Markowitz was Wrong!*

Jason MacQueen
Alpha Strategies & R-Squared Ltd

“Return is Good, Risk is Bad”?

- The best way to manage equity portfolios is to maximise expected return while minimising risk
- The Finance textbooks teach us to do this by maximising Utility, usually defined as:-

$$\text{Max } U = R_P - ? V_P \quad \text{s.t. } S x_i = 1$$

A Little More Detail

- We can expand this expression to see where portfolio return and risk are coming from
- For return, we have :- $$R_{Pt} = \sum_{i}^{N} x_i R_{it}$$
- And for risk, we have :- $$V_P = \sum_{i}^{N} \sum_{j}^{N} x_i x_j C_{ij}$$

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Practical Critique

- In this simple world, managers have an Expected Return for each stock, a full covariance matrix from somewhere(?), and an optimiser
- All return is regarded as equally attractive and all risk is regarded as equally bad
- The manager simply optimises the portfolio to maximise return and minimise risk (subject to the usual well-known limitations of optimisers)

A Different Perspective

- However, these days most active managers use multi-factor models of return to help them pick stocks and build their portfolios
- In these (sometimes implicit) models, stock return consists of a number of factor-related components, plus a stock alpha
- Typically, managers use both the factor exposures and the alpha to select stocks

A Multi-factor Model of Stock Return

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

Multi-Factor Portfolio Return and Risk

$$R_{Pt} = \sum_{f=1}^{K} b_{Pf} R_{ft} + a_{Pt}$$

$$V_P = \sum_{f=1}^{K} \sum_{g=1}^{K} b_{Pf} b_{Pg} C_{fg} + RSD_P^2$$

Stock Selection

- Managers typically use a relatively small number of criteria to select stocks
- These might include Value, Growth, Size or Momentum characteristics, as well as Country or Industry membership
- All of these are common factors
- Stocks might also be chosen for stock specific reasons (alpha)

Deliberate vs Incidental Bets

- However, the stocks selected will also have many other factor exposures
- Stock selection models usually focus on a relatively small portion of total return
- Risk models, on the other hand, need to capture ALL the common factor and stock specific risks in the portfolio to be useful

Skill vs. Noise (a.k.a. Luck!)

- The manager's **Skill** is represented by the portfolio returns due to its exposure to the deliberate factor bets plus any stock alpha

- Unfortunately, these **Skill returns** can easily be dominated by the **Noise returns** from the Incidental (unwanted) factor bets

Not All Risk is Bad

- If we select stocks this way, then it is clear that not all risk is equally bad
- The portfolio has deliberate exposures to certain factors in order to capture an Expected Return, or Risk Premium
- What we actually want to do is to minimise the UNWANTED bets

Efficient Portfolios

- Ideally, we would want to ensure that the Expected Returns from the portfolio's exposure to each factor was matched against its contribution to portfolio risk
- An efficient portfolio is one in which each unit of risk is compensated for by a unit of Expected Return

A Real Case Study

- Global Equity manager, $1.8bn fund
- Long only, between 50 to 60 holdings
- Mostly Developed Market stocks
- Small number of Emerging Market stocks

- Value added by stock selection (alpha), plus a few country and global sector bets

Portfolio Historical Data

- Historical Risk Management Overlay was run from December 2003 to July 2006
- This was a bull market for global equities – MSCI World rose 34.04% over this period
- The total portfolio return was 50.19%
- We were given month-end holdings, and re-balanced the Overlay monthly

