

Are Your Returns From 100% Good Risk?

No added noise, accidental bets, or luck,

just skill

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 R-Squared Risk Management

The background features three overlapping circles. The leftmost circle is light blue, the rightmost is light green, and the central circle is a mix of the two, appearing as a pale cyan. The circles are semi-transparent, allowing the colors of the other circles to show through.

Are you sure?

 **R-Squared Risk Management**

The 4 Uses of a Portfolio Management Risk Model

(In order of importance)

- 1 Portfolio Management
 - Maximising good risk (skill) → Improved returns
- 2 Portfolio (Risk Adjusted) Returns Attribution
 - Did you make money where you said you were going to (check your skill)
- 3 Build Tailored Overlays
 - Remove exposure to the things you have no skill at (incidental bets, or noise)
- 4 Optimise
 - But good risk should be constrained **IN** and bad risk should be minimised **OUT**

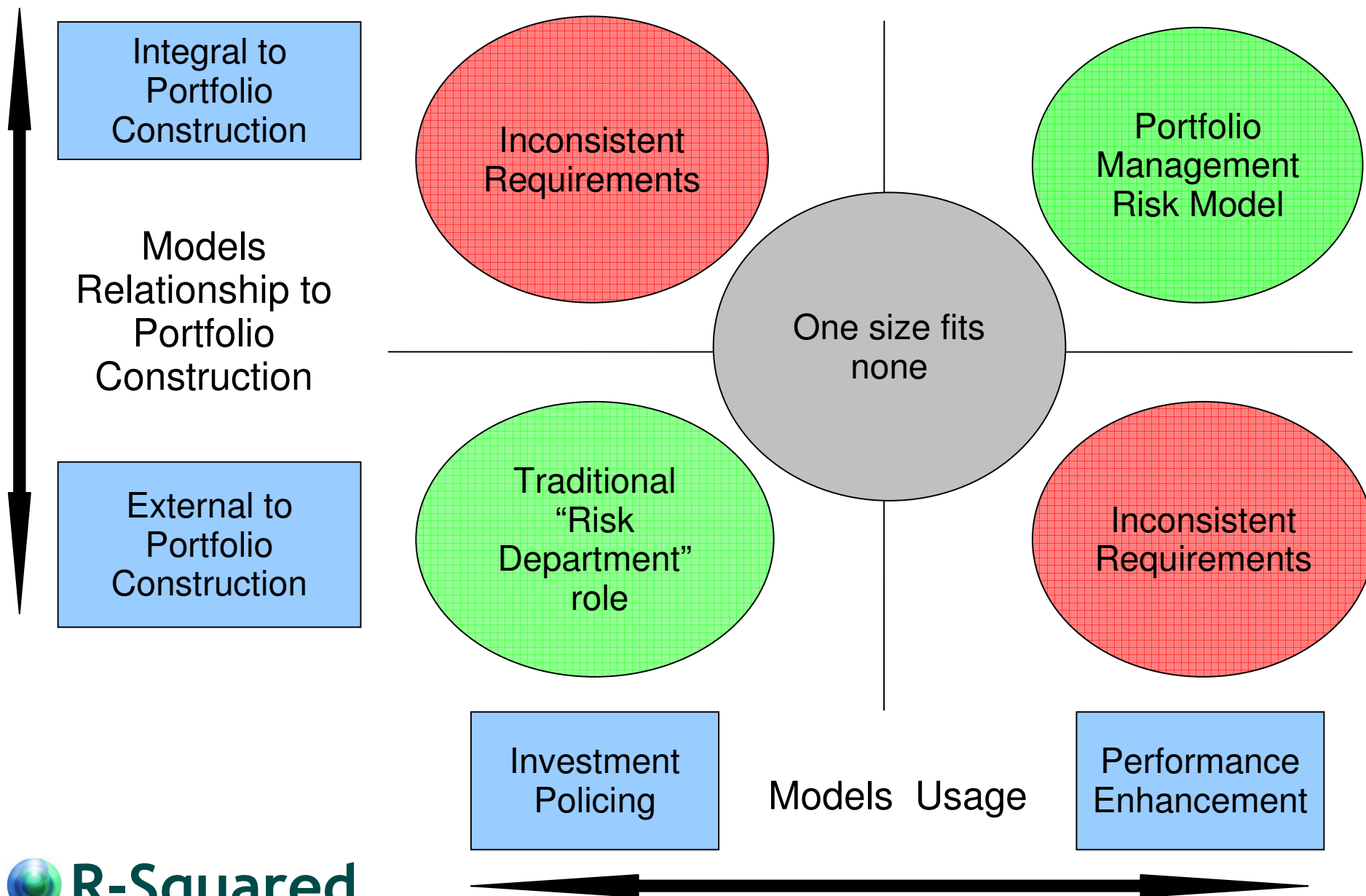
Good Risk - A Definition

- Deliberate bets
- High IC (Information Coefficient)
- Previously successful tilts
- Back tested stock selection factors
- Any systematic risk you expect to out perform

Two Dimensions of a Risk Model

Aside 1

Derived from "The case for in(ter)dependence - Incorporating Risk into Portfolio Construction"
CFA Institute 19 May 2009, Kai D Leifert, Head of Risk, Northern Trust



What a Portfolio Management Risk Model is NOT for

- Warning you of impending reversal of your quant' factors
- Pricing in market crashes
- Forecasting the failure of interbank markets
- Identifying the colour of oncoming swans
- Analysing down-side risk
- Allowing for any events that are not well represented in the modelling history used to build it

**For these things you need a different model,
and not one I will cover today**

Portfolio Management Risk Model: Design requirements

Aside 2

- Meaningful factor returns
 - Not data-mined Principal Component factors
- Factor correlations weighted such that they are as responsive as possible, whilst still being stable
- Scale the whole covariance matrix, or individual factor variance, but don't alter the correlations
- Individual stock factor sensitivities
 - Secondary sensitivities matter
 - “Two-Thirds of the earnings from the FTSE 100 companies are from outside the UK” *
 - Dummy variables **WILL NOT WORK**
 - They give systematic biases, underestimating leveraged stocks, and over-estimating unleveraged

