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RULES-BASED STYLE ROTATION: Dynamic Switching between Smart Portfolios

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February 2016

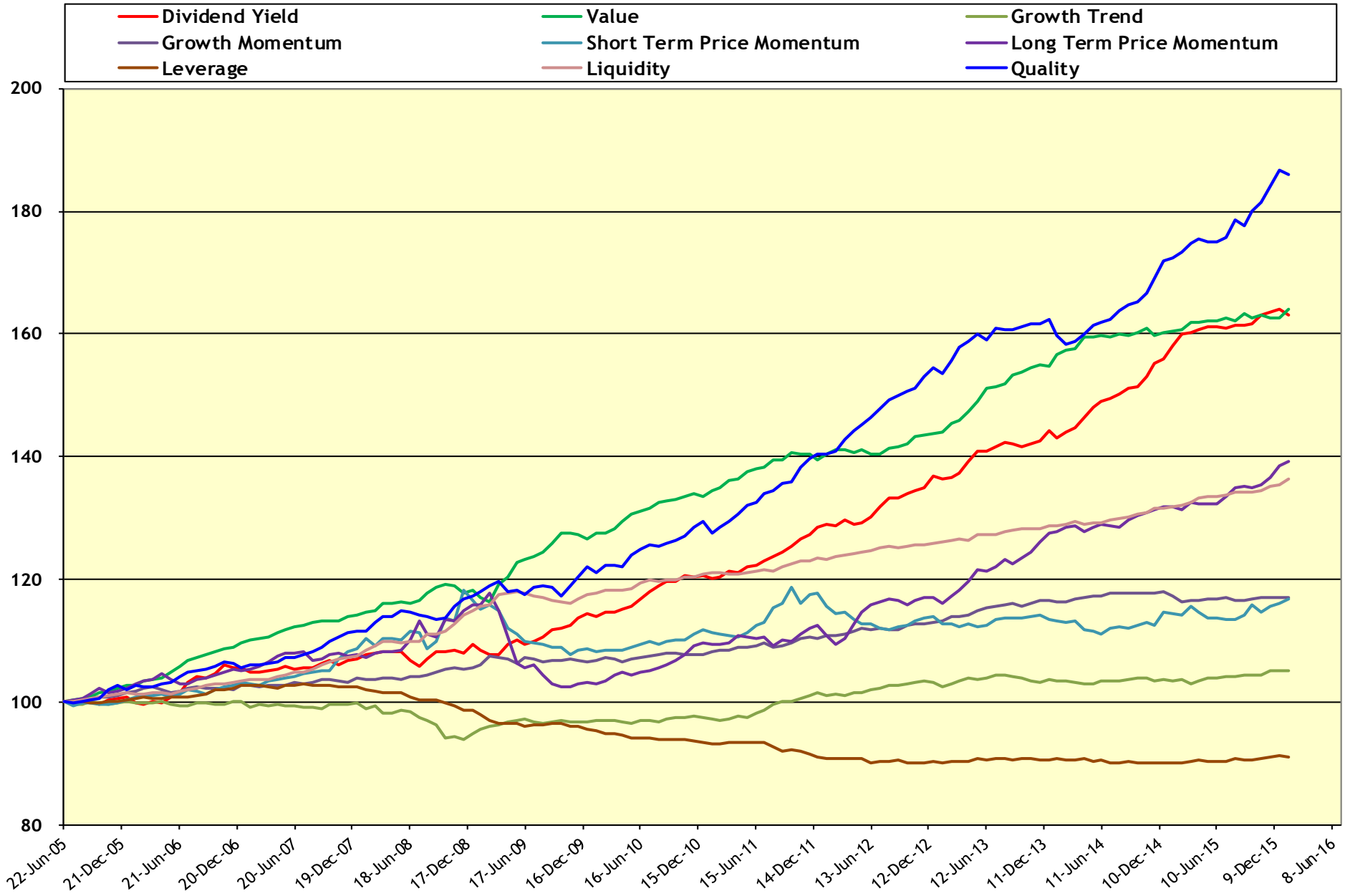
A Problem with Active Management

- Hiring a number of different active managers quickly becomes self-defeating, as the effects of the individual managers' stock selection skills diversify away very rapidly, leaving a very expensive index fund overlaid with a small number of Style tilts
- A 2009 study done for the Norwegian sovereign wealth fund concluded that the fund would be better off simply building a set of Style factor portfolios themselves
- In recent years, this conclusion has resulted in the enormous growth of so-called 'Smart Beta' funds and ETFs, which purport to deliver Style factor risk premia (a.k.a. returns) to investors
- To a quant, of course, these are just Style factor portfolios

Estimating Style Factor Returns

- It is not possible to measure Style factor returns directly.
- They can be estimated by creating Factor-Mimicking Portfolios (FMPs); the difficulty here lies in trying to make the portfolios as independent as possible of other factor effects
- Alternatively, they can be estimated using cross-sectional regressions, although the Style factor returns will then be conditioned on the other factors included in the regression
- Style factor returns are nearly always conditioned on each other; however, they are often conditioned on market, industry or currency factors as well

European Style Factors - 1



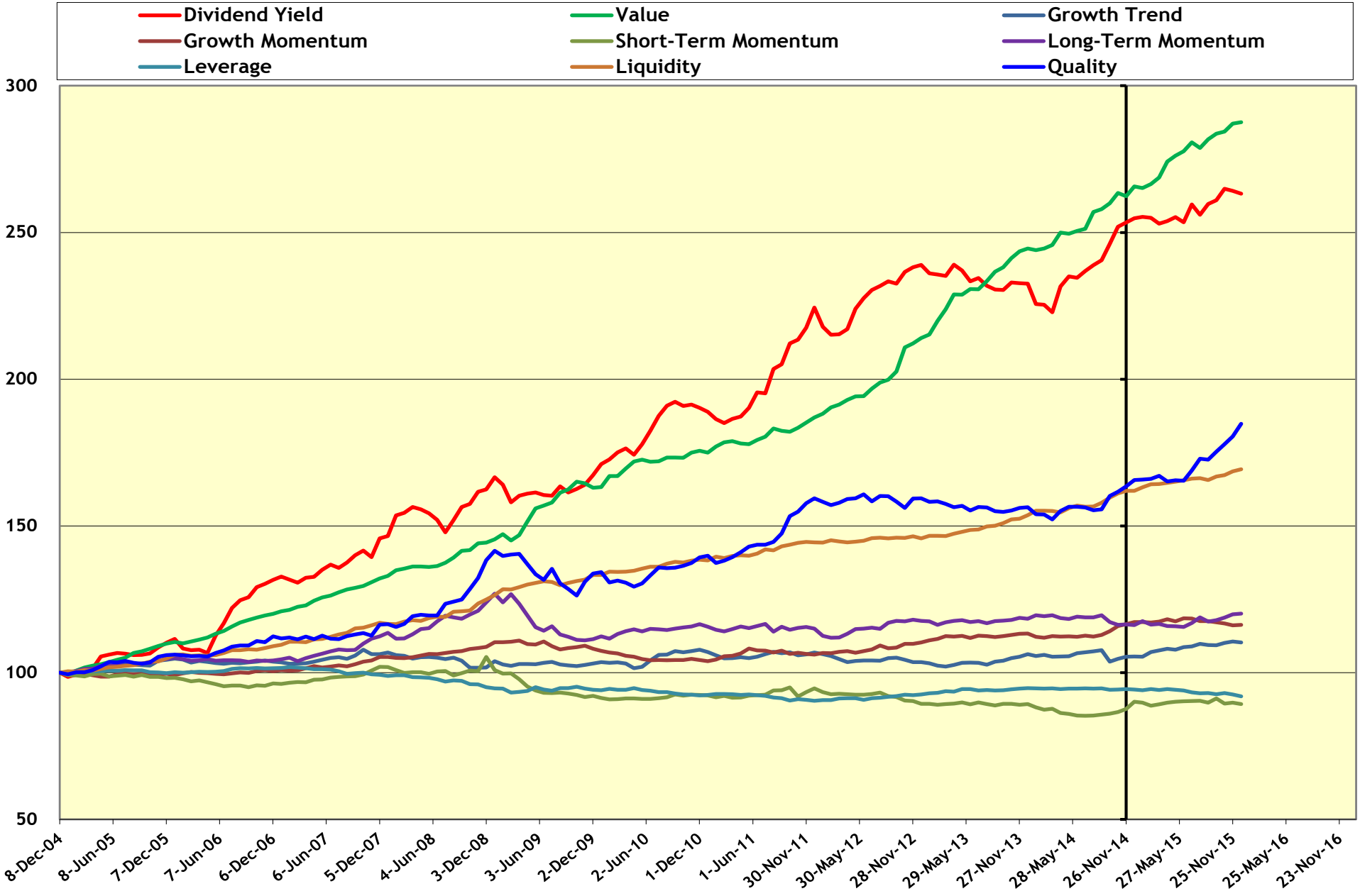
European Style Factors - 2 (for the quants)

