CTA Trend-Following — This Time is Different?

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Firm Overview

ARP Investments ("ARP") was established in early 2014 and focuses exclusively on providing alternative risk premia products to investors globally. ARP's core investment objective is to generate superior risk-adjusted returns that are uncorrelated with equities and bonds. ARP portfolios are designed to have large capacity through investments in liquid markets. Since inception of live trading in 2014, ARP's products have outperformed hedge funds pursuing related strategies while offering appropriate liquidity, high transparency, and lower fees.

ARP employs a systematic investment process to implement alternative risk premia strategies in futures, currency forwards, and single name equities globally.

ARP chooses alternative risk premia signals based on over 20 years of research and investment experience of its founding partners. Currently, ARP invests in a number of market selection (momentum, valuation, carry, volatility, and others) and security selection (valuation, momentum, event, volatility, and others) risk premia. ARP groups and trades these risk premia in the following strategies: Trend Following, Stock Selection, Equity Event, and Systematic Macro. To best meet client needs, ARP offers combined Multi-Strategy exposures, individual exposures to underlying strategies, and customized strategy combinations.

ARP's founding partners have been pioneers in alternative risk premia investing. ARP has spent 100+ human work years developing a world-class risk premia research and electronic trade execution capability. ARP has developed proprietary models for forecasting factor returns, implementing tactical tilts across factors, and quantifying risks in alternative risk premia portfolios. ARP emphasizes diversified risk and return contributions across signals, asset classes, regions, and securities.

ARP focuses exclusively on risk premia products to avoid internal conflicts with competing products at different fee levels.

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Executive Summary

Recent investor interest in CTA trend-following has been high. Concurrently, over the last 2-3 years, performance of many large CTA funds has been disappointing, in absolute terms and compared to historical returns for the strategy. Is this a case of "This time is different"?

In this paper, we share some of our insights into CTA trend-following, focusing on the environment and performance of CTA trend-following during the last 2-3 years. We demonstrate that there has been an increase in trend shifts across assets, asset classes, and trend horizons. Pinpointing the reasons for this change is beyond the scope of this paper but the transition in the environment coincides with a period of unusual global monetary policy and net asset growth in CTA trend-following and other systematic strategies.

In this challenging environment, ARP's Trend strategy has generated positive returns and materially outperformed the large CTA hedge funds included in the SG Trend Index. ARP has generated these returns through a differentiated and sophisticated investment process with large capacity. ARP's edge is the combination of sophisticated signals, dynamic risk allocation, and efficient trade execution.

We don't know if "This time is different". However, we do know that simple trend-following approaches no longer work in the current environment. CTA funds need to adapt their investment processes to the more frequent changes in trend and market volatility. CTA funds that fail to adapt presumably will continue to underperform.

The large dispersion in recent returns has confirmed that trend following is not a "generic" strategy and that choosing an appropriate manager matters. Especially for funds that can adapt to this new environment, we remain confident about the prospects for CTA trend-following risk premia going forward.

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1. Introduction

Over the last several years, investor interest in CTA trend-following has been high. However, the environment for trend-following strategies has been challenging, as indicated by the low returns for CTA indexes. Much of that challenge has come from trends shifting across assets, asset classes, and signal horizons. We don't know if "This time is different". However, we do know that simple trend-following approaches no longer work in the current environment. CTA funds need to adapt their investment processes to the more frequent changes in trends and market volatility. CTA funds that fail to adapt presumably will continue to underperform. Thus, while investors may hope that the environment will improve, they should also invest in trend-following strategies that can prosper without a change in the environment.

Our research into alternative risk premia, including trend-following, goes back more than 20 years. For a recent example, see Gurnani and Hentschel (2010). Several years ago, we launched alternative risk premia products, including ARP Trend, that allow investors to benefit from these insights directly.

We show that the live performance of the ARP Trend alternative risk premia product has materially exceeded that of the largest CTA hedge funds that constitute the SG Trend index. This is empirical confirmation of our investment philosophy that sophisticated alternative risk premia strategies can outperform high-quality hedge fund portfolios in similar strategies.

We demonstrate that annualized outperformance of ARP Trend 1x and 2x versus the SG Trend Index has been roughly 4% and 10%, respectively, on a risk-adjusted basis. (ARP Investments can customize risk levels for ARP Trend.) These excess returns vastly exceed the fee differentials between our alternative risk premia products and hedge funds and hence must be driven by excess returns gross of fees.

