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Trend Following and Momentum Strategies for Global REITs

Executive Summary. In this study, we investigate whether the risk-adjusted returns of a global REIT portfolio would be enhanced by adopting a trend following global strategy (which is an absolute concept sometimes known as absolute momentum), a momentum-based strategy (which is a relative concept and requires individual country allocations), or indeed a combination of the two. We examine the results in terms of both a dedicated global REIT exposure, and the impact on a multi-asset portfolio. We find that the main improvements arise when the broad index is replaced with one of the four trend following strategies. The portfolios deliver similar returns but volatility is reduced by up to a quarter to the 8%–9% range, the Sharpe ratios increase by 0.1 to 0.5 with the main benefit being the reduction in the maximum drawdown to under 30% compared to 43% when the broad index was used. We thus find that a combined momentum and trend following a global REIT strategy can be beneficial for both a dedicated REIT portfolio and adding REITs to a multi-asset portfolio.

Alex Moss
Andrew Clare
Steve Thomas
James Seaton

The nature of the benefit of adding real estate investment trusts (REITs) to a multi-asset portfolio has been widely researched (Lee and Stevenson, 2005), with recent evidence (Lee, 2010) confirming that both the benefit (be it return enhancement, diversification, or risk reduction) and the size of the impact are time-variant. Studies on the impact of adding listed real estate to a direct portfolio (Moss and Farrelly, 2014) have shown that there is a positive return enhancement, and that the relative risk contribution of listed real estate is lower than expected. However the majority of studies have adopted a "buy and hold" strategy for adding listed real estate to a multi-asset portfolio. We add to these findings by asking rather different questions: firstly, in a multi-asset global portfolio comprising equities, bonds, commodities and property, and employing simple rule-based asset allocation methods, what role would property play? Secondly, pursuing a momentum investment strategy across all four asset classes, is there a significant and time-varying role for the regional REITs indices? This strategy genuinely involves only past data and has no look back bias often associated with mean variance comparisons, which form forecasts based on perfect foresight. Thirdly, we move on from using passive REIT strategies to construct investment strategies using a set of country REITs and apply trend following and

momentum strategies to create portfolios with superior investment performance.

Following the market dislocation in the global financial crisis of 2007–2009, the key risk variable (after liquidity) that a number of practitioners started to focus on was maximum drawdown, and how to minimize it without sacrificing returns. Maximum drawdown is defined here to be the maximum possible loss suffered by an investor over a particular calendar period who purchased the asset at the highest possible price and sold at the subsequent lowest price. This class of risk measure actually has a long history of both practical and theoretical importance dating from Roy (1952). The prospect of losing several years (or even decades) of value accumulation in a brief period meant that attention turned to strategies that could minimize the full loss crystallized in a buy and hold strategy. The two most obvious strategies that could be applied to REITs are momentum and trend following.

The classic equity strategy highlighted by Jegadeesh and Titman (1993) involves buying the "winners" over the past 6–12 months and selling the "'losers" over the same period. This is frequently referred to as cross-sectional momentum, or relative momentum by Antonacci (2012). Studies by Erb and Harvey (2006) and Miffre and Rallis (2007) demonstrate the effectiveness of this approach within commodity markets. In our context, we rank the past performance of individual country REITs and form portfolios of the best performing assets: this is our "momentum property portfolio."

An alternative type of momentum investing is where one is interested only in the direction of prices or returns rather than how they fare against their peer group. This type of activity is known as trend following (other names include time series momentum and absolute momentum) and is frequently used by commodity trading advisors (CTAs) (Szakmary, Shen, and Sharma, 2010). As examples, trend following rules may use the current price relative to a moving average (Faber, 2007), or the length of time that excess returns have been positive over a range of timeframes (Hurst, Ooi, and Pedersen, 2012). The aim is always to trade in the direction of the prevailing price (i.e., when prices are rising long positions are taken and when prices are falling then cash or short positions are taken).

