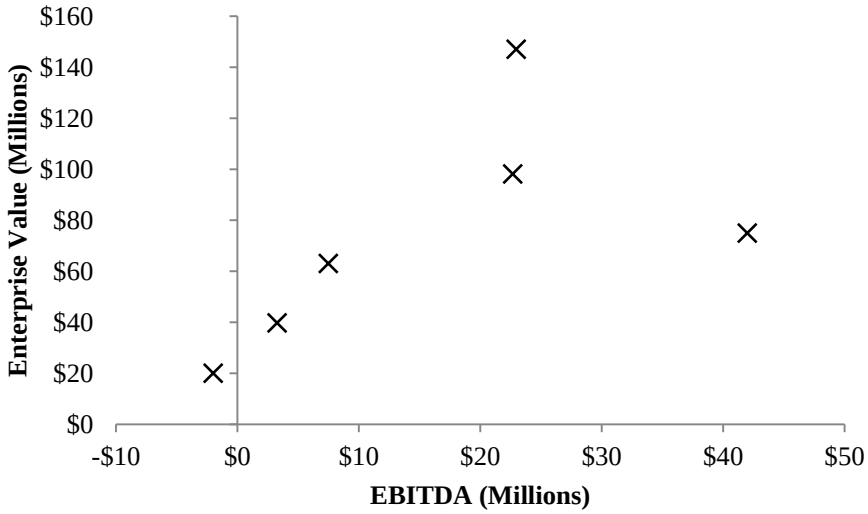
The first two rows of Table 5 show that the median multiple performs much better than the mean multiple as an estimator in the comparable companies method. This is because the mean can easily be skewed by one or two large values, while the median is less susceptible to this problem.

The third row in Table 5 reports the results of the regression analysis estimates. Comparing this row to the first two rows in the table provides a direct comparison of the comparable companies and regression analysis methods of valuation. The same firms are valued, using the same group of comparables, for each method. The mean and median absolute percentage errors are smallest when using the regression analysis method. This shows that the regression method generates, on average, more accurate estimates than the comparable companies method. As further evidence, we found that the estimate from regression analysis was better than the comparable companies estimate for more than 84% of the firms.

The regression estimates are much better because the regression technique does not impose as many restrictions on the data as the comparable companies method. In particular, value need not be directly proportional to the scaling variable in the regression model. While the comparable companies method effectively imposes this constraint, the regression method does not. In addition, the Ordinary Least Squares algorithm chooses the parameters to minimize the sum of squared errors in the group of comparables. The comparable companies method, in contrast, simply uses the mean or median of the comparable firms' ratios. This renders the comparable companies estimates more susceptible to outliers.

Another advantage of the regression analysis method of valuation is that it can make use of more data than the comparable companies method. Returning to our earlier example of valuing Astex Pharmaceuticals, Figure 10 shows why the comparable companies method does not typically include firms with negative multiples in its analysis.

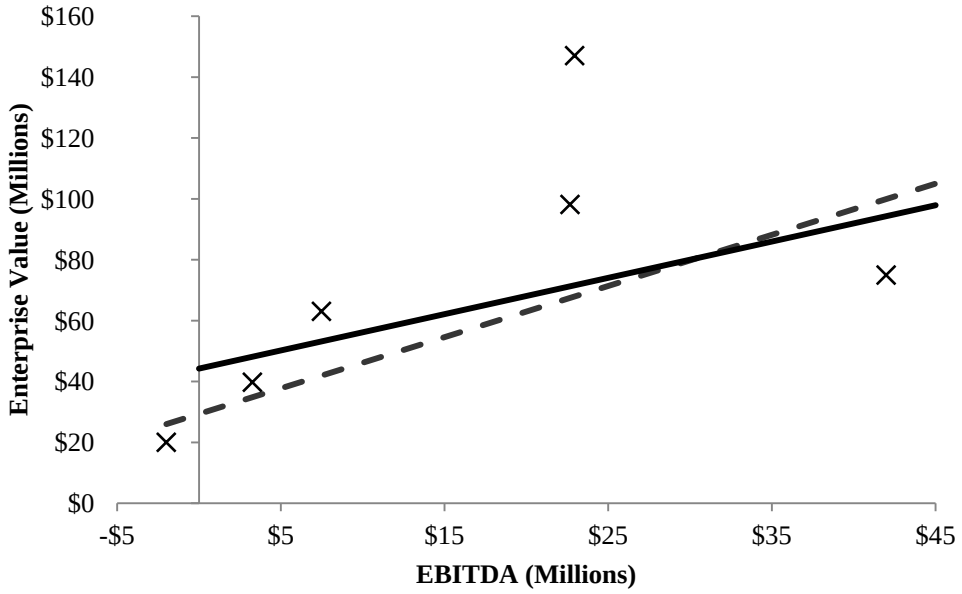
Figure 10: The Comparable Companies with Negative Multiples