ARP's edge is the combination of sophisticated signals, dynamic risk allocation, and efficient trade execution. ARP's alternative risk premia products are sophisticated systematic investment strategies offered at low, fixed fees. There now exist several competing alternative risk premia products, with more continuing to enter. Initially, some investors considered these products to be "generic". The realized returns for these alternative risk premia have had large dispersion, however, demonstrating that alternative risk premia products come in many different forms.

We argue that deep hedge fund experience, and risk management expertise in particular, is an important ingredient in successful alternative risk premia products. Yet, alternative risk premia products offered by hedge funds are subject to conflicts of interest that should trouble investors. Obviously, a hedge fund manager has incentives to keep the best ideas for the high-fee hedge fund instead of offering them in a lower-fee alternative risk premia product. An obvious way to avoid this conflict is to choose alternative risk premia products from asset managers without competing hedge fund products but with hedge fund experience.

2. Trend-Following Returns

We define the trend-following strategy, at its core, as a collection of sophisticated trend-following signals applied to a large set of diverse, liquid futures contracts, using dynamic risk allocations in order to ensure diversification across signals, contracts, and asset classes. The strategy is long or short different futures contracts at different points in time.

Investors increasingly recognize that such a strategy has attractive returns that have approximately zero correlation with traditional asset returns and exhibit positive convexity.[1] These features allow trend-following exposures to mitigate major portfolio risks while making

[1] Fung and Hsieh (2001) describe and document the positive convexity in trend-following returns. A successful trend-following strategy earns positive returns by being long an asset during periods of rising prices and also earns positive returns by being short the same asset during periods of falling prices. This naturally creates convexity in the returns of the trend-following strategy.

positive return contribution. Many other strategies that offer portfolio insurance require investors to sacrifice returns in normal investment environments.

Historically, investors have invested in trend-following via CTA hedge funds. Some of the largest hedge funds in the world are CTA managers. More recently, firms like ARP Investments have offered trend-following strategies in the form of alternative risk premia with more attractive transparency, liquidity, and fees.

The ARP Trend strategy invests in a diverse set of more than 60 liquid futures contracts across the four major asset classes: commodities, equities, fixed income, and exchange rates. The trades for each contract are driven by a collection of distinct trend-following signals. These signals indicate long positions when recent prices are higher than previous prices and short positions when recent prices are lower than previous prices.[2] The signals estimate price trends using a variety of metrics over different periods, with comparison periods ranging from approximately 1 month to approximately 1 year.

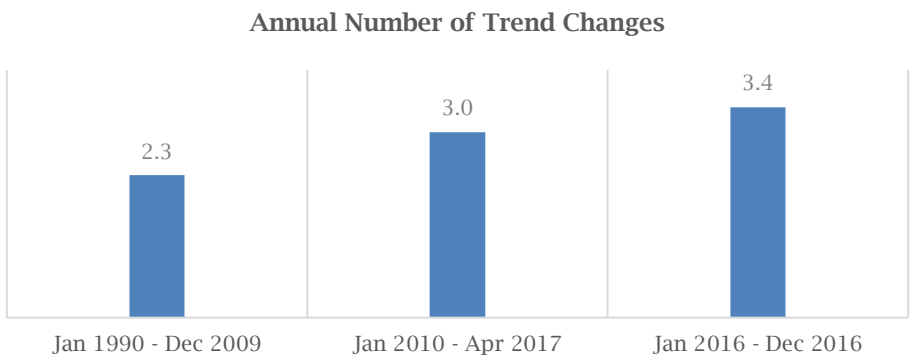
The ARP Trend process sizes these long and short positions using portfolio construction and risk management techniques that consider liquidity, transaction costs, and the volatility of signals, contracts, and asset classes, as well as their correlations. The objective is to maximize returns net of costs within a target risk range while maintaining liquidity and avoiding portfolio concentration in individual signals or contracts.

Recent Performance

Trend-following performance over recent years has been hampered by trends that have shifted more frequently across assets, asset classes, and signal durations. Since 2010, the average duration of trends has shortened. To summarize this effect, we compute the number of times per year trend-following signals switched from long to short or vice versa. We count these switches for a composite signal that blends short-, medium-, and long-term trend signals. Of course, we hold the weights across the signal durations constant.

