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Alpha

- the most abused term in Finance

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Delusional Active Management

- Almost all active managers claim to add ‘Alpha’ with their investment process
- This Alpha is usually attributed to their ‘Stock Selection’ skills
- This is nearly always **Just Plain Wrong**

Some Common Examples

- Value Managers
  - Screening on B/P, E/P, D/P, C/P, S/P, etc.
- Growth Managers
  - Screening on EGR, EMOM, EVOL, DGR, etc.
- Large Cap / Small Cap Managers
  - Diversified within Cap-delimited universes
- Socially Responsible Investment (SRI)

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Active Management Styles

- All of these are actually examples of **common factor** approaches to investment
- Each of them could be represented by a multi-factor model of stock returns
- Indeed, managers who use these type of approaches will often claim to be using a ‘Multi-factor Model’

A Multi-factor Model of Stock Return

$$R_{it} = \sum_{f=1}^{K} b_{if} R_{ft} + a_{it}$$

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How are these 'Models' used?

- Most managers follow a standard process :
  - Define a 'Followed List' of investable stocks
  - Identify a set of attributes linked to returns
  - Screen the universe for stocks with attribute values above (or below) certain limit values
  - Alternatively, sort the universe into N-tiles
  - Convert the screen or sort into Buy/Hold/Sell

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How are the Attributes chosen?

- Typically, run cross-sectional regressions of stock attributes at the end of month **t** against stock returns over month **t+1**
- Repeat over a number of months, and then select attributes with consistently positive (or negative) Information Coefficients
- (N.B. don’t forget to convince yourself that this is not just data-mining)

Multi-factor Model for Stock Selection

- The forecasting form of the model is :

$$E[R_{it+1}] = \sum_{f=1}^{K} b_{ift} E[R_{ft+1}] + (E[a_i] + E[e_{it+1}])$$

- Since the expected value of the error term is zero, this becomes :

$$E[R_{it+1}] = \sum_{f=1}^{K} b_{ift} E[R_{ft+1}] + E[a_i]$$

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Consequences - Betas

- If we relate the standard stock selection process back to the form of the underlying multi-factor model, we can see that :
  - The attributes are being treated as proxies for the underlying stock betas $ß_{if}$
  - While the true stock betas are dimensionless scalars, the attributes may be in any arbitrary units (such as B/P or Capitalisation)

Consequences - Factors

- Note that nothing is being said explicitly about the SIZE of the factor returns
- However, by implication, the SIGN of each factor return is presumed to be known
- Thus, screening for high B/P implies that the Value factor return is POSITIVE
- Screening for Small Capitalisation implies the Size factor return is NEGATIVE

Consequences - Weighting?

- This overly-simplistic implementation of a multi-factor model for stock selection leads to an **entirely artificial** problem :
  - How to weight the attributes?

- This arises simply because nothing is being said about the SIZE of the factor returns

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Consequences - Persistence?

- Whatever weights are used will be proxies for the SIZE of the missing factor returns
- In most ‘multi-factor models’, these weights add up to one, implying that the factors always ‘work’ just as well
- In reality, factors sometimes work well and sometimes don’t work at all (and sometimes even go into reverse!)

Consequences - Alpha?!

- Nowhere in the standard process is there any attempt to forecast stock Alphas
- Instead, the focus is entirely on selecting stocks that have desirable Attributes
- Each stock is being treated simply as a set of exposures to a limited set of factors

Multi-factor Model for Stock Selection?

- In a typical implementation this equation :

$$E[R_{it+1}] = \sum_{f=1}^{K} b_{ift} E[R_{ft+1}] + E[a_i]$$

effectively becomes transformed into this one :

$$E[R_{it+1}] = \sum_{f=1}^{K} Attr_{ift} E[(S * W)_f] + 0$$

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Features of this Implementation

- The Alpha term has disappeared, since no stock Alphas are actually being forecast
- Attribute values are being used instead of Betas
- The factor returns are replaced by a dummy sign variable S (+1 or-1) and an arbitrary weighting W
- Note that these ‘returns’ are no longer in return units, but will be ‘return per Attribute unit’

A Simple Example

- Suppose we follow a Small Cap/Value strategy, equally weighted
- Buy list is the top quintile of Small Cap, high B/P ratio stocks
- Sell list is the bottom quintile of not-Small (Large) Cap, not-high (low) B/P ratio stocks
- The 'model' is equally-weighted, so we assume that the SIZE of the two factor returns are equal