This graph is identical to Figure 4 except a firm with negative EBITDA has been added to the group of comparable companies. The two firms with EBITDA near zero in the graph provide approximately the same information: in particular, firms can have a positive enterprise value even with very low EBITDA. The comparable companies method would typically discard the observation on the firm with the negative EBITDA. This is because its multiple would be a very large negative number. In contrast, the "nearby" firm with the slightly larger (and positive) EBITDA would have a very large positive multiple. So even though these firms provide very similar information, the comparable companies method would treat them very differently.

Regression analysis, on the other hand, can easily incorporate this additional observation. If the firms are otherwise comparable, it is wasteful to throw out useful information. The regression method therefore allows the analyst to take advantage of more data than the comparable companies method. Figure 11 shows how the predicted values of the regression change as the additional observation is taken into account.

Figure 11: Regression Analysis Predicted Values with Negative Multiples



The solid line is the original prediction line, estimated without the firm with negative EBITDA. The dashed line is the new prediction line after taking into account all relevant data. In this case, the predicted value of Astex, which has an EBITDA of $16.4 million, decreases, and the estimate moves closer to the true value.

The summary statistics in Table 6 show that the valuation can be improved by incorporating all available information.

Table 6: Absolute Percentage Errors When Including All Information

EBITDA as the Explanatory Variable

Estimation Method	Sample Valued	Comparables Sample	Absolute Percentage Error	
			Mean	Median
Regression	Positive	Positive	55.5%	39.7%
Regression	Positive	Full Dataset	27.3%	10.7%
Regression	Full Dataset	Full Dataset	50.8%	7.4%

Revenue as the Explanatory Variable

Estimation Method	Sample Valued	Comparables Sample	Absolute Percentage Error	
			Mean	Median

Regression	Positive	Positive	31.7%	9.0%
Regression	Positive	Full Dataset	31.3%	7.1%
Regression	Full Dataset	Full Dataset	32.4%	7.4%

The third row of Table 5 is reproduced here as the first row of Table 6 for ease of comparison. Comparing the first two rows in Table 6 shows that valuation accuracy improves when more information is included in the estimation process. The sample of firms being valued is the same for these two rows (the Positive sample). The difference between these rows is in which firms are included in the group of comparable companies: in the second row, the comparable firms might have negative earnings, while in the first row all comparable firms must have positive earnings.[16] Since the average absolute percentage errors are smaller in the second row of Table 6, using all available data improves the valuation's accuracy.

The estimates in the third row of Table 6 come from valuing all of the firms in our database, including those with negative earnings variables. The mean and median absolute percentage errors are approximately equal to the corresponding values in the second row, and do not differ in any systematic way. The regression method can be used to accurately value firms which the comparable companies method cannot.

These results show that the regression analysis method of valuation is superior to the comparable companies method for three reasons. First, regression analysis is more accurate when it is constrained to use the same data as the comparable companies method. Second, it is able to take advantage of more data than the comparable companies method, and its estimates improve when this data is used. Third, it is able to accurately value firms which the comparable companies method cannot.

VI. Conclusion

This paper studied the Comparable Companies Valuation method as it is commonly used in practice. We presented a simple graphical description of the algorithm underlying the comparable companies method. These graphs show intuitively why the

[16] In the context of our graphical analysis the group of comparables for estimations in the second row *might* look like Figure 10, while the group of comparables for estimations in the first row *must* look like Figure 5.

this method generates poor predictions of value. It is a very rudimentary technique without rigorous foundation.

We then showed that an alternative prediction methodology using regression analysis performs much better than the comparable companies method. The estimates using regression analysis were shown to be much closer to the true value when using the same set of information as the comparable companies method. Additionally, regression analysis is able to take advantage of useful information contained in observations on firms with negative multiples. Including this information in the sample improves the estimates. Since the computational cost of using regression analysis is only slightly higher than the comparable companies method, we argue that practitioners should forego the comparable companies method in favor of using regression analysis.

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