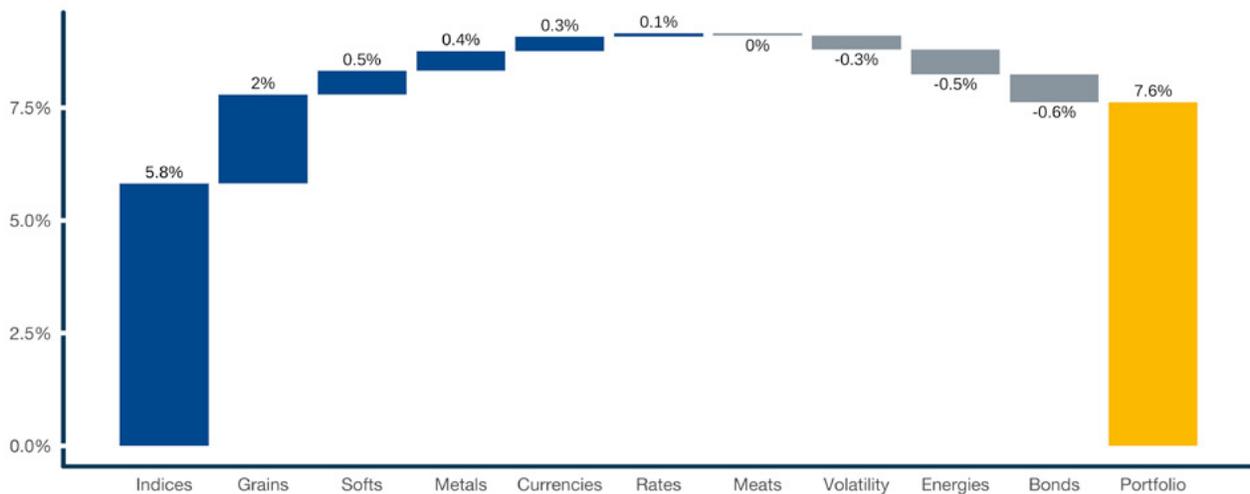


## PERFORMANCE REVIEW

### Q4 Discussion

As discussed at length in the [Q3 commentary](#), the Evolution program benefitted from a comprehensive upgrade that was deployed in early September. The fund delivered a strong 7.6 percent return in the fourth quarter, with the lion's share coming from an explosive rally in equities, both international (German DAX, Hong Kong Hang-Seng, and UK FTSE indices) and US (S&P 500). Grains (soybeans and canola) and softs (cotton, cocoa, and sugar) also contributed, while metals (copper and silver), currencies (Swiss Francs, Euro, and Japanese Yen) and rates (Eurodollar and Sterling) made marginal positive contributions. Losses in US 5Y bonds, German BUXL, and UK Gilts overcame gains from German Bunds and Canada Bonds leading to a small loss. Trading in energies (heating oil and carbon emissions) and the volatility complex also contributed marginally on the downside.

