

Cutting off the tail

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Overview

- Asset allocation 1.0: Traditional asset allocation
- Asset allocation 2.0: Rules versus discretion
- Research results: *The Trend is Our Friend: Risk Parity, Momentum and Trend Following in Global Asset Allocation*
- Summary: Cutting off the tail



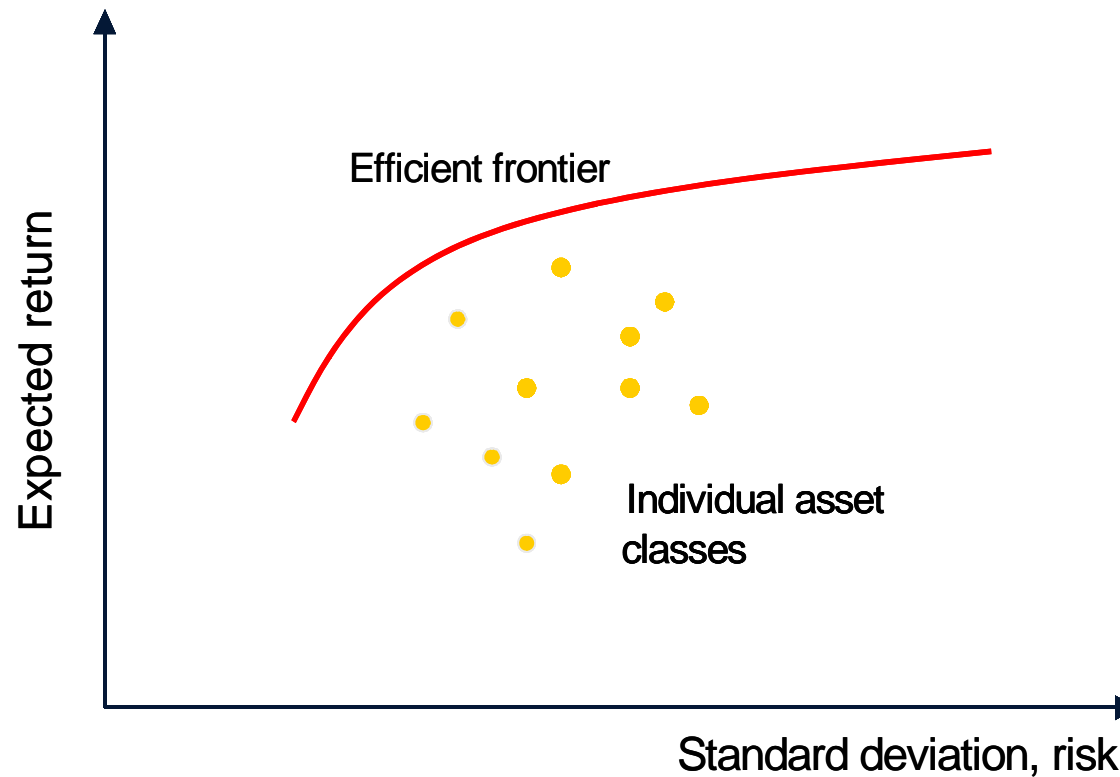
Asset allocation 1.0

Traditional asset allocation

Traditional asset allocation & “New balanced”