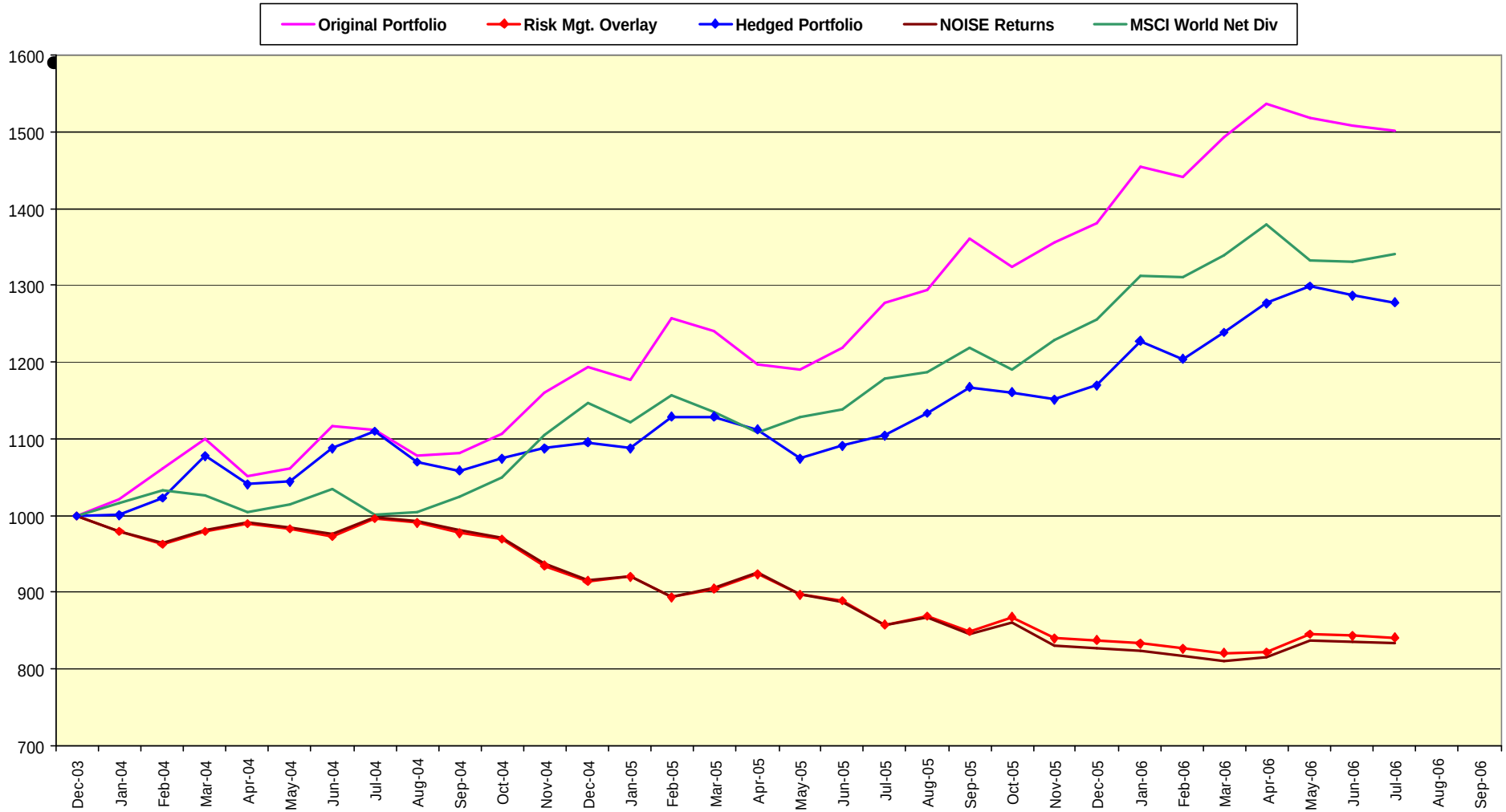
Deliberate Factor Bets

- This portfolio manager was positive on :
  - Japan for the whole period
  - Global Healthcare for the whole period
  - Global Energy from December 2003 to September 2005
- All other country, sector and currency bets were to be hedged away with the Overlay

Risk Management Overlay Process

- Run a risk analysis of the updated portfolio with the existing Overlay each month
- Optimise to rebalance the Overlay using all permissible hedge instruments
- Iteratively squeeze out the smallest trades until an acceptable solution is found
- Monitor and analyse performance