Evidence for the effectiveness of trend following strategies has been presented by Faber (2007), ap Gwilym, Clare, Seaton, and Thomas (2010), and Moskowitz, Ooi, and Pedersen (2011), amongst others. Clare, Seaton, Smith, and Thomas (2012) demonstrate that when relative momentum is compared to trend following it is the latter that provides by far the more impressive investment performance enhancement for a variety of asset classes. A few researchers have considered combining relative momentum with other established equity strategies such as value. Asness (1997) observes that momentum is present in both value and growth stocks in the United States but that the effect is larger in the latter. Similar results are observed by ap Gwilym, Clare, Seaton, and Thomas (2009) in the United Kingdom when momentum is combined with dividend yield. Clare, Seaton, Smith, and Thomas (2014) study a variety of international markets and find that trend following enhances the risk-adjusted returns of both value and growth companies, but particularly for the latter.

Data

We use broad index data for four major asset classes: developed equity (MSCI World Index), global bonds (Citigroup World Government Bond Index), commodities (Bloomberg Commodity Index), and global REITs (EPRA Developed Markets Index). We also use country-level REIT indices (all EPRA): Australia, Belgium, Canada, France, Germany, Hong Kong, Italy, Japan, Netherlands, Norway, Singapore, Sweden, Switzerland, U.K., and U.S. All data used in this paper contain monthly observations for 1991–2014 with values in U.S. dollars. Any returns described are calculated using total return versions of the indices described previously.

Trend Following and Momentum as Investment Strategies: Behavioral Rationale

In 2014, the S&P 500 rose 13.7% yet the average investor in U.S. equity mutual funds made only

5.5%; similarly, the Barclays U.S. Aggregate Bond Index returned just short of 6%, while the average investor in fixed income funds gained 1.16%. Investors in diversified asset allocation funds made 2.24% on average.[1] Over the last 30 years, the S&P 500 has returned an annualized 11.6% against 3.8% for the average equity investor and 2.7% for inflation.

Why is there such a discrepancy? Why have investors fared so badly? After adjusting for active managers' underperformance and fees, they find that the overwhelming driver of the discrepancy is bad timing by investors, particularly during extreme events; for instance, in October 2008, following the Lehman Brothers collapse, the S&P 500 dropped 16.8% but the average investor lost over 24% as they bailed out before the recovery towards the end of the month. Similarly, huge underperformance occurred around the Black Monday crash of October 1987, the Asia crisis of November 1997, and the Russian crisis of 1998, while there was large underperformance in March 2000 when the market did well: investors are most likely to panic at big market turning points. In addition, they give up on market rallies too early, as in 2014.

The above examples and performance data are striking examples of poor decision making by investors and have their foundations in the tenets of behavioral finance. We can see elements of herding, regret, conservatism, and similar behavioral biases in all of these decisions.

So how could investors overcome such biases that destroy investment returns? One way is to use rigid quantitative investment rules that take discretion away from investors and reflect what we know about investor preferences for risk and return. The Dalbar study[2] reports that only about 15% of investors want to "beat the market" but twice that percentage show *extreme* loss aversion: so how can we design investments (and investment strategies) that will avoid such emotional responses as bailing out too early?

Further, the traditional method of asset allocation of 60% in domestic equities and 40% in domestic bonds and, apart from a little rebalancing, holding these positions indefinitely increasingly appears archaic. Aside from the diversification benefits lost by failing to explore alternative asset classes, Asness, Frazzini, and Pedersen (2011) argue that this is a highly inefficient strategy since the volatility of equities dominates the risk in a 60/40 portfolio. Instead they suggest that investors should allocate an equal amount of risk to stocks and bonds, to achieve "risk parity," and show that this has delivered a superior risk-adjusted performance compared to the traditional 60/40 approach to asset allocation. Although, nominal returns have historically been quite low to this strategy, proponents argue that this drawback of constructing a portfolio comprised of risk parity weights can be overcome by employing leverage.

A number of authors have recently looked at ways of combining assets in portfolios using simple rule-based allocation methods and comparing them with mean-variance optimization (MVE) methods (Chaves, Hsu, Li, and Shakernia, 2011; Ang, 2012). Simple rules based on risk parity or equal dollar shares (equal weights) perform surprisingly well and this motivates our portfolio construction results below.

Why Does Trend Following Work?