**Figure 1. Q4 Return Attribution**

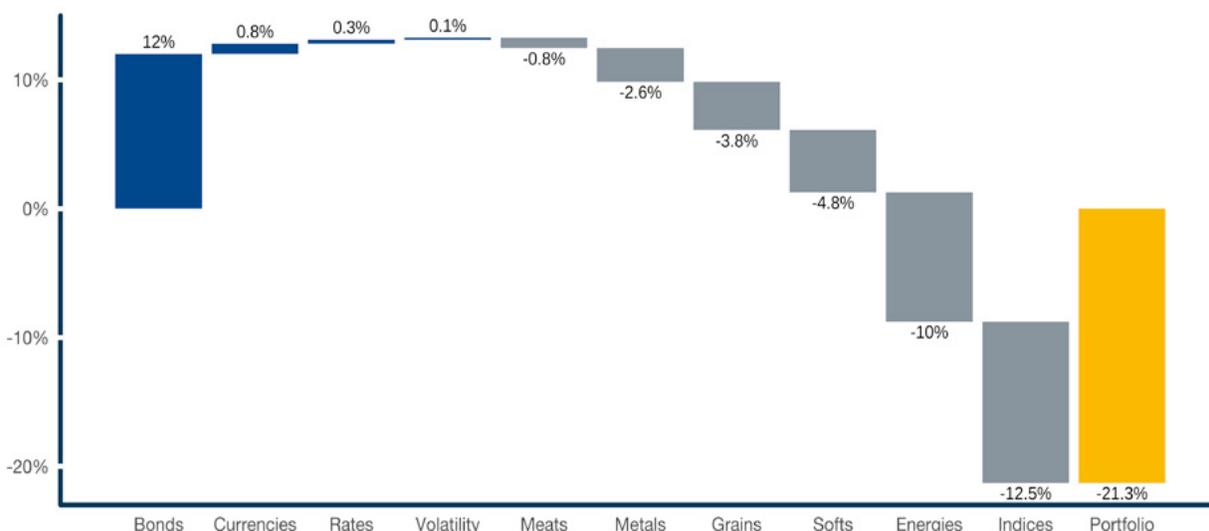


Source: ReSolve Asset Management. Results may differ due to rounding. Performance is expressed in USD. Strategy attribution is a best efforts approximation, net of all applicable borrowing costs, fees and fund accruals for the period. Indicated returns of one year or more are annualized. Past performance is not indicative of future performance.

### 2020 Discussion

Of course, the most intense period occurred earlier in the year while the Evolution program was using our previous strategy deployment, which focused on an ensemble approach of short-, medium- and longer-term forecasting methods for its various sub-strategies. While the systems that focused on shorter time frames navigated February and March quite well, longer time frame systems struggled with the unprecedented velocity of decline during the acute phase of the pandemic-induced crash. The aggressive recovery of April and May further exacerbated the problem.

Bonds, led by 10-year US Treasuries and German Bunds, were the only meaningful source of positive returns on the year. Currencies also offered some ballast, mainly via trades in the Euro, Japanese Yen and Swiss Franc. The majority of losses came from equity markets (mainly from the French CAC40, Spanish IBEX, Canadian TSX and US Dow Jones) and energies (crude oil, gasoil and RBOB).

**Figure 2. 2020 Return Attribution**


Source: ReSolve Asset Management. Results may differ due to rounding. Performance is expressed in USD. Strategy attribution is a best efforts approximation, net of all applicable borrowing costs, fees and fund accruals for the period. Indicated returns of one year or more are annualized. Past performance is not indicative of future performance.

## GENERAL MARKET REVIEW

It was a year like no other in living memory. The outbreak of a new coronavirus in a central Chinese province during the final months of 2019 morphed into a global pandemic of proportions not since seen the 1918 Spanish Influenza. As cases spread through all corners of the globe and threatened to overwhelm healthcare systems, major cities – and in some cases entire countries – were placed under varying forms of lockdown. By the early days of March much of the planet had come to a halt. Airports, retail centers and most communal spaces became practically (and in some cases completely) deserted. The mass shutdown of businesses – many of which will never reopen – brought about a huge spike in unemployed, a collapse in inflation and growth, and the deepest global recession since World War II<sup>1</sup>.

The ensuing carnage in global risk assets was comparable to, and in some instances exceeded, the throes of 2008's Global Financial Crisis. Equity markets experienced their fastest 30% decline in history<sup>2</sup>. Emerging Markets were amongst the worst affected, especially given their dependency on commodities, which suffered some of the largest drawdowns. The most remarkable story was in crude oil, where a price war aggravated a backdrop of plummeting demand and limited storage capacity, leading to the implausible episode of negative prices for a few North American energy contracts. Investors sought refuge in the US dollar, the Japanese Yen, the Swiss Franc and a handful of sovereign bonds as most yields contracted to all-time lows. Gold also offered protection, though other precious metals sustained double-digit losses. The VIX (CBOE Volatility Index) rose approximately fourfold and closed at almost 83 on March 16th, its highest recorded level.