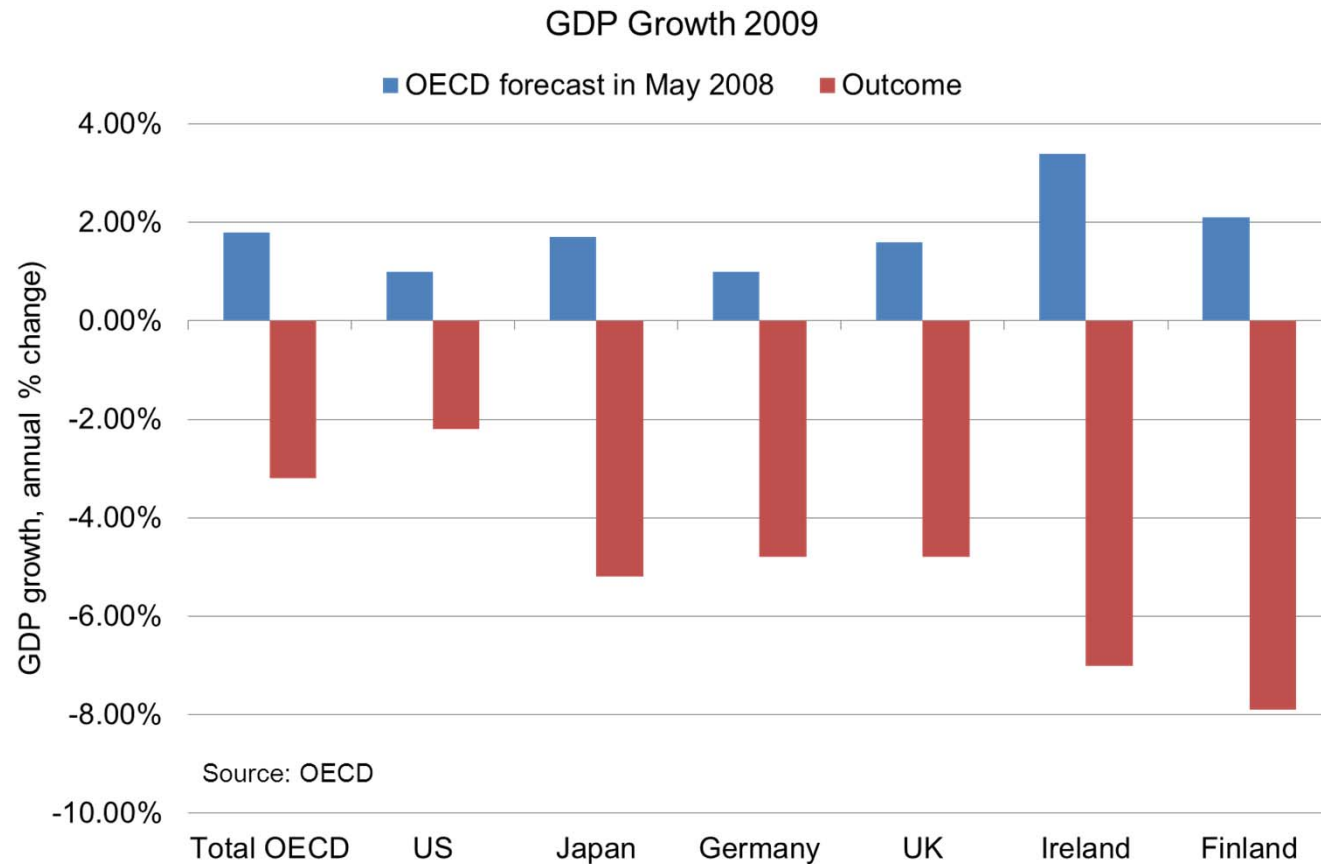
- Traditional asset allocation has been based upon 60/40 lines – 60% risk asset classes, 40% low risk asset classes
- In the institutional world (at least DB pensions) ‘balanced mandates’ were popular, but managers seemed to just copy one another’s allocations
- And now we have DGF funds – what we can refer to as “New Balanced” – which typically comprise a wider range of asset classes than the old “Balanced” funds

The Mean Variance Framework



- Asset allocators make use of the MV framework, but to do so they need to know: expected returns, variances and covariances to construct the frontier

But forecasting is difficult



- Remember May 2008 was after Northern Rock and Bear Stearns ... though before Lehmans

The problems with constructing MVEFs

- The mean-variance efficient frontier often comprises positions in just two asset classes – a very low risk asset class and a very high risk asset class

There is often no role for many of the asset classes in which the asset allocator is interested

We also need to remember that a Mean-Variance optimiser is not magical, it simply '*tells*' the user what it has been '*told*'

For example, if the user plugs in a return expectation of 20%pa and volatility expectation of 5%pa for UK equities the optimiser is likely to '*suggest*' a high weight to this asset class

Remember: *garbage in equals garbage out*

Bootstrapping the MVEF

- This involves:
 - random sampling of the asset returns series
 - calculation of means, variances and covariances
 - construction of MVEF
 - for the range of risk, identify the composition of the portfolio with the highest Sharpe ratio
 - store the composition of these portfolios
- Repeat this process many times
- Calculate the average portfolio composition and Sharpe ratio at each risk point and average mean return