Trend following strategies work if price trends continue more often than not,[3] but why should such trends continue? Much of our understanding of this is based on the thinking of Tversky and Kahneman (1974) and is related to the behavioral biases involved in under reaction in market prices to new information. If prices initially underreact to either good or bad news, trends tend to continue as prices slowly move to fully reflect changes in fundamental value. These trends may continue further to the extent that investors chase the trend via herding behavior, which can lead to an overreaction in prices beyond fundamental value. Naturally all trends will eventually come to an end as deviations from fair value cannot continue indefinitely. This is the domain of managed futures' investing, and has been applied with some success across many asset classes (Hurst, Ooi, and Pedersen, 2012) with particular success during extreme up and down markets.

The raison d'etre for the existence of trends lies firmly in the area of behavioral finance. A major shift in some fundamental variable driving an asset price is adopted into the market slowly revealing an initial under-reaction to the new information; the trend in price then overextends due to herding effects and finally results in a reversal. Research has linked the initial under-reaction to behavioral features and frictions that slow down the price discovery process. These include anchoring and the disposition effect. Edwards (1968) and Tversky and Kahneman (1974) find that historical data provide a natural anchor for people and their views adjust slowly to new information: anchoring leads to under-reaction to news. Shefrin and Statman (1985) and Frazzini (2006) note that people tend to sell winners too early as they like to realize gains, thus slowing down the rise in price, and they hold losers too long as they wish to avoid realizing losses, hence slowing any downward move in prices.

Of course, once a trend has become established there are a number of features that can extend the trend, including herding and feedback trading and confirmation bias/representativeness. DeLong, Schleifer, and Waldmann (1990) and others argue that when prices start moving up or down for a while then some traders will naturally join the bandwagon and the herding effect will feed on itself; this has been observed with equity analysts' forecasts and mutual fund investors. Tversky and Kahneman (1974) show that people tend to look for information that they already believe and take recent price changes as representative of the future. Hence, more investors join the trend: it becomes self-reinforcing.

Of course eventually prices extend far beyond underlying fundamental value and the trend evaporates: prices may move sideways for a period until new information moves prices once more.

Methodology and Results

Basic Portfolios

We first examine the returns of the individual asset classes. Panel A of Exhibit 1 shows that equities returned 8% per annum with a volatility of nearly 15%. Bonds had a lower return at 5.9% but with a much reduced volatility of 6.6%, this leads to a Sharpe ratio of 0.47, which is the highest of the four asset classes. Commodities had the lowest return at 3.1% and a similar volatility to equities, which resulted in a Sharpe ratio of close to zero. Finally, REITs had the highest return of all assets at 9.4% but also the highest volatility at 18.2%. The Sharpe ratio of 0.36 is very similar to that of equities. Note that equities, commodities, and REITs all experienced drawdowns in excess of 50% during the study period with REITs suffering the largest at 67.2%. Bonds, by contrast, only endured a maximum drawdown of just 9%.

Exhibit 1 | Asset Class Returns with Equally-Weighted and Risk Parity Portfolios Formed using These Assets

	Equity	Bonds	Commodities	REITs
Panel A: Asset Class Returns				
Annualized return (%)	8.00	5.94	3.14	9.38
Annualized volatility (%)	14.77	6.61	14.81	18.22
Sharpe ratio	0.35	0.47	0.02	0.36
Maximum drawdown (%)	53.65	8.96	54.75	67.20
Skew	−0.74	0.12	−0.51	−0.71
	E/B	**E/B/C**	**E/B/R**	**E/B/C/R**
Panel B: Equally-weighted Portfolios				
Annualized return (%)	7.27	6.09	8.17	7.09
Annualized volatility (%)	8.68	9.09	11.17	10.54
Sharpe ratio	0.51	0.36	0.48	0.40
Maximum drawdown (%)	29.22	36.78	44.31	43.31
Skew	−0.52	−0.87	−0.71	−1.00
	E/B	**E/B/C**	**E/B/R**	**E/B/C/R**
Panel C: Risk Parity Portfolios				
Annualized return (%)	6.73	6.25	7.49	6.84
Annualized volatility (%)	7.16	7.54	8.79	8.66
Sharpe ratio	0.54	0.45	0.53	0.46
Maximum drawdown (%)	20.50	25.33	31.69	32.88
Skew	−0.31	−0.52	−0.67	−0.86

