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## Identifying a “COVID-19 Factor”

How SAPIAT Risk™ helps Institutional Investors and their Managers measure the impact of COVID-19 on their portfolios

SAPIAT Article

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### **Background**

Post-2008, Institutional Investors are aware that they may suddenly find themselves exposed to large and unanticipated risks and consequently their own due diligence burden obliges them to improve their knowledge of the risks that are being taken on their behalf.

For this purpose, just knowing the level of risk of a given mandate is inadequate, as the Institution's aggregate risk will be affected by the correlations between the risks of the different strategies invested in. Consequently, risk transparency requires that the asset manager disclose both the individual assets and the systematic factors – be they macroeconomic, sector, country or fundamental style bets – that account for the majority of the risk taken.

Traditional risk factor models are potentially the ideal analytical tool for this purpose. They are explicitly able to distinguish between asset specific risk and systematic factor risk. However, to gather adequate data for the required computations these models are based on several years of historic data and consequently are slow to respond to changing market dynamics. This means that, at the times when market volatility jumps and risk concerns are most to the fore, the models will be least useful.

SAPIAT, uniquely among the providers of traditional factor models, have addressed this issue with an extension of its multi-factor model that forecasts near term volatility shifts across the whole systematic factor space. This system, called [FASTVaR™](#), takes the daily performance of the systematic factors and applies a GARCH process to them – this being the established method of volatility forecasting. As the profitability of a company is dependent on the macro-economic environment in which it operates, [FASTVaR™](#) is, in effect, estimating the impact on profitability of the currently expected market environment. This means that, when managing a portfolio, and when reporting on the risk profile to clients, the manager is able to demonstrate that they are fully aware of, and are taking account of, the current market risk environment.

## Identifying the “COVID-19 Factor”

During market turbulence, conventional fundamental style factors (such as Value, Size, etc.) are more likely to be affected by emerging sources of risk, driven by investor analysis as they reassess what exposures they are willing to pay for. In some cases, this can be characterised as “style rotation”, but when markets are facing unprecedented conditions, these emerging sources of risk may turn out to be quite novel and can persist into a new market regime.

In order to estimate the full factor structure for the current market regime, SAPIAT uses a machine learning approach based on the EM algorithm<sup>1</sup>. Here we review specifically the impact for the US equity market.

### “Extra Market” Factor vs. S&P 500

(Jan. 2015 ~ Apr. 2020)



In order to identify a factor for COVID-19, SAPIAT first extracts a “market factor” to match the majority of variance in a market-representative index (such as the S&P 500 index for US equities). This market factor is constructed so that the market index loads completely on this first factor and zero against all others. We then construct a second, “extra-market factor” such that this is *the only other factor with non-zero returns* in the sample period from 11<sup>th</sup> March to 18<sup>th</sup> March, 2020 when the COVID-19 effect significantly started impacting the markets.