Policymakers responded with colossal firepower, with an almost USD 3 trillion fiscal package from the US and trillions more from European and Asian economies. The IMF estimated, as of the end of May, that approximately USD 9 trillion had been deployed by governments around the world in emergency relief. Central banks also mustered their collective toolkits, bringing (or keeping) policy rates close to zero and restarting (or expanding) their quantitative easing programs. In addition, the Fed joined the ECB and Bank of Japan in buying corporate bonds in the secondary market through a special purpose vehicle – essentially circumventing the law in support of credit markets. The definition of whatever it takes increased by a few orders of magnitude.

<sup>1</sup> <https://www.worldbank.org/en/news/press-release/2020/06/08/covid-19-to-plunge-global-economy-into-worst-recession-since-world-war-ii>

<sup>2</sup> <https://www.cnbc.com/2020/03/23/this-was-the-fastest-30percent-stock-market-decline-ever.html>

But few anticipated what followed. Vast government stimuli combined with a surge in demand for services catering to the stay-at-home economy – from online retail and social media, to video conferencing and streaming – turned the fastest bear market in history into the shortest. Led by its dominant technology sector, the S&P500 rallied 55% and broke new highs by August. What many believed would be another Great Depression became the shortest recession in US history. History neither repeated nor rhymed.

Though global asset classes continued their recovery into the very end of the year, the ride was anything but smooth. After a quiet summer, the virus resurged in September and new restrictive measures were once again imposed across much of the world. This resulted in an increasingly bifurcated, K-shaped recovery, where large companies – and much of their now remote workforce – were able to adapt (and even thrive), while small businesses, gig-workers and much of the general population appeared largely left behind.

A highly polarized and contentious US presidential election was yet another source of volatility, culminating in the victory of Democrat Joe Biden over the Republican incumbent Donald Trump.

Geopolitical tensions between the US and China also intensified across multiple fronts including corporate espionage, the crackdown in Hong Kong, and accusations over the origins and fallout of the pandemic.

The final two months of the year saw successful trials followed by approvals of several different vaccines, an extraordinary feat of ingenuity and collective effort, especially given the speed with which it was accomplished. A massive rally in risk assets ensued, led by raw materials (particularly energies) and global equities, some of which had their largest monthly gains in over 30 years. By the time the long awaited additional fiscal relief package was approved by the US Congress and an initial Brexit trade deal was signed, they were basically icing on the cake.

## RESEARCH HIGHLIGHTS

Our research has evolved from one that was informed by naïve factors, universal hard-coded rules that were applied to all markets in the same way, to a strategy informed by bespoke factors, the shape and quality of which emerged from the way market conditions impact each market individually.

**Figure 2. The Evolution of Factor Investing**

Naive Factors	Bespoke Factors
Grounded in economic theory	Grounded in empirical relationships observed in the data
Common relationships across all assets	Relationships are unique to each market
Simple relationship structure (i.e. binary, linear)	Complex relationship structure (i.e. non-linear)
Focused on long-term average behaviour	Focused on behaviour under different conditions
Validated with in-sample analysis	Validated with robust out-of-sample methods

This transition required a fundamental shift in thinking and material leaps of innovation at several stages of the research process.

First, since the bespoke factor methodology accommodates a much wider variety of explanatory variables, we required new infrastructure to collect, verify, wrangle, and transform data of different types into a universal feature library. Next, in recognition of the curse of dimensionality and statistical challenges with tests on many thousands of hypotheses, we borrowed from advanced data science methods to narrow our features universe down to an optimal dimension. This was accomplished by extracting only the truly unique elements from all of the different features, a process called dimensionality reduction.

With unique feature dimensions and market data in a useful format, the next step was to learn the relationships between our features and forward market returns. While there is no shortage of tools available to mine these relationships, we chose to create our own methodology. Most off-the-shelf methods are not well suited to financial time-series, and require the tuning of perhaps dozens of hyperparameters, which are irrelevant to our objectives.

In addition, it's often challenging to tease out the underlying mechanics to gain intuition about the output of commercial packages. Our methodology was designed to focus exclusively on what matters to us with financial time series, while providing the necessary intuition to guide us through inevitable rough patches.