Panel B of Exhibit 1 displays the performance of equally-weighted portfolios formed using various combinations of the asset classes. We use the first letter of each asset class to denote its inclusion in the portfolio (e.g., E/B is a portfolio formed using equities and bonds). The E/B portfolio shows a higher risk adjusted return than either of the two asset classes individually but the inclusion of commodities lowers the return and increases the volatility and drawdown. Adding REITs to the portfolios

raises both the return and volatility, with a lower Sharpe ratio in the E/B/R portfolio compared to E/B but a higher Sharpe ratio in the E/B/C/R portfolio compared to the E/B/C portfolio. Maximum drawdowns also rise with the inclusion of REITs.

Panel C of Exhibit 1 reports the performance of four portfolios formed using the risk parity method of asset allocation. Following the method of Asness, Frazzini, and Pedersen (2011), portfolio weights are proportional to the inverse of observed volatility. More specifically, we calculate the asset class volatilities using one year's worth of data, and then calculate the weights from these volatilities. The process is then repeated at the end of each month. From the summary statistics in Panel A, it is clear that this style of asset allocation is going to lead to higher weightings to bonds given their low volatility. This can be seen visually in Exhibit 2, although all asset classes have a meaningful presence. Our results show that in each of the four risk parity portfolios, a higher Sharpe ratio is achieved and lower maximum drawdown compared to their equally-weighted equivalents. We now examine what happens to the results when we adopt a trend following strategy, a momentum-based strategy, and a combination of the two.

Trend Following Strategies

Trend following has been an investment approach used for many decades, particularly in commodities markets (Ostgaard, 2008). Essentially investors are looking to own assets that are showing rising (positive) trends (returns) and sell assets that are in downward (negative) trends (negative returns, falling prices). A number of researchers have demonstrated the validity of the strategy such as Hurst, Ooi, and Pedersen (2012) in futures markets, Faber (2007) and Clare, Seaton, Smith, and Thomas (2014) in a multi-asset context, and Szakmary, Shen, and Sharma (2008) in commodities. There are a very large number of ways of defining a trend and these have been explored extensively in the investing literature: one can look at today's asset price and compare it with an average of the last 90-, 120-, or 200-day average (so-called "moving averages"), or compare different moving averages to see when (if) they "crossover," or one could simply ask if recent (however defined) returns are positive. Clare, Seaton, Smith, and Thomas (2013) investigate a very wide range of such technical rules for investing in the S&P 500 for most of the twentieth century and conclude that very simple trend following investing rules are at least as good as, if not superior to, more complex rules. To this end, we adopt the straightforward but robust rule outlined below, which has been applied successfully in many asset classes, countries, and time periods (Faber, 2007).

Hence we adopt the simple rule used by Faber (2007), which has also been extensively tested and discussed in Clare, Seaton, Smith, and Thomas (2013). This rule states that if the price of the asset class index is above its 10-month moving average (i.e., the average of the previous 10-months' last trading day's closing price), then we classify the asset class as in an uptrend and it is purchased, if not already held. However, if the price is below the 10-month moving average, then the asset is classified as in a downtrend and the asset is sold, with the proceeds invested in U.S. Treasury bills. Signals are determined on an end-of-month basis. Consistent with Faber (2007), no short-selling is permitted and no transactions costs are deducted. As mentioned above, Clare, Seaton, Smith, and Thomas (2013) examine whether more complex technical trading rules, stop-losses or more frequent trading would improve performance but they show conclusively that this is not the case.

Panel A of Exhibit 3 shows the effect of applying trend following to each of the individual asset classes. Higher returns are observed for equities, commodities, and REITs compared to their standard counterparts with only bonds exhibiting a lower value. The most apparent difference is in the volatility levels. The addition of the trend following methodology sees the volatility reduced by close to a third for equities, commodities, and REITs with a reduction of around 10% for bonds. This leads to much improved Sharpe ratios for all asset classes with the exception of bonds. We also observe that drawdowns are substantially reduced through the application of trend following with REITs having a maximum value of just 16.8% compared to 67.2%

