Under the Microscope:
Examining the Coronavirus Through the Lens of Multiple Fixed Income Risk Models

April 16, 2020

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Presentation Outline

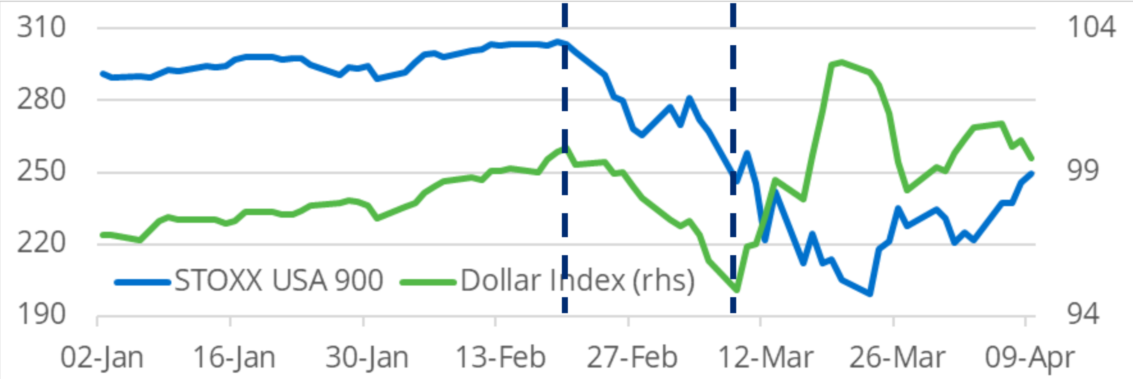
- Market environment review
  - Coronavirus disrupted 'traditional' cross-asset correlations, eliminating diversification
- Corporate bond spreads
  - Corporate bonds hit by double blow of rising rates and spreads in scramble for cash
  - Proportional spread model shows sharp uptick in predicted risk
  - Investment-grade debt increasingly driven by credit risk, raising danger of 'fallen angels'
  - Factor model reveals mostly market risk and some steepness, as lower-rated curves invert
- Further resources
  - Coronavirus commentary page, blog posts and whitepapers

Market Environment Review

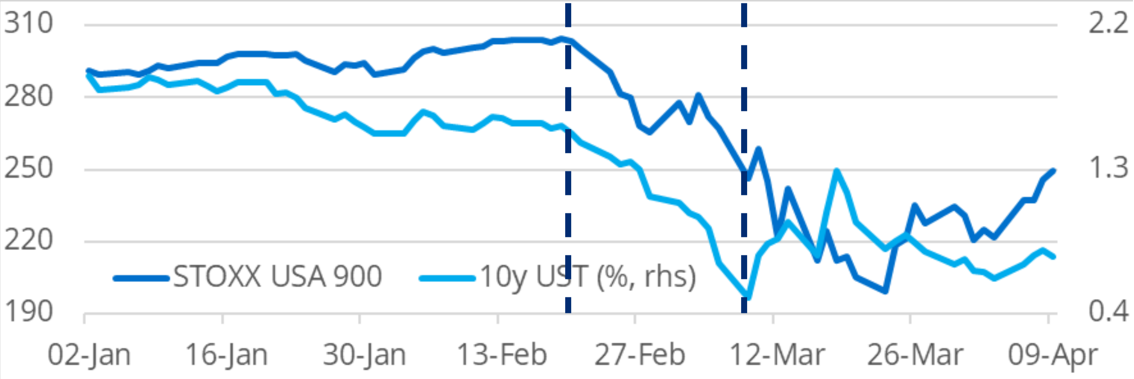
How the coronavirus affected cross-asset correlations and diversification

Major Asset Class Movements

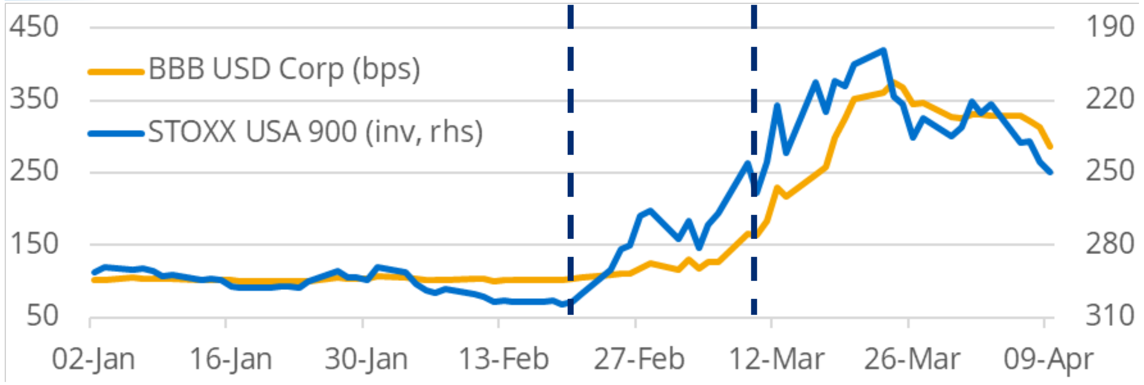
Equities vs US dollar



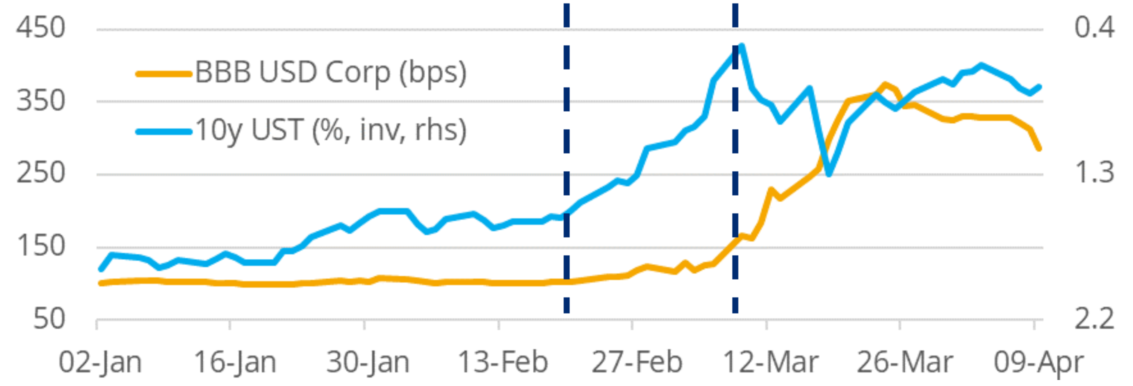
Equities vs sovereign yields



Credit spreads vs equities



Credit spreads vs sovereign yields



Sources: Qontigo, Axioma Fixed Income Spread Curves

Multi-Asset Class Risk Type Return Correlations (3 Months)