	Dividend Yield	Value	Growth Trend	Growth Momentum	Short-Term Momentum	Long-Term Momentum	Leverage	Liquidity	Quality
Mean	4.68	4.73	0.47	1.50	1.49	3.16	-0.89	2.96	5.93
S. D.	2.06	1.76	1.50	1.13	3.26	3.39	1.03	1.05	2.37
Skewness	-0.21	0.28	-1.28	-0.18	0.65	-1.41	-0.72	0.92	-0.66
t-statistic	-0.99	1.34	-6.10	-0.84	3.10	-6.73	-3.42	4.40	-3.16
Kurtosis	-0.04	2.00	6.28	1.36	4.20	5.31	0.78	1.98	0.76
t-statistic	-0.09	4.76	14.96	3.25	9.99	12.65	1.86	4.71	1.81
Serial Corr	0.13	0.17	0.10	0.02	-0.06	0.32	0.26	0.24	0.08
t-statistic	1.53	1.97	1.17	0.26	-0.65	3.77	3.03	2.77	0.93

European Style Factors - 3

CORRELATION MATRIX of FACTOR RETURNS									
	Dividend Yield	Value	Growth Trend	Growth Momentum	Short-Term Momentum	Long-Term Momentum	Leverage	Liquidity	Quality
Dividend Yield	1.000	0.120	0.158	-0.159	-0.153	-0.232	0.246	0.036	0.252
Value	0.120	1.000	-0.112	-0.049	-0.165	-0.476	0.229	-0.191	-0.430
Growth Trend	0.158	-0.112	1.000	-0.008	-0.258	-0.080	-0.024	-0.011	0.144
Growth Momentum	-0.159	-0.049	-0.008	1.000	-0.006	0.221	-0.114	0.031	-0.029
S-T Momentum	-0.153	-0.165	-0.258	-0.006	1.000	0.329	-0.176	0.102	0.149
L-T Momentum	-0.232	-0.476	-0.080	0.221	0.329	1.000	-0.049	0.011	0.259
Leverage	0.246	0.229	-0.024	-0.114	-0.176	-0.049	1.000	-0.153	-0.008
Liquidity	0.036	-0.191	-0.011	0.031	0.102	0.011	-0.153	1.000	0.199
Quality	0.252	-0.430	0.144	-0.029	0.149	0.259	-0.008	0.199	1.000

US Style Factors - 1



US Style Factors - 2 (for the quants)

	Dividend Yield	Value	Growth Trend	Growth Momentum	Short-Term Momentum	Long-Term Momentum	Leverage	Liquidity	Quality
Mean	8.60	9.43	0.65	1.35	-0.95	1.82	-0.90	4.71	5.75
S. D.	5.77	2.72	2.82	1.97	3.50	3.66	1.55	1.63	4.77
Skewness	0.23	0.76	-0.86	0.05	-0.00	-0.78	-0.33	0.42	0.19
t-statistic	1.15	3.74	-4.25	0.24	-0.01	-3.86	-1.61	2.05	0.93
Kurtosis	0.56	2.81	4.15	0.20	6.66	1.80	1.62	0.54	0.87
t-statistic	1.38	6.90	10.21	0.49	16.37	4.42	3.97	1.34	2.14
Serial Corr	0.16	0.07	0.07	0.11	-0.11	0.11	0.04	0.02	0.21
t-statistic	1.97	0.86	0.85	1.29	-1.30	1.30	0.45	0.19	2.50

US Style Factors - 3

CORRELATION MATRIX of FACTOR RETURNS									
	Dividend Yield	Value	Growth Trend	Growth Momentum	Short-Term Momentum	Long-Term Momentum	Leverage	Liquidity	Quality
Dividend Yield	1.000	0.228	0.214	-0.068	0.060	-0.111	0.073	0.053	0.316
Value	0.228	1.000	-0.101	0.027	-0.166	-0.442	0.448	-0.023	-0.437
Growth Trend	0.214	-0.101	1.000	-0.101	-0.045	0.160	0.083	0.106	0.059
Growth Momentum	-0.068	0.027	-0.101	1.000	0.066	0.030	0.035	0.068	0.057
S-T Momentum	0.060	-0.166	-0.045	0.066	1.000	0.235	-0.320	-0.055	0.292
L-T Momentum	-0.111	-0.442	0.160	0.030	0.235	1.000	-0.397	0.041	0.417
Leverage	0.073	0.448	0.083	0.035	-0.320	-0.397	1.000	-0.010	-0.539
Liquidity	0.053	-0.023	0.106	0.068	-0.055	0.041	-0.010	1.000	0.083
Quality	0.316	-0.437	0.059	0.057	0.292	0.417	-0.539	0.083	1.000

Smart Beta funds . . . or Dumb Beta funds?

- The problem with most 'Smart Beta' ETFs is that they are built in a way which almost guarantees that they will do a very poor job of capturing the Style factor risk premia
- Many of them are capitalisation-weighted or equal-weighted; the S&P (so-called) 'Pure Style' ETFs have portfolio weights in proportion to the appropriate Style metric; for Value, this is a combination of normalised BV/P, E/P and S/P
- In most cases, a simplistic, arbitrary weighting scheme is being applied to a set of stocks with high exposures to a chosen Style
- There is no attempt to build efficient portfolios, or to trade off expected returns against risk

The KISS Principle at Work

- At best, these various weighting schemes simply give a Style tilt to these portfolios
- **The marketing imperative to have a simple story is more important than having an efficient Style factor portfolio**
- Without any attempt to optimise these Style factor portfolios, their return and risk performance will be dominated by their exposure to market, industry and other factors
- In short, they are very unlikely to do what it says on the tin
- **In quant terms, they are very inefficient, and it should therefore be easy to improve their performance**

Not-so-Smart Portfolio construction

- Harry Markowitz won his Nobel prize for proposing that the most efficient way to manage portfolios was to have holdings whose contribution to portfolio expected return matched their contribution to risk
- Note that this idea was first published in 1952, and no-one has yet come up with a better idea
- However, most Smart Beta funds don't do this
- In fact, their construction often disregards risk completely, except for sometimes having lots of holdings, which is presumed to give greater diversification

Smart Portfolio construction

- We first design an optimal portfolio construction process to create an efficient Style factor portfolio, using Dividend Yield as our test case
- This portfolio significantly outperforms the usual market benchmarks and similar Smart Beta funds
- We then apply exactly the same portfolio construction methodology to other Style Factors
- The results show that building Smart Portfolios can generate significant improvements in performance, and that Smart Portfolios do a much better job of capturing the Style factor risk premia, or returns

The US YIELD Smart Portfolio Strategy - 1

- A long-only Dividend Yield factor portfolio
- Target Yield = Average yield of the top 10% of stocks

- Maximum Stock holding = 3%
- Maximum Cash holding = 2%
  - Standard practice to cover expenses, fees, etc.

- Only uses top 1,000 stocks by market capitalisation
- US Domicile stocks only (no ADRs, GDRs etc)

- Minimum price per share = $5 : this avoids penny stocks, and is a common restriction for mutual funds

The US YIELD Smart Portfolio Strategy - 2

- Expected return = Trailing Annual Dividend Yield
  = Last 12 months dividends / Current price
- Risk = Northfield XRD US multi-factor risk model
  - 6 Currency factors (only relevant for foreign stocks)
  - 9 Style factors : (the usual suspects!)
    - Dividend Yield Value Quality Leverage Liquidity
    - Growth Trend Growth Mom. S-T Price Mom. L-T Price Mom.
  - 2 US Market factors
    - (US Large – like S&P 500 and US Small – like Russell 2000)
  - 20 US Industry factors (based on GICS classifications)
  - 4 Statistical factors
  - Style factor returns are estimated from cross-sectional regressions
  - For all other factors, the stock betas are estimated from time series regressions

The US YIELD Smart Portfolio Strategy - 3

- Optimisers are notoriously prone to error maximisation
- We therefore need to have as much confidence in our expected return and risk estimates as we can
- In the case of Style factor portfolios, the expected return proxy is actually the stock's sensitivity to the Style factor (i.e. its beta)
- We hope that the Style factor premium is positive, but at least we are sure about the stock beta to the factor
- In this case, all we are really forecasting is that the next 12 months dividends will be like the last 12
- Using Style betas as the expected return proxy ensures that the portfolios have a significant Style factor tilt