From 1990 through 2009, trends switched direction an average of 2.3 times per year. Since 2010, trends have switched direction an average of 3.0 times per year. During 2016, the number of direction changes reached 3.4 per year, the highest average for any calendar year since 1990. Figure 1 shows these changes graphically.

Figure 1: Number of Trend Changes Per Year (Simulated Results)



The figure shows the average number of times trend signals changed sign over 3 periods: January 1990 to December 2009, January 2010 to April 2017, and calendar year 2016. The trend signals and their changes are based on a constant blend of short-, medium-, and long-term trend signals.

[2] Due to the expiration of individual futures contracts, we adjust futures prices before comparing them across expiration dates.

These results are based on simulated or hypothetical performance results that have certain inherent limitations. Unlike the results shown in an actual performance record, these results do not represent actual trading. Past performance is not indicative of future results. Commodity interest trading involves substantial risk of loss.

Hypothetical performance results have many inherent limitations, some of which are described below. No representation is being made that any account will or is likely to achieve profits or losses similar to those shown. In fact, there are frequently sharp differences between hypothetical performance results and the actual results subsequently achieved by any particular trading program.

One of the limitations of hypothetical performance results is that they are generally prepared with the benefit of hindsight. In addition, hypothetical trading does not involve financial risk, and no hypothetical trading record can completely account for the impact of financial risk in actual trading. For example, the ability to withstand losses or adhere to a particular trading program in spite of trading losses are material points which can also adversely affect actual trading results. There are numerous other factors related to the markets in general or to the implementation of any specific trading program which cannot be fully accounted for in the preparation of hypothetical performance results and all of which can adversely affect trading results.

The difference between pre- and post-2009 represents a large and highly unusual change. While trend patterns vary over time, the post 2009 increase in the number of annual direction changes is 2.6 standard deviations above the 1990-2009 norm. This is a 30% increase in the number of direction changes and a 25% decline in the associated average duration of the signals. However, as we will show, simply using faster trend signals would not have addressed this issue since trends were also weak or absent from many assets for extended periods.

Naturally, most trend-following strategies find it harder to generate attractive returns when trends shift in this fashion. Investors speak of getting “whipsawed”. Since these shifting trends may be here to stay it is important for investors to find trend-following implementations that can succeed in this environment.

We launched the ARP Trend 1x strategy on December 19, 2014. Table 1 shows performance statistics net of fees, expenses, and transaction costs, from inception until April 30, 2017, a period of nearly two and a half years. The table also includes information for the SG Trend Index and the HFRX Systematic Diversified CTA index. Both indexes measure returns for CTA hedge funds net of fees and transactions costs. The SG Trend index includes the largest CTA funds by assets under management. The HFX CTA index includes managers selected by HFRX.

We offer the ARP Trend strategy at a range of customized risk levels. For reference, we show performance for a baseline “1x” portfolio with a risk target of 8-10% in table 1 and for a pro forma “2x” portfolio with a risk target of 16-20% in table 2. For brevity, we focus our discussion on table 2. Apart from the natural effects of leverage, the results in both tables are similar.

Overall, the live ARP Trend returns have generated strong returns and materially exceeded the index returns over this period. Panel A of table 2 shows that the ARP Trend 2x portfolio has outperformed the SG Trend index by nearly 8% annualized and the HFRX CTA index by nearly 7% annualized. Importantly, ARP Trend 2x has had positive returns of 5.46% annualized during a challenging period for CTA managers, when both indexes have lost money.

Table 1: Realized Performance from 12/19/2014 to 4/30/2017

	ARP Trend 1x	SG Trend	HFRX CTA
Panel A: Summary Statistics			
Return	2.36	-2.33	-1.10
Risk	8.51	10.49	8.19
Sharpe Ratio	0.25	-0.24	-0.16
Panel B: Relative Performance			
ARP Alpha (% pa)		4.06	3.43
ARP Beta vs index		0.74	0.84
Panel C: Correlation			
ARP correlation vs index		0.91	0.76

The table shows summary statistics based on realized daily returns for the ARP Trend 1x strategy from December 19, 2014 to April 30, 2017. For comparison, the table shows summary statistics for two separate benchmarks: the SG Trend index and the HFRX Systematic Diversified CTA index. Both indexes track the performance of CTA hedge funds.

Panel A shows realized annualized returns, annualized risk, and annualized Sharpe ratios. All returns are net of fees and actual transaction costs.