Feb. 14, 2020 (Stock-market peak)

	FX	Equity	Interest Rates	Credit Spreads	Commodity
FX	1.00	-0.51	0.07	-0.26	0.16
Equity	-0.51	1.00	-0.68	0.86	0.16
Interest Rates	0.07	-0.68	1.00	-0.76	-0.17
Credit Spreads	-0.26	0.86	-0.76	1.00	0.13
Commodity	0.16	0.16	-0.17	0.13	1.00

March 6, 2020 (Flight to quality)

	FX	Equity	Interest Rates	Credit Spreads	Commodity
FX	1.00	-0.27	0.60	-0.60	-0.15
Equity	-0.27	1.00	-0.58	0.80	0.71
Interest Rates	0.60	-0.58	1.00	-0.83	-0.21
Credit Spreads	-0.60	0.80	-0.83	1.00	0.59
Commodity	-0.15	0.71	-0.21	0.59	1.00

March 20, 2020 (Scramble for USD cash)

	FX	Equity	Interest Rates	Credit Spreads	Commodity
FX	1.00	0.36	0.87	0.73	0.39
Equity	0.36	1.00	0.08	0.76	0.84
Interest Rates	0.87	0.08	1.00	0.45	0.23
Credit Spreads	0.73	0.76	0.45	1.00	0.80
Commodity	0.39	0.84	0.23	0.80	1.00

April 9, 2020 (Liquidity concerns ease)

	FX	Equity	Interest Rates	Credit Spreads	Commodity
FX	1.00	0.52	0.46	0.77	0.01
Equity	0.52	1.00	-0.12	0.67	0.41
Interest Rates	0.46	-0.12	1.00	0.09	0.13
Credit Spreads	0.77	0.67	0.09	1.00	0.31
Commodity	0.01	0.41	0.13	0.31	1.00

Source: Axioma Risk

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How the Coronavirus Affected Portfolio Diversification

- Scramble for USD cash meant that government bonds, JPY, CHF and gold all dropped alongside share prices
- Conventional diversification strategies no longer worked
- Positive correlations meant that all asset classes added to portfolio risk
- US Treasuries provided some relief as they uncoupled from other assets

How the coronavirus killed portfolio diversification

The extraordinary market movements over the past few weeks have thrown long-established cross-asset class correlations into disarray.

Christoph Schon, CFA, CIPM

Posted 03.24.20

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Corporate Bond Risk

Analysing corporate bond risk, using credit spread curves and fixed income risk models

Corporate Bonds

> Corporate bonds were hit by double blow of higher sovereign yields and exploding credit spreads

> Spread levels already surpassed previous peaks, but have yet to reach heights of GFC

> BBB risk rose much more than higher-quality issues, raising danger of 'fallen angels'

> Corporate-bond returns and volatility increasingly driven by credit spreads (and share prices)

Treasury yields are up and stocks are down… And that spells double

Since the beginning of the equity sell-off in the last week of February, credit spreads have widened rapidly and significantly.

Christoph Schon, CFA, CIPM Posted 03.19.20

Equity Markets Fell, Are Angels Next?

The well-publicized fall in equity markets may have overshadowed a potentially much more impactful risk from the corporate bond market – that of fallen angels.

Olivier d'Assier Posted 03.19.20

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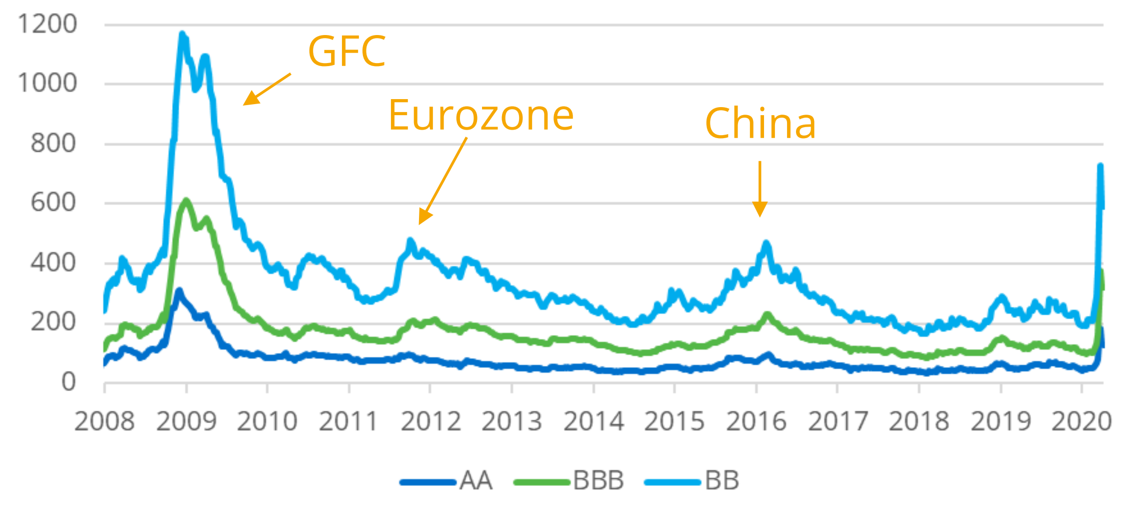
Corporate Bond Spreads

> Spreads already past previous peaks of Eurozone debt crisis in 2011 and Chinese stock-market turbulence in 2015/16

