



### Beta – A Surprisingly Complicated Greek

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#### Introduction

Any investment professional or student of financial analysis will probably claim to have a good understanding of the concept of stock beta. However, conversations with a range of valuation professionals, both in the UK and elsewhere, appear to imply that few people really take the time to truly understand it. When questioned why they have calculated beta in a certain way the answer often comes back “because that is company policy.”

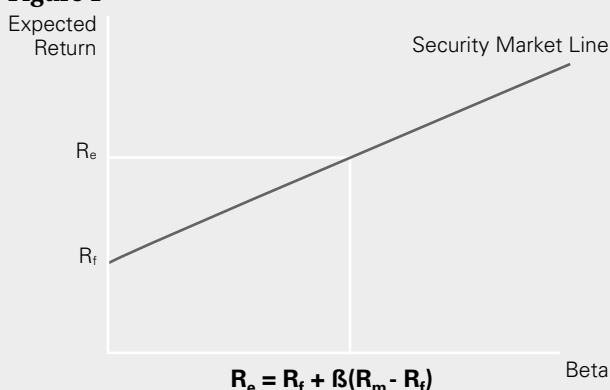
As with many things in finance there is no one right way to arrive at a company’s beta. What I have sought to do in this brief discourse is to raise some of the questions that I think should be considered when trying to decide on an appropriate calculation methodology as opposed to simply firing up the nearest Bloomberg terminal, or your preferred equivalent, and reading off the number based on its default calculation parameters.

#### Brief recap

The Capital Asset Pricing Model (CAPM) and its derivatives are amongst the most widely used techniques for estimating the return, and hence value, of an investment in a risky asset. The basic CAPM model<sup>1</sup> has three parameters:

- i. the risk free rate ( $R_f$ )
- ii. the estimated market return ( $R_m$ )
- iii. Beta – a measure of the sensitivity of the asset’s return to the returns of the market as a whole (its systematic risk).

Figure 1



Graphically, beta is the slope of the Security Market Line. Mathematically, it is the covariance of the Expected Return ( $R_e$ ) and Market Return ( $R_m$ ) divided by the variance of the Market Return. Stock betas, at least for public companies, are typically estimated by regressing the returns of a stock against the returns of the market.

So far so good. However, if we pause to consider the inputs

for a moment there are a number of questions that arise. In this paper I am not intending to be exhaustive, for example I park the question of “risk-free rate” selection, but simply to highlight some of the questions that should be thought about particularly when trying to derive a beta for use in valuing a privately held company. In particular:

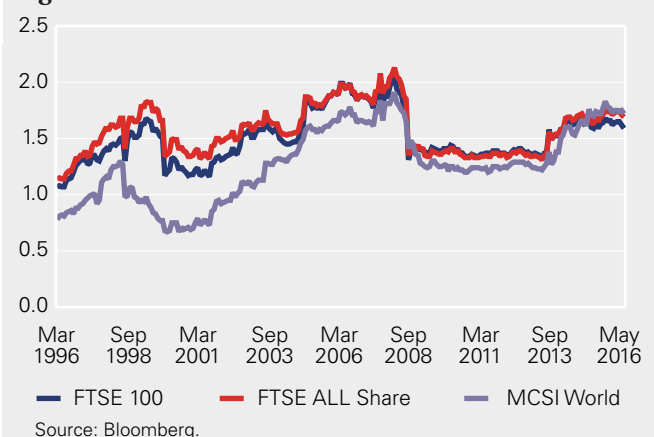
- i. What “market” should we be using?
- ii. What time period and what frequency of measurement should be used?
- iii. How should we select a comparable peer group?
- iv. Should we use adjusted or unadjusted beta?

Given our area of investing I have used companies in the asset management sector as examples.

#### What market should we be using?

Per the CAPM, the market measure should be the entire market of all risky assets, measured in a value-weighted index. In the real world no such index exists – to quote Eugene Fama<sup>2</sup> “poor proxies for the market portfolio of invested wealth is one of the key weaknesses of CAPM.” So we need to give the selection of a suitable market proxy some consideration. In practice it is usually taken to be an appropriate stock market index. Since the correlation between stock indices is assumed to be at or close to unity, little thought is usually given to which particular index to use. However, consider figure 2 below. This shows the stock beta for Schroders plc derived by regressing the monthly returns on the stock against each of three equity indices over rolling 3-year periods, between March 1996 and March 2016. As can be seen, there are extended periods where the beta differs significantly depending on which index has been used. So index selection is an important consideration.

Figure 2



#### Over what time period and with what frequency?

As an example, consider the beta of the US manager Franklin Resources. The following table gives the beta, as



measured against the S&P 500, for various combinations of time period and frequency ending 31 May 2016.

Raw Beta		Data Frequency		
		Daily	Weekly	Monthly
Period	5 years	1.469	1.575	1.755
	3 years	1.371	1.572	n/a
	1 year	1.380	1.761	n/a

Source: Bloomberg.

As can be seen, the choice of period and frequency has a significant bearing on the result. Note that monthly results for 1-year and 3-year periods are not shown – it is normally accepted that at least 50 data points are required to produce a reasonable result.