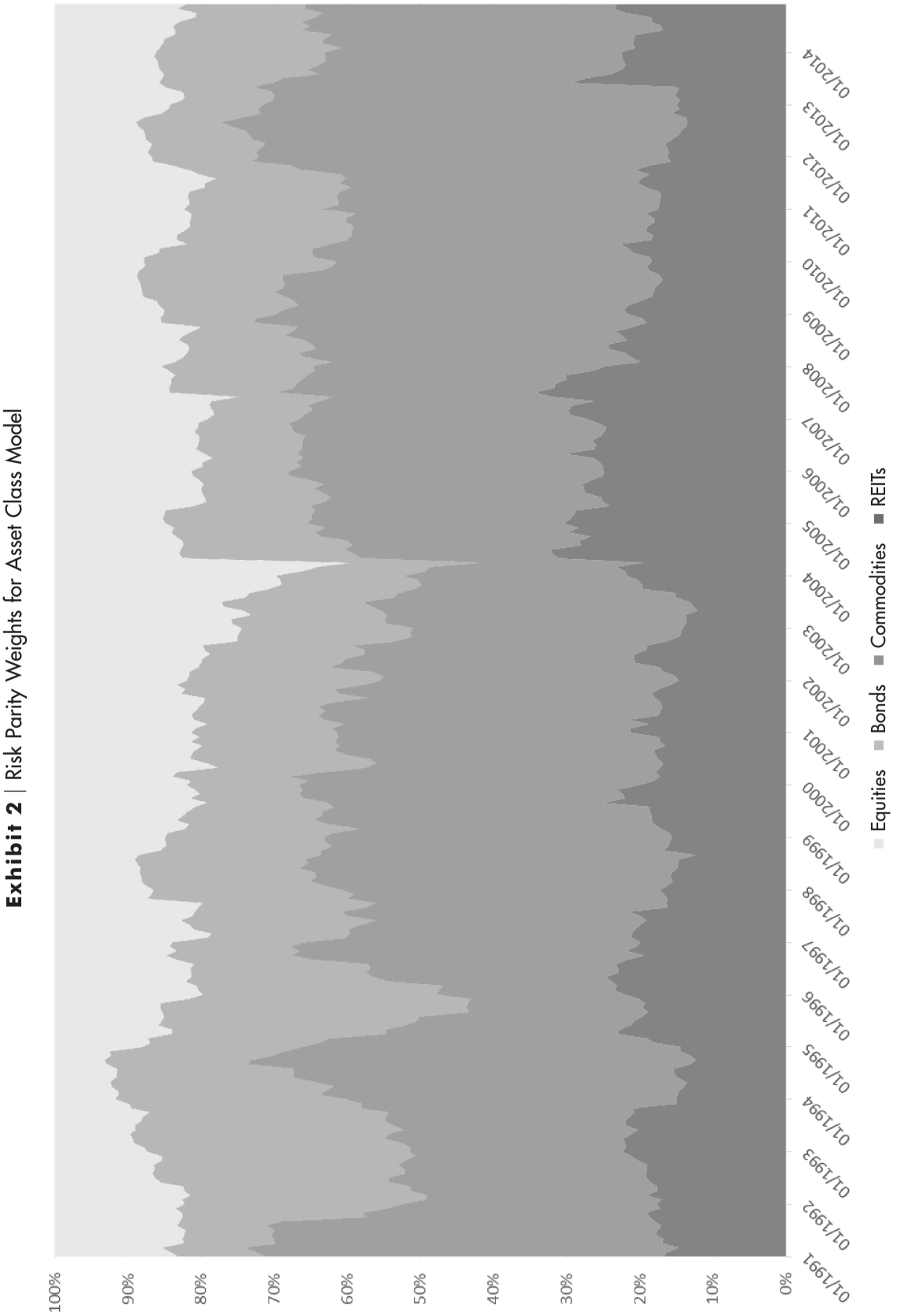

Exhibit 2 | Risk Parity Weights for Asset Class Model

Exhibit 3 | Trend Following Asset Class Returns with Equally-Weighted and Risk Parity Portfolios Formed using these Assets