> Have yet to reach heights of global financial crisis in 2008/2009

> Fastest surge since autumn 2008

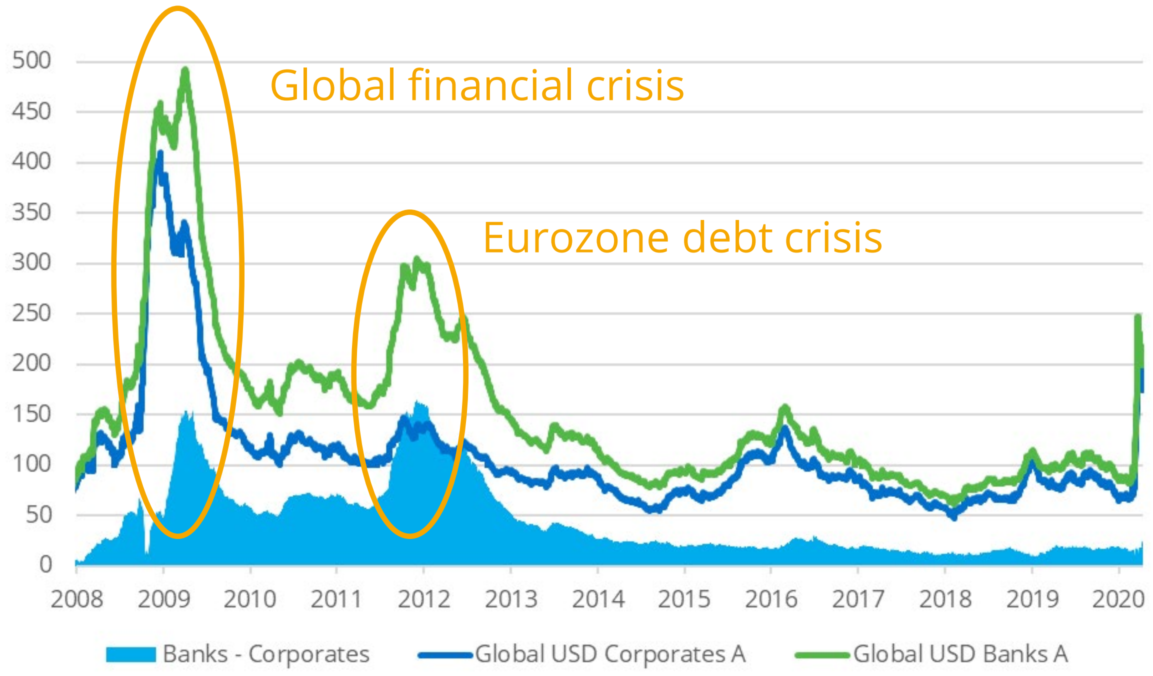
Average 5-year spreads over USD swaps for North American corporates



Source: Axioma Fixed Income Spread Curves

Bank Credit Spreads: Will This Time Be Different?

Avg. 5y spread for global corporates & banks



Source: Axioma Fixed Income Spread Curves

- Banks have moved in line with overall market so far
- Financial spreads widened 150bps over market average in GFC and Eurozone debt crisis
- Previous crises caused by specific type of ‘toxic’ asset; now wider range of debt
- US banks provisioned for bad loans
- European governments promised to back bank loans and mortgage holidays

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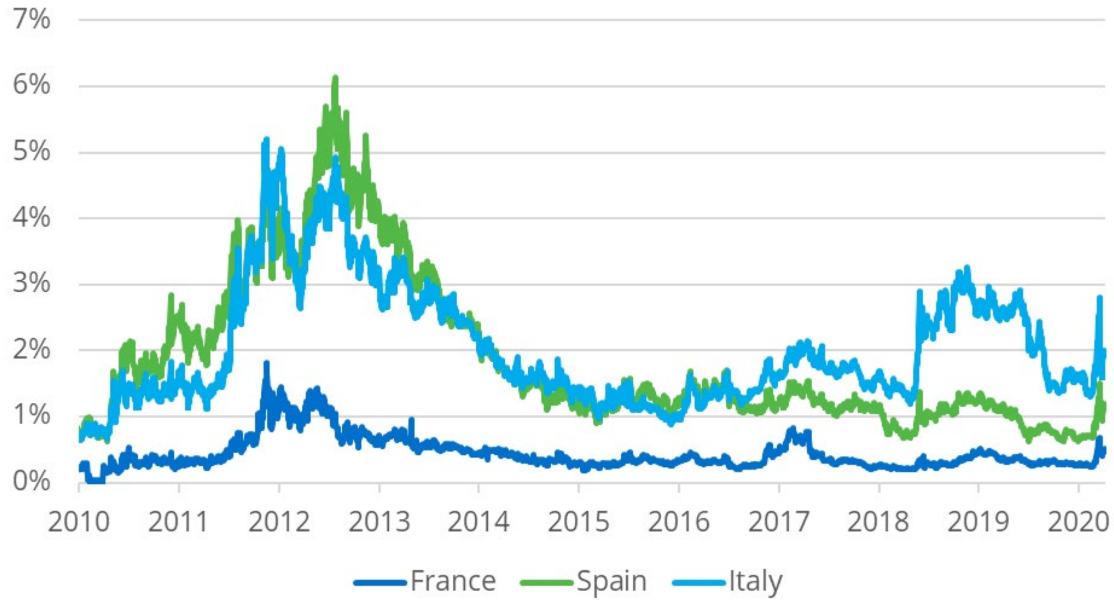
Bank Credit Spreads: Doom Loop Reloaded?

- Fiscal rescue packages will put upward pressure on both ‘core’ rates and ‘peripheral’ spreads
- But Spain widened less than Italy due to stronger fiscal position
- Banks in peripheral countries often hold domestic sovereign debt and may need bailout, as balance sheets deteriorate
- This will put additional pressure on fiscal position, raising spreads even further