Results – Portfolio Performance



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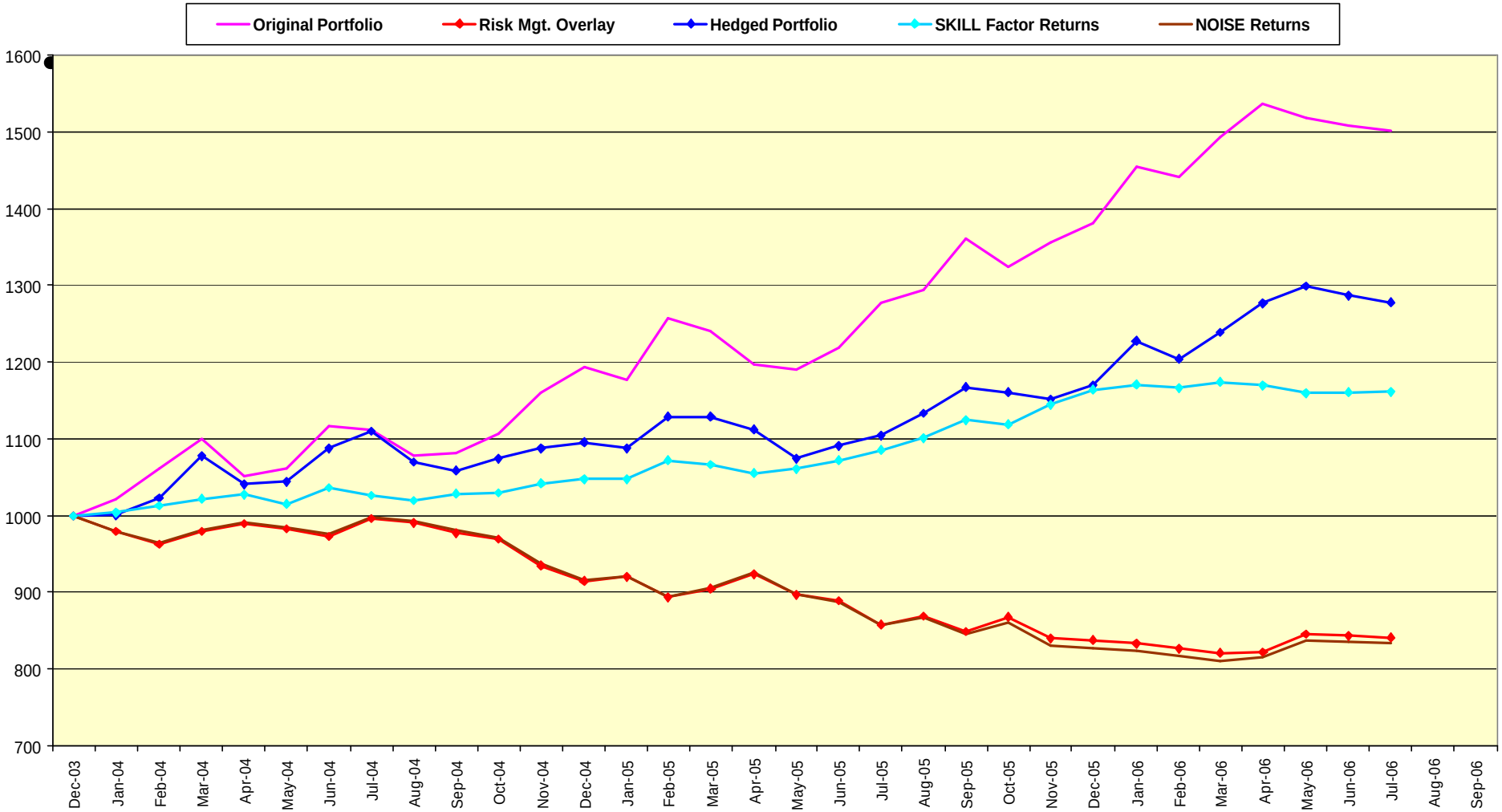
Results – Performance Decomposition