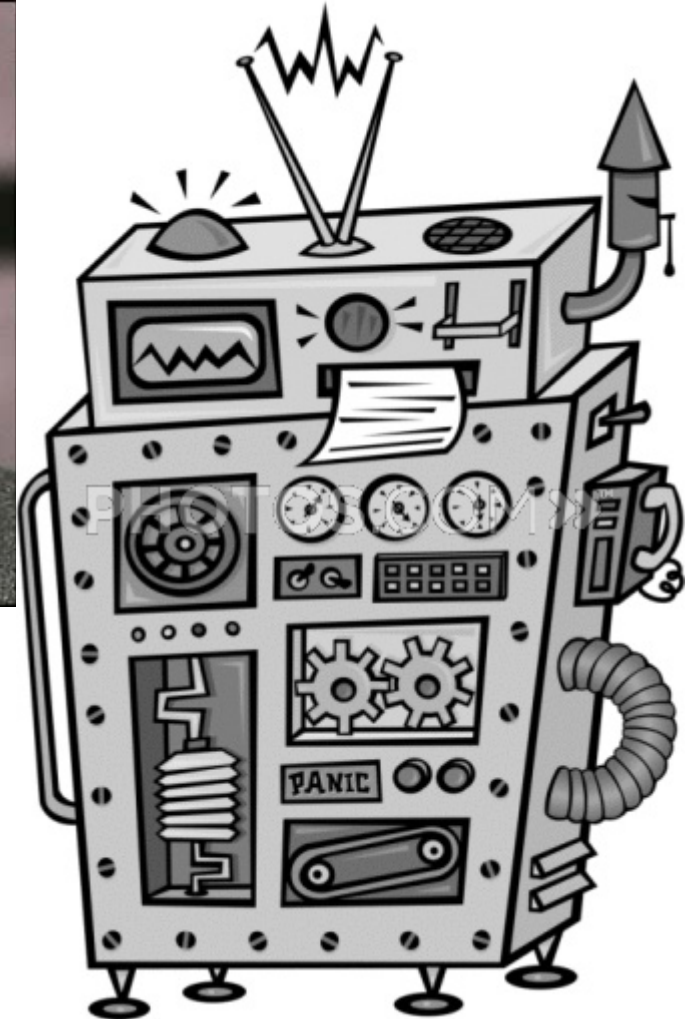
Asset allocation 2.0

Rules versus discretion

Is it time for new management?



or ...



The principles of Asset Allocation 2.0

- i. Forecasting is impossible
- ii. Unless you know something about the future 1/N investing should be the default (see i)
- iii. Diversification works, at least in the long-run
- iv. Trading should be kept to a minimum
- v. Focus on reducing tail risk
- vi. Simplicity and transparency should be preferred to complexity

So what should the asset class mix be?

- If there is one thing we know for certain it is that we don't know which asset class will be the best performer over any given future period*
- Optimisers seem sophisticated, but they simply give us the answer that we put into them
- Evidence** to suggest that equally-weighted approaches to asset allocation outperform optimised portfolios – 1/N investing
- This applies both:
 - within asset classes
 - and across asset classes

*The Dog and the frisbee, Andrew Haldane, speech at Jackson Hole, 2012, www.bankofengland.co.uk/publications/Pages/speeches/default.aspx

**The 1/N investment strategy is optimal under high model ambiguity, G. Plfug, A. Pichler, and D. Wozaba, (2012), Journal of Banking and Finance, February 2012.

Can we improve on a passive, 1/N approach?

- Being equally exposed to N asset classes, passively, will still mean that the investments will sometimes 'track' the market down
- We have been researching various mechanical rules* to see if we can improve on the main problem with passive investment – tracking the market down:
 - momentum
 - risk parity
 - trend following

*The Trend is Our Friend: Risk Parity, Momentum and Trend Following in Global Asset Allocation, A. Clare, J. Seaton, P. Smith and S. Thomas, 2012. (<http://ssrn.com/abstract=2126478>)

*Breaking into the Blackbox: Trend Following, Stop Losses, and the Frequency of Trading, The Case of the S&P500, A. Clare., J. Seaton, P. Smith and S. Thomas, 2012. (<http://ssrn.com/abstract=2126476>)



Research results

The Trend is Our Friend: Risk Parity,
Momentum and Trend Following in
Global Asset Allocation

Our study

- We collected end month, total return data on 5 broad asset classes and a wide range of sub-components of these asset classes
- We then investigated the usefulness – or otherwise – of the main mechanical rules posited as being useful for asset allocation
- The sample period is January 1993 to December 2011, and all indices are in USD
- Our results are broadly in line with those of other researchers ...

The asset classes

Benchmark Returns (sub-components)

Developed economy equities	Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Israel, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, Canada, United States, Australia, Hong Kong, Japan, New Zealand and Singapore
Emerging economy equities	Brazil, Chile, Colombia, Mexico, Peru, Poland, South Africa, Turkey, China, India, Indonesia, Korea, Malaysia, Philippines, Taiwan and Thailand
Bonds	Australia, Germany, Canada, France, Ireland, Japan, Netherlands, Austria, Sweden, Switzerland, United Kingdom, United States, Denmark, Belgium, Spain, Italy, New Zealand, Finland and Norway
Commodities*	Aluminium, Coffee, Copper, Corn, Cotton, Crude Oil (WTI), Gold, Heating Oil, Lean Hogs, Live Cattle, Natural Gas, Nickel, Silver, Soybeans, Soybean Oil, Sugar, Unleaded Gas, Wheat, Zinc, Cocoa, Lead, Platinum and Tin
REITs	Australia, Belgium, France, Germany, Hong Kong, Italy, Japan, Netherlands, Singapore, Sweden, Switzerland, United Kingdom and United States

- We tried to put together the most comprehensive list possible in each case

*Trend Following, Risk Parity and Momentum in Commodity Futures, A. Clare., J. Seaton, P. Smith and S. Thomas, 2012. (<http://ssrn.com/abstract=2126813>).