Panel B shows the annualized realized alpha of the ARP Trend strategy relative to the beta-adjusted benchmark returns. The panel also shows the betas. We estimate alphas and betas by regressing the ARP Trend returns in excess of the risk-free interest rate on index returns in excess of the risk-free interest rate.

Panel C shows the realized correlation of the ARP Trend strategy with the 2 benchmark series, based on daily returns.

Reported actual returns are unaudited preliminary estimates, subject to revision and net of 0.75% per annum management fees. Returns for the strategy are estimated by applying a notional capital allocation (and applicable expenses) to the P/L associated with the portion of the ARP Alternative Risk Premia Master Fund Ltd allocated to the strategy. Performance results reflect the reinvestment of income. Please note that the returns could be materially different from those stated above in case the strategy was managed in a dedicated standalone fund. The fee structure is for the Day 1 Investor Share Class. Certain investors may have higher management and performance fees depending on applicable share class. ARP also manages other accounts using the same investment strategy. Returns for the other accounts may differ from the returns shown here, depending on differences in risk levels and investment restrictions, timing of cash flows and fee structures. Please see important disclosures at the end.

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Panel A of table 2 also shows that ARP Trend 2x runs higher risk than either index. To adjust for these risk differences, panel B of table 2 shows the results from regressing ARP returns in excess of the risk-free interest rate on index returns in excess of the risk-free rate. The betas from separate return regressions are 1.46 and 1.67 for the SG Trend and HFRX CTA indexes, respectively. The same regressions yield intercepts that confirm that ARP Trend 2x has materially outperformed the indexes on a beta or risk adjusted basis. In annualized terms, the outperformance has been 9.77% versus the SG Trend index and 8.51% versus the HFRX CTA index.

Unfortunately, we do not know fees and expenses for the managers constituting either index. Even at a full “2 and 20” fee for the hedge funds, however, this performance differential greatly exceeds the fee differential.

Panel C of table 2 shows that correlations between ARP Trend and the CTA indexes is 0.91 and 0.76, respectively. These correlations are so high that it is clear that ARP Trend and the hedge funds in the indexes are pursuing comparable strategies—albeit with distinctly different outcomes.

Table 2: Pro Forma Performance from 12/19/2014 to 4/30/2017

	ARP Trend 2x	SG Trend	HFRX CTA
Panel A: Summary Statistics			
Return	5.46	-2.33	-1.10
Risk	17.05	10.49	8.19
Sharpe Ratio	0.31	-0.24	-0.16
Panel B: Relative Performance			
ARP Alpha (% pa)		9.77	8.51
ARP Beta vs index		1.46	1.67
Panel C: Correlation			
ARP correlation vs index		0.91	0.76

The table shows summary statistics based on pro forma daily returns for the ARP Trend2x strategy from December 19, 2014 to April 30, 2017. The returns are computed by applying 2x leverage to the realized returns net of transaction costs of the ARP Trend strategy. For comparison, the table shows summary statistics for two separate benchmarks: the SG Trend index and the HFRX Systematic Diversified CTA index. Both indexes track the performance of CTA hedge funds.

Panel A shows realized annualized returns, annualized risk, and annualized Sharpe ratios. All returns are net of fees and actual transaction costs.

Panel B shows the annualized realized alpha of the ARP Trend strategy relative to the beta-adjusted benchmark returns. The panel also shows the betas. We estimate alphas and betas by regressing the ARP Trend returns in excess of the risk-free interest rate on index returns in excess of the risk-free interest rate.

Panel C shows the realized correlation of the ARP Trend strategy with the 2 benchmark series, based on daily returns.