	Equity	Bonds	Commodities	REITs
Panel A: Asset Class Returns				
Annualized return (%)	9.52	5.13	4.61	9.85
Annualized volatility (%)	10.00	5.91	10.63	12.01
Sharpe ratio	0.67	0.39	0.17	0.58
Maximum drawdown (%)	14.10	12.43	31.31	16.84
Skew	−0.55	0.07	−0.26	−0.05
	E/B	**E/B/C**	**E/B/R**	**E/B/C/R**
Panel B: Equally-weighted Portfolios				
Annualized return (%)	7.46	6.65	8.38	7.56
Annualized volatility (%)	6.19	5.99	7.11	6.43
Sharpe ratio	0.74	0.63	0.78	0.73
Maximum drawdown (%)	6.94	11.56	7.39	11.13
Skew	−0.30	−0.17	−0.14	−0.13
	E/B	**E/B/C**	**E/B/R**	**E/B/C/R**
Panel C: Risk Parity Portfolios				
Annualized return (%)	6.71	6.39	7.38	6.93
Annualized volatility (%)	5.57	5.39	6.12	5.72
Sharpe ratio	0.69	0.66	0.74	0.71
Maximum drawdown (%)	8.22	8.12	7.01	8.38
Skew	−0.09	−0.01	−0.30	−0.23

without the filter. There is a tendency towards less negative skewness also. These results are consistent with prior research in this area (e.g., Clare, Seaton, Smith, and Thomas, 2012).

Throughout our sample period, government bonds are largely in a bull market. Interest rates decline substantially in many developed markets and are now close to zero. The gradual decline in rates (appreciation in bond prices) has been in marked contrast to the volatility experienced in equity, commodity, and real estate markets. The study period contains both the dot-com collapse and the recent financial crisis. These exceptional times offer periods when trend following can deliver substantial outperformance. Greyserman and Kaminski (2014) describe the notion of "crisis alpha" and demonstrate that trend following can realize excess returns during periods of market turmoil. In the case of this paper, the outperformance is captured through harboring in the safe haven of Treasury bills during periods of low returns and high volatility.

Panel B of Exhibit 3 displays the same set of equally-weighted portfolios as Exhibit 1. Every portfolio benefits from trend following with a small gain in return and a substantial reduction in volatility and maximum drawdown. This in turn leads to improvements in Sharpe ratios of between 0.23 (E/B) and 0.33 (E/B/C/R). Panel C of Exhibit 3 reports the performance of the trend following risk parity portfolios. Returns are largely unchanged between these and the standard equivalents in Exhibit 1. This is due to the larger bond weighting of these portfolios and the accompanying reduced trend following benefit. Volatility is once again reduced though, resulting in Sharpe ratio improvements of between 0.15 (E/B) and 0.25 (E/B/C/R). In every portfolio, maximum drawdown is reduced to single figures, ranging between 7.0% and 8.4%. This compares to a range of 20.5% to 32.9% for the standard portfolios.

Momentum-based Strategies

A rather different way to approach the contribution of property to a multi-asset portfolio is described by Clare, Seaton, Smith, and Thomas (2012). The approach allows a flexible selection of the best performing assets from a range of individual regional (or equivalent) indices over a certain calendar time. We select the best risk-adjusted performing *n*-asset subgroup using the previous 12 month's performance. The ranking takes place after dividing by the 12-month volatility for the asset: this is done to avoid the highly volatile asset classes jumping in and out of chosen portfolios (Ilmanen, 2011). These chosen indices form an equally-weighted portfolio that is held for one month before being recalibrated. In addition, a trend following overlay is used (as defined earlier, namely if the current price is above or below a 10-month average) so that if a chosen index is in a downward trend, then that portion is moved into cash. This is called the flexible multi-asset momentum portfolio with trend following.

Clare, Seaton, Smith, and Thomas (2012) demonstrate that the flexible method of allocation provides a substantial increase in risk-adjusted returns, along with lower drawdowns compared to traditional investing methods. They paper report the asset allocation over time for a universe of 95 indices (of

which 13 are REITs) with REITs making a meaningful contribution to the performance with an average weighting of over 10% in the flexible portfolio.