Broad asset classes

Benchmark Returns (Broad asset classes)

	Dev. Equity	Emer. Equity	Govt Bonds	Comms.	REITs
Annualized Return (%)	6.09	5.48	5.12	6.14	7.04
Annualized Volatility (%)	15.72	24.54	3.07	15.98	18.88
Sharpe Ratio	0.19	0.10	0.66	0.19	0.21
Max. Monthly Return (%)	11.32	17.14	3.44	13.00	20.70
Min. Monthly Return (%)	-18.93	-28.91	-1.89	-21.28	-27.85
Maximum Drawdown (%)	53.65	61.44	4.69	54.26	67.20
Skew	-0.72	-0.71	-0.01	-0.62	-0.97

- Govt bonds have (not surprisingly) produced the best risk-adjusted return over our sample period

Momentum

- We wanted to see if momentum-based rules might help, there is support in the literature that suggests it is a useful way to asset allocate
- The portfolios are constructed by performance ranking the sub-components using 12 months of return data and then by investing in the top 25% of sub-component performers, that is, the top quartile of 'winners'
- NB: the portfolios do not consist of short positions in 'losers'

Risk parity*

- Risk parity has grabbed a great deal of attention recently. Risk parity weights are calculated as follows:

	Vol	1/Vol	Weight
Asset class 1	20%	5.00	14%
Asset class 2	10%	10.00	29%
Asset class 3	5%	20.00	57%
		<u>35.00</u>	

	Vol	1/Vol	Weight
Asset class 1	30%	3.33	10%
Asset class 2	10%	10.00	30%
Asset class 3	5%	20.00	60%
		<u>33.33</u>	

	Vol	1/Vol	Weight
Asset class 1	10%	10.00	33%
Asset class 2	10%	10.00	33%
Asset class 3	10%	10.00	33%
		<u>30.00</u>	

- The problem is that it tends to “overweight” low return asset classes – so *proponents argue that leverage can improve the return outcome*
- We constructed risk parity portfolios by applying risk parity rules to the broad asset classes, and to their sub-components, where volatility has been calculated using 12 months of return data.

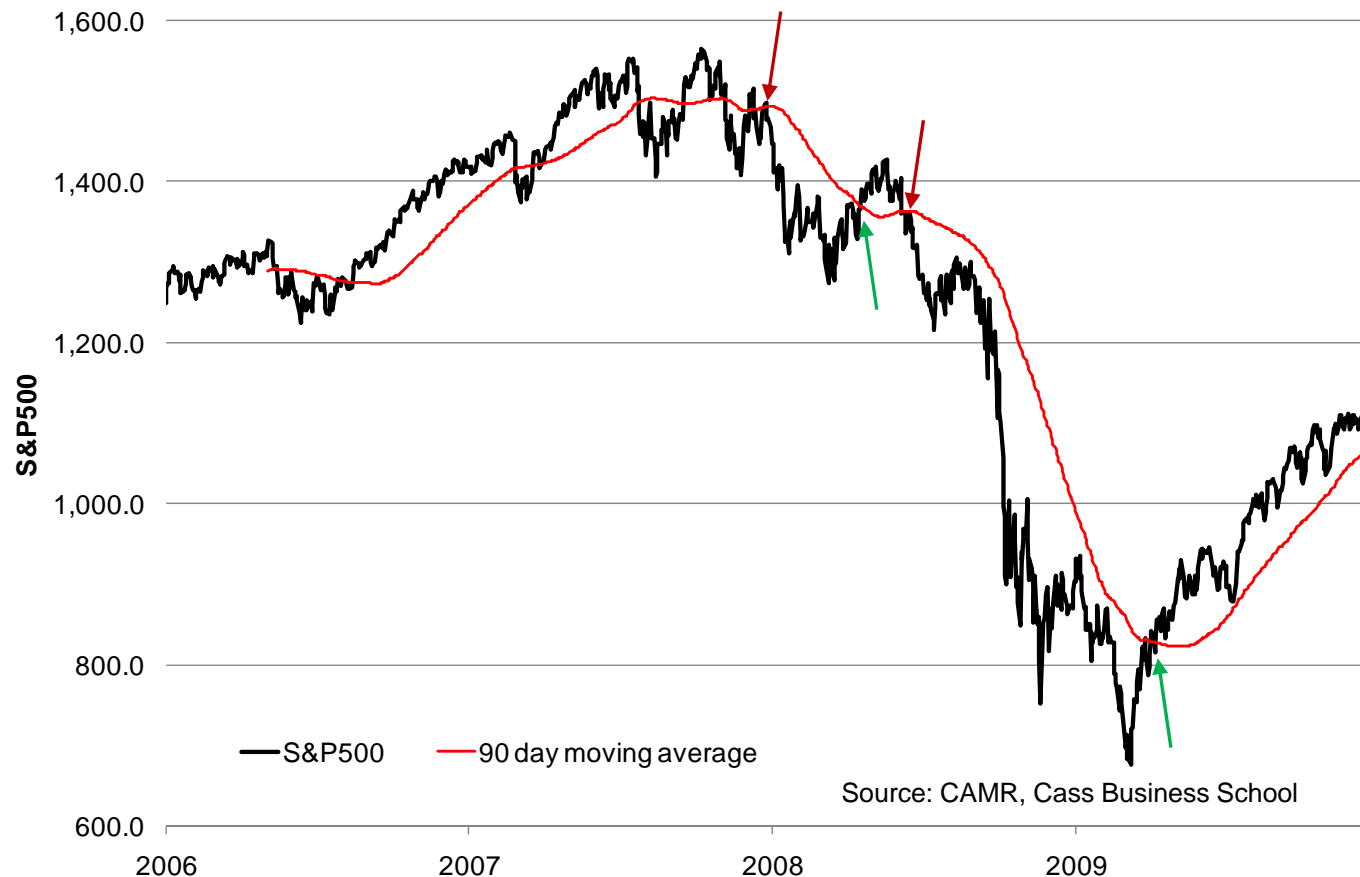
*Asness, C., Frazzini, A., and Pedersen, L., (2011). "Leverage Aversion and Risk Parity", AQR Capital Management, Working Paper.