Reported actual returns are unaudited preliminary estimates, subject to revision and net of 0.75% per annum management fees. Performance results reflect the reinvestment of income. Please note that the returns could be materially different from those stated above in case the strategy was managed in a dedicated standalone fund. The fee structure is for the Day 1 Investor Share Class. Certain investors may have higher management and performance fees depending on applicable share class. ARP has generated pro forma results for running the Trend 2x strategy at 16-20% annualized volatility. There are no assurances, however, that the actual performance from running the strategy at higher volatility levels will be in line with the pro forma results shown here. In fact, the actual returns could be much lower than those shown here. ARP does not manage any capital in the Trend 2x strategy. The pro forma results for the Trend 2x strategy are estimated from the live performance of the Trend 1x strategy, using the process described below. The target volatility of the Trend 2x strategy is 16-20% annualized (twice that of the Trend 1x strategy). The excess returns for the Trend 1x strategy are calculated by subtracting the US T-Bill return from the total return. The excess return is then multiplied by two (the ratio of the volatilities of the two strategies) to arrive at the excess return for the Trend 2x strategy. The pro forma returns for the Trend 2x strategy are computed by adding the US T-Bill return to the excess returns. This process is repeated for each day and has the net effect of increasing the profits in profitable periods for the Trend 1x strategy and conversely increasing the losses during periods where Trend 1x strategy suffers losses. Please see important disclosures at the end.

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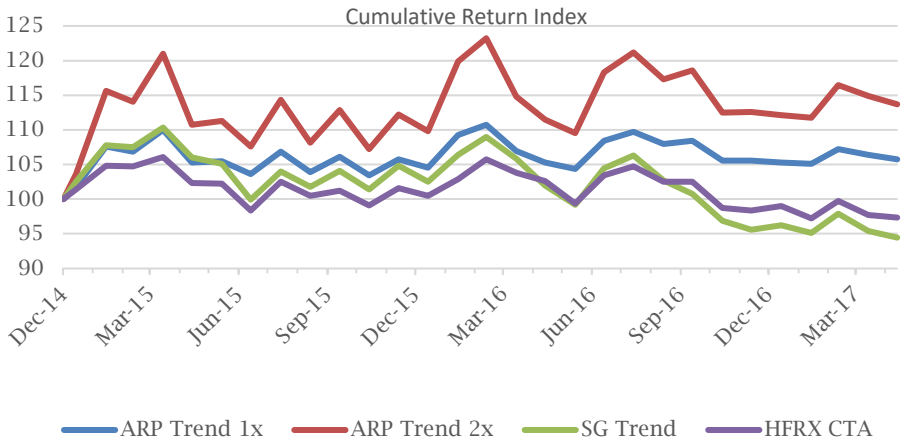
Figure 2 compares cumulative returns for the ARP Trend strategy and the benchmark indexes. The cumulative return graph illustrates the high correlation between the ARP Trend returns and the benchmark returns. The graph also shows the consistent outperformance of the ARP strategy.

Figure 2: Cumulative Performance



The figure shows cumulative monthly performance from December 19, 2014 to April 30, 2017. From top to bottom at the right, the returns are for the ARP Trend 2x strategy in red, the ARP Trend 1x strategy in blue, the HFRX CTA index in purple, and the SG Trend index in green. All returns are net of fees and transaction costs. The ARP Trend 2x returns are pro forma returns based on applying 2x leverage to the ARP Trend 1x returns.

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By the design of the index, the SG Trend index includes the 10 largest CTA trend-following mangers. In fact, the size of these CTA hedge funds has triggered investor concerns that the largest CTA managers have shifted their focus from asset management to asset gathering and that this has negatively affected returns. The index performance during the ARP Trend live trading period seems to warrant this concern. Yet, the HFRX CTA index generally includes smaller managers and has delivered very similar performance, so that manager size may not be the only impediment to recent CTA hedge fund performance.

