



THE  
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**Alternative risk premia  
COVID-19 deep dive**

# ▶ Frontier Advisors

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# Executive summary

Calendar year 2020 has been a difficult one for Alternative Risk Premia (ARP) managers. The key drivers for this performance were the rapid market stresses during the height of the COVID-19 crisis which started in the last week of February 2020. Whilst the performance by some managers was extremely poor, the returns for the sector however were consistent with expectations for the strategy style given the extreme nature of the market moves.

The timeframe for assessing an ARP manager's performance is usually medium-term (e.g. five years). Suffering large losses over short periods (such as COVID-19) can materially impact the ability for ARP managers to achieve this return objective over this medium-term time horizon. For this reason, it is important to understand the drivers of such large losses and to consider how to size this allocation going forward.

In this paper, we have analysed the performance of a large group of ARP managers with several undergoing a deep dive analysis into the performance of different specific alternative risk premia (which we refer to as sleeves in this paper). This analysis can be helpful for readers when understanding how their own ARP managers performed relative to peers. Our analysis shows that the single stock equity risk premia sleeve had the largest correlation during the COVID-19 period. This finding warrants investigation into the merits of constructing an ARP portfolio either with a reduced allocation to or exclusion of these equity risk premia via a bespoke portfolio.

There are key lessons learned from this crisis. These lessons include understanding a manager's allocation to specific premia (e.g. single stock equities), approach to volatility targeting (short term vs medium term and the pros and cons of each), portfolio rebalancing frequency (pros and cons of more regular vs less frequent) and complexity (pros and cons of including complex instruments which are very valuable in normal periods but which can generate outsized losses in very rare but very severe market stresses).

The lessons learnt from this recent crisis are helpful for investors if considering creating a bespoke portfolio of alternative risk premia sleeves rather than allocating to a manager. Specifically, these will be considerations around which sleeves to select, how to combine and size these sleeves and also how to risk manage any bespoke portfolio.

For investors preferring to invest into manager products, our analysis can help with considering how to size the manager or the sector in the investor's total portfolio. It can also help with considering how to find complementary managers.

While there are lessons learned from this period, it is important to note that this is a rare event. ARP strategies provide diversified return profiles in most market conditions and so it is important to size this strategy within a sector in a manner which does not overemphasise the recent period. It should certainly be part of the sizing discussion but perhaps should not drive it.

# Quick primer on ARP strategies

ARP strategies invest across asset classes and use a systematic investment process to take advantage of non-equity return drivers (e.g. carry or momentum) to create a diversified return stream in normal market conditions with relatively low volatility and equity beta. Downside losses can still arise should the low correlation across risk premia change to become loss-additive, as has occurred in previous market drawdowns and especially during the COVID-19 period.

Frontier has written two previous research pieces on ARP. The first was in our June 2015 AltIQ and was an introductory educational piece called "[The case for Alternative Beta](#)" (ARP is sometimes referred to as Alternative Beta). The follow-up paper in November 2017 (titled "[Building Better \(Alternative\) Beta](#)") was focused more on what to look for when assessing these strategies and the various implementation approaches including the characteristics of individual risk premia both versus each other and key portfolio risk factors (equities and bonds). We recommend the reader refer to these previous pieces if seeking further background on ARP.

Table 1: Risk/return profile of alternative risk premia

Characteristic	Alternative risk premia
Target returns	Cash + 3-5% p.a. depending on volatility target
Target volatility	Can be scaled but on average 8% p.a.
Return drivers	Alternative risk premia factors such as carry, value, momentum, volatility across asset classes. Some utilise tail risk hedging or drawdown profile during portfolio construction
Complexity level	Complexity in use of relative value trades to remove beta, implementation approach (e.g. momentum) and portfolio risk management
Risks	Assumption of zero correlation across alternative risk premia factors can break down in market stresses magnifying loss potential
Summary	Compared to traditional beta return sources (e.g. equity/bond returns), ARP refers to non-conventional but persistent sources of return. ARP strategies can be diversifying to a standard multi asset class defined contribution portfolio. We believe that ARP has merit but requires careful selection of risk premia and a risk controlled portfolio construction

Source: Frontier

# Setting the scene

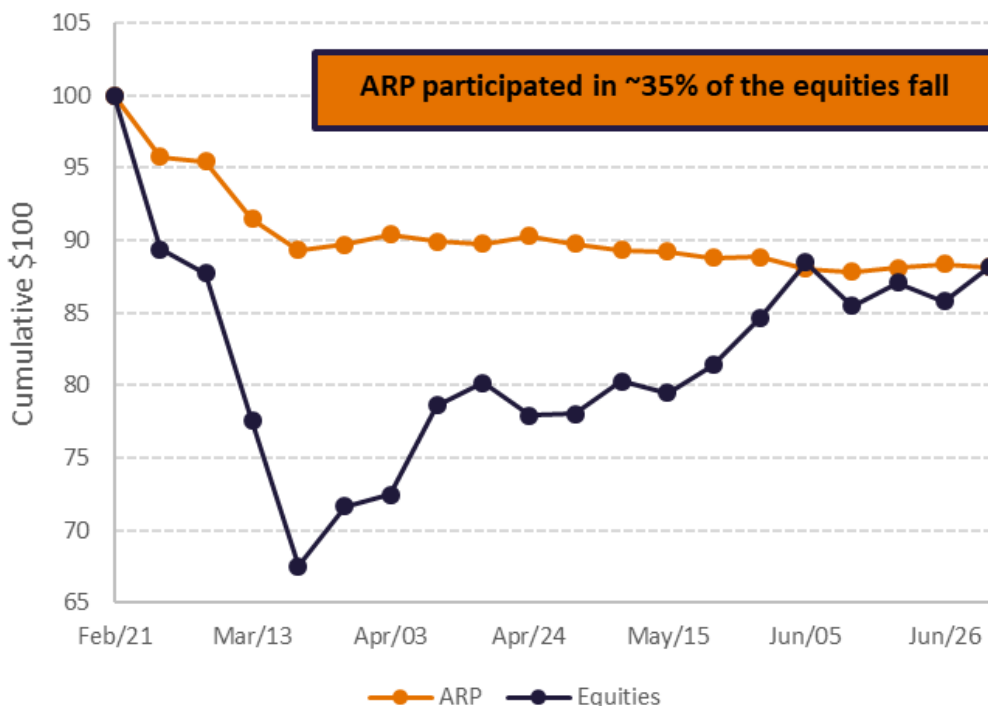
ARP strategies are systematic strategies and may be susceptible to suffering losses from very rapid and very large market moves, particularly when the strategies themselves have closer connections to traditional markets. These are the types of moves experienced across asset classes from the start of the COVID-19 crisis (February 24) to the end of week three in March. We would note though that we haven't experienced this type of market stress since ARP as a sector reached maturation in recent years. So while it is not a surprise to see a loss, we will acknowledge that the magnitude of some individual manager losses was outside expectations.