Introduction of Example

- US only, small cap, 130/30 (in practice varies down to about 120/20)
- Benchmarked against Russell 2,500
- Live portfolio, fully implemented since May 2008
- Tracking Error under 9, but absolute risk lower than benchmark
- Strong focus on stock selection factors, with sector views
- Buy and sell list created from these factors, then stocks cherry picked
- A maximum of 300 names, but varies down to 200

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Maximising the Good Risk

Portfolio Management

- What are your bets on?
- Forward looking, **NOT** a post investment process
 - It's too late then
- Are they on the things you think you are good at?
 - Are they in proportion to your convictions?
- What are your incidental bets?
 - Are they on things that you have negative expectations for?
 - Are they on things you have no view on?
 - Are they systematic?

Why Maximising the Good Risk?

(A Rough and Ready Estimate)

70% of active risk is on factors managers have a positive view on \therefore 30% is not.

Say this is split 15% on bad risk and 15% on neutral. Let's also assume that for every 10% of your risk you make 10 bps.

If your views are correct your return is:

+70 bps	good risk
- 15 bps	bad risk
+ 0 bps	neutral risk
<hr/>	
55 bps	

Now assume we can improve that 70% to 85%, by refocusing half of the bad 15% and half the neutral 15% risk:

+85.0 bps	good risk
- 7.5 bps	bad risk
+ 0.0 bps	neutral risk
<hr/>	
77.5 bps	

A **22.5 bps improvement** (about 40%), requiring **no improvement in returns forecasting**

Type of Risk	Relative Betas	Factor Risk	% Contribution to Tracking Variance	Directional bets	Wts Relative to R2500
F1	0.123	1.88	0.61	Over	
F4	0.182	3.07	0.77	Over	
F33	<u>-0.067</u>	2.04	0.39	Over	
F43	0.272	2.57	-1.75	Over	
:	:	:	:	:	
F57	0.213	2.55	1.94	Over	
F59	0.197	2.12	-1.22	Over	
F61	0.061	2.41	-0.54	Over	
Consumer Staples	0.157	10.88	-8.09	Over	8.28
Heath Care Providers	<u>0.009</u>	23.52	-1.14	Under	0.53
Retailers	-0.067	18.33	10.21	Under	-2.55
Energy Equipment & Services	0.013	37.20	-2.45	Neutral	-0.24
Energy Producers	0.042	34.44	-4.19	Over	-0.65
:	:	:	:	:	
Software	0.045	21.69	-8.21	Over	2.46
Materials	-0.030	23.42	5.34	Under	-0.98
Utilities	-0.057	17.38	3.56	Under	-6.19
Telecom Services	-0.011	19.57	1.58	Neutral	-1.11
Statistical factor1	0.028	21.22	1.55	Neutral	
Factor Summary		6.8	88.8		
Stock Specific Summary		2.4	11.2		
Relative Summary		7.2	100.00		