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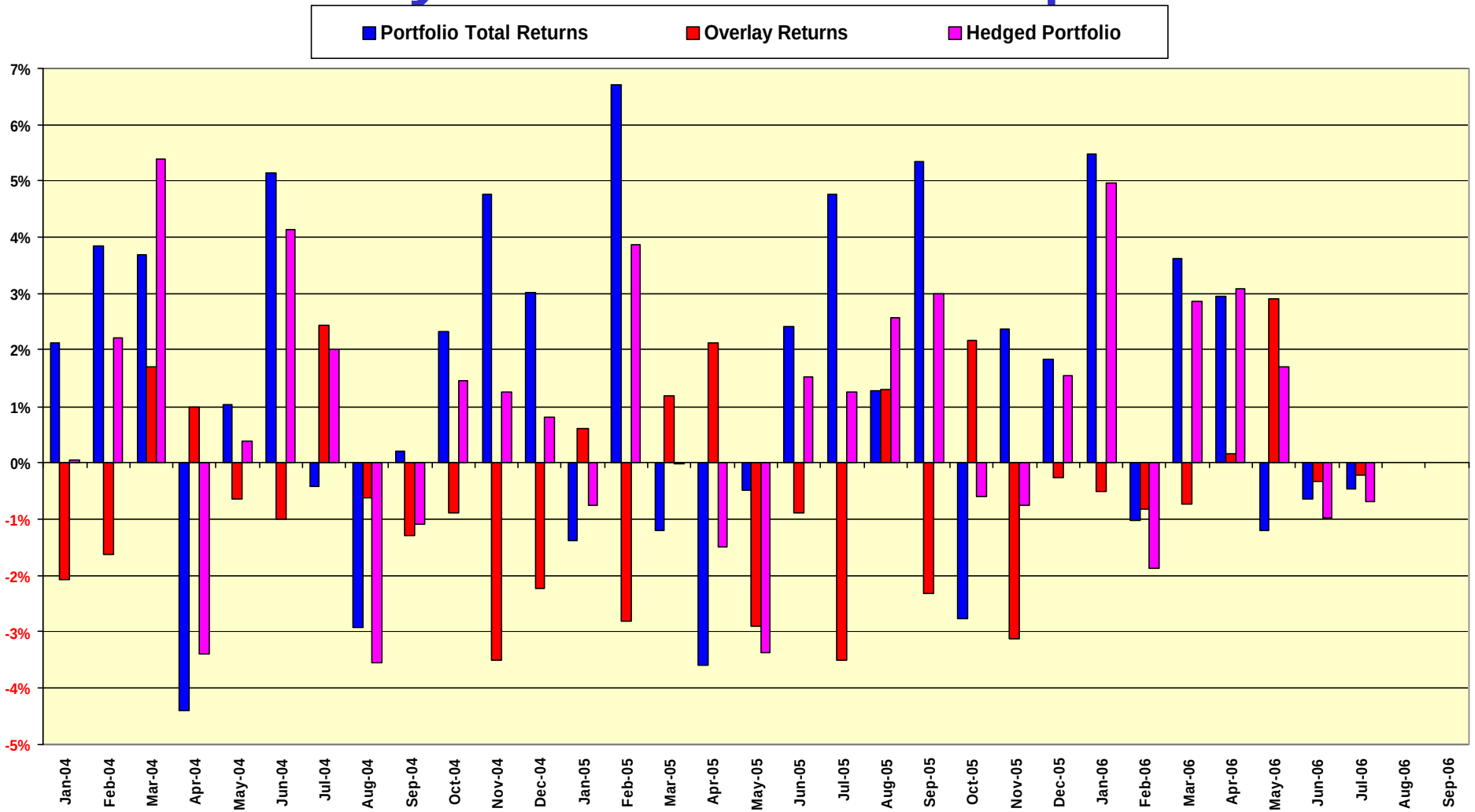
Monthly Returns Decomposition