Not only are systematic strategies unable to handle rapidly moving markets (simply because the human element of foreseeing an emerging issue is not one which is present in the data set used to derive the systematic signals) but the sizing of the portfolio's risk for nearly all managers also relies on backwards looking views on risk. The time horizon for this view of risk is also usually medium-term in nature.

## Reliving the COVID-19 experience

It feels like it's been eons since COVID-19 first decimated markets but it was only back in the last week of February this year. From the end of the first week of this crisis, Frontier started sourcing weekly performance data from circa 20 managers which we cover closely in the alternative risk premia sector. Chart 1 shows the evolution of the weekly median performance of those managers against a blended equities return series (a blend of the ASX200 and MSCI World net total return index hedged into AUD). Normally we analyse monthly performance of managers but we recognised early on that a month was too long in such rapidly changing market conditions.

Chart 1: Evolution of median strategy performance in each COVID-19 week

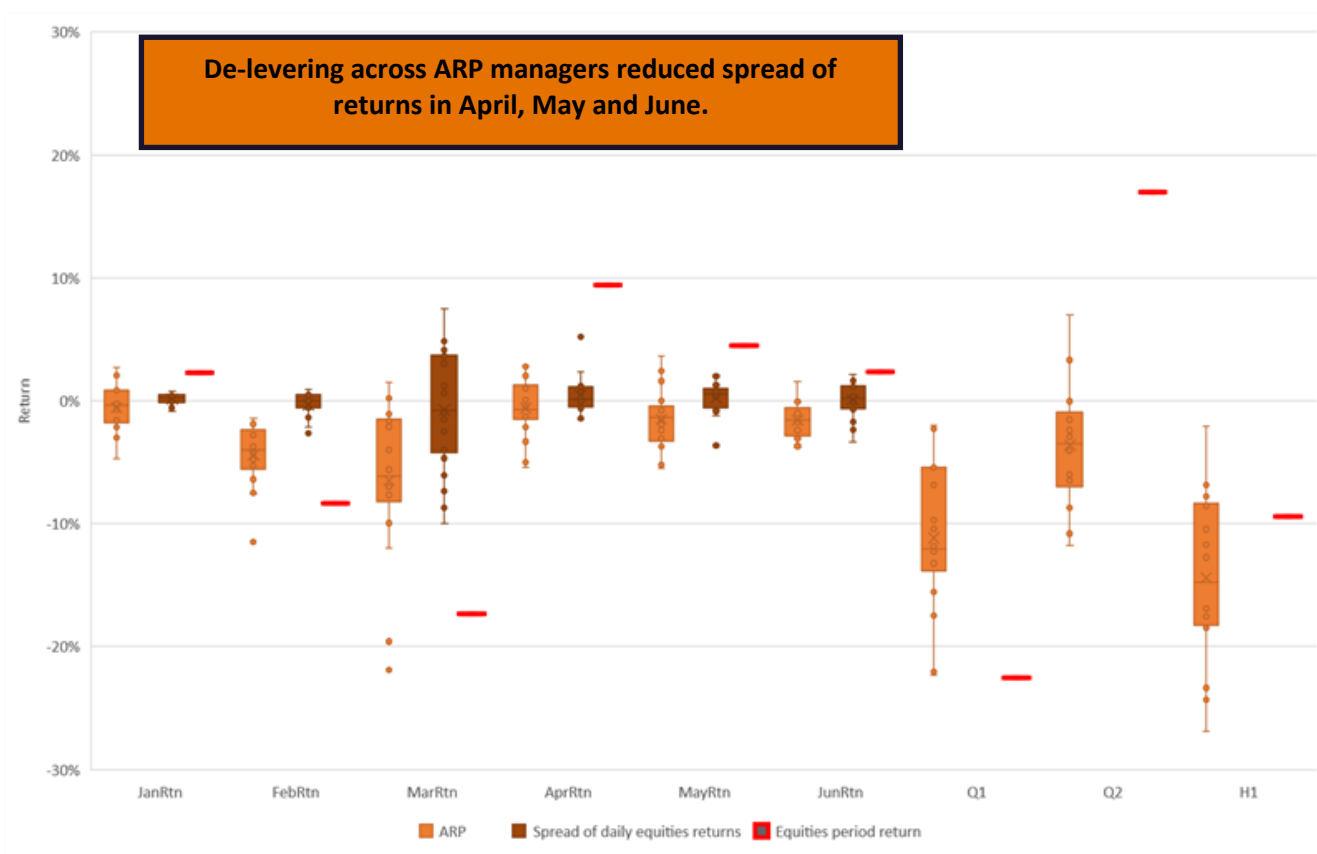


Source: Source: Frontier, managers, Bloomberg. COVID-19 period from Feb 21 to Jul 3

Most ARP managers rebalance their portfolios on a monthly basis. For most managers, this coincided with the end of February (after week one of the COVID-19 crisis). By this stage, medium-term volatility was not that high (short term was very high after the S&P dropped 10% in one week but longer term was still quite low which averaged out to a normal medium-term level of volatility) and so portfolios did not have to reduce their leverage to reduce the overall portfolio volatility.

By not reducing their leverage, strategies were essentially “sitting ducks” for the extreme levels of risk experienced in week three of the crisis (in this week ending March 13, S&P dropped over 10% and experienced an extremely volatile week). Some managers did take discretionary steps to reduce their leverage which helped reduce loss potential in that week. One manager which suffered the largest loss did not make this change.

Chart 2: Spread of ARP manager returns during H1 2020



Source: Frontier, managers, Bloomberg. Red dash refers to the equity return over the respective period.