The mining step produces thousands of models – relationships between features and market returns. What qualities of the output help to signal whether a model is useful? How many models should be chosen? How should they be weighted in a portfolio? It turns out the most challenging and rewarding aspect of the entire process stack revolves around how to answer these questions. Perhaps surprisingly, the eyes of experienced traders – aided by a variety of quantitative tools, dashboards, and analyses - are often the most useful tool for separating the wheat from the chaff.

Once models are deployed, it's critical to monitor and manage the performance of strategies at multiple levels: at the model level, the market level, the sector level, and the strategy level. This requires another layer of infrastructure that is tied into the risk control function.

There are other important considerations that factor into each step. For example, trading costs – expected commissions and trade slippage – might render an otherwise highly prospective model effectively untradeable. Ideally, trading costs are integrated into the data pipeline since they would be expected to change over time. Mining should incorporate trading costs in fitting models. And the selection step should incorporate trading costs when choosing which markets and models to trade, and in what weight.

The framework above represents minimum requirements to develop and deploy bespoke factor strategies. We are continuously working to evolve the approach both incrementally – by adding new feature sources, markets, forecast horizons, etc. For example, the team has observed that markets are heavily influenced and explained by information derived from the volatility surface and the plumbing of the financial system. Features that help triangulate risk and opportunity in these dimensions are a high priority research direction at the moment.

While our tech stack is designed for continuous incremental innovation, it is important to keep at least one good eye on strategic direction. This means regularly taking time out to reimagine the fundamental objectives of the approach from the ground up. One important step in this direction is the ability to mine for models based on how features impact on the portfolio of all markets, rather than evaluating one market at a time.

In summary, a migration to bespoke factors was a long-term strategic decision with profound implications for ReSolve and yourself as an investor. Aside from the fact that this approach puts us firmly out in front of other competitors in the quantitative space, it also offers a large number of potential research directions with opportunities for major incremental and strategic improvements.

## DO VALUATIONS STILL MATTER?

While markets rose steadily through December, a new and more contagious strain of the coronavirus was discovered, leading to renewed and, in some cases, stricter lockdown measures in many countries. Not only does it remain unclear whether the various vaccines are effective against this new mutation (several labs have claimed “confidence” that they will be), but questions also arose whether inoculated individuals might be protected against severe illness but could still transmit the virus. Tensions also increased on the geopolitical front as reports emerged of a massive cybersecurity breach across multiple US government agencies. According to experts, the highly sophisticated nature of the attack bears the signs of state-sponsored espionage and appears to have lasted for several months.

The aggressive recovery and performance of equity markets in 2020 has shocked many investors, some of whom have described this as the biggest asset bubble in history. Others have retorted that this is just the natural consequence of the actions of policymakers; not only eliminating any meaningful opportunity cost for capital (left with no alternative but to chase stocks higher) but also encouraging increased risk-taking by delivering on the promise to always be there to rescue shareholders (the infamous Fed Put).

Some observers have also pointed to the relentless growth of passive investment vehicles, many of which track popular market-cap weighted indices, and their simplistic reaction function: buy stocks when money flows in, sell when it flows out. This price-insensitive dynamic leads to an overallocation to ever-larger mega-cap stocks (think Big Tech), while little to no capital is directed to smaller, and largely cheaper, peers. As money continues to flow towards these index-tracking funds, and away from active equity managers (many of whom would tend to buy the cheap and sell/short the expensive companies), the gap between prices and what historically has been considered sound, long-term fundamentals, may continue to widen.

Yet there are signs that markets may have begun to price in some of these imbalances and underlying risks in the system. A plunging US dollar

and strong appreciation of gold and other precious metals – not to mention the meteoric rise in Bitcoin and other crypto-assets – are suggestive of concerns that the US and other countries might seek to debase their currencies in order to inflate away an unsustainable global debt-load. Meanwhile, the possibility of a major regulatory clampdown on both sides of the Atlantic hangs over technology giants, which could overwhelm equity markets.

As elevated uncertainty continues to set the tone and investors grow more accustomed to prices divorced from valuations, they should consider whether there are any risks beyond the powers of almighty policymakers.

Sincerely,

Your ReSolve Team