Trend following*

- The third basic approach that we investigate is Trend Following
- It works like this:
 - invest 100% in the risk asset class in a positive trend
 - invest 100% in a “riskless” asset class in a negative trend environment
 - apply this rule to each asset class - independently

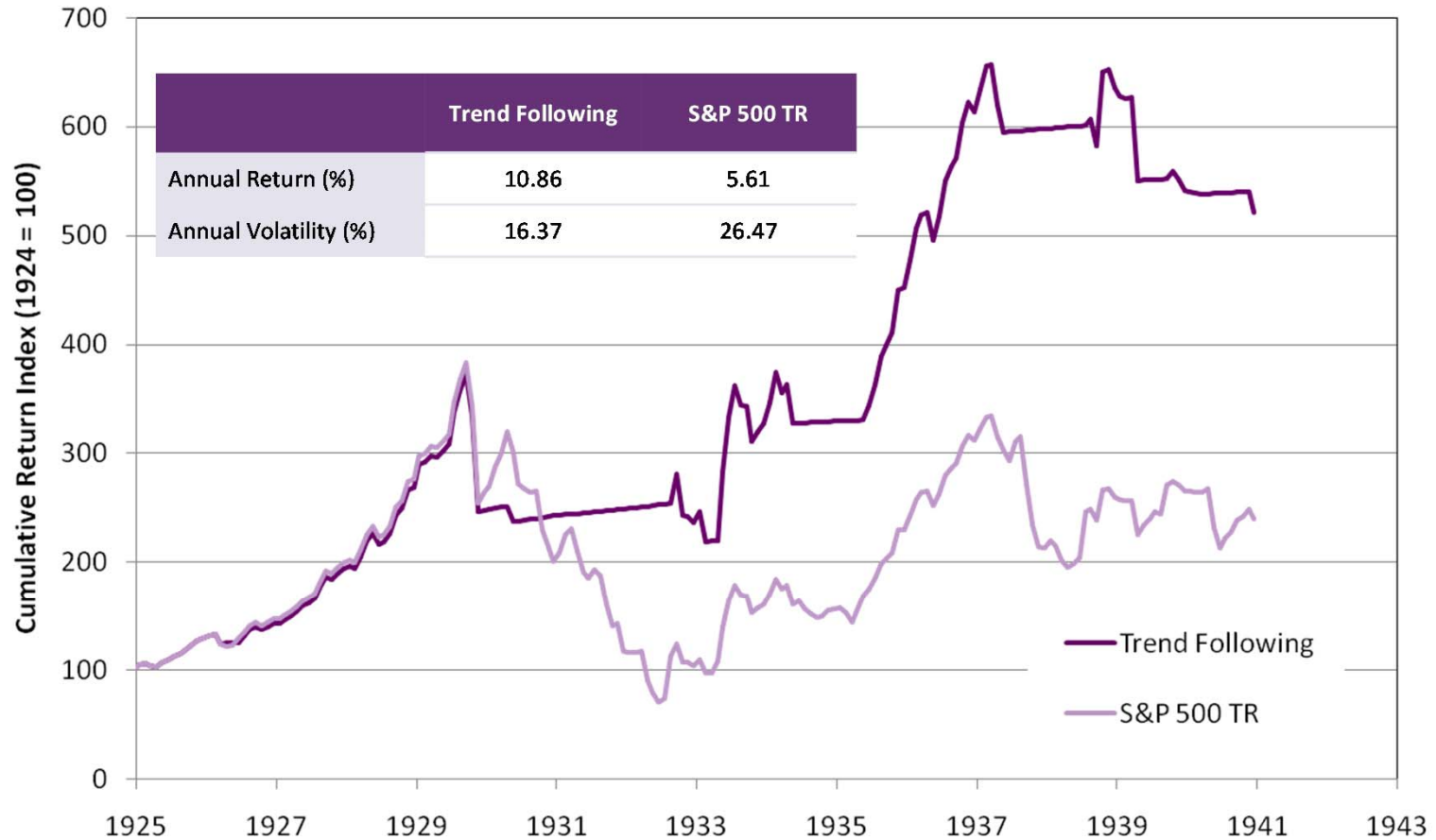
*ap Gwilym O., Clare, A., Seaton, J., Thomas, S., (2010), "Price and Momentum as Robust Tactical Approaches to Global Equity Investing", *Journal of Investing*, 19, 80-92.