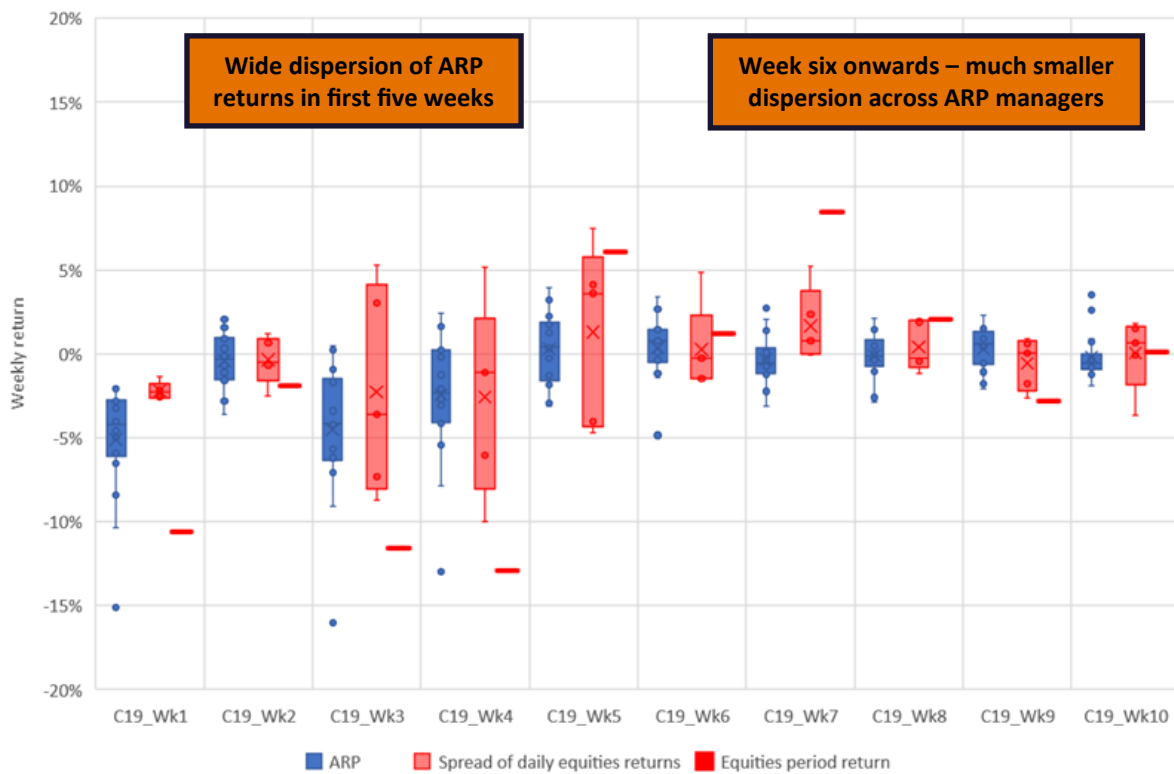
<sup>1</sup>A portfolio's volatility can be scaled up by increasing the size of positions within the portfolio. To do this requires taking leverage. Leverage creates risk because increased leverage means that potential returns and losses increase. The opposite holds true: if a manager wanted to reduce the portfolio's volatility (as they did during COVID-19), then this is achieved by reducing the size of positions and therefore the leverage in the portfolio. This process is known as "de-levering".

By the end of March 13, most managers had reduced the leverage they were taking by material amounts which helped dampen the losses for the peer group since that time. So while equities have rallied very strongly from the nadir of a 33% fall by the end of March 20, ARP has been relatively flat and remains down around 12% since the start of this crisis.

Chart 2 and Chart 3 include boxplots of ARP manager returns in different periods which helps to depict the spread of returns in each respective period. Chart 2 includes each month of the first half of 2020.

Chart 3 provides this in a more granular fashion on a weekly basis from the start of the COVID-19 period and for the next 19 weeks to 3 July 2020. We found this to be very helpful during the period to be able to benchmark the performance of our managers and especially to highlight any material outliers which warranted close attention.

Chart 3: Weekly spread of ARP manager returns relative to equities



Source: Source: Frontier, managers, Bloomberg. Red dash refers to the equity return over the respective period.

# Lessons learned

Since the onset of the crisis in the last week of February to the week ending July 3, Frontier has been studying the returns of nearly 20 ARP managers on a weekly basis. We performed a deeper dive on six of these managers, analysing their losses at the sleeve level. These were chosen because they provided a mix of outcomes ranging from peer leading to material losses.

We were also aware from our conversations with each manager, that they each approached the period in different manners whether that be as a result of their process or via discretionary overrides to their baseline process. Table 2 details our areas of focus as well as our findings. The granular analysis behind these findings is provided from page 8 onwards.

Table 2: Areas of focus during our deep dive analysis

Area of focus	Questions	Findings
<b>Performance</b>	How was the performance of ARP funds against comparable investments?	The average return for ARP funds was -12% over the period. This was accumulated mostly during March
<b>Volatility</b>	Was the realised volatility within expectations	The average volatility was 18% overall and 25% during March. During March funds realised on average 2.9x more than target volatility
<b>Betas</b>	Was the beta to specific markets (e.g. equities, crude oil) within expectations	The average beta to equities in March was 0.2. The highest beta was 0.45. Funds had varied betas to bonds, crude oil, and VIX
<b>Correlations</b>	How much diversification is available amongst managers	The average correlation between funds was 0.45 overall and 0.44 during March. This is expected for funds running similar strategies. A principal components decomposition showed strong contributions from common factors across funds
<b>Large movers</b>	What were the largest contributors at the sleeve level	Large negative contributions came notably from long/short volatility and crude oil positions where the historical data had not matched the speed nor the magnitude of price moves experienced over March
<b>Replication</b>	How replicable were the returns of ARP managers using combinations of known factors	Most fund returns were well replicated by a known set of standard ARP factors

Source: Frontier



## Broad themes across the six deep-dive ARP managers

The three themes below are key takeaways we had from our investigation which will be helpful for manager selection. This is important not just for standalone identification of an ARP manager but also how they combine with other ARP managers in an alternatives sector.

### Volatility estimation

A shorter term volatility measure does allow a portfolio to delever quicker as stresses start to mount. However, in normal market conditions, using a short term measure may result in more portfolio turnover which can erode performance. It could also lead to higher leverage being taken in very low short-lived volatility environments when medium-term volatility measures show normal levels of volatility

### Portfolio rebalancing

More frequent portfolio rebalancing was very beneficial during this period but in normal market conditions may not be warranted. CTAs (including those ARP strategies run by CTAs) will use frequent rebalancing but it is performed in a manner which makes strong use of the CTA's best execution. There aren't many non-CTA run ARP strategies which can leverage off this execution expertise.