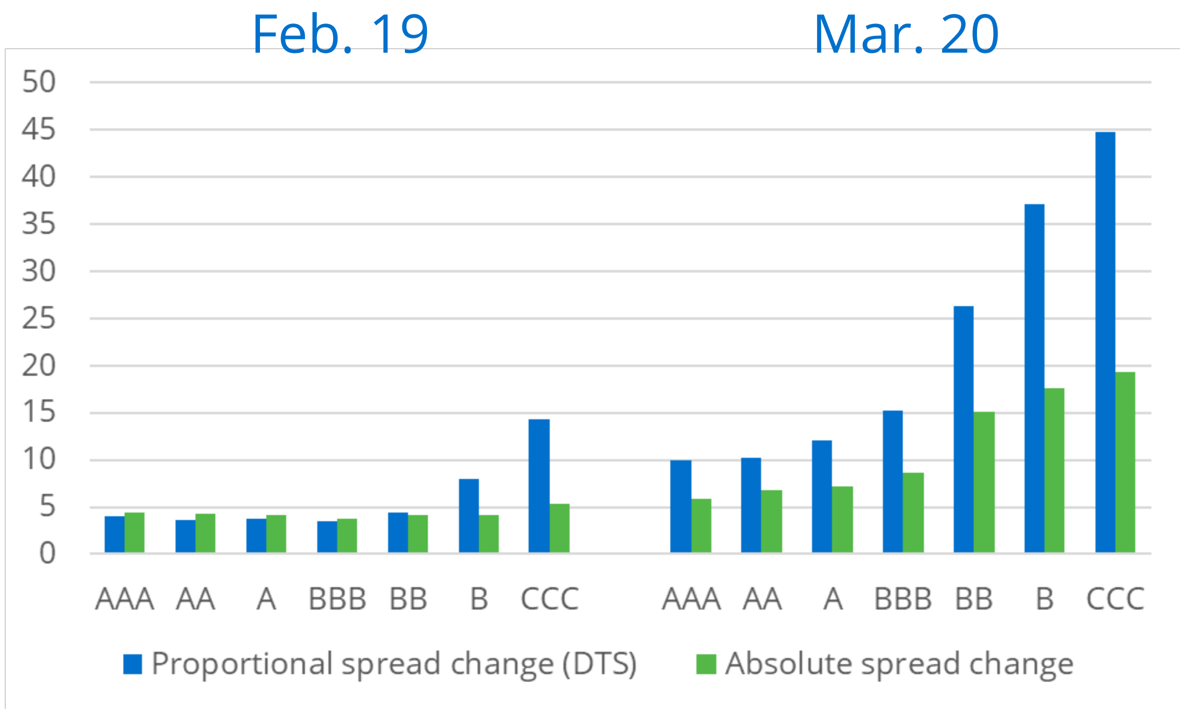
10y sovereign spread over German Bunds



Source: Qontigo

Risk Model Comparison

Predicted volatility for USD corporates



Source: Axioma Risk

- > Proportional-spread, DTS-based model is quicker to react
- > Absolute-change model forecast is similar to DTS model in 'normal' times, but 40-60% lower in crisis
- > Investment-grade risk homogenous before crisis, but BBB now reflects increased likelihood of 'fallen angels'
- > Risk models calibrated on weekly returns over 5 years with 1y half-life

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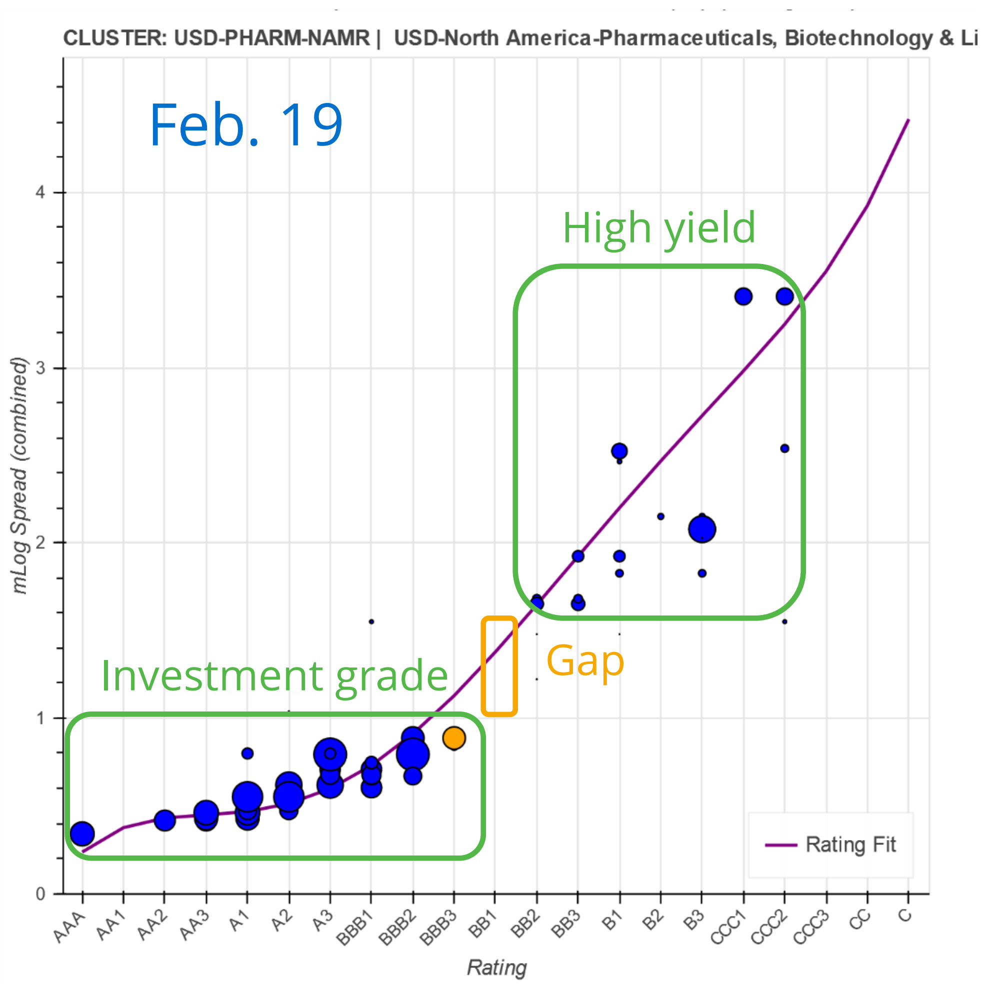
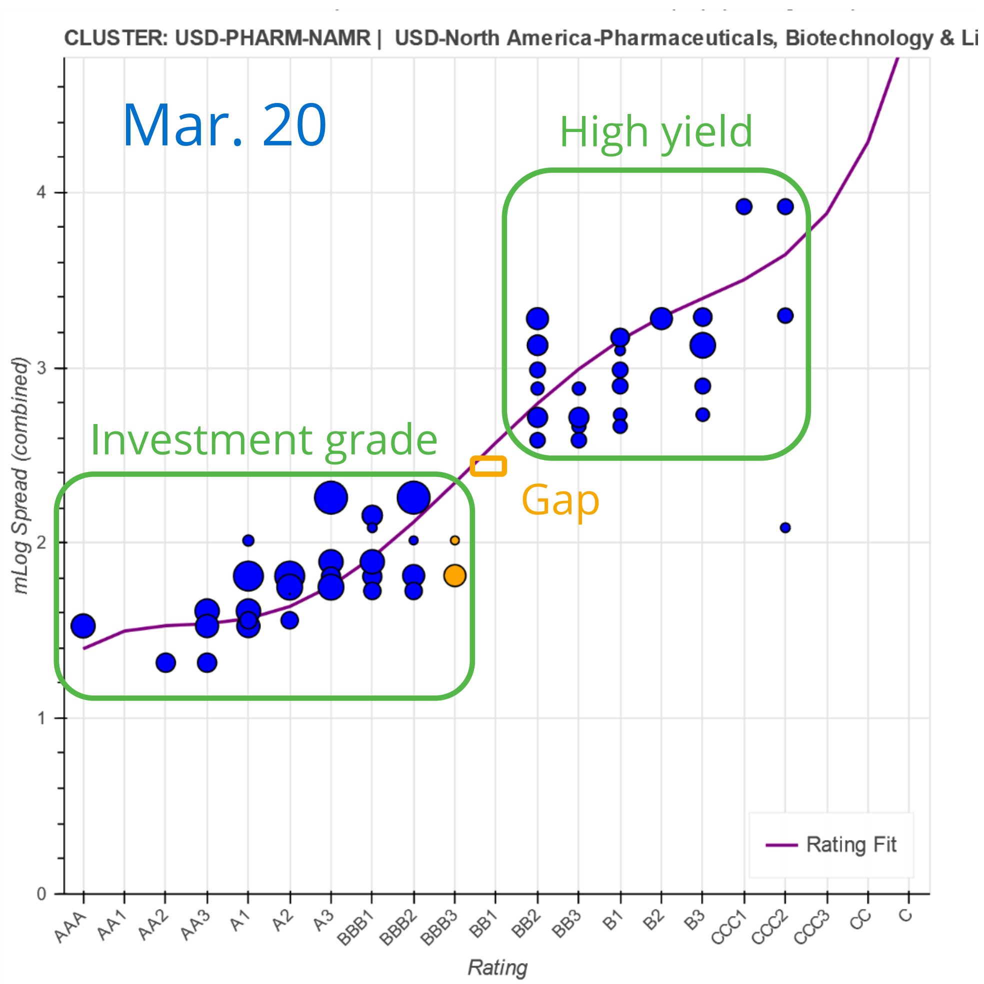
Rating Comparison Over Time