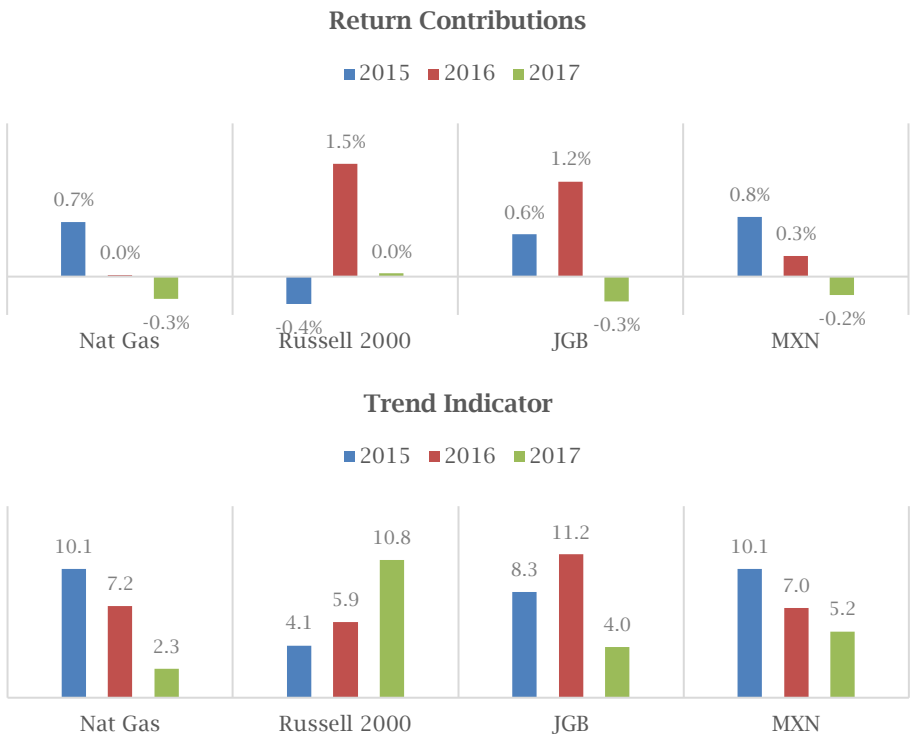
Dynamic Risk Allocations Add Value

The performance of the ARP Trend strategy shows that a sophisticated trend-following strategy can earn attractive returns in an environment of less reliable trends. Key features that allow the ARP Trend strategy to sustain performance in an environment with less stable trends are a broad array of signals to detect trends, the ability to dynamically allocate risk to assets and asset classes with strong trends, and the ability to dynamically manage overall portfolio risk so exposures can shrink and grow with the overall opportunity set.

Figure 3 illustrates this idea with four contracts, one from each asset class. For each contract, the top panel of the figure shows the return contribution to the ARP Trend portfolio by calendar year. The bottom panel of the figure shows a trend indicator that adjusts signal strength by volatility. The indicator is large for strong and stable trends and small for weak and variable trends. By design, the trend indicator does not distinguish between positive or negative trends.

The ARP Trend portfolio deliberately allocates more risk to assets, asset classes, and signals with stronger trend indicators. If this allocation process is successful, larger trend indicators are associated with larger return contributions. We now show that this has been the case, thereby mitigating the impact of less reliable trends.

Figure 3: Dynamic Allocations to Assets with Trends



The top panel of the figure shows return contributions, net of transaction costs, to overall portfolio returns for ARP Trend 1x from four futures contracts, one from each asset class: Natural Gas, Russell 2000 small-cap equities, Japanese 10-year government bonds, and the Mexican peso vs US dollar exchange rate. The bars show returns contributions by calendar year. The contributions for 2017 are up to April 30, 2017.

The bottom panel shows trend indicators for the same assets and periods. The trend indicator measures the strength of the trend, regardless of sign, divided by the variability of the trend.

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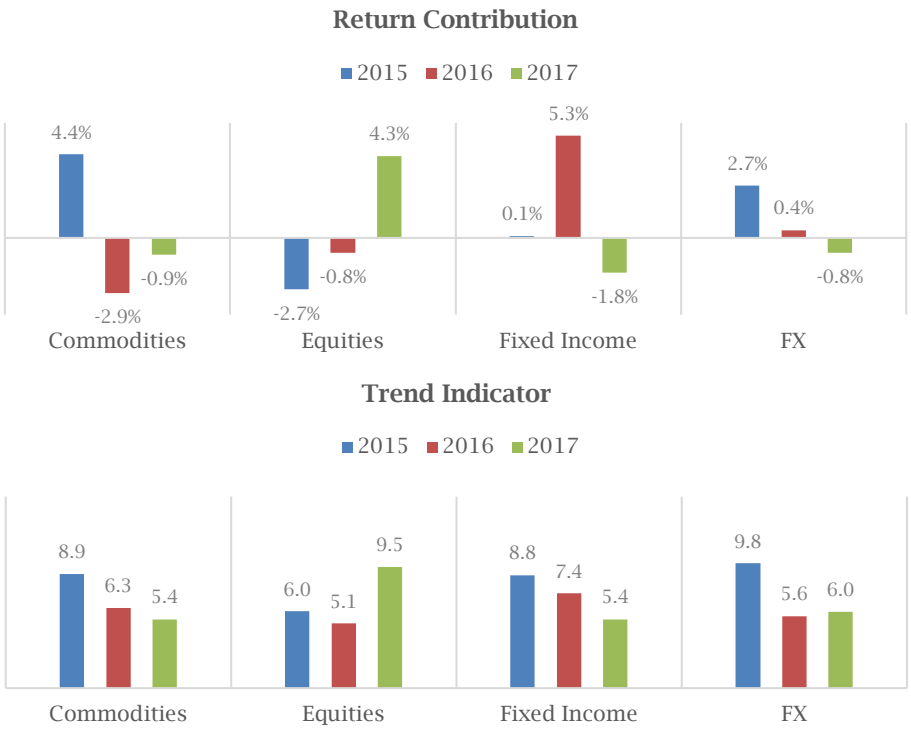
Looking over time for a particular contract, a comparison of the panels in figure 3 shows that a given contract generally made larger return contributions during periods of stronger trends. Similarly, looking across contracts in a given period, the figure shows that the portfolio generally derived larger return contributions from contracts with stronger trends. This is evidence that the ARP investment process identifies trends and shifts risk allocations to contracts with stronger trends.