### Complexity

Complexity can be valuable in normal market conditions but can cause issues in stresses. There were a few managers which performed very poorly, not so much because of the individual premium but more because of the approach used to implement the strategy. One instrument which was used to express a relative-value trade of options on one index against another led to unexpectedly large losses for some managers. Whilst complexity can add value, it needs to be properly understood including the potential loss profile in different market scenarios.

## Final observations

While the losses were large at the peer group level, they were nonetheless consistent with the loss level we would expect for such extreme market moves, although we'll acknowledge that some specific manager losses were well outside our expectations. In addition, the delevering which took place when market volatility was at extremes led to a fairly muted return profile post the height crisis; this follow-up return profile was likewise consistent with expectations given ARP managers target specific volatility targets. While the overall return evolution since COVID-19 started may well be within expectations, it doesn't negate the need to understand the drivers, learn from the experience and then consider how an ARP allocation may need to evolve to reflect this new data point in our experience with ARP.

There are key lessons learned from this crisis which could have flow-on effects to manager selection for an investor's portfolio or for how to structure a bespoke portfolio for those investors who can be more targeted in their ARP sleeve allocations.

These lessons include understanding a manager's allocation to specific premia (e.g. since stock equities), approach to volatility targeting (short term vs medium term and the pros and cons of each), portfolio rebalancing frequency (pros and cons of more regular vs less frequent) and complexity (pros and cons of including complex instruments which are very valuable in normal periods but which can generate outsized losses in very rare but very severe market stresses).

# ARP deep dive

## Background

Based on our prior historical analysis, we expect on average for ARP to underperform when equity markets have material negative months although the average loss is expected to be less than equities. Those periods like COVID-19 where rapid falls are followed by rapid reversals are also problematic for ARP where the manager has de-levered its portfolio during this period to reflect the shorter term volatility. This makes it harder to recoup any losses given the smaller overall position sizes. Our historical analysis has also demonstrated that whilst ARP strategies have struggled over very short periods of market volatility, they are able to recoup part of these losses over a longer time horizon (e.g. 12 months).

We had not experienced this type of short and extremely sharp move in markets since most ARP strategies have been in operation (since circa 2012/13). To put this into perspective, analysis of ARP at index level (using a Frontier proprietary index) in the GFC demonstrated losses of similar magnitude (12.6% over a two month period for September and October 2008 relative to a cumulative loss of 26% for the S&P). The ratio of the ARP drawdown by March 27 of this year to the S&P drawdown was also similar in size. Nonetheless, even though ARP strategies provide a diversified return stream in normal periods, this volatile experience has highlighted potential shortcomings of the broad ARP universe and raised questions of their robustness in these type of rare but damaging market conditions. We were disappointed by some ARP managers doing particularly poorly and performed a deep-dive investigating further the risk management decisions and particular premia drivers for those managers.



## Thematics across managers

### Theme 1

Traditional risk-on trades performed as expected. The standard 'risk-on' ARP trades – currency carry, short volatility, credit carry – had negative performance in March but none were decisive. This reflects conservative sizing for these trades combined with tail protection strategies employed within the strategies and at fund level. Several funds reduced strategy weights based on the VIX term structure, decreasing weights as VIX increased and the term structure inverted. Others bought VIX calls and equity puts which reduced losses in these strategies.

### Theme 2

ARP funds had outsized losses in idiosyncratic trades. Two trades are instructive: long-short variance between two country equity indices (structured by being short volatility on one equity index and long volatility on another equity index) and long crude oil.

The volatility trade relied on historical relationships holding during a stress given this trade had been diversifiers during previous stresses. On this occasion, the change in volatility for the short leg was larger than the long leg leading to losses. Implementation was also key: an exotic trade implementation was used for this volatility trade. Within this trade is a trigger which can result in one leg disappearing for a period of time based on the level of the underlying equity index. The mechanics within this trade led to the long volatility leg being excluded from providing an offset to the losses for the short leg leading to magnified losses. This is an important takeaway from this episode: to ensure that complex trade implementations are properly understood and how they could perform in different market scenarios.

The crude oil trade is more about misfortune to be positioned the wrong way as an individual market plummeted by extreme levels over a very short period of time.

### Theme 3

Fast moving signals helped (this time). ARP funds commonly have dynamic risk models that weight recent market volatility and correlations to estimate future behaviour. Funds differ in how responsive the models are to new data. For a commonly used class of models, this responsiveness is measured by the half-life of information (the time lag at which the weights decay by half). Funds with relatively fast (shorter half-life) risk models performed better as these models reduced risk more in late February. The choice of speed by managers is a trade-off: fast risk models close positions quickly into a crisis, dampening losses at the cost of participation in the recovery.

# ARP managers' responses during the crisis

Most managers implemented some form of discretionary hedging during March. Table 3 includes information from the six surveyed managers labelled A-F and the changes they made during the crisis. Overrides were conducted at four levels:

- Overrides for specific trades (e.g. variance trade)
- Overrides of signals for asset class (e.g. for oil)
- Reduction in risk budget for sleeves
- Reduction in risk budget for whole portfolio

Discretionary hedges are appropriate where the manager believes the market environment has changed, but also raise philosophical questions for systematic processes. The discretionary nature of the de-risking trades implies a discretionary re-risking. Timing associated with re-risking in the higher volatility environment at the time was an active consideration by several managers.

Most managers also implemented some long-term changes driven by the COVID-19 experience. These included:

- Removing strategies where they feel the environment has changed sufficiently to alter the rationale
- Changing risk weights (e.g. down-weighting some strategies)
- Changing implementation (e.g. rebalancing frequency, choice of instruments for variance strategies)
- Adding strategies (e.g. new tail protection)

Changes were broadly reasonable, however there was a clear danger of managers continuing to fight the last war in their risk management processes.