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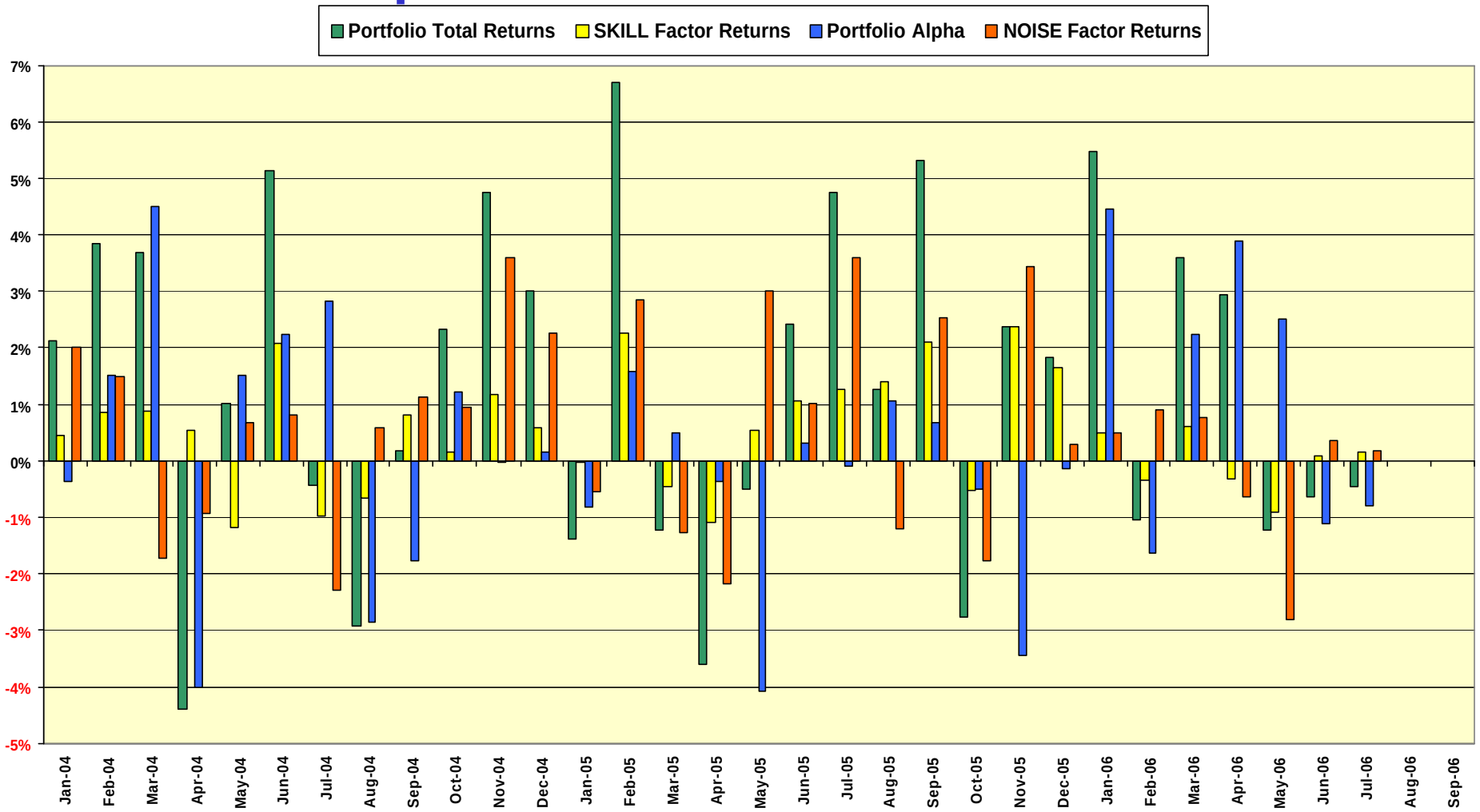
Components of Skill Returns



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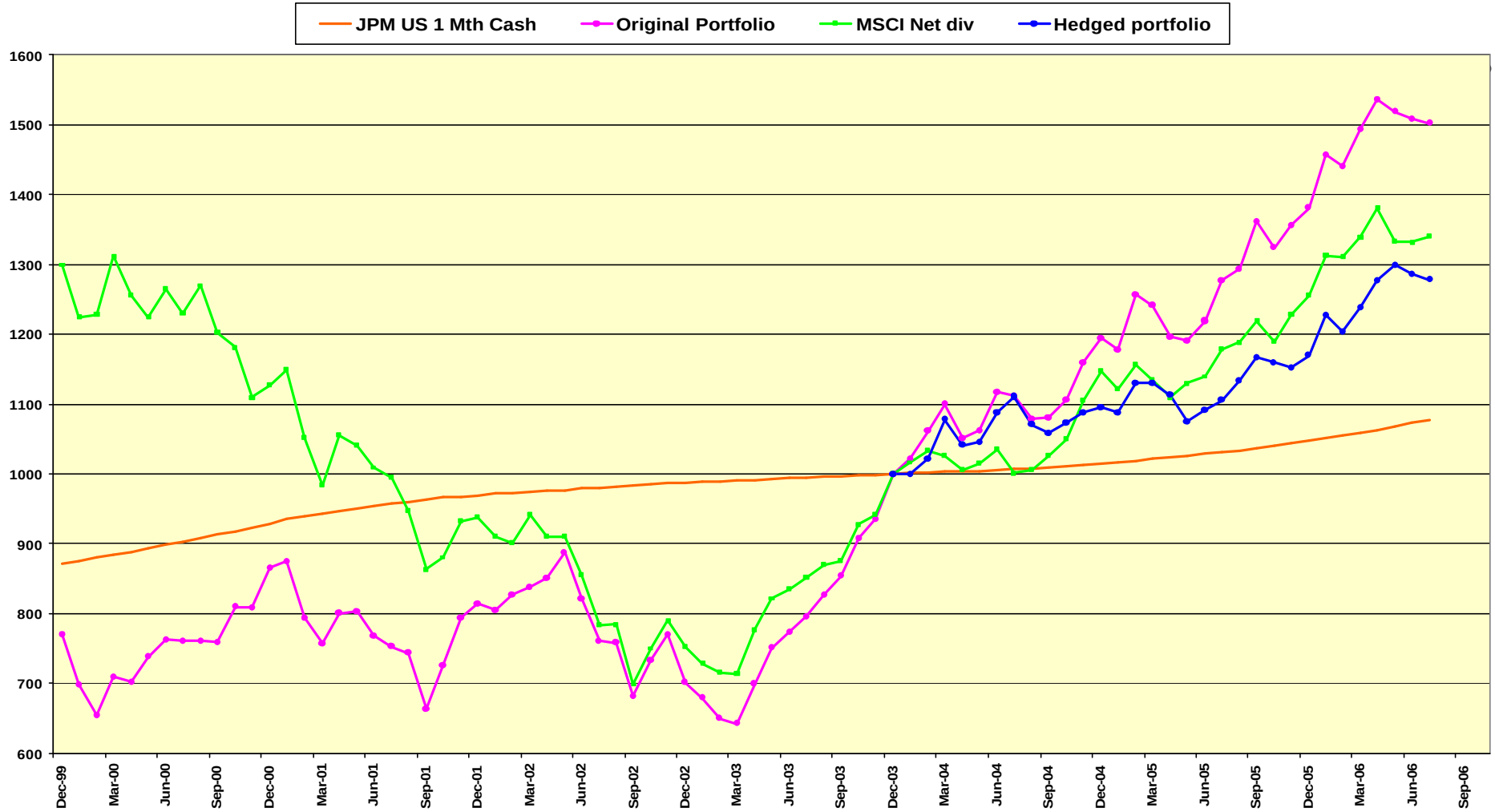
Summary Characteristics