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Comments

- It seems highly unlikely that :
  - Small Cap is always better than Large Cap
  - Value stocks always do better than the market
  - The Return to Value is always the same as the Return to Small Cap
- In reality, we know that while Value and Small Cap do often 'work', sometimes they don't

Oh, Yes - the Scaling Problem

- If stock A has half the Capitalisation of stock B is it twice as attractive?
- What if its B/P ratio is twice as large?
- These scaling issues are often addressed by simply normalising the attributes
- However, this simply makes the attributes LOOK the same – it doesn't necessarily make them equally significant

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Comment on IC analysis

- The conclusions we can draw from the IC analysis are actually quite limited
- We may be confident that higher B/P stocks tend to outperform lower B/P stocks, but we have no reason to believe that all stocks will react the same way to a given increase in their B/P ratio
- In fact, different stocks may well react in different ways to the same change in B/P ratio
- **Attributes may not be good proxies for betas**

A Better Way

$$E[R_{it+1}] = \sum_{f=1}^{K} b_{ift} E[R_{ft+1}]$$

- Derive estimates of the true betas by assuming a linear relationship between the attribute and the underlying beta (Return-Space Rescaling - RSR)
- Model the (time-varying) factor returns and make actual forecasts of factor returns

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Features and Benefits - Betas

- RSR produces true dimensionless betas
- RSR recognises that not all stocks' returns react to changes in attribute values to the same extent
- RSR also copes with different accounting conventions and investor perceptions
- RSR also deals with the scaling problem

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Features and Benefits - Factors

- Modeling the factor returns with FMPs recognises that they are time-varying in size <u>and</u> sign
- Various methods can be used to forecast factor returns, including Vector Auto-Regression, moving averages, and/or exogenous variables
- Forecasting the factor returns eliminates the (artificial) weighting problem, and allows for the possibility that factors sometimes stop working (i.e. factor returns become close to zero)

Features and Benefits - Risk

- Turning a stock selection process into a true multi-factor model also has other advantages :
  - A corresponding risk model can be developed
  - This can be used to ensure that portfolio risk consists mainly of the factor bets that are expected to be rewarded
  - Performance attribution will provide useful feedback on the value and consistency of the Stock Selection Model

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Back to Alpha

- True Alphas are stock specific returns
- Assume a simple CAPM risk model in which
  - Market risk = 18% p.a.
  - Specific risk = 32% p.a. (on average)
- The model has an average stock R^2 of 24%
- Even so, stock risk diversifies away quickly

Number of Holdings Problem

- For a portfolio's performance to contain a meaningful Alpha, it would probably need to have less than 20 holdings
- Note, however, that the CAPM is not normally used as a risk model, for the simple reason that there are actually **many more sources of co-variation** in stock returns than the market