Table 3: Different manager approaches during COVID-19

Manager	Overrides	Response
A	Reduced risk budget by 33% for systematic strategies	Re-evaluating equity style strategies, especially low beta for unexpected correlation and crowding
B	Risk managed variance trades	Revise implementation for long/short volatility strategies
C	20% reduction in leverage but only after the material losses had occurred	Research on rebalancing frequency
D	No overrides	Removing several strategies the manager feels have become crowded and 'financialised' Introducing additional downside protection
E	Overrode long crude oil signals coming from multiple sleeves	None
F	Reduced fund exposures by 40% for two weeks	Possible overrides as prices reach upper or lower bounds

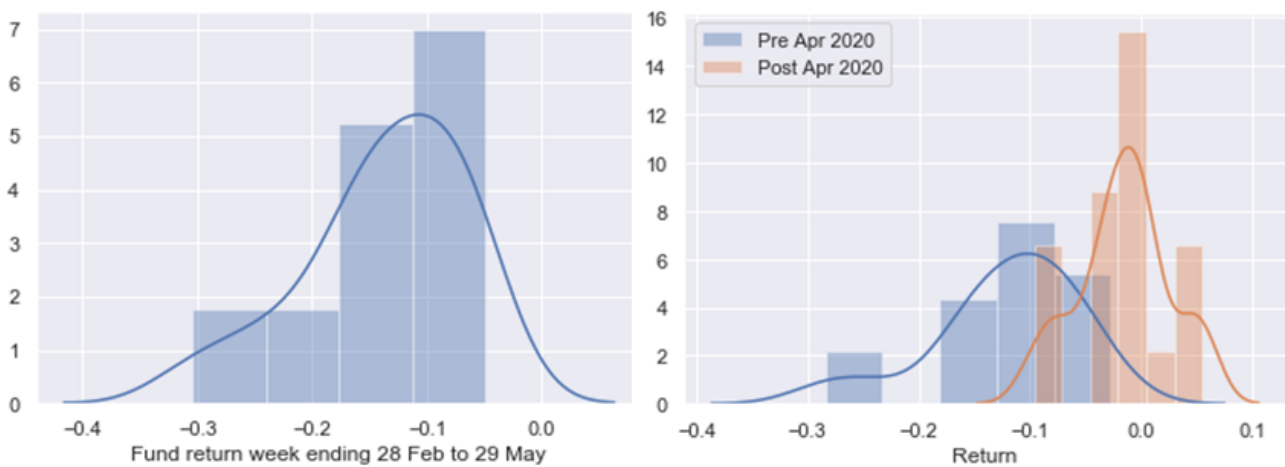
Source: Frontier

# Analysis of the ARP universe

Chart 4 and 5 analyse the spread of manager returns for COVID-19 period vs post when manager returns stabilized. There was a clear impact on returns during the crisis relative to post.

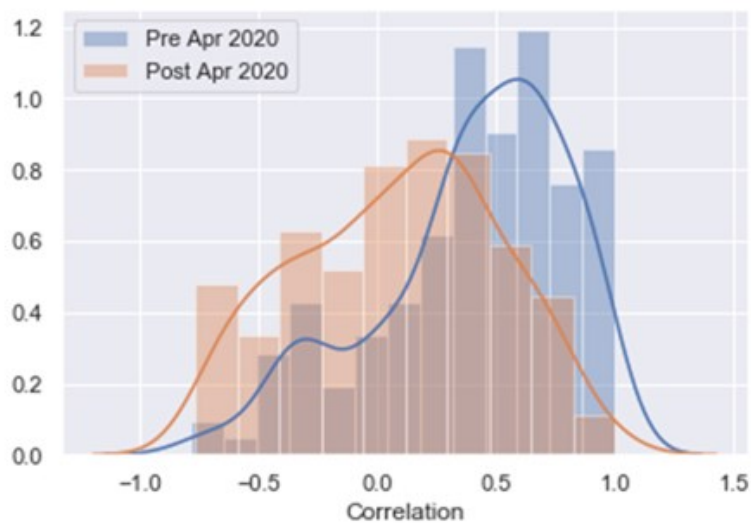
Amongst the cohort of managers, average correlation between funds was 0.4 in March, 0.09 in April, and 0.45 overall. This suggests that managers were diversifying overall, though less during March.

Chart 4: Spread of ARP manager returns during H1 2020



Source: Frontier, managers. Return in decimal format (i.e. -0.3 means -30% return).

Chart 5: Correlation profile of ARP managers during the COVID-19 period



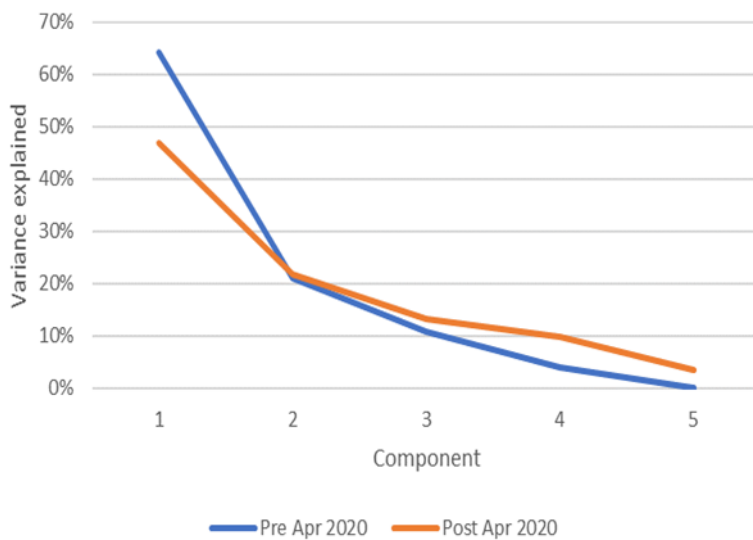
Source: Frontier, managers

We performed a statistical technique known as principle components analysis<sup>2</sup> (Chart 6) to better understand the diversification of return drivers across ARP managers. Before April 1, the majority (60%) of the variability of returns was explained by a single factor with two additional factors explaining an additional 30%. This demonstrates a relatively small degree of diversification in return drivers across the managers. After April the first component reduced to around 50% as systematic risks decreased.

As per Chart 7, the returns in March were far more volatile with average volatility around 25%; this settled into April with average volatility around 8%. This was due partly to decreased market volatility as equities and other markets rebounded but also to deleveraging by managers.

