1FP571
Special seminar – Advanced Corporate Finance

Valuation Analysis – Regression Approach

Regression for Business Valuation

2 main types of regression analysis:

- time series analysis

- cross-sectional analysis

(plus the combination of both, the so-called cross-sectional time series a.k.a. panel data)

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Time series analysis: effect of time on the company's data (e.g. sales), aims to understand the theory behind data points (= what has generated them) or to make forecasts.

Cross-sectional analysis: relationship between variables at one point in time (e.g. between income, locality, and expenses); how the variables affect each other at the same time

E.g. with sales also rise the cost of sales and expenditores; regression equation of cross-sectional analysis:

$Exp = a + (b \times Sales)$

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Regression analysis more accurate than ratio analysis?

Ratio analysis calculates ratios of a dependent variable to independent variables that are "value drivers" (related to how much the investors would pay for the reference companies), e.g. sales, earnings, and cash flow, etc.

Calculated are typically the **mean** or **median** Price/Sales or Price/Earnings multiples as proxies for the most probably observation in a data set.

Mean is the arithmetic average of the data set ... but can be skewed (dramatically) by outliers.

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Median is the middle of a distribution: half of the observations are above and half below the median

- less sensitive to extremes than the mean -> better measure for highly skewed distributions
- less reliable as the size of a data set decreases

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For developing a **mathematical relationship** between **fair (market) value** and the **value drivers**, regression analysis wins over valuation ratios as it:

1) provides the **fair (market) value to valuation driver(s) relationship**; it can work with all the variables simultaneously while ratio analysis is limited to one variable at a time,

2) provides the **measurement of the strength of the explanatory power** of the independent variables using **R-squared**; the percentage reduction in the forecast error compared to using the mean of the dependent variable,

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3) measures the **statistical significance** of independent variables using the **p-value**; probability that the true (unobservable) x-coefficient = 0. The robustnes increases with the decrease in p; accepted get ususally variables with p ≤ 5%, even p ≤ 10%;

4) calculates the **standard error** or accuracy of the regression estimate; approx. 95% confidence interval = 2x standard error (i.e. we can be approx. 95% sure the true value of a dependent variable is its estimate ± 2× standard error).

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In summary, regression analysis

- provides an additional information on the sample data;
- its results inform on the reliability and significance of the sample data;
- produces less forecasting error than average multiples;
- is recommended *in addition to the ratio analysis*: the appraiser knows how reliable the input data are and how meaningful are the calculated multiples;
- provides a critical input to the market approach in the reconciliation of fair (market) value
- acts as a sanity check to bolster the final valuation report.

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REFERENCES

Jordan , Daniel T. The Superiority of Regression Analysis over Ratio Analysis. Business Appraisal Practice, November 2007 (adapted)