Summary Risk Analysis

	Actual Contribution to Tracking Variance	Total Percentage Contribution to Tracking Variance	Percentage In Wrong Direction
Active factors	19.4	36.6	2.7
Sector factors	25.7	48.4	3.7
Statistical factors	2.0	3.7	
Stock Specific Risk	5.9	11.2	

89.9% of the risk is in line with our beliefs
 6.4% of risk is against our beliefs
 3.7% of risk is neutral

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Factor Returns for Risk are NOT the same as those for Return Attribution

- Attribution is *backward* looking
- Risk models are *forward* looking
 - But they rely on past history; with guidance from the priors
- Risk Models may not use historical capitalisations (they are mostly out of date)
 - We want to know IBM's impact next period, this is better expressed by its weight in the market **NOW** so we use this instead of the historical cap weight
- Risk model factors may well have been exponentially time-weighted and/or rescaled
- But now the factor returns are not the actual returns of those markets
 - Must recalculate the factor returns to be the actual historical returns

Portfolio (Risk Adjusted) Returns Attribution

Portfolio return is the contribution to return from the factor plus the independent stock return

$$PR_t = PFR_t + P\alpha_t$$

$$PFR_t = \sum PR_{ft}$$

Portfolio return due to factor f ,

$$PR_{ft} = \beta_{ft-1} R_{ft}$$

Type of Risk	Relative Betas	Factor Risk	% Contribution to Tracking Variance	Directional bets	Wts Relative to R2500
Consumer Staples	0.157	10.88	-8.09	Over	8.28

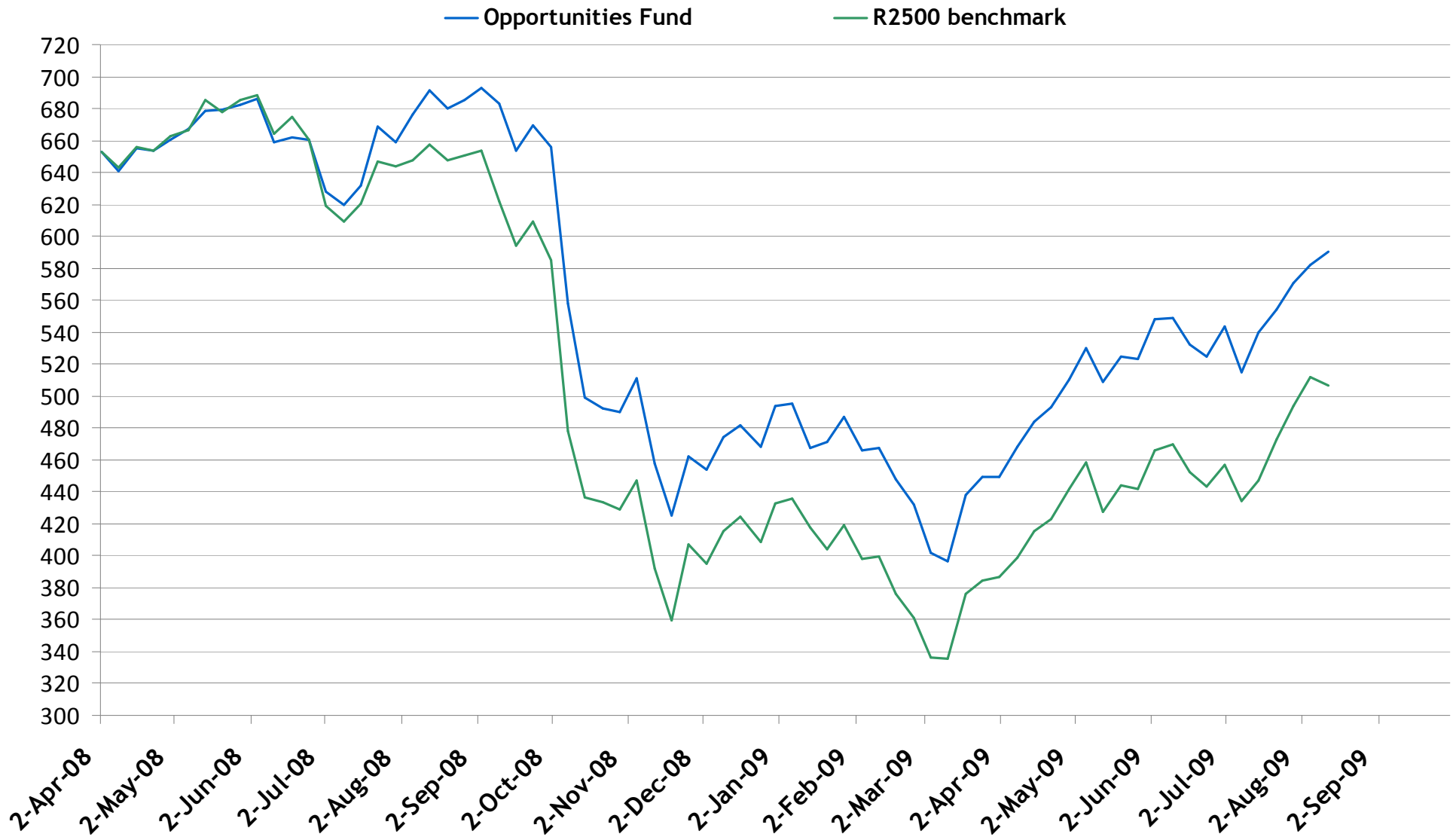
Portfolio (Risk Adjusted) Returns Attribution