Individual Country REIT Allocations

Above we have largely considered REITs as a single asset represented by a global index. We now examine whether improvements can be made by disaggregating the asset class into the 15 individual country indices. Exhibit 4 shows the results of forming both equally-weighted and risk parity portfolios based on the country-level data. We observe that returns are somewhat lower at 8.2% (EW) and 8.6% (RP) compared to the index at 9.4%. Volatility is also a little lower, giving a Sharpe ratio for the risk parity portfolio of the 0.36, which is the same as the index. The equally-weighted portfolio had a slightly lower Sharpe ratio at 0.31.

The momentum effect of buying winners and selling losers has been well established in the financial literature by, amongst others, Jeegadeesh and Titman (1993, 2001). We now examine momentum in a REIT context using 15 countries. Remaining consistent with our earlier results, we eschew short selling and thus look to hold portfolios of winners (plus cash where appropriate). Standard momentum calculations have involved calculating the return of assets of a prior period of time and ranking them accordingly. Ilmanen (2011) makes the case for adjusting momentum rankings to take account of the volatility of each asset. It is argued that without this consideration, the most volatile assets spend a disproportionate amount of time in the top and bottom momentum ranking categories. We follow this approach by calculating volatility-adjusted momentum rankings by dividing the prior 12-month total return by the realized volatility over the same period and then ranking in the traditional fashion with rebalancing taking place monthly.

Exhibit 5 shows the results of the volatility-adjusted momentum strategy with portfolios formed based on the Top 3 and Top 5 in the rankings. There is a substantial increase in return at 11.5% (Top 3) and 10.6% (Top 5) compared to the 8.2% returned by the equally-weighted portfolio in Exhibit 4 and the 9.4% of the broad index in Exhibit 1. Volatility is slightly lower for the momentum portfolios than the equally-weighted portfolio and slightly higher than the risk parity version. Overall, Sharpe ratios of 0.52 (Top 3) and 0.47 (Top 5) are an improvement on the portfolios that always contain all 15 countries.

At this point we emphasize the distinction between trend following and momentum. The former is an absolute concept. For instance, it is entirely possible that all of the individual REIT indices are in an uptrend (or downtrend) at the same time. Momentum, by contrast, is a relative concept. If all the indices have negative returns over the past 12 months, the winners are the ones that have lost the least. It is quite likely that in such a case the winners are actually in downtrends as defined by the trend following rule. Clare, Seaton, Smith, and Thomas (2014) demonstrate that when trend following and momentum strategies are compared, it is the *former* that shows the highest risk-adjusted returns, although the latter often has the highest unadjusted returns. They also show, along with Faber (2010), ap Gwilym et al. (2010), and Antonacci (2012) that com-

Exhibit 4 | Equally-Weighted and Risk Parity Portfolios Formed using Individual Country REITs

	Equally-Weighted	Risk Parity
Annualized return (%)	8.24	8.61
Annualized volatility (%)	17.40	16.00
Sharpe ratio	0.31	0.36
Maximum drawdown (%)	65.72	61.30
Skew	−0.51	−0.74

Exhibit 5 | 12-Month Volatility-Adjusted Momentum Portfolios Formed using Individual Country REITs

	Top 3	Top 5
Annualized return (%)	11.48	10.55
Annualized volatility (%)	16.45	16.29
Sharpe ratio	0.52	0.47
Maximum drawdown (%)	55.45	57.62
Skew	−0.78	−0.73

Exhibit 6 | Trend Following Overlays to Portfolios Formed using Individual Country REITs

	Equally-Weighted	Risk Parity	Mom Top 3	Mom Top 5
Annualized return (%)	9.58	9.98	11.39	10.69
Annualized volatility (%)	8.73	8.21	13.35	12.64
Sharpe ratio	0.77	0.87	0.64	0.62
Maximum drawdown (%)	10.62	9.32	19.50	18.66
Skew	−0.04	−0.04	−0.09	−0.07

Exhibit 7 | Adding REIT Strategies to Equally-Weighted Portfolios of Equities, Bonds, and Commodities

	EW	RP	Mom3	Mom5	TF EW	TF RP	TF Mom3	TF Mom5
Annualized return (%)	6.77	6.83	7.58	7.33	7.03	7.13	7.54	7.35
Annualized volatility (%)	10.51	10.22	9.97	10.11	8.15	8.07	8.87	8.91
Sharpe ratio	0.37	0.39	0.47	0.44	0.51	0.53	0.53	0.50
Maximum drawdown (%)	42.48	41.71	38.79	39.74	28.75	28.84	28.85	29.48
Skew	−0.95	−1.03	−1.09	−0.97	−0.64	−0.63	−0.52	−0.43

bining the two methods can deliver higher risk-adjusted returns than either approach individually.