Source: Axioma Fixed Income Spread Curves

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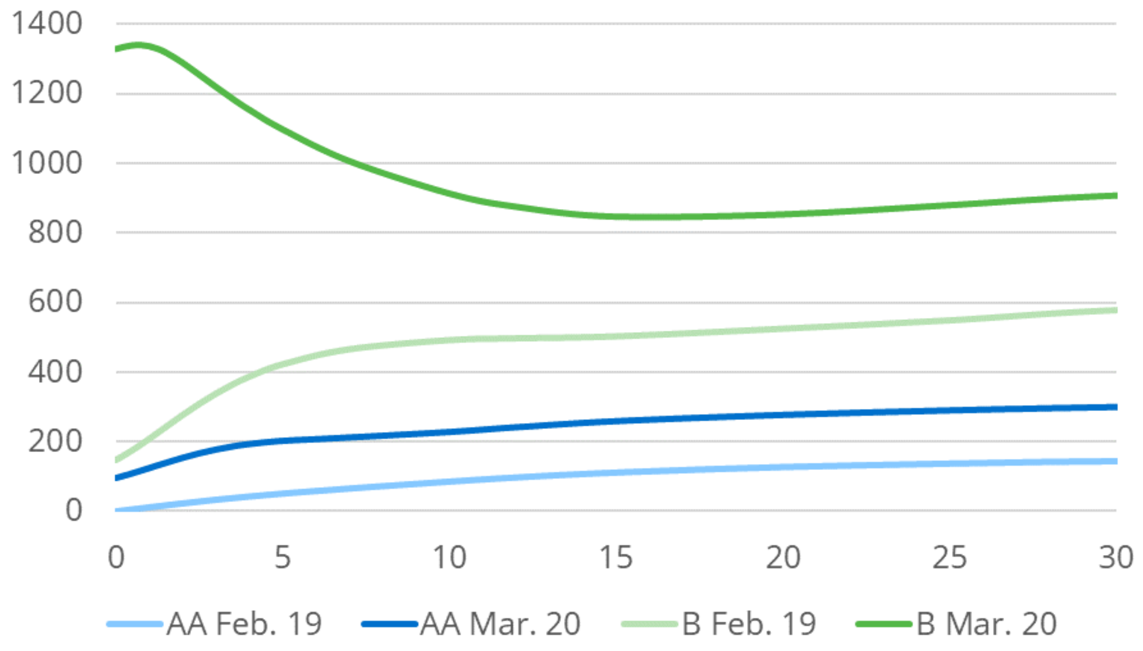
Credit Curve Term Structure

Credit spreads of North American corporates



Source: Axioma Fixed Income Spread Curves

- Investment grade spreads moved mostly in parallel across maturities
- High-yield curve inverted, reflecting higher default risk for shorter issues

Stress Testing an Equity-Market Downturn

- Transitive stress test, based on 10% drop in US share prices
- Investment-grade returns homogenous over first period, driven by lower rates
- BBB first to show negative returns, while Treasury yields were still falling alongside share prices for second period
- Losses across all ratings, as risk-free bottom and rebound, while credit spreads continue to surge

Simulated returns for 10% US equity drop

Rating	Jan. 2 – Jan. 24	Jan. 24 – Feb. 19	Feb. 19 – Mar. 16
AAA	3.7	1.0	-1.5
AA	3.2	0.6	-1.4
A	3.1	0.2	-1.9
BBB	2.0	-1.5	-2.5
BB	-8.8	-11.9	-5.9
B	-8.9	-15.2	-8.4
CCC	-16.4	-20.8	-11.3