Figure 4 shows that same deliberate risk allocation also has been effective across asset classes. Similar to the previous figure, figure 4 graphs return contributions by asset class for each calendar year and the matching trend indicators. As the figure shows, the portfolio has been successful in earning larger return contributions from asset classes with stronger and more stable trends.

Figure 4: Dynamic Allocations to Asset Classes with Trends



The top panel of the figure shows return contributions, net of transaction costs, to overall portfolio returns for ARP Trend 1x from asset class allocations. The bars show returns contributions by calendar year. The contributions for 2017 are up to April 30, 2017.

The bottom panel shows trend indicators for the same asset classes and periods. The trend indicator measures the strength of the trend, regardless of sign, divided by the variability of the trend. The trend indicator for each asset class is an average of the trend indicators for the futures contracts in the ARP Trend investable universe belonging to the asset class.

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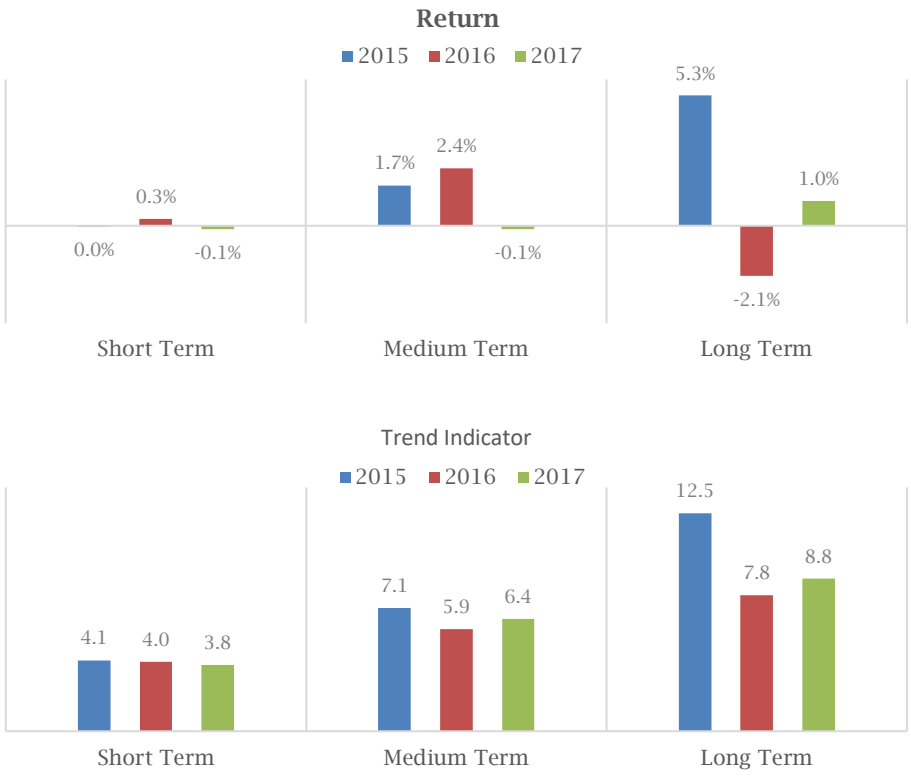
While it is tempting to conclude that faster trend signals would be more productive in an environment with short trend durations, figure 5 demonstrates that this has not been the case. The returns, net of transaction costs, in the top panel show that short-term signals have been consistently ineffective over the last two and a half years. The top panel in figure 5 shows returns, not return contributions, because the netting of signals with different durations makes such attribution ambiguous. Moreover, short-term signals have generated such low net returns in all 3 years that we want to make it clear that low contributions are not driven by low exposures to short-term signals.