		Annualised Return	Annualised Risk	Annualised Sharpe ratio
Risk-free rate	**(T-Bills)**	2.93%	0.00%	
Original Portfolio	**Skill + Noise**	17.63%	10.20%	1.441
Overlay Portfolio	**- Noise**	-6.32%	6.23%	-1.484
Hedged Portfolio	**= Skill**	**10.30%**	**8.16%**	**0.902**
SKILL Factor Returns		6.05%	3.48%	0.896
Portfolio Alpha		3.67%	7.73%	
Hedged Portfolio	**= Skill**	**10.30%**	**8.16%**	**0.902**
MSCI World		12.36%	8.08%	1.167

This is an Improvement?

- At first sight, it is hard to see how this is an improvement
  - The Hedged Portfolio (HP) return is lower
  - The HP Sharpe ratio is lower
  - The HP underperforms MSCI World
- However, this manager is actually seeking to generate absolute returns
- In a bull market, Noise tends to be positive

A Longer Term Perspective



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Comments - 1

- We were unable to extend the backtest beyond January 2004. However, . . .
- During the last nine months of 2003, the fund was up 56% and the index was up 40%
- During the 39 months from 31 Dec 1999 to 31 Mar 2003, the fund was down -17% while the index was down -45%

Comments - 2

- The Noise returns in the nine month bull market of 2003 would probably have been positive
- However, during the bear market over the previous three years the Noise returns would obviously have been negative
- Given the total returns, and assuming constant Skill, the HP would therefore have significantly outperformed the index over this earlier period

Summary - 1

- If the manager had forecast a bull market three years ago, we would have left global market exposure as a deliberate bet
- At the time, however, most investors expected a period of low positive returns
- Despite not being right about everything, this manager clearly has useful Skill

Summary - 2

- Most investors believe that few managers have real Skill
- It is also said that it would take a lifetime of performance data to demonstrate that a manager had statistically significant Skill
- Perhaps the real problem is that managers true Skill is being obscured by Noise?

Summary - 3

- Absolute Return funds have become popular as investors have become aware of the problems with capitalisation-weighted benchmarks
- It makes no sense for investors to pay fees for **Noise returns** when they can be easily removed with Risk Management Overlays
- On the other hand, investors should be happy to pay performance fees for true **Skill returns**
- This is the future of fund management.

Oh yes, the *

- My sincere apologies to Harry Markowitz for the cheap gag at his expense
- Harry got the Nobel Prize for the idea that the best way to manage portfolios is to trade off expected return against risk
- To this day (nearly 50 years later) no-one has yet come up with a better paradigm

Contact Information

Jason MacQueen
Alpha Strategies
45 West 60th Street, Apt. 9K,
New York, NY 10023.

Office = 212 334 6575 Cell = 1 646 280 9598

Email : jasonmacqueen@msn.com