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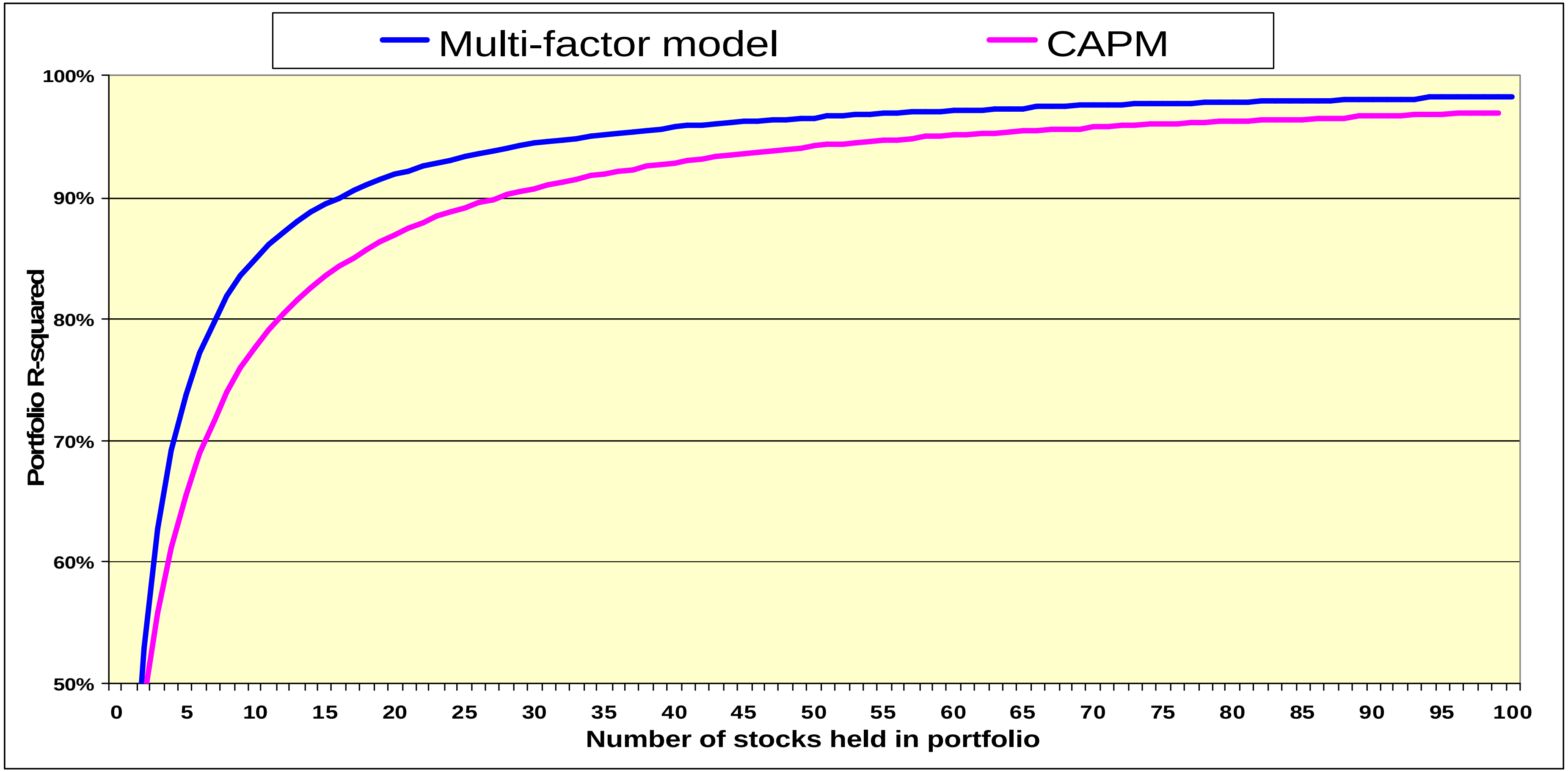
Adding factors makes it harder

- In a more realistic multi-factor risk model, the average R^2 would be more like 35-40%, and the average Specific risk around 24%
- Such a model would identify a larger part of the portfolio risk as factor-related, and leave an even smaller part to generate true Alpha
- The number of holdings in a true (long-only) ‘Alpha’ portfolio would need to be even smaller

Portfolio Diversification



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Choose your analysis !

- Systematic risk in a CAPM framework is likely to seem lower than in a multi-factor risk model
- This offers obvious possibilities for a manager to be able to report a higher ‘Portfolio Alpha’
- This can be done by simply deducting from the portfolio return the market/benchmark-related return, and claiming everything else as ‘Alpha’
- This ‘Alpha’ is risk-adjusted portfolio return, but using an inappropriate risk model

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Summary 1 – the Strategies

- Alpha is properly defined as factor-risk-adjusted stock specific return
- Most active investment strategies are based on common factor approaches
- These strategies may well generate out-performance, but this is not Alpha
- True Alphas are very rarely forecast

Summary 2 - the Holdings

- Most institutional portfolios are diversified to the point that their stock specific risk is a very small proportion of their total risk
- Such high diversification is inconsistent with achieving portfolio Alpha, but is consistent with pursuing a common factor active strategy
- True Alpha portfolio managers would only have a very small number of holdings (Warren Buffet?)

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Summary 3 - the Analysis

- Most claims of portfolio Alpha are based on an inappropriate analysis of return, such as only recognising the portfolio's beta to the benchmark (the CAPM)

- To demonstrate genuine Alpha, the risk model should include all the common factors used in the investment strategy

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Postscript

- Managers rarely consider more than a dozen factors, although there are clearly many other common factor effects at work
- It would be possible to eliminate Alpha altogether, by simply having enough factors in the risk model
- The degree to which stock return is factor-related or Alpha is essentially arbitrary

ALPHA ! !

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