### The problem of comparable peers

Having decided how best to calculate beta, a common problem, at least when trying to determine the appropriate beta for a privately held company, is how to arrive at a beta for the target company given that there is no observable share price from which to calculate it. Many valuers will use the mean or median beta from what they consider to be an appropriate peer group. Again, using our own asset management sector as an example, let me illustrate the problem by trying to estimate the beta for say, Aberdeen Asset Management, by using a peer group. Assume that the peer group consists of listed European asset management companies. Aberdeen earns the majority of its income from “traditional” as opposed to “alternative” products so let’s exclude those managers we might define as alternative managers. That leaves a peer group of eight managers. Amundi and Anima have not been listed long enough to provide a sufficiently long-term share price track record. If we exclude those two as well we end up with a peer group of six managers. The following table shows the beta for the peer group as at the end of May 2016 based on five years of monthly data.

Peer	Beta
Schroders	1.524
Hendersons	1.728
Azimut Holdings	1.084
Jupiter	1.378
Charlemagne	0.844
Liontrust	0.837
Mean	1.233
Median	1.231

Source: Bloomberg.

If we assume that the median is the appropriate measure then the peer group suggests that the beta for Aberdeen Asset Management should be 1.231. In fact Aberdeen’s beta over the same period was 1.823 – a difference of almost 50% which would give rise to a very different outcome in any discounted cash flow (DCF) based valuation.

The problem is two-fold; firstly the number of listed asset management companies, even in the US, is really

too small from which to derive a meaningful peer group data set. Secondly, the idiosyncratic nature of active asset management companies means that there are usually very significant differences between them, hence their differing market sensitivities. In our sector these two issues raise the not unreasonable question as to whether or not CAPM is actually a suitable approach at all – but that is a subject for another day.

### Adjusted versus unadjusted beta

The concept of adjusted beta was first proposed by Marshall Blume<sup>3</sup> of the University of Pennsylvania. Published in 1971, his paper considered “The Stationarity of Beta over Time.” He analysed stocks traded on the NYSE over six periods between 1926 and 1968 to see how the average beta of the stocks varied over time. He found that, for portfolios of stocks, their average beta regressed towards the market mean (i.e. a beta of 1) and that future (“adjusted”) beta can be estimated as  $0.371 + 0.635 \times$  historic (“unadjusted” or “raw”) beta. The concept of adjusted beta is widely used by valuation practitioners in their calculations.

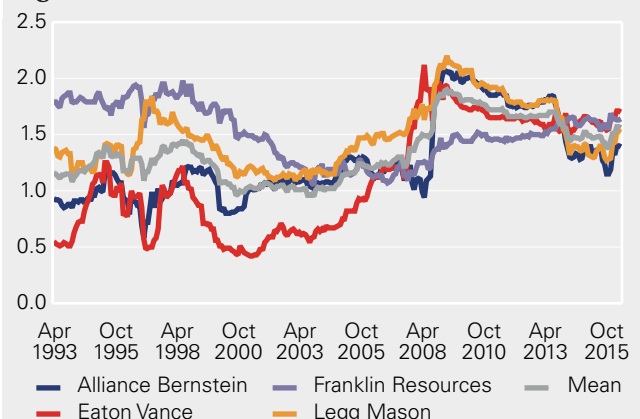
The table below shows both the unadjusted (raw) and adjusted betas for the same portfolio of asset managers (as measured against the FTSE 100 using five years of monthly data ending May 2016).

Peer	Unadjusted Beta	Adjusted Beta
Schroders	1.524	1.349
Hendersons	1.728	1.485
Azimut Holdings	1.084	1.056
Jupiter	1.378	1.252
Charlemagne	0.844	0.896
Liontrust	0.837	0.891
Mean	1.233	1.155
Median	1.231	1.154

Source: Bloomberg.

However, in the same paper Blume also showed that this regression to the mean was not evident for small portfolios or single stocks. Consider *figure 3* below. This shows how the beta of four listed US asset management companies has varied over time.

Figure 3



Source: Bloomberg.



As the graph illustrates, the betas have varied considerably over time and there is little evidence of mean reversion. To take Eaton Vance as an example, the unadjusted beta at the start of the period illustrated above was 0.5. If, back then, we had taken that figure and simply applied the Blume adjustment to forecast future beta, it would have given us a figure of 0.69. In fact at the end of the period it had risen to 1.7. It is also worth noting that the number of companies analysed by Blume varied between 415 and 847, depending on the time period, and that none of them was an asset management company. We would argue therefore that there is little evidence to suggest that adjusted betas should be used when valuing individual asset management firms.

### Conclusion

The choice of parameters used when calculating stock betas has a considerable influence on the outcome. Does it all matter? Well, yes, we would argue it does – the principal sensitivity in any DCF calculation is the discount rate. If that rate is derived from the CAPM then a major determinant of the DCF result will be the value of beta used.

On the face of it beta seems like a simple concept, but we believe its practical use requires rather more thought than simply selecting the appropriate Bloomberg page.

### References

<sup>1</sup>Sharpe, William. “*Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk.*” *Journal of Finance*, 1964.

<sup>2</sup>Fama, Eugene and French, Kenneth. “*The Capital Asset Pricing Model: Theory and Evidence.*” *Tucker Business School Working Paper*, 2003.

<sup>3</sup>Blume, Marshall. “*On the Assessment of Risk.*” *Journal of Finance*, 1971.

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