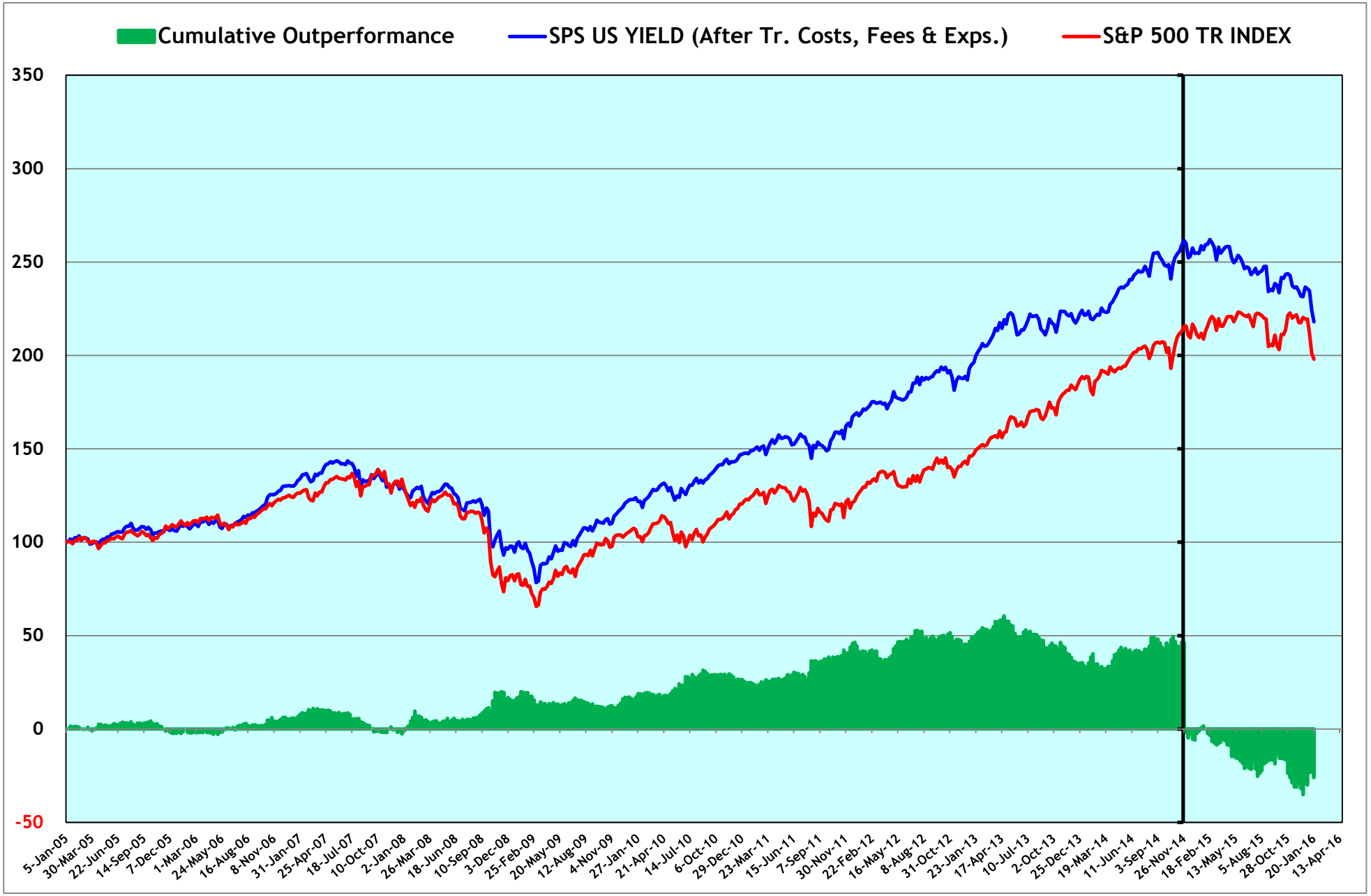
The US YIELD Smart Portfolio Strategy - 4

- We also need to be confident about the risk numbers
- This means we need to be sure that the risk model has done a good job of capturing the systematic common factor risks for each stock
- To achieve this, we filter the candidate universe to screen out stocks with low R-Squareds
- The risk characteristics of very high risk stocks are more likely to be biased estimates of their true risk, and may also appear to offer (spurious) diversification
- We therefore also filter out these stocks, to avoid them having a disproportionate effect on portfolio risk if our estimates of their risk or diversification properties are wrong

The US YIELD Smart Portfolio Strategy - 5

- Liquidity control : the maximum we buy of any stock must be less than its average daily volume over the past 60 trading days, so we should be able to complete any trade within a week
- The portfolio is rebalanced every 12 weeks
- For the purposes of illustration, we assume :
  - Estimated transaction costs : Buy 0.15%, Sell 0.15%
  - Estimated management fees : 0.1% + 0.1% expenses
- However, these assumptions are not material to the relative performance of these Style factor portfolios

US Yield Smart Portfolio



US Yield Smart Portfolio

5-Jan-05	to	26-Nov-14	=	9.89	years

Annualised Performance in Backtest*

	Return	Risk	I. R.
Portfolio*	9.7%	13.6%	0.71
Benchmark	7.7%	17.2%	0.45
Relative*	1.9%	8.2%	0.24

Beta to S&P 500 = 0.70 Beta to Yield = 1.39

Performance Attribution

	Target Style	Other Styles	Other Factors	Portfolio Alpha	Portfolio Return
Return	12.7%	2.1%	1.6%	-6.4%	9.9%
Pct	128%	21%	16%	-65%	100%

Average Number of Holdings & Annualised Turnover

Holdings :	38	Turnover :	39%

26-Nov-14	to	20-Jan-16	=	1.15	years

Annualised Performance out of sample*

	Return	Risk	I. R.
Portfolio*	-15.8%	11.1%	-1.42
Benchmark	-7.4%	13.8%	-0.53
Relative*	-8.5%	8.5%	-0.99

Beta to S&P 500 = 0.63 Beta to Yield = 1.49

Performance Attribution

	Target Style	Other Styles	Other Factors	Portfolio Alpha	Portfolio Return
Return	4.1%	-0.7%	-12.7%	-6.3%	-15.6%
Pct	-26%	5%	81%	40%	100%

Average Number of Holdings & Annualised Turnover

Holdings :	40	Turnover :	43%

US Yield Smart Portfolio – Drawdowns < -5%

ABSOLUTE DRAWDOWNS	PEAK	VALUE	VALLEY	VALUE	WEEKS	RETURNS	RELATIVE RETURN
Benchmark	2-Mar-05	102.6	20-Apr-05	96.6	7	-5.8%	2.7%
Portfolio		102.3		99.1		-3.2%	
Benchmark	3-Aug-05	106.3	12-Oct-05	100.9	10	-5.1%	-0.6%
Portfolio		110.1		103.9		-5.6%	
Benchmark	14-May-06	114.6	14-Jun-06	106.7	4	-6.8%	2.9%
Portfolio		111.7		107.3		-3.9%	
Benchmark	18-Jul-07	136.9	15-Aug-07	124.8	4	-8.9%	-0.7%
Portfolio		142.1		128.6		-9.5%	
Benchmark	10-Oct-07	139.0	4-Mar-09	65.6	73	-52.8%	9.6%
Portfolio		138.0		78.5		-43.1%	
Benchmark	17-Oct-12	145.2	14-Nov-12	135.0	4	-7.0%	0.6%
Portfolio		193.7		181.3		-6.4%	
Benchmark	15-Jan-14	188.7	5-Feb-14	179.0	3	-5.2%	3.9%
Portfolio		221.8		219.1		-1.2%	
Benchmark	17-Sep-14	207.2	15-Oct-14	193.1	4	-6.8%	2.8%
Portfolio		251.0		240.9		-4.0%	
Benchmark	20-May-15	223.2	20-Jan-16	197.9	35	-11.3%	-2.7%
Portfolio		253.6		218.1		-14.0%	