Source: Axioma Risk

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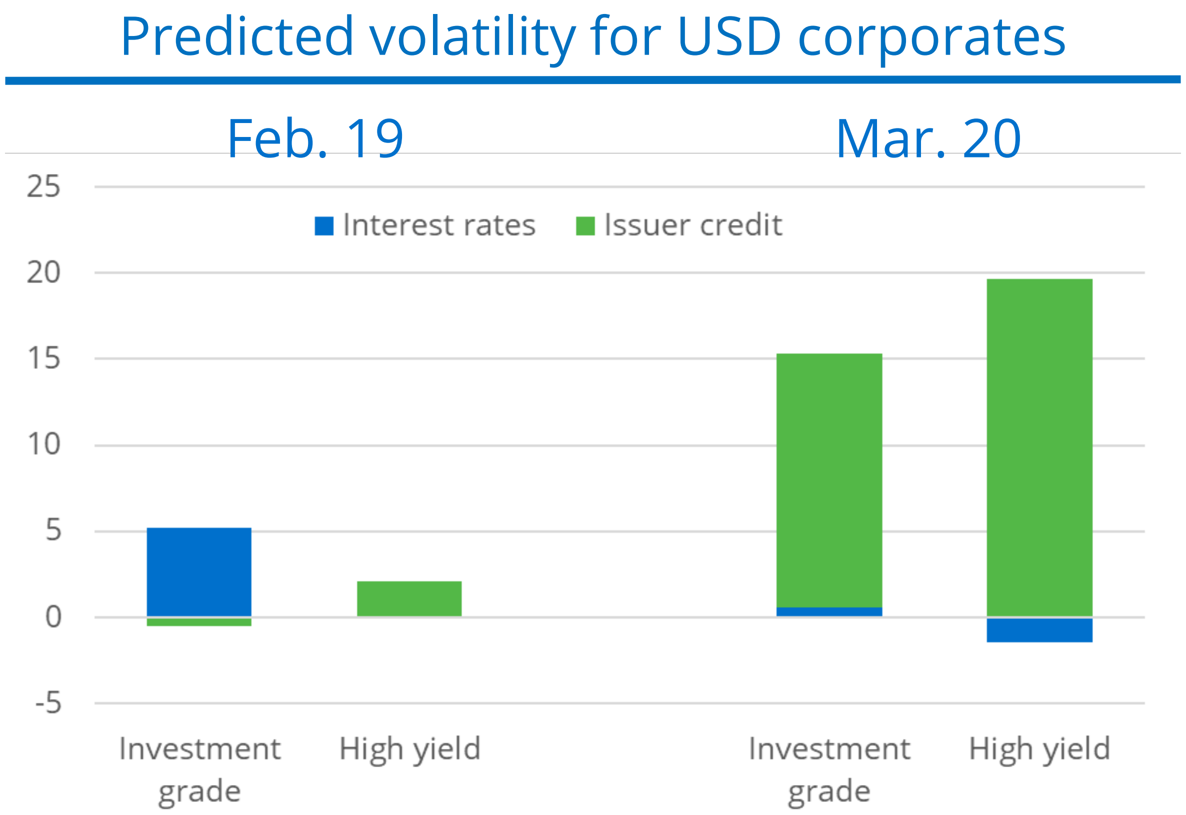
Risk Decomposition by Risk Type



Source: Axioma Risk

> Investment-grade debt normally mostly driven by interest rates, while high yield is dominated by spread risk

> High-yield risk lower before crisis, due to shorter duration and inverse relationship of rates and spreads

> Corporate bonds now driven by spreads (and share prices) across all ratings, with high-yield volatility rising disproportionately

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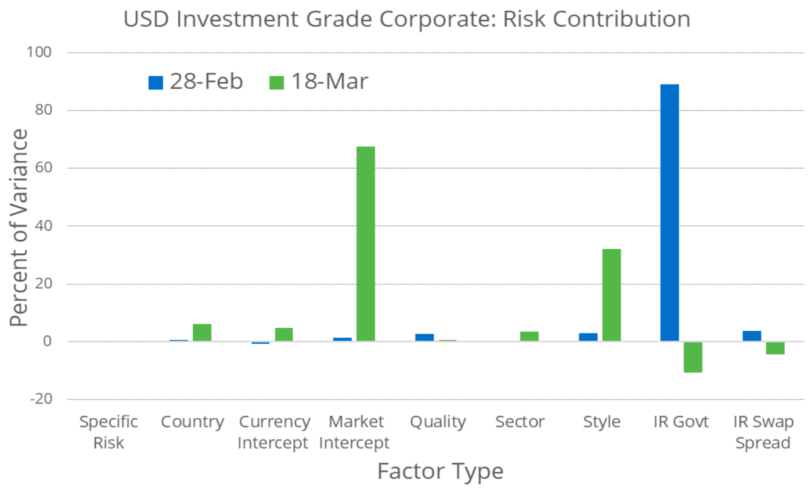
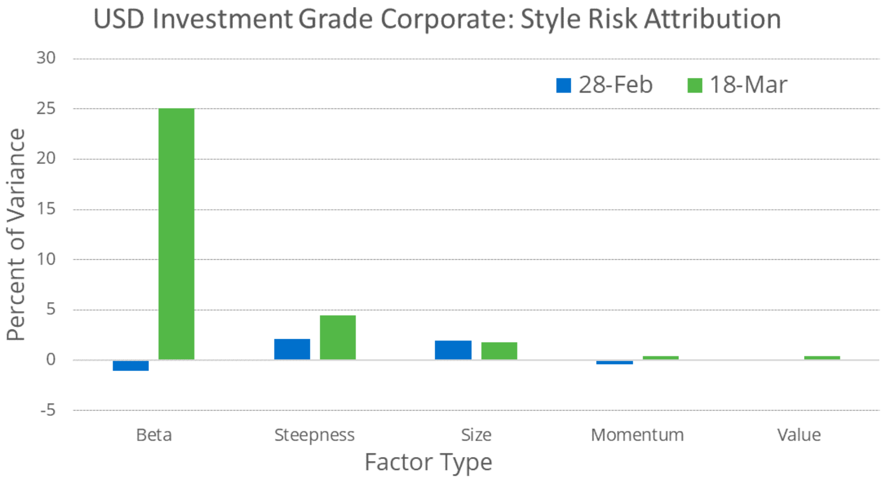
Through the Lens of a Factor Model