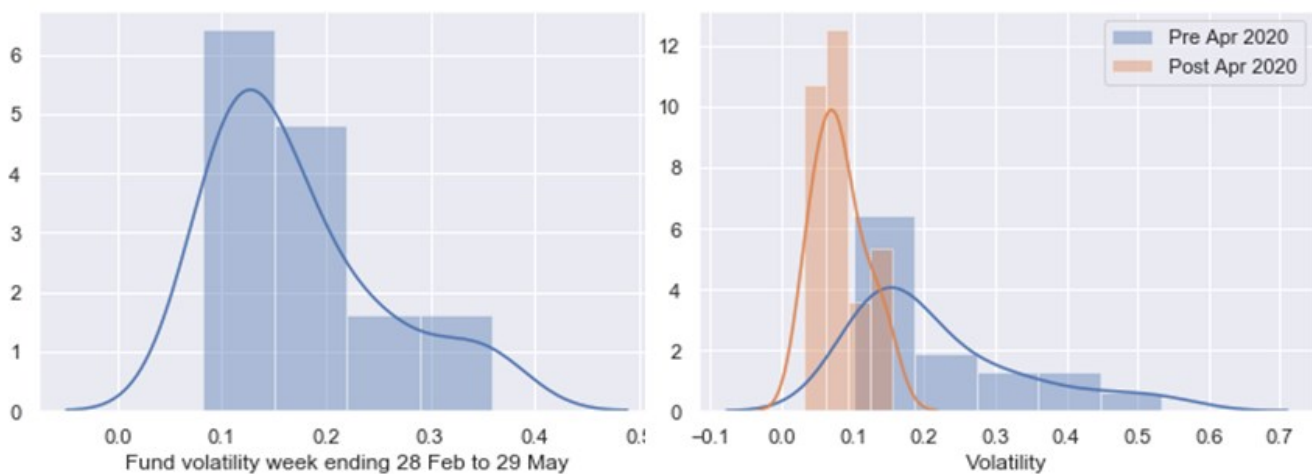
Most ARP funds have risk models that respond to recent history, so high recent volatility is interpreted as high future volatility, and this tends to reduce position sizes. As mentioned earlier, several managers also implemented discretionary hedges.

Chart 6: Principal components analysis across ARP managers



Source: Frontier, managers

Chart 7: Analysis of volatility across managers in different periods during COVID-19



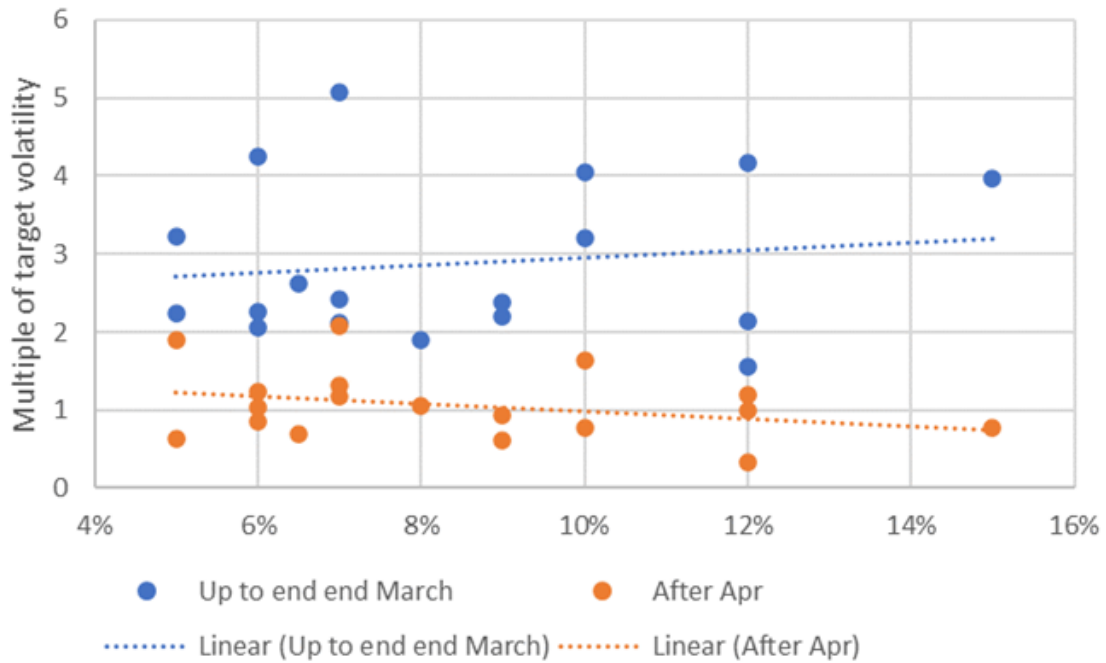
Source: : Frontier, managers. Return in decimal format (i.e. -0.3 means -30% return)

<sup>2</sup>Principal Components Analysis (PCA) is a statistical technique which aims to identify the main drivers of variability or predictability in a statistical series. In our case, the series is manager returns. PCA helps with understanding how diversified are the return drivers across the ARP manager group. If most of the variability in returns is explained by a small number of principal components, then this indicates that most managers had similar drivers for their returns.

Chart 8 depicts the ratio of realised volatility for each manager relative to their target volatility. On average, realised volatility was 2.9x target volatility before April and 1.1x after. There was no evidence that this multiple was different for higher or lower target volatility funds.

While extreme, this realised volatility and the respective multiples of target volatility are within expectations for ARP funds.