The bottom panel of figure 5 confirms that short-term signals had the weakest and most volatile trends, as measured by the trend indicator.

Although trends have been shorter over the last few years, these short trends also have been weak, so that the returns from faster signals were largely offset by the higher transaction costs associated with more frequent trading.

Figure 5: Effectiveness of Trend Signal Durations (Simulated)



The top panel of the figure shows returns, net of transaction costs, for simulated trend-following portfolios focused on signals with short, medium, and long durations, respectively. Short-term signals range from 1 to 3 months. Medium-term signals range from 3 to 6 months. Long-term signals range from 9 to 12 months. The bars show returns by calendar year. The returns for 2017 are up to April 30, 2017.

The bottom panel shows trend indicators for the same signal durations. The trend indicator measures the strength of the trend, regardless of sign, divided by the variability of the trend. The trend indicator for each duration is an average of multiple trend indicators for all of the futures contracts in the ARP Trend investable universe.

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3. A Complement to Hedge Funds

Given the strong returns for the ARP Trend strategies in a challenging environment, investors should consider including ARP Trend in their portfolios. While investors have traditionally built trend-following exposures via CTA hedge funds, this has not worked as well recently. The SG Trend index — which consists of the largest CTA funds in the world — has materially underperformed ARP Trend alternative risk premia.

In addition to differentiated investment process and returns, two attractive features distinguish ARP Trend from CTA hedge funds. Due to the liquidity of ARP Trend, investors can

scale up exposures when investors think the strategy will perform relatively well and scale them down when investors think the strategy will perform relatively poorly. Moreover, the absence of performance fees means that ARP Trend products are much cheaper than hedge funds during periods of high strategy returns, when investors would like to have larger exposures. For example, when trend following returns are 20% before fees, a 2/20 hedge fund leaves 14.4% return net of fees to the investor. At a 0.75% fixed fee, ARP Trend would return 19.25% to the investor, an additional 485 basis points!

4. Conclusions

The realized returns for ARP Trend strategy have confirmed one of our investment theses: a sophisticated alternative risk premia product can outperform a portfolio of high-quality hedge funds. Since inception, ARP Trend 1x has outperformed the SG Trend index by more than 4% annualized on a risk-adjusted basis. ARP Trend 2x has outperformed the SG Trend index by nearly 10% annualized on a risk-adjusted basis. ARP Trend has generated this large outperformance with a realized correlation of 0.9 with SG Trend returns.

Since the SG Trend index consists of the largest CTA hedge funds, this experience confirms that fund size is not a reliable indicator of excellent future performance.

We show that sophisticated trend-following signals and dynamic risk allocations have aligned the ARP Trend portfolio with trends in different assets and asset classes, even though such trends have recently been less stable. There is reason to believe that trends in futures prices will continue to exist but that they may continue to shift more quickly in the patterns exhibited over the last few years. In such an environment, successful trend-following strategies will require sophisticated signals and dynamic risk allocations. As a result, we are confident about the prospects for ARP Trend going forward, even if the recent trend following environment turns out to be the new normal and not an unusual episode. If the overall environment should turn out to be more favorable, these skills should add alpha to a higher baseline strategy return.

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The **HFRX Macro: Systematic Diversified CTA Index** includes managers employing the Systematic Diversified CTA strategy. Systematic Diversified CTA managers typically employ an investment process designed to identify opportunities in markets exhibiting trending or momentum characteristics across individual instruments or asset classes. Strategies utilize quantitative processes which focus on statistically robust or technical patterns in the return series of the asset, and typically focus on highly liquid instruments.

The **SG Trend Index** (f.k.a. SG Trend-Sub Index) is designed to track the 10 largest (by AUM) trend following CTAs and be representative of the trend followers in the managed futures space. Managers must meet the following criteria: must be open to new investment; must report returns on a daily basis; must be an industry recognized trend follower as determined at the discretion of the SG Index Committee; must exhibit significant correlation to trend following peers and the SG Trend Indicator. The SG Trend Index is equally weighted, and rebalanced and reconstituted annually.