- **Where has your return come from?**
 - Post investment
 - Has the return come from things you thought you were good at?
 - Over time the reality of your success and failures becomes irrefutable - you have removed the noise that clouds the picture
 - Was it in proportion to your conviction
 - Efficient use of risk? If not then you could have had more return for the same level of risk
 - Were the compromises you made to build the portfolio good?

Portfolio (Risk Adjusted) Returns Attribution

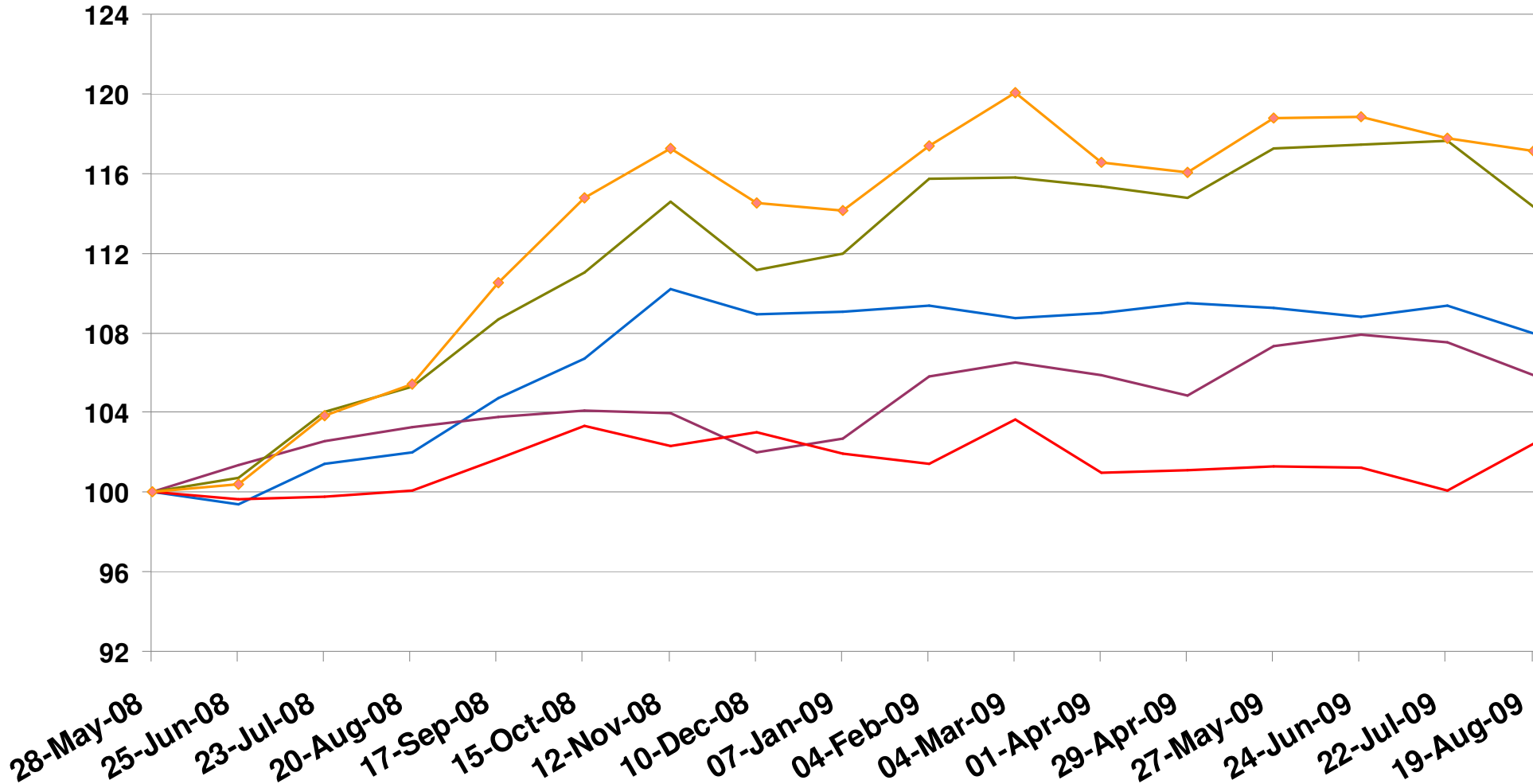
- Real time feed back of the time varying **multivariate** performance of **your** stock selection factors **and** sector or country bets
- We all know the performance of stock selection factors waxes and wanes (mostly wanes), so it is important to cull them as soon as the performance falls off.