Combination Strategies

Exhibit 6 reports the performance of applying the trend following rule described earlier to the four strategies previously detailed in Exhibits 4 and 5. In the case of the momentum portfolios, if the asset is classed as a momentum winner, then if the trend is also positive, a long position is taken otherwise that allocation (33.3% in the case of the Top 3 strategy and 20% in the Top 5 strategy) is invested in to Treasury bills. Thus, if all the winners in a momentum strategy are in a downtrend as defined by the trend following rule, then 100% will be invested in Treasury bills for that month. We observe that returns for the equally-weighted and risk parity portfolios are over 1% higher after adopting the trend following filter, while the momentum returns are little changed. As previously highlighted, the addition of trend following reduces volatility considerably with a reduction of around half for the equally-weighted and risk parity portfolios and near 20% for the momentum portfolios. Maximum drawdowns are slashed and Sharpe ratios significantly improved to a high of 0.87 for the risk parity portfolio. Skewness has also become much less negative with values between 0 and −0.1.

Using REIT Strategies in Asset Allocation

We finally consider the effect of using REIT strategies in broader asset allocation. Exhibit 7 shows the performance when each of the eight strategies in Exhibits 4, 5, and 6 is used as a replacement for the broad REIT index in the E/B/C/R equally-weighted portfolio in Exhibit 1. It is observed that returns remain fairly similar to the original portfolio but volatility is now, on average, less than 90% of its previous value. In addition, there is a reduction in the average level of maximum drawdown. We note, however, that the largest benefits come from the inclusion of the four trend following strategies.

Conclusion

We have introduced trend following and momentum investment strategies to a portfolio of global country REITs, observing similar patterns as for other assets (Clare, Seaton, Smith, and Thomas, 2012). We find that there is no appreciable benefit

from utilizing the equally-weighted (EW) and risk parity (RP) strategies but adding the Momentum Top 3 (Mom3) and Momentum Top 5 (Mom5) leads to slightly higher returns and similar volatility. The main improvements are found when the broad index is replaced with one of the four trend following (TF) strategies. All of these portfolios deliver similar returns but volatility is in the 8%–9% range compared to 10.5% for the Exhibit 1 equivalent. Sharpe ratios are around 0.5 compared to 0.4 in the standard portfolio. Consistent with earlier findings, the introduction of the trend following REIT strategies lowers the maximum drawdown experienced by the whole portfolio to under 30% compared to 43% when the broad index is used. We thus find that a combined momentum and trend following global REIT strategy can be beneficial for both a dedicated REIT portfolio and adding REITs in a wider multi-asset context.

While real estate as an asset class is often considered too risky or volatile for many investors, we have shown that by overlaying a liquid vehicle such as a country REIT with a simple trend following removes much of the volatility inherent in the asset class and, along with momentum-based portfolio construction, can offer attractive risk-adjusted returns. Why is this possible? It is because the discipline of rule-based investing such as trend following overcomes the psychologically-based biases we find in behavioral finance, which induce the volatile patterns seen in long only real estate investing.

Endnotes

1. Source: Dalbar's 21st edition of the *Quantitative Analysis of Investor Behaviour*, quoted by John Authers, *Financial Times*, April 23, 2015, p. 30.
2. 2015, again as quoted by Authers.
3. See AQR Understanding Managed Futures, Winter 2010, Hurst, Ooi, and Pedersen.

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Alex Moss, Consilia Capital and Henley Business School, London, W1J 6BD or alex.moss@consiliacapital.com.

Andrew Clare, Centre for Asset Management Research, Cass Business School or a.clare@city.ac.uk.

Steve Thomas, Centre for Asset Management Research, Cass Business School or stephen.thomas.1@city.ac.uk.

James Seaton, Centre for Asset Management Research, Cass Business School or james.seaton@talk21.com.