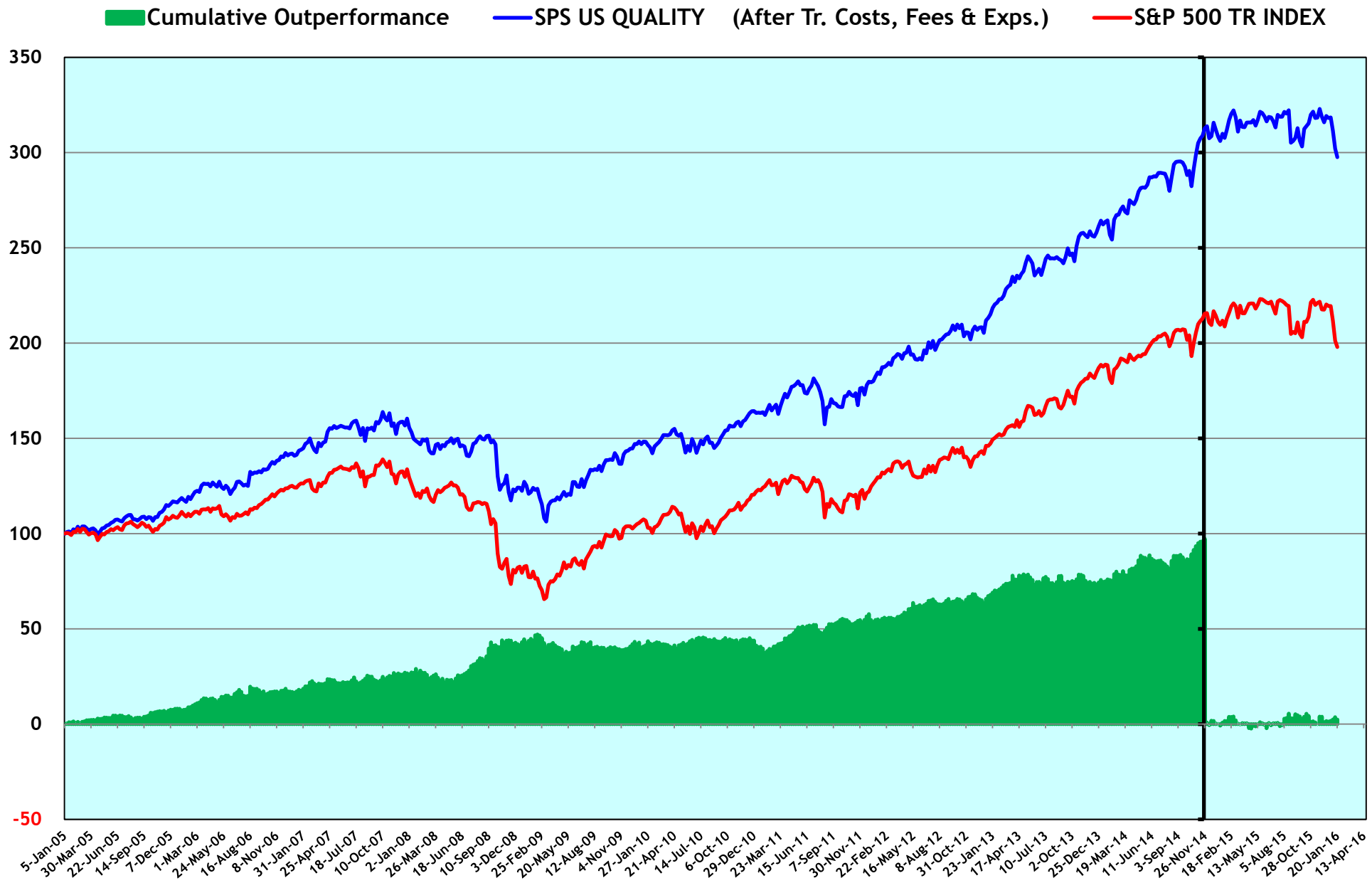
Now Repeat for the other Styles

- We now apply EXACTLY the same Smart Portfolio construction process to some other Style factors

- To emphasise, we use exactly
  - The same constraints
  - The same risk filters
  - The same risk model
  - The same optimisation

- We change ONLY the expected return proxy

US Quality Smart Portfolio



US Quality Smart Portfolio

5-Jan-05	to	26-Nov-14	=	9.89	years

Annualised Performance in Backtest*

	Return	Risk	I. R.
Portfolio*	11.5%	13.0%	0.88
Benchmark	7.7%	17.2%	0.45
Relative*	3.7%	7.6%	0.49

Beta to S&P 500 = 0.69 Beta to Quality = 1.21

Performance Attribution

	Target Style	Other Styles	Other Factors	Portfolio Alpha	Portfolio Return
Return	6.2%	6.0%	2.4%	-2.8%	11.7%
Pct	53%	51%	21%	-24%	100%

Average Number of Holdings & Annualised Turnover

Holdings :	36	Turnover :	57%

26-Nov-14	to	20-Jan-16	=	1.15	years

Annualised Performance out of sample*

	Return	Risk	I. R.
Portfolio*	-4.3%	10.2%	-0.42
Benchmark	-7.4%	13.8%	-0.53
Relative*	3.1%	5.3%	0.57

Beta to S&P 500 = 0.70 Beta to Quality = 1.18

Performance Attribution

	Target Style	Other Styles	Other Factors	Portfolio Alpha	Portfolio Return
Return	15.2%	2.6%	-11.8%	-10.1%	-4.1%
Pct	-371%	-64%	289%	246%	100%

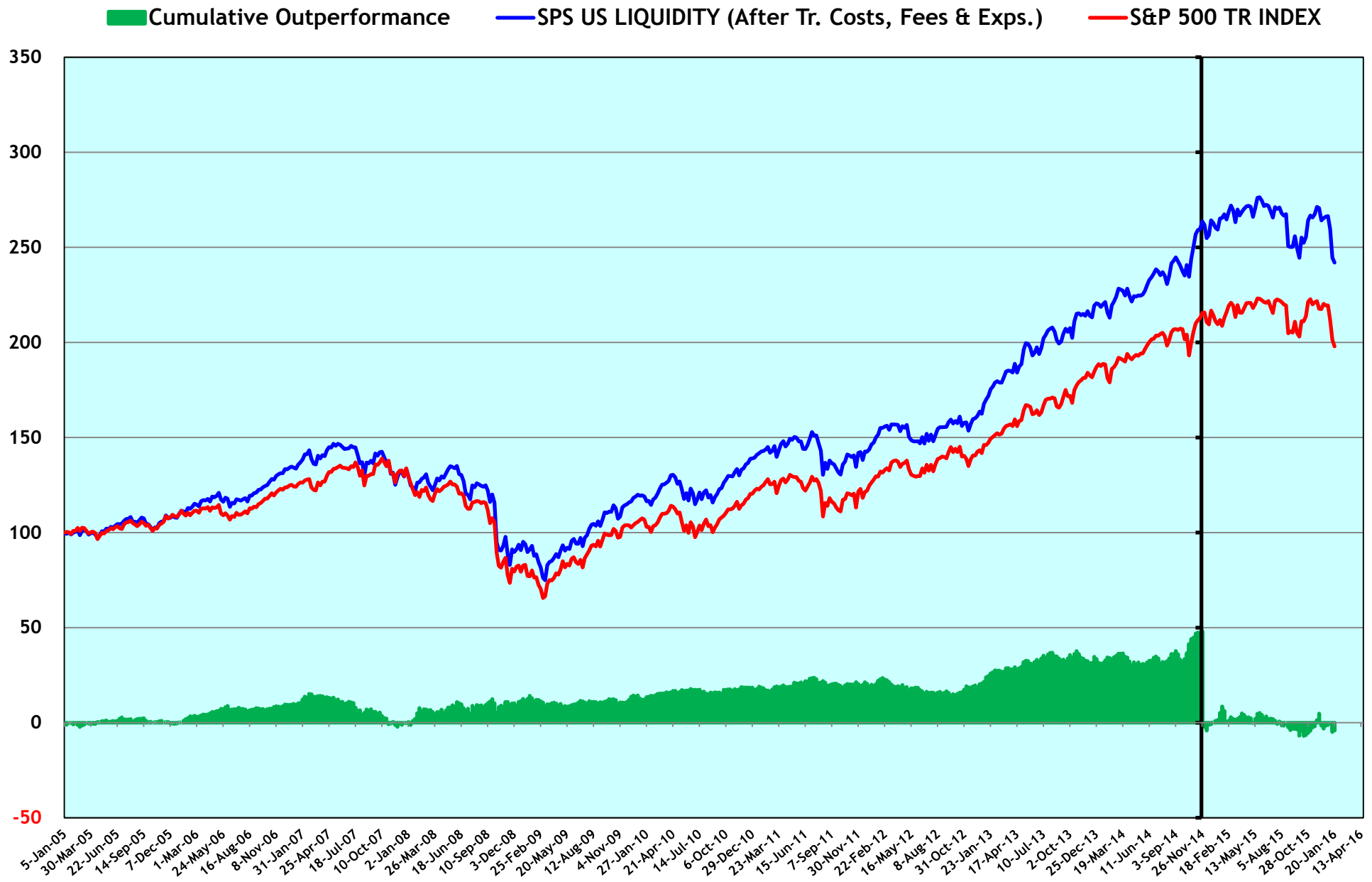
Average Number of Holdings & Annualised Turnover