Performance Overview



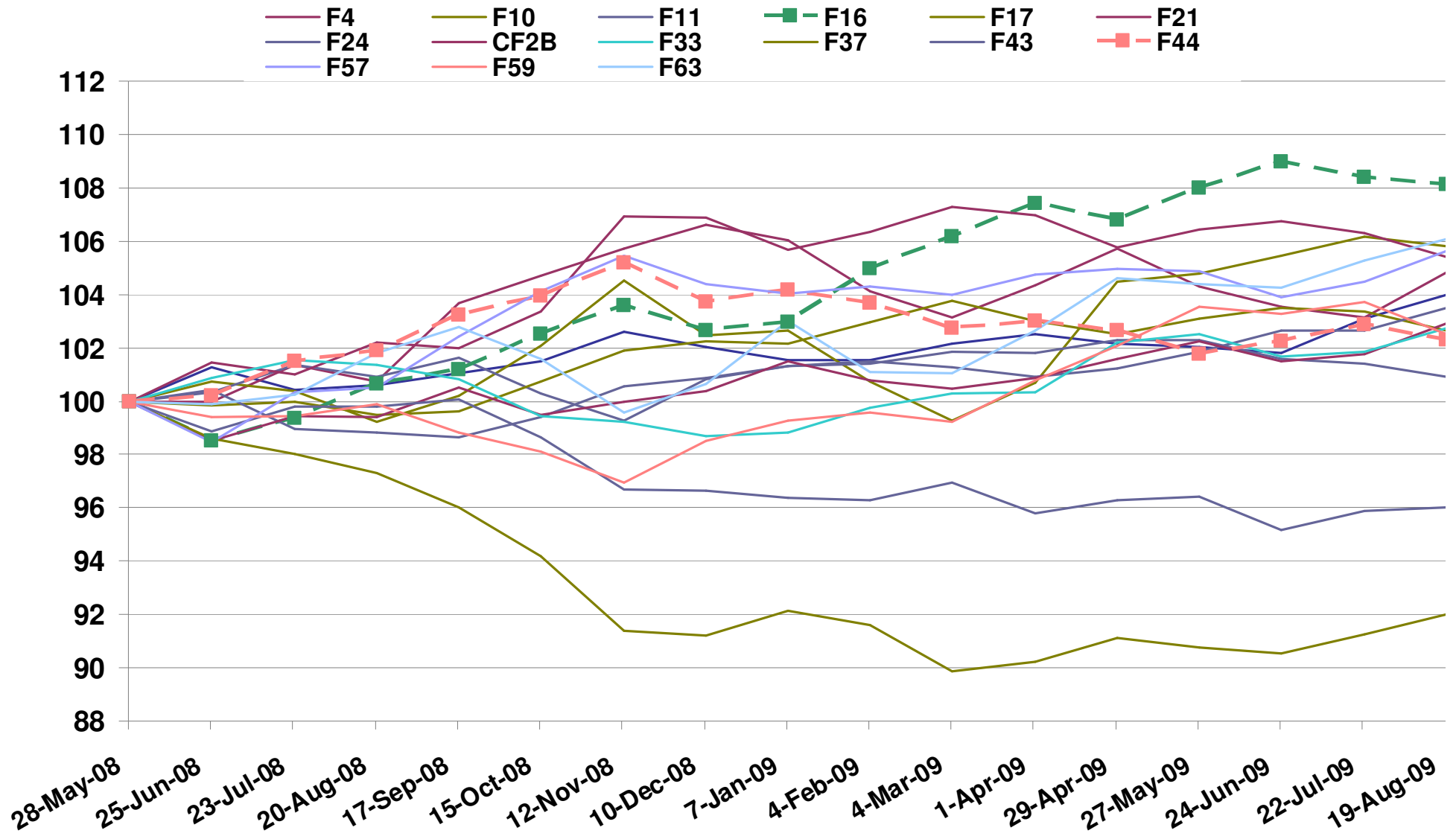
Return Breakdown

- Relative Active Factor Returns
- Relative Factor Returns Index
- Relative Returns Index
- Relative Sector Factor Returns
- Relative Alphas Index