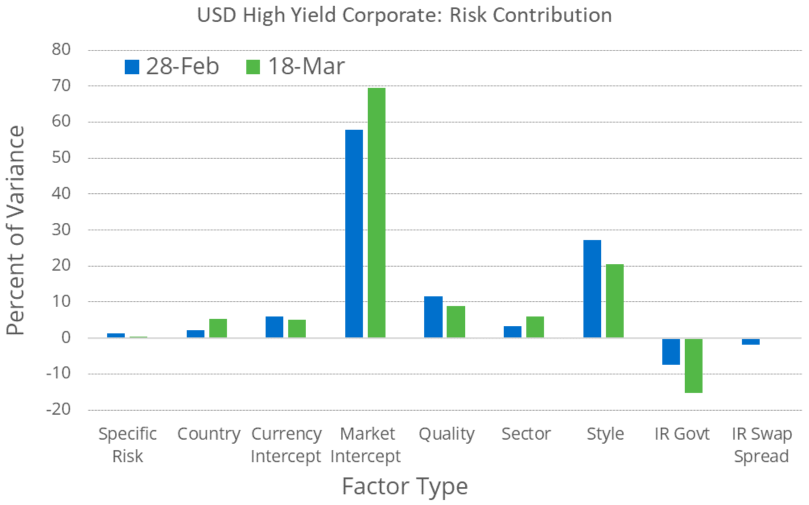


USD Corporate Risk: Big Changes in Risk Profiles, Viewed Through the

It's no surprise that the risk of corporate portfolios has increased substantially in the past few weeks.

David Antonio

Posted 03.20.20



Style factor definitions

> Beta: Timeseries sensitivity of issuer-curve changes to overall credit-spread changes

> Steepness: Difference in the 10y and 2y curve level

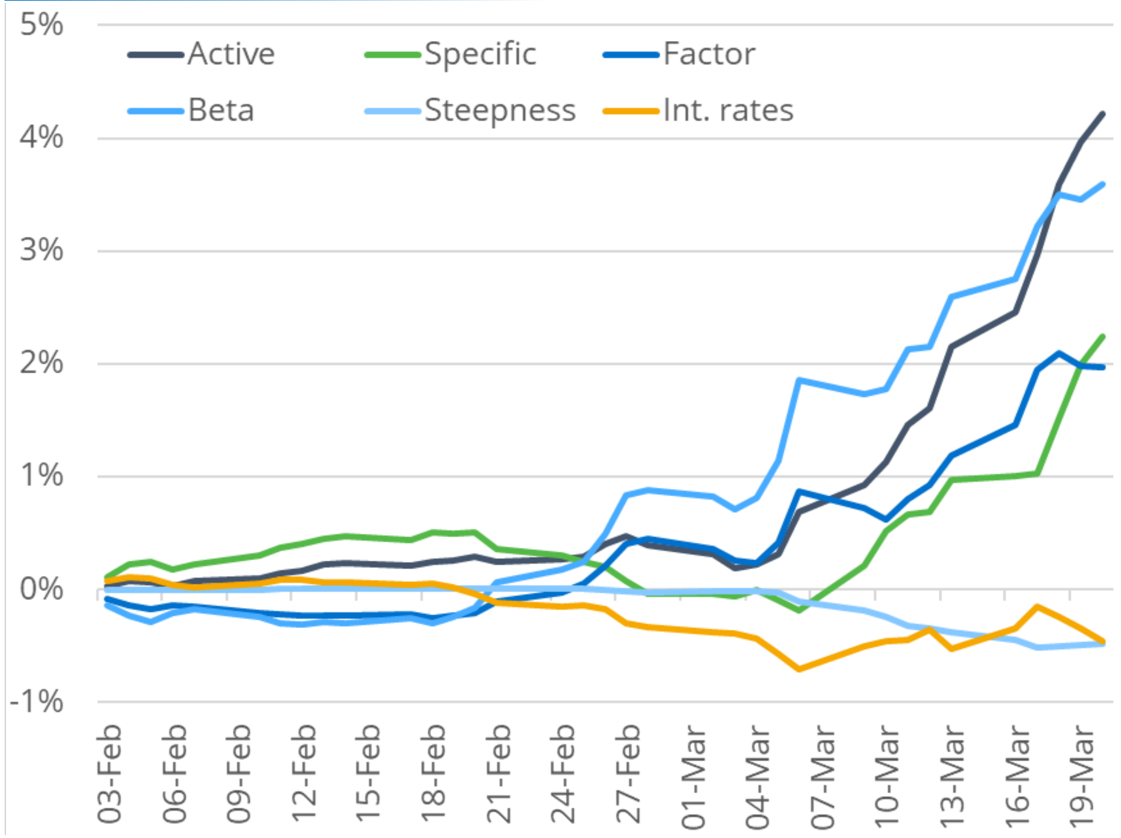
> Size: Largest bond amount outstanding for issuer

> Momentum: 6 month change in issuer-curve level

> Value: Issuer-curve level minus cluster-curve level

Fixed Income Factor Performance Attribution and Portfolio Optimization

Factor performance attribution

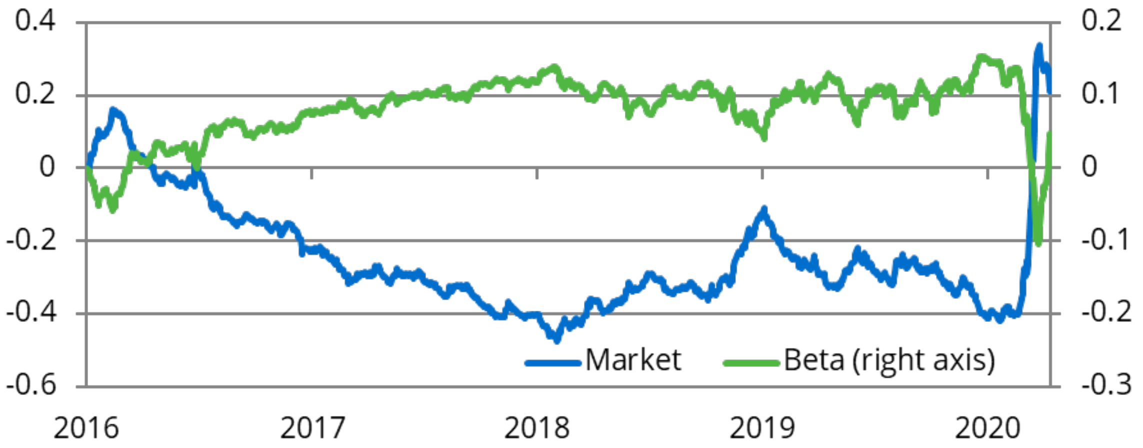


Source: Qontigo

> Optimized USD high-yield portfolio, tilting toward low-beta names

> DTS-neutral versus benchmark, with tracking-error limit of 1% p.a.