Holdings :	37	Turnover :	105%

US Quality Smart Portfolio – Drawdowns < -5%

ABSOLUTE DRAWDOWNS	PEAK	VALUE	VALLEY	VALUE	WEEKS	RETURNS	RELATIVE RETURN
Benchmark	2-Mar-05	102.6	20-Apr-05	96.6	7	-5.8%	1.7%
Portfolio		103.8		99.5		-4.2%	
Benchmark	3-Aug-05	106.3	12-Oct-05	100.9	10	-5.1%	2.2%
Portfolio		109.8		106.7		-2.8%	
Benchmark	14-May-06	114.6	14-Jun-06	106.7	4	-6.8%	1.7%
Portfolio		127.3		120.7		-5.1%	
Benchmark	18-Jul-07	136.9	15-Aug-07	124.8	4	-8.9%	2.1%
Portfolio		159.3		148.6		-6.7%	
Benchmark	10-Oct-07	139.0	4-Mar-09	65.6	73	-52.8%	18.8%
Portfolio		163.8		108.2		-34.0%	
Benchmark	17-Oct-12	145.2	14-Nov-12	135.0	4	-7.0%	3.3%
Portfolio		209.7		201.9		-3.7%	
Benchmark	15-Jan-14	188.7	5-Feb-14	179.0	3	-5.2%	1.6%
Portfolio		263.7		254.3		-3.6%	
Benchmark	17-Sep-14	207.2	15-Oct-14	193.1	4	-6.8%	2.6%
Portfolio		294.8		282.3		-4.2%	
Benchmark	20-May-15	223.2	20-Jan-16	197.9	35	-11.3%	3.9%
Portfolio		321.4		297.6		-7.4%	

US Liquidity Smart Portfolio



US Liquidity Smart Portfolio

5-Jan-05	to	26-Nov-14	=	9.89	years

Annualised Performance in Backtest*

	Return	Risk	I. R.
Portfolio*	9.8%	16.7%	0.59
Benchmark	7.7%	17.2%	0.45
Relative*	2.0%	5.8%	0.35

Beta to S&P 500 = 0.91 Beta to Liquidity = 0.42

Performance Attribution

	Target Style	Other Styles	Other Factors	Portfolio Alpha	Portfolio Return
Return	2.0%	6.5%	1.9%	-0.4%	10.0%
Pct	20%	65%	19%	-4%	100%

Average Number of Holdings & Annualised Turnover

Holdings :	37	Turnover :	207%

26-Nov-14	to	20-Jan-16	=	1.15	years

Annualised Performance out of sample*

	Return	Risk	I. R.
Portfolio*	-7.4%	13.5%	-0.55
Benchmark	-7.4%	13.8%	-0.53
Relative*	-0.1%	5.9%	-0.01

Beta to S&P 500 = 0.89 Beta to Liquidity = 0.17

Performance Attribution

	Target Style	Other Styles	Other Factors	Portfolio Alpha	Portfolio Return
Return	0.3%	8.8%	-14.2%	-2.1%	-7.2%
Pct	-4%	-122%	196%	30%	100%

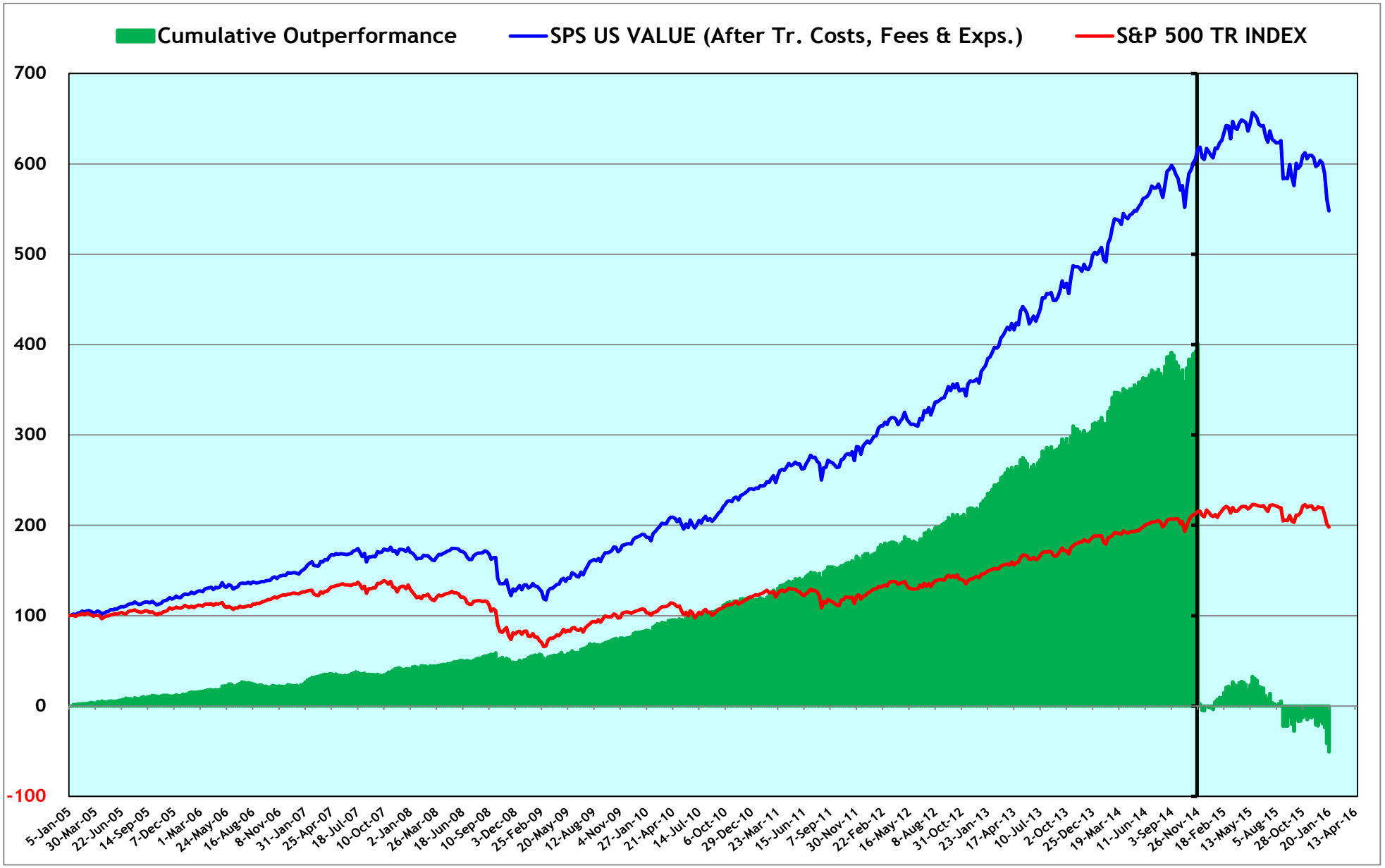
Average Number of Holdings & Annualised Turnover

Holdings :	36	Turnover :	210%

US Liquidity Smart Portfolio – Drawdowns < -5%

ABSOLUTE DRAWDOWNS	PEAK	VALUE	VALLEY	VALUE	WEEKS	RETURNS	RELATIVE RETURN
Benchmark	2-Mar-05	102.6	20-Apr-05	96.6	7	-5.8%	1.8%
Portfolio		101.1		97.0		-4.0%	
Benchmark	3-Aug-05	106.3	12-Oct-05	100.9	10	-5.1%	-1.6%
Portfolio		108.2		101.0		-6.7%	
Benchmark	14-May-06	114.6	14-Jun-06	106.7	4	-6.8%	0.7%
Portfolio		120.9		113.5		-6.1%	
Benchmark	18-Jul-07	136.9	15-Aug-07	124.8	4	-8.9%	-1.3%
Portfolio		144.8		130.0		-10.2%	
Benchmark	10-Oct-07	139.0	4-Mar-09	65.6	73	-52.8%	6.3%
Portfolio		142.5		76.2		-46.5%	
Benchmark	17-Oct-12	145.2	14-Nov-12	135.0	4	-7.0%	2.4%
Portfolio		161.0		153.6		-4.6%	
Benchmark	15-Jan-14	188.7	5-Feb-14	179.0	3	-5.2%	1.9%
Portfolio		220.1		213.0		-3.2%	
Benchmark	17-Sep-14	207.2	15-Oct-14	193.1	4	-6.8%	4.4%
Portfolio		240.4		234.5		-2.5%	
Benchmark	20-May-15	223.2	20-Jan-16	197.9	35	-11.3%	-1.0%
Portfolio		276.1		242.0		-12.3%	

US Value Smart Portfolio



US Value Smart Portfolio

5-Jan-05	to	26-Nov-14	=	9.89	years

Annualised Performance in Backtest*

	Return	Risk	I. R.
Portfolio*	18.3%	13.6%	1.34
Benchmark	7.7%	17.2%	0.45
Relative*	10.6%	7.0%	1.50

Beta to S&P 500 = 0.73 Beta to Value = 1.25

Performance Attribution

	Target Style	Other Styles	Other Factors	Portfolio Alpha	Portfolio Return
Return	12.3%	6.5%	3.1%	-3.4%	18.5%
Pct	66%	35%	17%	-18%	100%