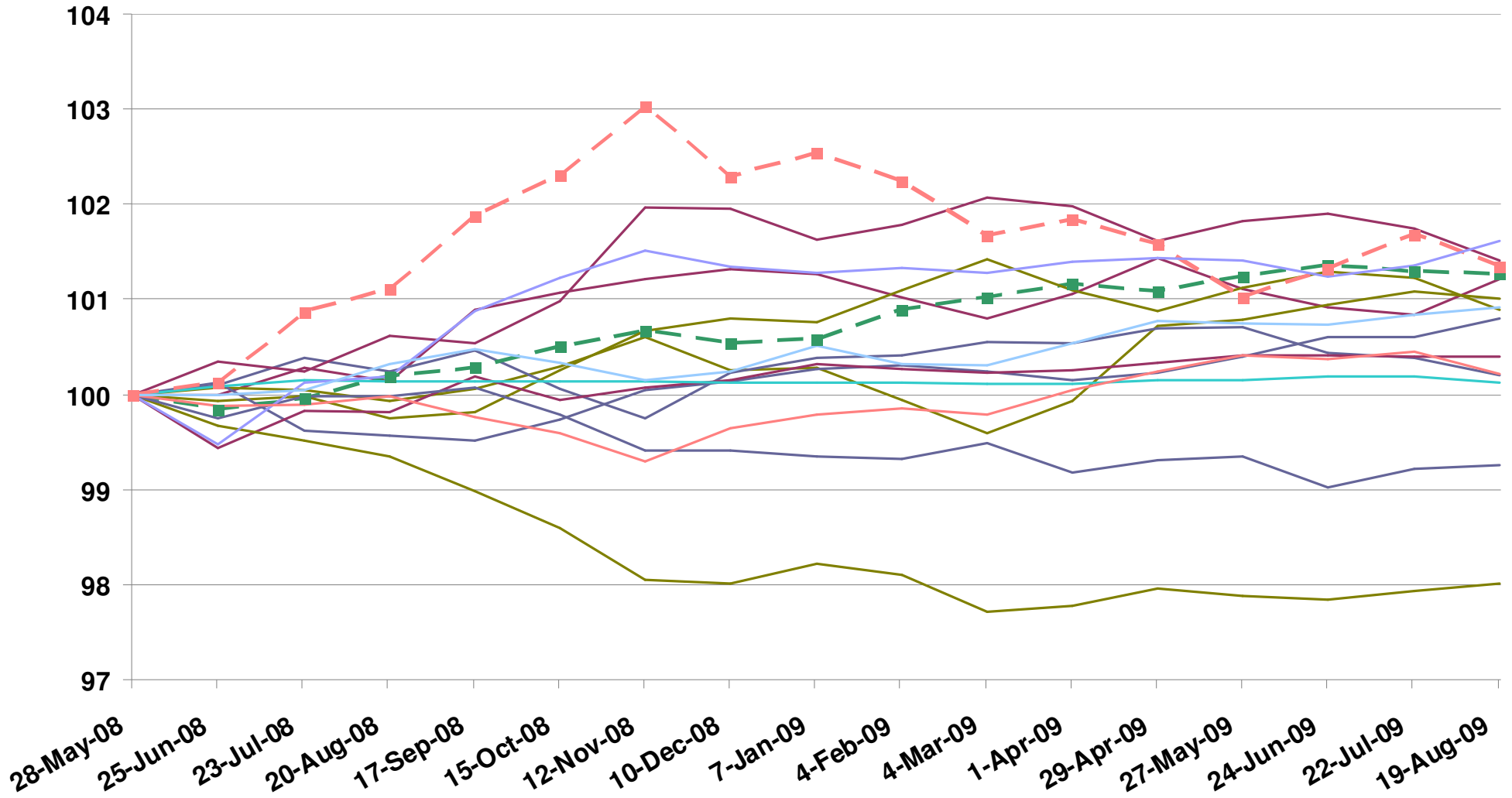
Multivariate Active Factor Returns

Example 3c



Portfolio Active Factor Returns Attribution

Example 3d



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Build Tailored Overlays

- Sometimes the incidental bets cannot be removed by selecting alternate stocks
 - Too much disruption to the portfolio
- But systematic bets can be removed with their inverse
- Build combinations of instruments tailored to remove specific, well defined unwanted *Betas*
 - Another situation where dummy betas in your risk model will give erroneous results
- For a single factor overlay
 - Start with the factor portfolio, fix the weights
 - Select a universe of easily traded (long and short) instruments
 - Then minimise using the instruments to remove all the portfolio's risk, the resulting combination of instruments is your overlay.
- Focusing on removing the things that will damage the performance of the portfolio is more likely to improve your performance than getting the last 20% out of the Good bets you already have

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Optimise

Review:

- Not all risk is equal: we want some risks.
 - Isolated good risk
 - By reverse optimisation you should be broadly happy with your risk-return trade off
 - You have removed as many of the incidental bets as possible through stock selection
- The unwanted systematic risk we cannot remove by alternate stock selection we have created tailored instruments to allow removal

Optimise

- Must set constraints that lock **IN** the Good risk
 - Can not do this at the stock level, as most stocks will bring bets on things you want and don't want
 - Cherry picked stocks must be constrained in