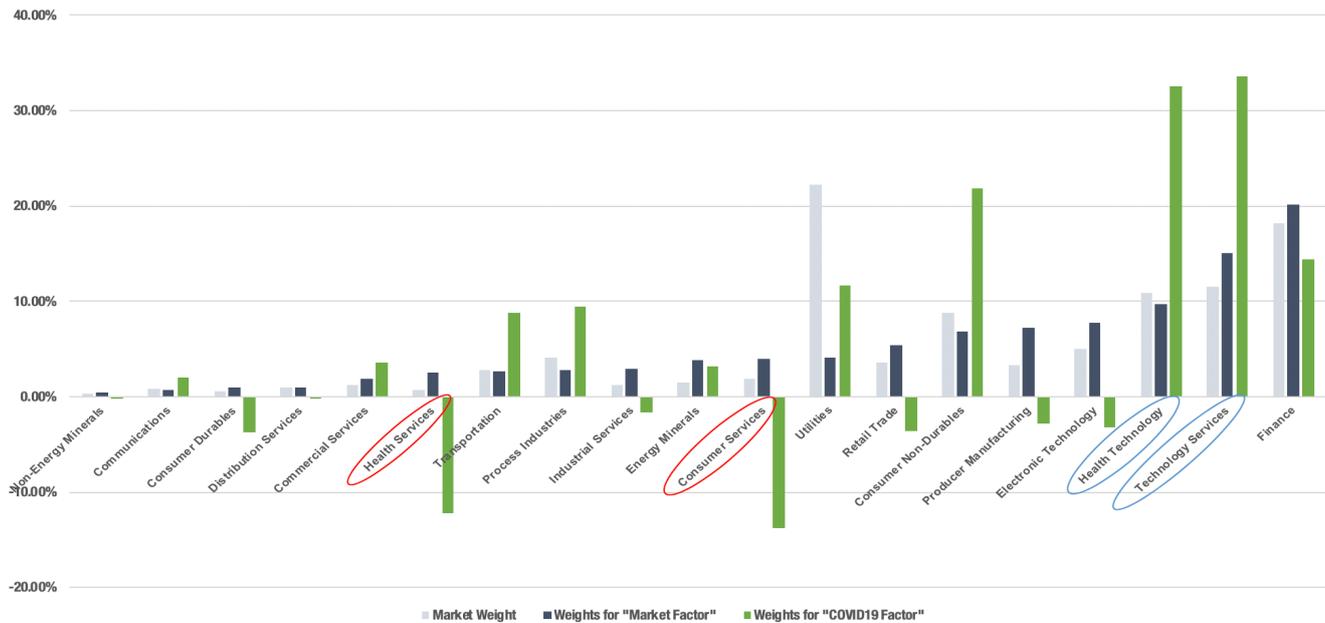
Thus this “extra-market factor” is identified with the second largest driver of systematic returns in the period. As illustrated in the chart above, this factor has a high explanatory power (net of market returns) in the period after 18<sup>th</sup> March 2020. It is also interesting to note that prior to 11<sup>th</sup> March, the factor is quite quiescent relative to and correlated with the overall market.

<sup>1</sup> Expectation Maximization algorithm which “learns” the best-fit distribution that can describe the observed data.

## Interpretation and Usage

The cross-sectional characteristics of this extra-market factor are then analysed by creating a set of “factor mimicking portfolios.” For example, in the chart below, we have constructed factor mimicking portfolios for *Factor 1* (the “market factor”) and *Factor 2* (the “extra-market factor”) and organized them by sector. We also contrast the weights of the Market Portfolio and Extra-Market Portfolio against the actual market weights of each sector. We can see that the sector weights for the Market Portfolio align closely with the actual market weights (except for the utilities sector). Meanwhile, the Extra-Market Portfolio’s sector weights deviate significantly from the actual market in certain industries— over-weighting “Health Technology” and “Consumer Non-durables” while underweighting “Consumer Services” and “Industrial Services.” Thus, we can begin to understand the characteristics of this extra-market factor to its potential association with the root drivers of return, such as COVID-19.

**Factor-mimicking portfolio weights for the “Market Factor” and the “COVID-19 Factor”**



We can also examine how individual companies rank in terms of exposure to this extra-market “COVID-19 Factor,” as a proportion of their overall systematic risk. We can see below that the “winners” in US equity universe from this perspective include many technology firms (Oracle, Akamai, Citrix, Cisco Systems) as well as delivery companies such as UPS. Certain consumer product companies like Clorox show a positive impact as well. On the other hand, companies such as Boeing and Delta Airlines are being affected negatively. We can also note that energy / oil companies like Chevron and DTE Energy are among the most badly affected, indicating that the factor may also be picking up effects of the recent oil- price collapse by its design.