Average Number of Holdings & Annualised Turnover

Holdings :	38	Turnover :	46%

26-Nov-14	to	20-Jan-16	=	1.15	years

Annualised Performance out of sample*

	Return	Risk	I. R.
Portfolio*	-10.2%	12.5%	-0.81
Benchmark	-7.4%	13.8%	-0.53
Relative*	-2.8%	5.2%	-0.54

Beta to S&P 500 = 0.84 Beta to Value = 0.49

Performance Attribution

	Target Style	Other Styles	Other Factors	Portfolio Alpha	Portfolio Return
Return	4.0%	7.2%	-13.9%	-7.2%	-10.0%
Pct	-40%	-73%	140%	73%	100%

Average Number of Holdings & Annualised Turnover

Holdings :	37	Turnover :	121%

US Value Smart Portfolio – Drawdowns < -5%

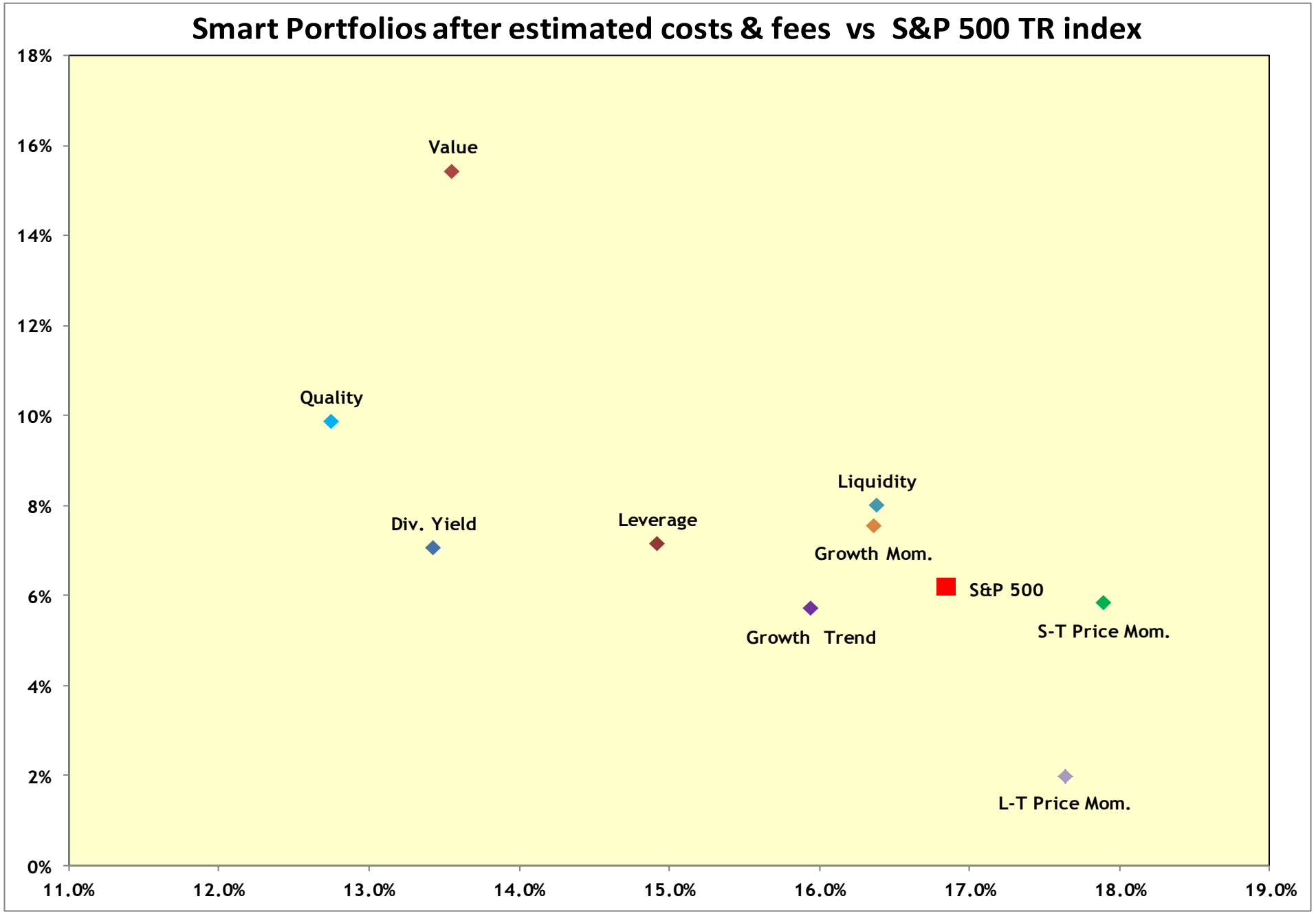
ABSOLUTE DRAWDOWNS	PEAK	VALUE	VALLEY	VALUE	WEEKS	RETURNS	RELATIVE RETURN
Benchmark	2-Mar-05	102.6	20-Apr-05	96.6	7	-5.8%	2.7%
Portfolio		105.2		101.9		-3.2%	
Benchmark	3-Aug-05	106.3	12-Oct-05	100.9	10	-5.1%	2.0%
Portfolio		115.2		111.8		-3.0%	
Benchmark	14-May-06	114.6	14-Jun-06	106.7	4	-6.8%	1.5%
Portfolio		136.4		129.2		-5.3%	
Benchmark	18-Jul-07	136.9	15-Aug-07	124.8	4	-8.9%	0.4%
Portfolio		174.3		159.5		-8.5%	
Benchmark	10-Oct-07	139.0	4-Mar-09	65.6	73	-52.8%	21.2%
Portfolio		173.7		118.7		-31.6%	
Benchmark	17-Oct-12	145.2	14-Nov-12	135.0	4	-7.0%	3.1%
Portfolio		357.1		343.0		-3.9%	
Benchmark	15-Jan-14	188.7	5-Feb-14	179.0	3	-5.2%	2.6%
Portfolio		503.9		491.2		-2.5%	
Benchmark	17-Sep-14	207.2	15-Oct-14	193.1	4	-6.8%	0.7%
Portfolio		588.2		551.9		-6.2%	
Benchmark	20-May-15	223.2	20-Jan-16	197.9	35	-11.3%	-5.2%
Portfolio		656.7		548.0		-16.5%	

Smart Portfolios - Summary

- The results for the other five Smart Portfolios are available for anyone interested in seeing them
- The main point to note is that they do what it says on the tin; subject to the obvious limitations of being long-only, these Smart Portfolios do a much better job of delivering the performance of the Style factors than most Smart Beta ETFs
- The Performance Attribution analyses show that the Style factor return was a major contributor to the overall performance, albeit with contributions from other factors and the portfolio alpha
- We would need to create Long-Short Smart Portfolios to minimise the other return contributions

Smart Portfolios - Results

	SMART PORTFOLIO RETURNS								
	Value	Quality	Div. Yield	Liquidity	Growth Mom.	Leverage	Growth Trend	S-T Price Mom.	L-T Price Mom.
Min	-15.22	-12.13	-16.19	-19.82	-17.38	-14.22	-16.16	-13.78	-15.94
Max	8.19	7.72	10.14	10.07	8.80	8.90	8.64	9.14	11.63
Return p.a.	15.41	9.86	7.05	7.99	7.55	7.14	5.69	5.83	1.99
Risk p.a.	13.56	12.75	13.43	16.38	16.36	14.92	15.95	17.90	17.63
Ratio	1.137	0.773	0.525	0.488	0.461	0.478	0.357	0.326	0.113


Smart Portfolios after estimated costs & fees vs S&P 500 TR index
18%
16%
14%
12%
10%
8%
6%
4%
2%
0%
11.0%
12.0%
13.0%
14.0%
15.0%
16.0%
17.0%
18.0%
19.0%
Value
Quality
Div. Yield
Leverage
Liquidity
Growth Mom.
S&P 500
Growth Trend
S-T Price Mom.
L-T Price Mom.