 - Set portfolio level **Beta** constraints
- Optimisation is now about the most efficient way to remove the **UNWANTED** risk.
- Becomes a **very** tightly constrained problem
 - Oddly reminiscent of how optimisation often ends up, but now with a quantitative focus on the Good risk
- Optimiser should be keen to select the overlay instruments
- Really minimise now under the influence of transaction costs

Summary - What Is A Risk Model For?

	Analysis	Requirements / Watch Out For
1	<p>Portfolio Management</p> <ul style="list-style-type: none"> • Maximising the good risk (skill) → Improved Returns • Pre investment process 	<p>Use the right Risk Model</p> <ul style="list-style-type: none"> • Tightly integrated with stock selection process • Secondary betas matter • Meaningful factors
2	<p>Portfolio (Risk Adjusted) Returns Attribution</p> <ul style="list-style-type: none"> • Did you make money where you said you were going to (check your skill) 	<p>Use the right factor returns</p> <ul style="list-style-type: none"> • Not same as risk model returns <p>No dummy variables</p>
3	<p>Build Tailored Overlays</p> <ul style="list-style-type: none"> • To aid removal of exposure to the things you have no skill at (incidental bets, or noise) 	<p>No dummy variables</p> <p>Use transaction costs</p>
4	<p>Optimise</p> <ul style="list-style-type: none"> • But really minimise now, as you now have good risk which you must constrain IN and bad risk to minimise out 	<p>Not all risk is equal, but the optimiser does not know this</p> <ul style="list-style-type: none"> • Constrain <i>portfolio</i> risk IN • Use transaction costs, and min lot sizes

Contact Information

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