Chart 8: Multiple of target volatility for ARP funds



Source: Frontier, managers

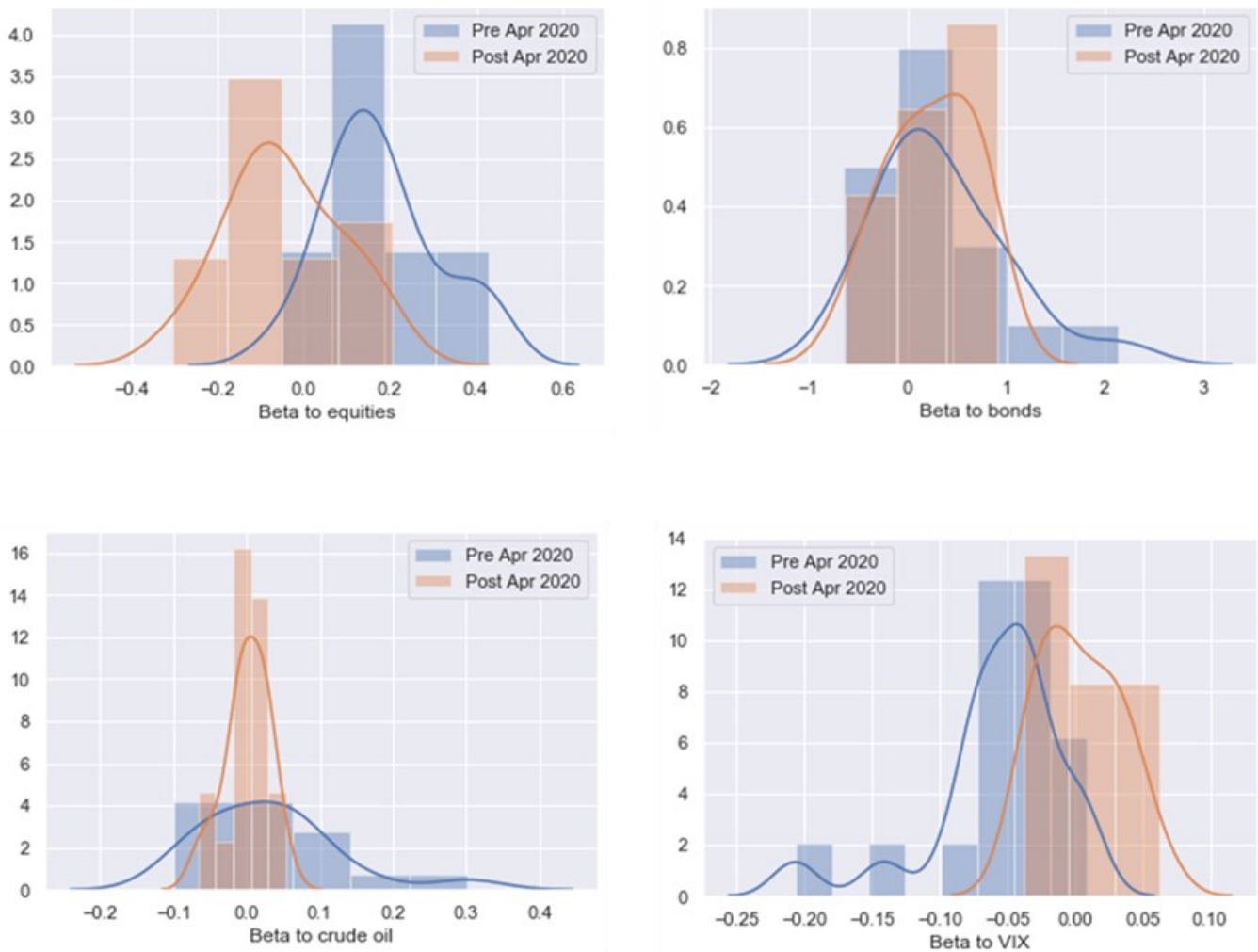
ARP managers usually structure their portfolios to have low sensitivity to the broader equity market. This co-movement sensitivity is proxied by the beta to equities. Whilst not usually a focus of analysis given that most investors have equities as their key portfolio return driver, it helps to also analyse the beta of ARP managers to other key asset classes.

In Chart 9, we measure the beta between managers and four factors: US equities, oil, bonds (10 year), and 30-day implied US equity variance (the VIX index). Similar in nature to the earlier analysis, the pattern shows much higher and more dispersed betas to these basic factors before April.

It is difficult to draw conclusions from betas alone, as factors manifest widely during a crisis, but there was clearly sensitivity to traditional market risk factors. Crude oil positions generated from commodity carry or momentum strategies were also important, and at least one manager attributed the entire negative performance to the oil price moves in March.

Overall, betas were nonetheless within expectations for the asset class given the circumstances.

Chart 9: Betas of ARP managers to different asset classes



Source: Frontier, managers



# ARP sleeve level analysis

Chart 10 (which uses HFRI indices constructed based on cohorts of similar bank swaps) demonstrates how material the correlations were with individual ARP sleeves during the height of the crisis. The asset class with the highest correlation was equities.

This has been an ongoing concern of Frontier’s for some time that the single stock equity premia can drive outsized losses. The chart also shows how diversified were the returns as the extreme market stress settled down; this is the type of return profile exhibited in normal market conditions.

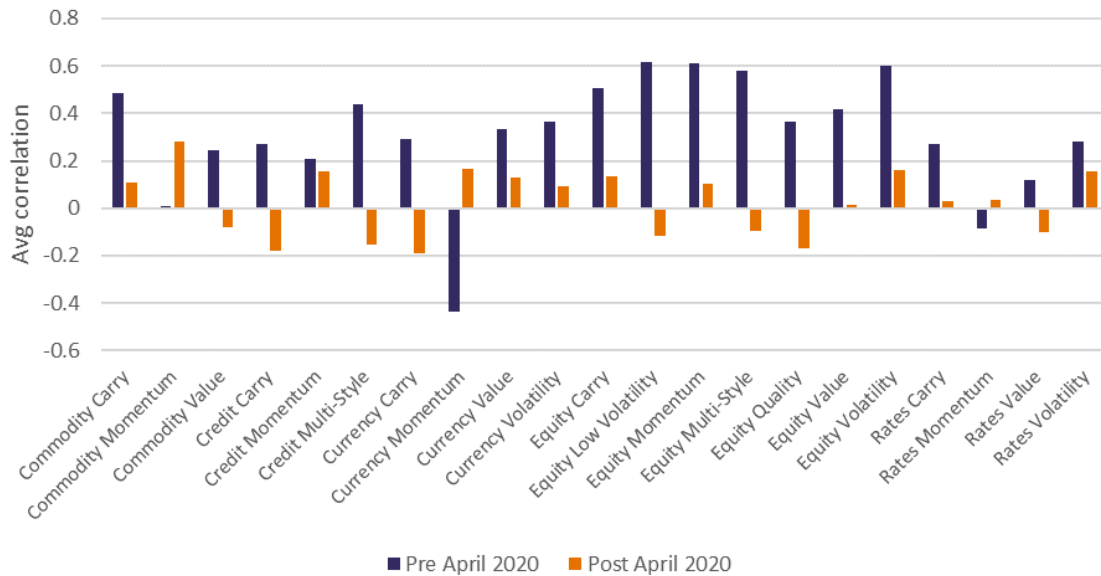
## Replicating ARP returns across standard ARP factors

Replicating of ARP factors helps to highlight the main drivers of returns across the ARP manager group.

Most ARP strategies are from a set of generally accepted risk premia: carry, value, momentum, volatility, and equity styles. We measure the replicability of ARP returns by estimating how closely fund returns can be replicated with a small number of known factors. For each manager we find the best three factors and record the resulting fit.

The standard ARP factors for the exercise are in the Table 4. Additionally, we include S&P500, Crude oil, Gold, US 10-year bonds, and VIX.