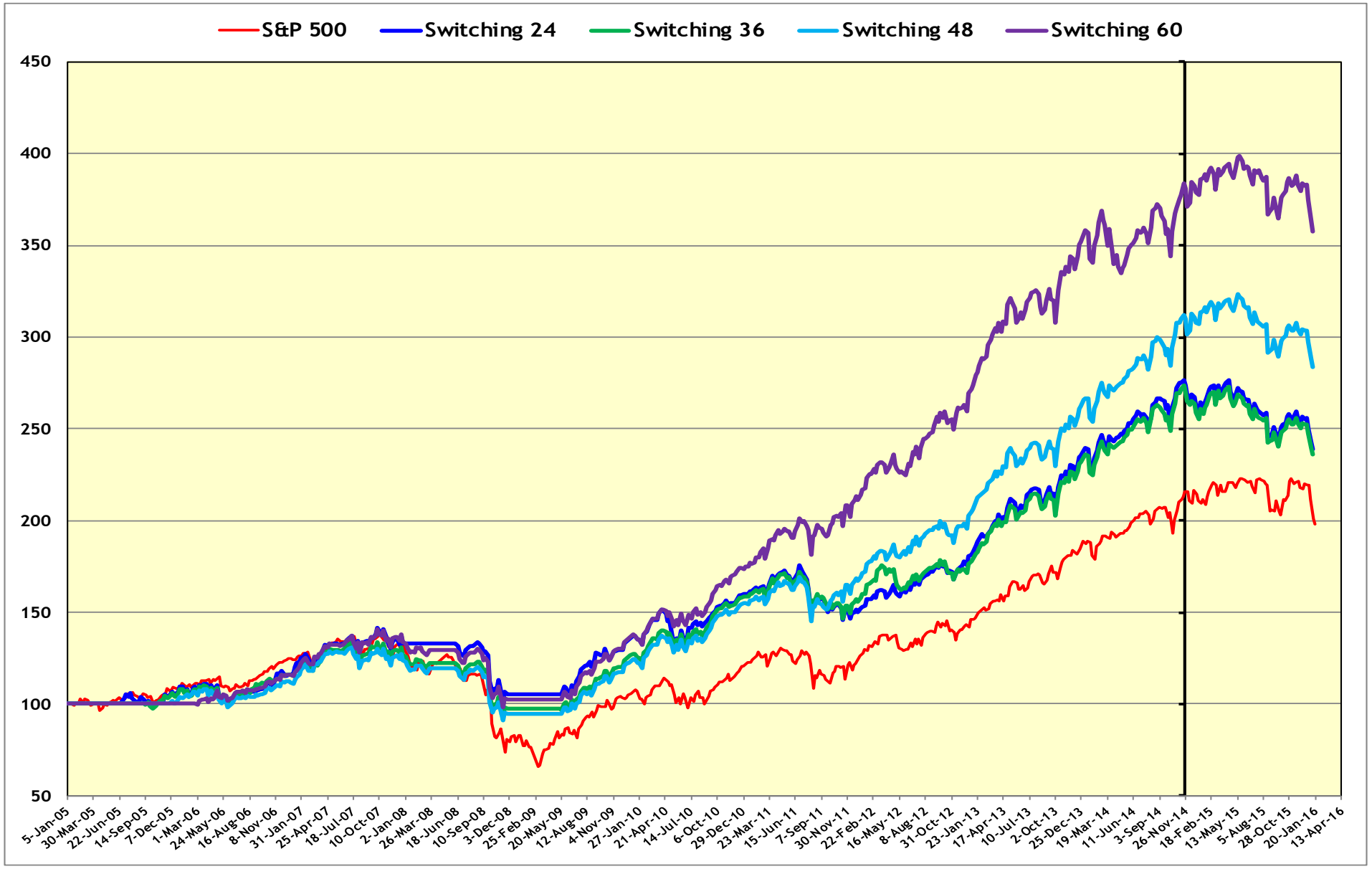
Dynamic Switching between Smart Portfolios

- Each of the Smart Portfolios provides exposure to a particular Style factor, and most of them have out-performed the S&P 500
- There are two underlying rationales for Smart Beta funds
  - Style factor premia are positive, *on average*, over long time periods
  - They tend to persist for relatively long periods, until they stop working
- Investors often talk of periods when "Value is working", for example, or when "Value is out of favour" (as it is currently!)
- We also note that some Style factors are negatively correlated: Value, Quality & Long Momentum being cited most often
- This suggests a dynamic switching strategy between the Smart Portfolios may be able to generate better overall performance

Dynamic Switching Methodology

- The Smart Portfolios are rebalanced every 12 weeks
- We are looking for persistence in the Style factor premia, as proxied by the corresponding Smart Portfolios
- Rather than simply use the portfolio returns, we use Sharpe ratios, which also take the portfolio risks into account
- We first calculate the Sharpe ratios every 12 weeks
- We then derive a Consistency measure, based on a time-weighted average of the Sharpe ratios over some number of past periods, divided by their standard deviation
- We looked at Consistency measures based on 24 weeks, 36 weeks, 48 weeks and 60 weeks (2, 3, 4 and 5 rebalances)