An example of a trend following rule

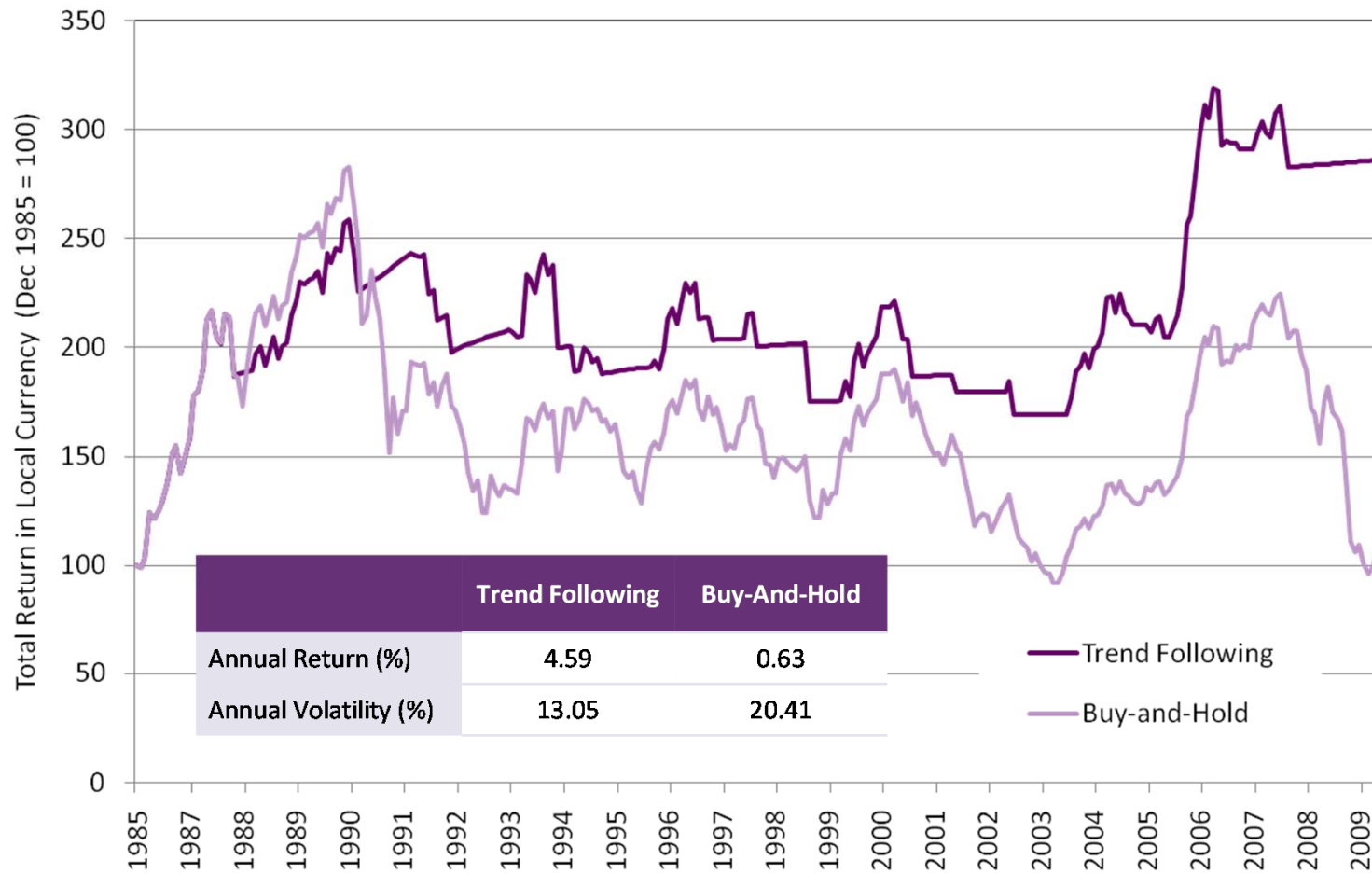


- The basic rule is simple: invest when the index is above the MA, and disinvest when it is below it

I. Historic example – S&P 500



II. Historic example – Japan



Momentum results

Benchmark Returns (Broad asset classes)

	1/N	Dev. Equity	Emer. Equity	Govt Bonds	Comms.	REITs
Annualized Return (%)	6.71	6.09	5.48	5.12	6.14	7.04
Annualized Volatility (%)	12.65	15.72	24.54	3.07	15.98	18.88
Sharpe Ratio	0.28	0.19	0.10	0.66	0.19	0.21
Max. Monthly Return (%)	10.21	11.32	17.14	3.44	13.00	20.70
Min. Monthly Return (%)	-18.99	-18.93	-28.91	-1.89	-21.28	-27.85
Maximum Drawdown (%)	46.60	53.65	61.44	4.69	54.26	67.20
Skew	-1.07	-0.72	-0.71	-0.01	-0.62	-0.97

Momentum results (top 25%)