Chart 10: Average correlation to ARP factors across funds



Source: Frontier, managers, Bloomberg, HFRI

Table 4: Standard ARP factors across asset classes

Commodity	Credit	Currency	Equity	Rates
Carry	Carry	Carry	Carry	Carry
Momentum	Momentum	Momentum	Momentum	Momentum
Value	Multi-style	Value	Multi-style	Multi-style
		Volatility	Value	Value
			Volatility	Volatility
			Low beta	
			Quality	

Source: Frontier

The factors fit relatively well. The average R-squared for the three-factor replication is 0.66. Of the nearly 20 managers, 15 had an R-squared of at least 0.4 (see charts below).

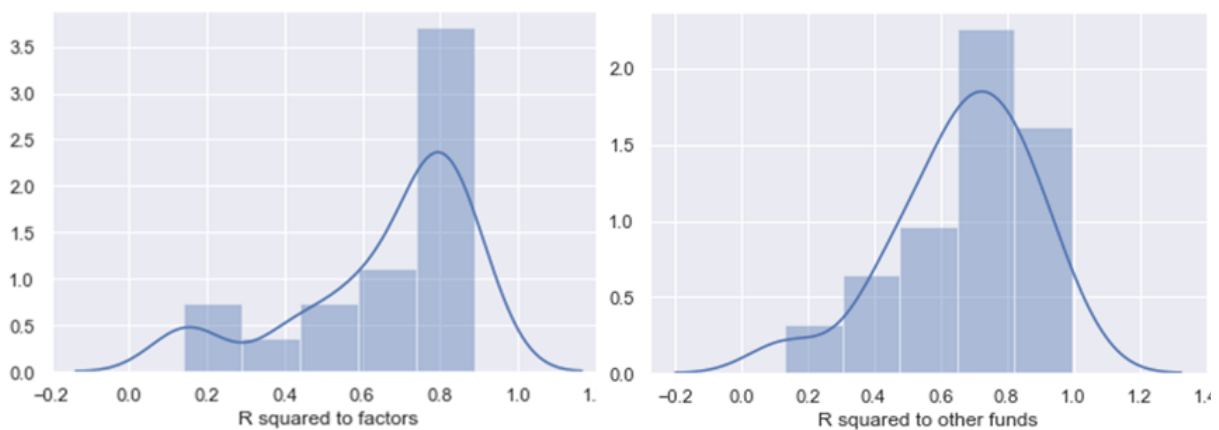
Overall, the managers' returns can be well replicated by a small number of standard ARP factors or a subset of other ARP funds.

Chart 12 includes the numbers of times that each ARP factor figured in the top three regression factors across the managers during the height of the COVID-19 crisis in March and then for the period after this when markets had settled down.

Unsurprisingly, equity factors figure prominently in the list of key return drivers for the managers during March. The prominent ARP factors change post March highlighting how different were the two periods. Not only are they different but also spread across different factors rather than focused on just a few and demonstrates diversification across the ARP sector.

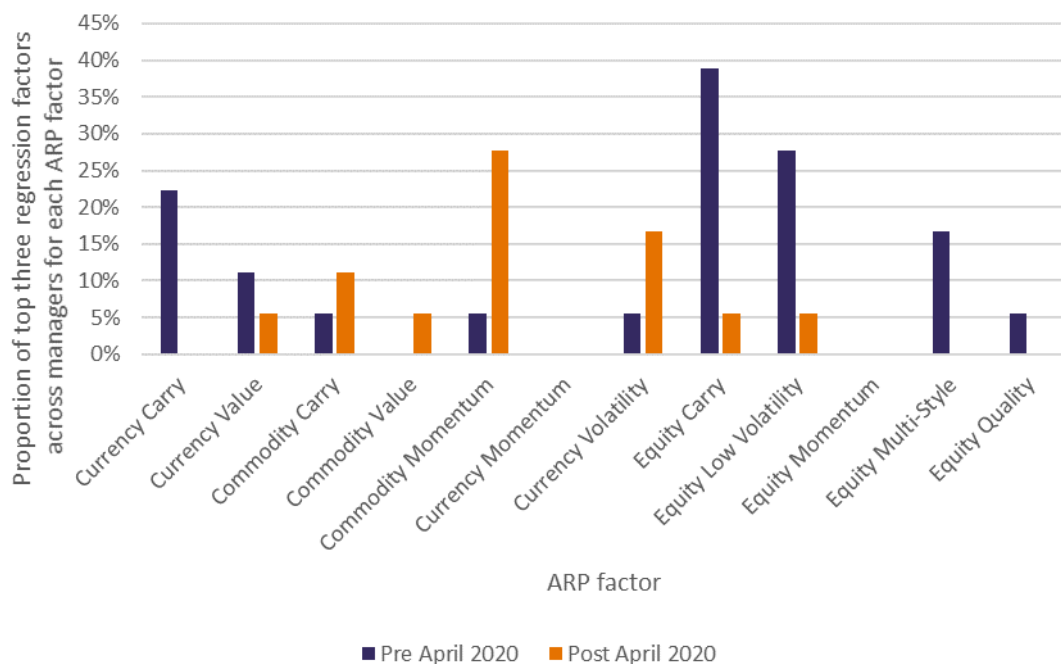
The above analysis is important since it shows that an otherwise relatively diverse group of managers can correlate together in a severe stress period. Any investor who had selected what they felt would be complementary managers would have been disappointed to see them correlate together.

Chart 11: R-squared for fund returns on best three factors and funds



Source: Frontier, managers

Chart 12: Proportion of times an ARP factor was in top three regression factors



Source: Frontier, managers, Bloomberg, HFRI

## The final word..

The COVID-19 period was an extreme event which highlighted which ARP strategies were robust and which were highly exposed to the dislocations which occurred in that stressed period.

The spread of manager outcomes highlights the critical importance of due-diligence. Part of this is understanding how managers size premia allocations, how often they rebalance, the timeframe used for targeting portfolio volatility and the use of vanilla vs complex instruments. Part of this is also understanding how managers behave during a crisis. Some were relatively calm whereas others appeared to make quick portfolio or process changes which may not have been as thoroughly considered as we would have liked.

This episode also highlighted the importance of a total portfolio perspective. Constructing a bespoke portfolio of ARPs (whether that be via a mandate or by using a combination of bank swaps) may provide a better fit at the total portfolio level. This is an ongoing area of focus for Frontier and one which we believe will gain more attention in the future.

Notwithstanding the above, it is important to note that this was a rare event. ARP strategies provide diversified return profiles in most market conditions and so it is important to size this strategy within a sector in a manner which does not overemphasise the recent period. It should certainly be part of the sizing discussion but perhaps should not drive it.



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