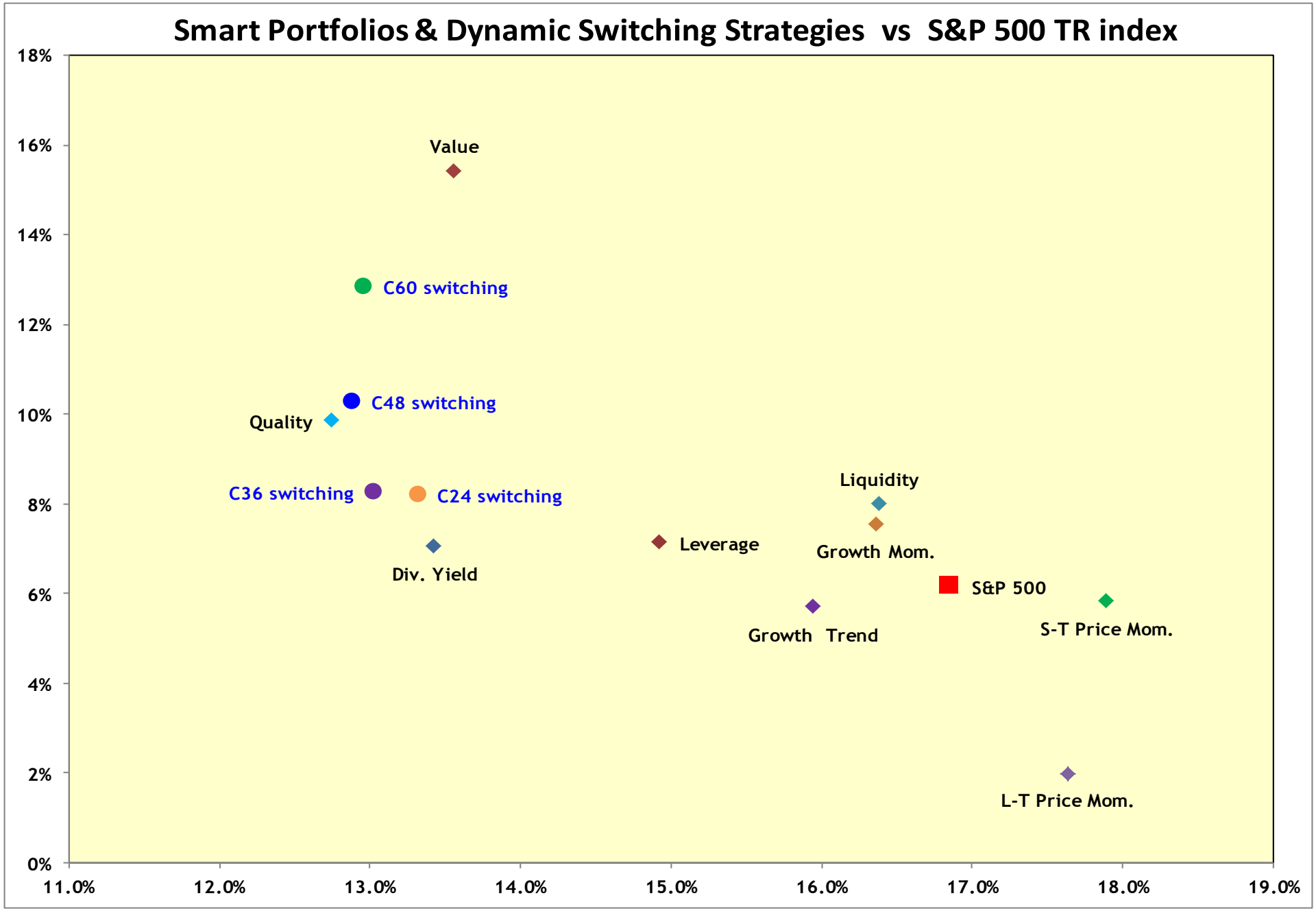
Dynamic Switching Results - 1



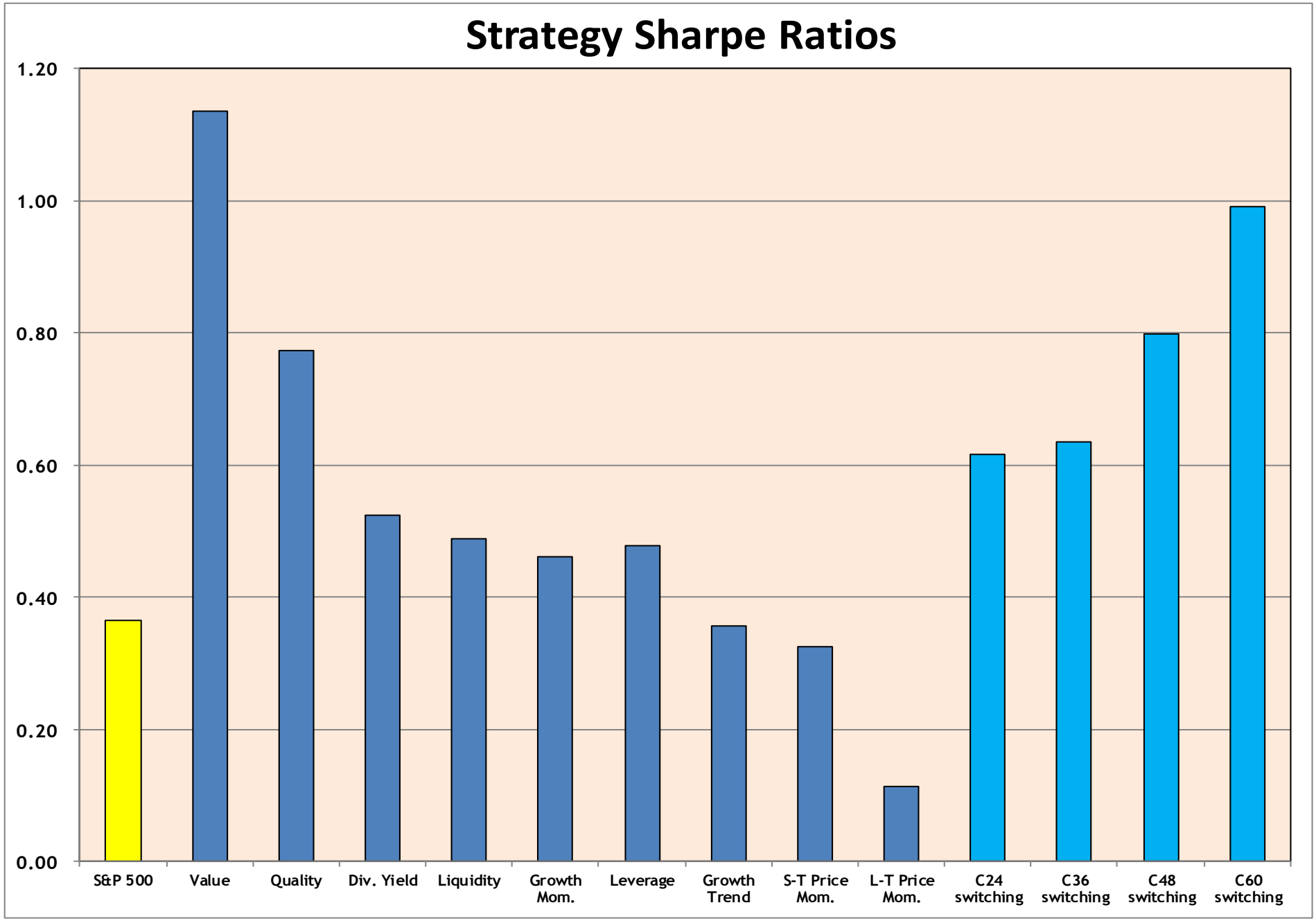
Dynamic Switching Results - 2

Dynamic Switching	S&P 500	C24 switching	C36 switching	C48 switching	C60 switching
Minimum	-16.37%	-12.13%	-12.13%	-12.13%	-12.13%
Maximum	9.67%	6.40%	5.78%	5.78%	5.68%
Return p.a.	6.80%	8.21%	8.27%	10.28%	12.85%
Risk p.a.	16.80%	13.32%	13.03%	12.88%	12.96%
Sharpe Ratio	0.405	0.617	0.635	0.798	0.992

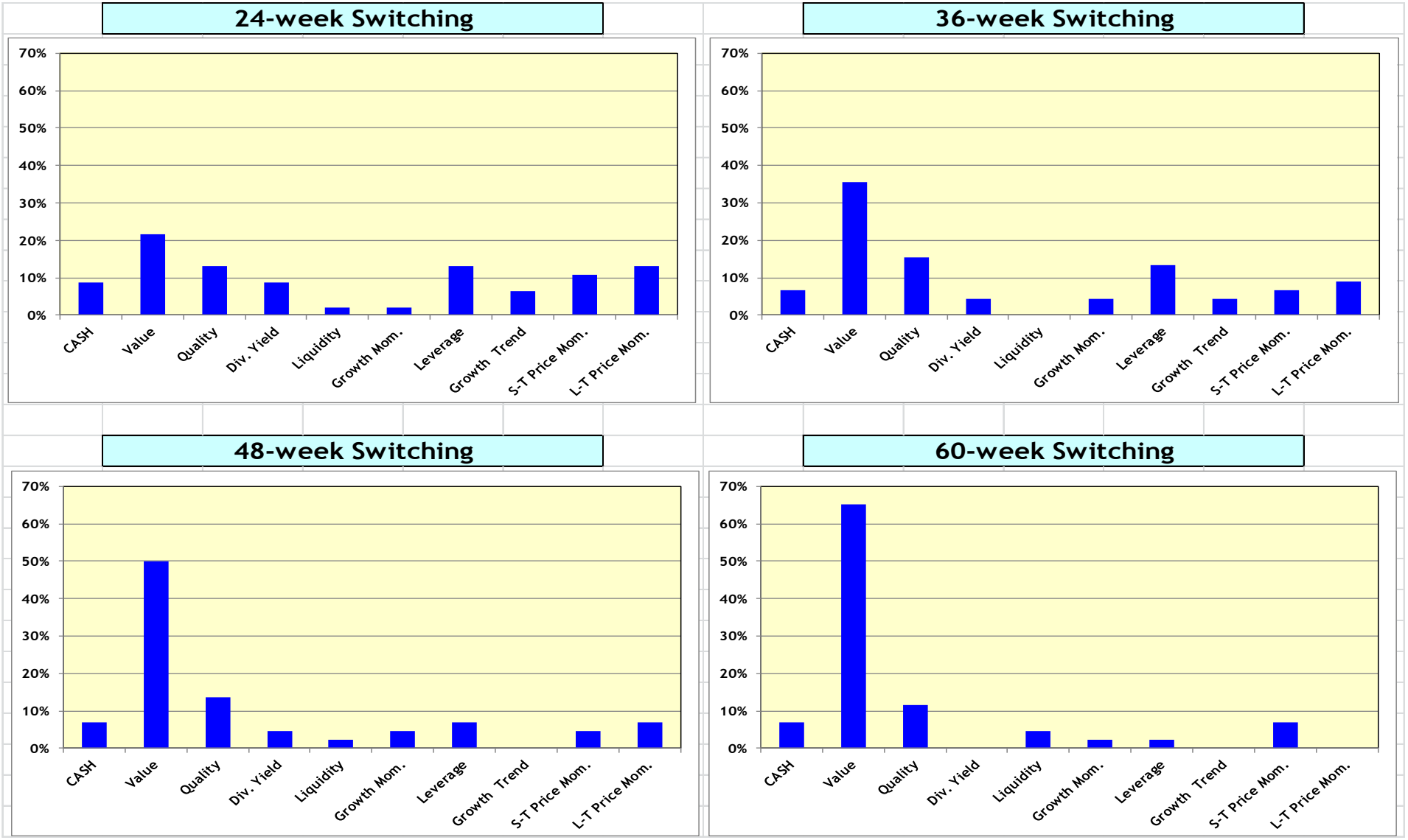
Smart Portfolios & Dynamic Switching Strategies vs S&P 500 TR index



Strategy Sharpe Ratios



Time Spent in each Smart Portfolio as %



Dynamic Switching between Smart Portfolios

- The Smart Portfolios are simply Smart Beta Style portfolios, built using Markowitz' idea of efficient portfolios
- The 12-week rebalancing strategy is designed to maximise exposure to the particular Style, while minimising exposure to other factors as far as possible, given the long-only constraint
- The Dynamic Switching algorithm is also rules-based; there is no judgement or human interference involved
- Each of the Smart Portfolios will have periods when they underperform, and periods when they outperform
- Based on the belief that Style factor returns tend to persist, the Dynamic Switching algorithm is able to generate better returns with lower risk than most of the individual Smart Portfolios

A Philosophical Conclusion

- Active management adds value for investors in **two** ways
  - Stock Selection
  - Portfolio Construction
- Most fund managers spend most of their time and resources on Stock Selection, and very little on Portfolio Construction
- Most existing Smart Beta ETFs are a pervasive case in point
  - Their focus is entirely on Stock Selection, while their Portfolio Construction is usually cap-weighted or equal-weighted
- We can do better than this!