**Companies scored by proportional exposure to the "COVID-19 Factor" vs all systematic risk factors**

Best 20	Company	Factor 2 exposure score	Volatility
1	BioNTech ADR	-0.777	124.8%
2	United Parcel Service B	-0.694	23.6%
3	Citrix Systems	-0.658	20.8%
4	Walgreens	-0.653	25.6%
5	Hormel Foods	-0.601	20.3%
6	Baxter Intl	-0.593	21.1%
7	Walmart	-0.590	17.5%
8	Akamai Technologies	-0.568	31.7%
9	Oracle	-0.568	21.7%
10	Kellogg	-0.547	20.2%
11	Clorox	-0.544	18.4%
12	Mettler-Toledo	-0.517	24.6%
13	Thermo Fisher Scientific	-0.499	22.1%
14	T. Rowe Price Group	-0.495	25.4%
15	Johnson & Johnson	-0.476	16.2%
16	Gilead Sciences	-0.456	24.1%
17	General Mills	-0.456	20.8%
18	Costco Wholesale	-0.447	20.3%
19	Cisco Systems	-0.438	21.9%
20	ANSYS	-0.434	25.7%

Worst 20	Company	Factor 2 exposure score	Volatility
20	Realty Income	0.719	34.3%
19	McDonald's	0.665	22.2%
18	Sysco	0.639	36.7%
17	Ross Stores	0.604	34.9%
16	AutoZone	0.602	27.7%
15	Hershey	0.563	22.0%
14	CME Group A	0.555	25.4%
13	Coca-Cola European	0.520	28.0%
12	DTE Energy	0.515	22.1%
11	Aflac	0.509	26.7%
10	PPL	0.506	21.6%
9	Delta Air Lines	0.501	42.0%
8	American Intl Group	0.496	38.3%
7	O'Reilly Automotive	0.476	27.4%
6	Publ Svcs Enterpr	0.474	20.8%
5	Travelers	0.463	24.7%
4	Lowe's	0.459	33.3%
3	Boeing	0.453	46.8%
2	Chevron	0.452	29.8%
1	Chubb	0.451	21.7%

As seen from the exercise above, for the US equity market, this "COVID-19 Factor" can be represented as a long-short portfolio of stocks – which might be implemented as a market-neutral strategy portfolio by a hedge fund manager. Long-only managers can gain exposure to this factor by overweighting and underweighting stocks relative to a market benchmark, or by buying an appropriately weighted long portfolio of stocks together with a short position in market futures.

In each case, this approach to portfolio construction provides exposure to the biggest extra-market driving term of returns, and if this factor persisted in a more-or-less stable form for any length of time, it would allow investors to capture systematic returns ("beta") to a factor which we could justifiably call the "COVID-19 Factor".

As we estimate this COVID-19 factor going forward and monitor its stock exposures, we will better understand its nature and behaviour, and be able to model out scenarios and re-balancing strategies to protect or benefit from the progressing changes in the economy.

Investors can also compare our results to their own prior hypotheses about the sensitivity of their investment universe to the impact of COVID-19. In this way, they can ascertain concrete action to increase or reduce the exposure to this source of risk.

For active managers and stock-pickers, this analysis can be combined with the manager's own "fair-value" calculation to determine, on a risk-adjusted basis, how to right-size the bets they are taking in the new investment environment dominated by the pandemic. For example, within the insurance sector, user could answer questions like *"how does our view on the fundamentals-based cheapness of Travellers relative to Aflac correspond to the relatively small difference in exposure to the COVID-19 factor revealed in the table above?"*



As the economic environment changes again with more and more calls for a “return to work”, we believe it will be of great benefit to monitor and analyse every portfolio's exposures to the COVID-19 factor and to be alert to the opportunities it provides to improve the investment process. Better risk management is just the start – for many active managers this factor can be the key to improved performance in 2020.

Finally, while the current environment may or may not persist, and while the optimal response to a high risk environment may be to increase market exposure rather than reduce it, the ability to make a fully transparent risk report to institutional clients that takes account of the novel market environment is not only beneficial but also necessary for Institutional Investors to meet their fund objectives.

For more information please visit <https://sapiat.com/> or contact us at [sales@sapiat.com](mailto:sales@sapiat.com)