	All	Dev. Equity	Emer. Equity	Govt Bonds	Comms.	REITs
Annualized Return (%)	10.90	10.66	6.56	9.25	14.46	8.68
Annualized Volatility (%)	14.48	18.81	27.03	9.92	20.21	18.72
Sharpe Ratio	0.54	0.40	0.13	0.62	0.56	0.30
Max. Monthly Return (%)	10.46	12.70	23.75	10.71	15.91	13.82
Min. Monthly Return (%)	-21.08	-20.84	-35.46	-7.55	-25.90	-26.28
Maximum Drawdown (%)	45.12	58.58	64.21	18.00	47.09	56.16
Skew	-0.94	-0.72	-0.66	0.29	-0.59	-0.63

Risk parity results

<i>Benchmark Returns (Broad asset classes)</i>						
	1/N	Dev. Equity	Emer. Equity	Govt Bonds	Comms.	REITs
Annualized Return (%)	6.71	6.09	5.48	5.12	6.14	7.04
Annualized Volatility (%)	12.65	15.72	24.54	3.07	15.98	18.88
Sharpe Ratio	0.28	0.19	0.10	0.66	0.19	0.21
Max. Monthly Return (%)	10.21	11.32	17.14	3.44	13.00	20.70
Min. Monthly Return (%)	-18.99	-18.93	-28.91	-1.89	-21.28	-27.85
Maximum Drawdown (%)	46.60	53.65	61.44	4.69	54.26	67.20
Skew	-1.07	-0.72	-0.71	-0.01	-0.62	-0.97

<i>Risk Parity</i>	All	Dev. Equity	Emer. Equity	Govt Bonds	Comms.	REITs
Annualized Return (%)	6.78	7.72	9.58	8.14	6.75	9.11
Annualized Volatility (%)	6.13	17.75	22.92	9.56	13.06	17.00
Sharpe Ratio	0.60	0.26	0.28	0.53	0.28	0.35
Max. Monthly Return (%)	3.96	14.09	16.27	9.16	13.33	15.67
Min. Monthly Return (%)	-8.40	-23.05	-27.98	-8.84	-20.83	-27.15
Maximum Drawdown (%)	20.46	59.14	55.56	20.95	45.65	58.87
Skew	-1.01	-0.88	-0.76	0.00	-0.97	-0.90

Trend following results

Benchmark Returns (Broad asset classes)

	1/N	Dev. Equity	Emer. Equity	Govt Bonds	Comms.	REITs
Annualized Return (%)	6.71	6.09	5.48	5.12	6.14	7.04
Annualized Volatility (%)	12.65	15.72	24.54	3.07	15.98	18.88
Sharpe Ratio	0.28	0.19	0.10	0.66	0.19	0.21
Max. Monthly Return (%)	10.21	11.32	17.14	3.44	13.00	20.70
Min. Monthly Return (%)	-18.99	-18.93	-28.91	-1.89	-21.28	-27.85
Maximum Drawdown (%)	46.60	53.65	61.44	4.69	54.26	67.20
Skew	-1.07	-0.72	-0.71	-0.01	-0.62	-0.97

Trend following (ten month MA)

	All	Dev. Equity	Emer. Equity	Govt Bonds	Comms.	REITs
Annualized Return (%)	9.16	10.99	12.63	8.39	7.95	10.31
Annualized Volatility (%)	7.03	10.07	13.80	9.57	8.39	9.23
Sharpe Ratio	0.86	0.78	0.69	0.55	0.58	0.78
Max. Monthly Return (%)	6.75	9.58	13.37	9.16	9.84	10.82
Min. Monthly Return (%)	-6.55	-10.13	-11.05	-8.50	-8.22	-8.77
Maximum Drawdown (%)	7.41	11.50	25.36	19.35	14.97	9.88
Skew	-0.23	-0.24	0.40	0.02	-0.04	0.07

Putting it all together

- We next went on to devise a completely flexible approach comprising elements of all three approaches
- The following portfolio formation process was applied to all 95 individual sub-components, regardless of their asset class
 - Portfolios are constructed by performance ranking the sub-components using 12 months of return data standardized by the prior 12-month volatility and then by investing in the top 10 performers (column 1), the top 15 performers (column 2), *etc*
 - The positions within the portfolios are equally weighted. However, the weight of any sub-component of the portfolio is set to 0.0% if that sub-component is determined to be in a negative trend, where ten months of prior price data are used to determine the nature of the trend
 - The proportion allocated to that market is then allocated instead to the “*risk off*” asset, US T-Bills

Combined results ...

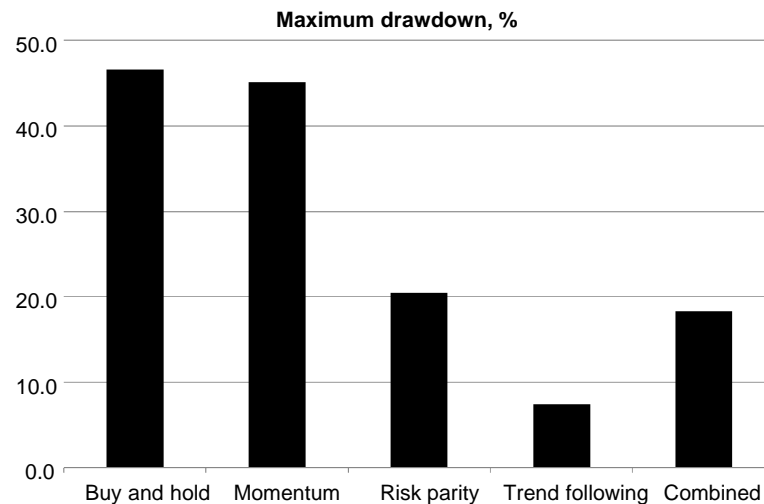
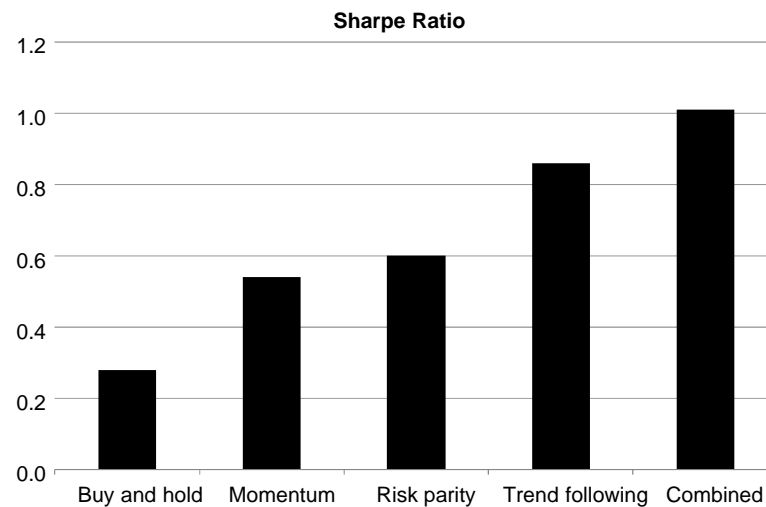
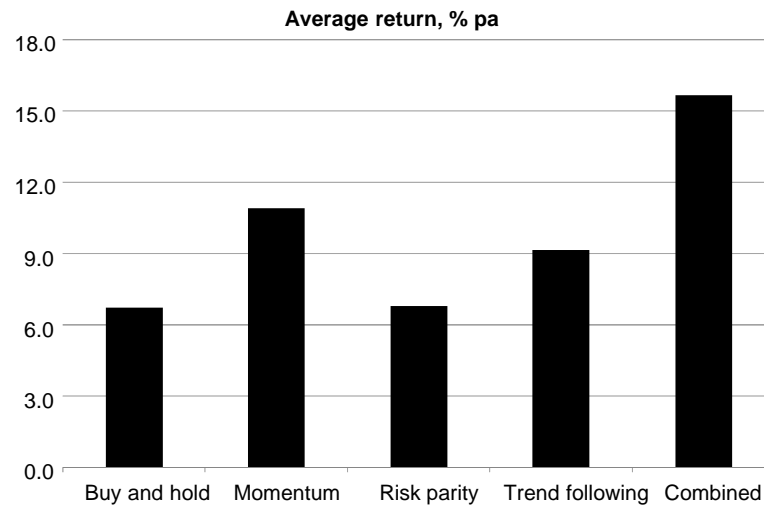
95 broad asset class sub-components	Number of Positions							
	1/N	10	15	20	25	30	40	50
Annualized Return (%)	6.71	15.17	15.69	15.65	14.68	14.60	13.66	12.57
Annualized Volatility (%)	12.65	14.09	13.01	12.44	11.97	11.65	10.80	9.99
Sharpe Ratio	0.28	0.86	0.97	1.01	0.97	0.99	0.98	0.95
Max. Monthly Return (%)	10.21	11.50	11.56	12.52	11.17	10.11	9.31	8.29
Min. Monthly Return (%)	-18.99	-11.02	-11.70	-11.46	-9.72	-9.17	-8.94	-8.71
Maximum Drawdown (%)	46.60	26.52	20.80	18.34	16.57	15.78	13.55	13.83
Skew	-1.07	0.06	-0.02	0.01	-0.04	-0.01	-0.04	-0.05

- The combination produced the highest Sharpe ratios, but the maximum drawdowns are higher than for the trend following rules applied to either the broad asset classes or within the asset class sub-components

Summary: Cutting off the tail



Summary of results



- Momentum tends to produce the highest return, trend following the lowest maximum drawdown
- Combination tends to produce Sharpe ratios that any active manager would be proud of

Summary

- Asset allocation based on simple, mechanistic rules can work
- The advantage of the approaches are that they are:
 - cheap to apply (particularly when compared to options-based strategies)
 - transparent
 - replicable and
 - can reduce drawdown – the tail – dramatically
- As such they could be ideal for:
 - investors with high levels of risk aversion
 - DC investors, pension drawdown

Thank you