Fixed income factor performance



Source: Axioma Fixed Income Spread Curves

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Fixed Income Factor Risk Attribution

Factor	% of Active Risk
Specific Risk	33.9
Factor Risk	66.1
Market	0.0
Style	82.3
Beta	97.7
Steepness	-9.4
Value	-7.8
Momentum	1.1
Size	0.7
Currency	0.0
Quality	0.0
Interest Rates	-7.0
Swap Spreads	-0.3

Factor	% of Active Risk
Country	-2.2
Sector	-6.5
Communication Services (+)	-2.6
Consumer Discretionary (-)	-1.8
Energy (-)	-1.4
Real Estate (+)	-0.4
Utilities (+)	-0.4
Industrials (+)	-0.2
Consumer Staples (-)	-0.1
Information Technology (-)	0.0
Financials (-)	0.1
Health Care (-)	0.0
Materials (+)	0.1

Key Takeaways

> Credit spreads now dominate corporate-bond risk and returns across all ratings, whereas this was only the case for high yield previously

> BBB issues experienced disproportionate increase in predicted volatility, compared with higher-rated debt, raising danger of 'fallen angels'

> Risk increase mostly from 'market' factor, with some impact from changes in steepness for lower ratings

> Curve inversion reflects increased default probability

> Asset-class interactions seem to be returning to 'normal' as liquidity concerns ease

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Further Resources

Coronavirus commentary page, blog posts and whitepapers

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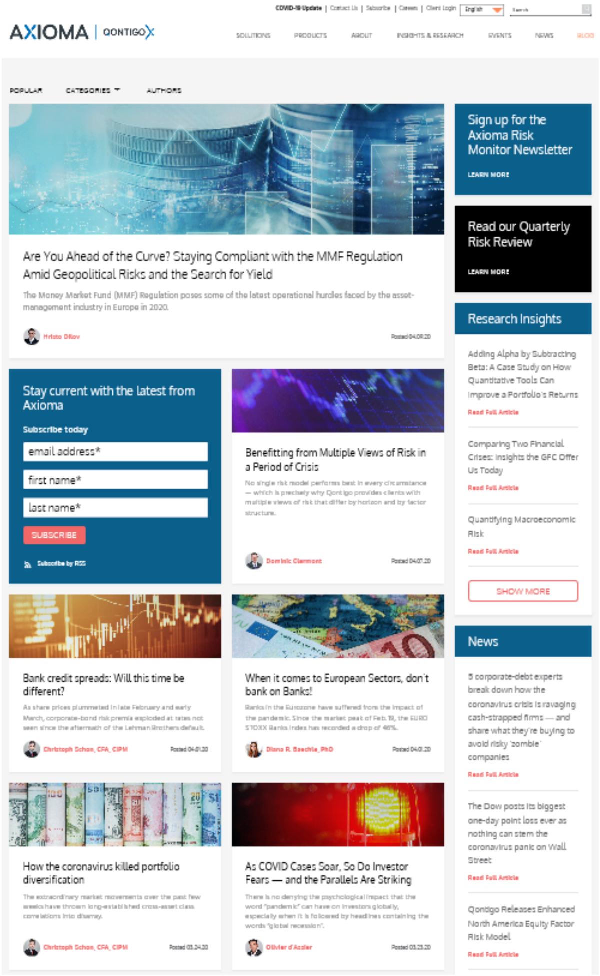
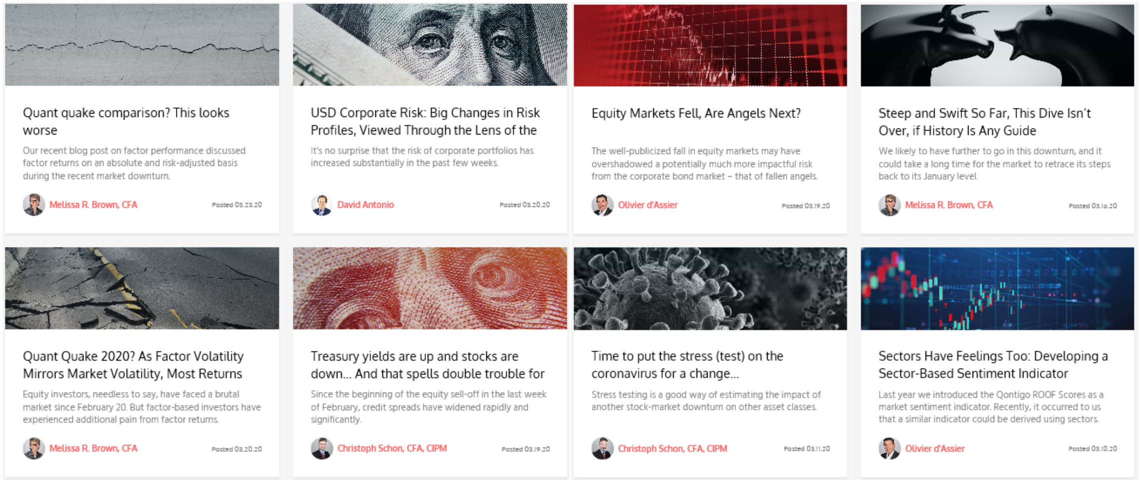
Coronavirus Commentary Page and Blog Posts



> Check our coronavirus commentary page for the latest insights: https://www.axioma.com/coronavirus/

> Or read the Axioma blog: https://axioma.com/blog/



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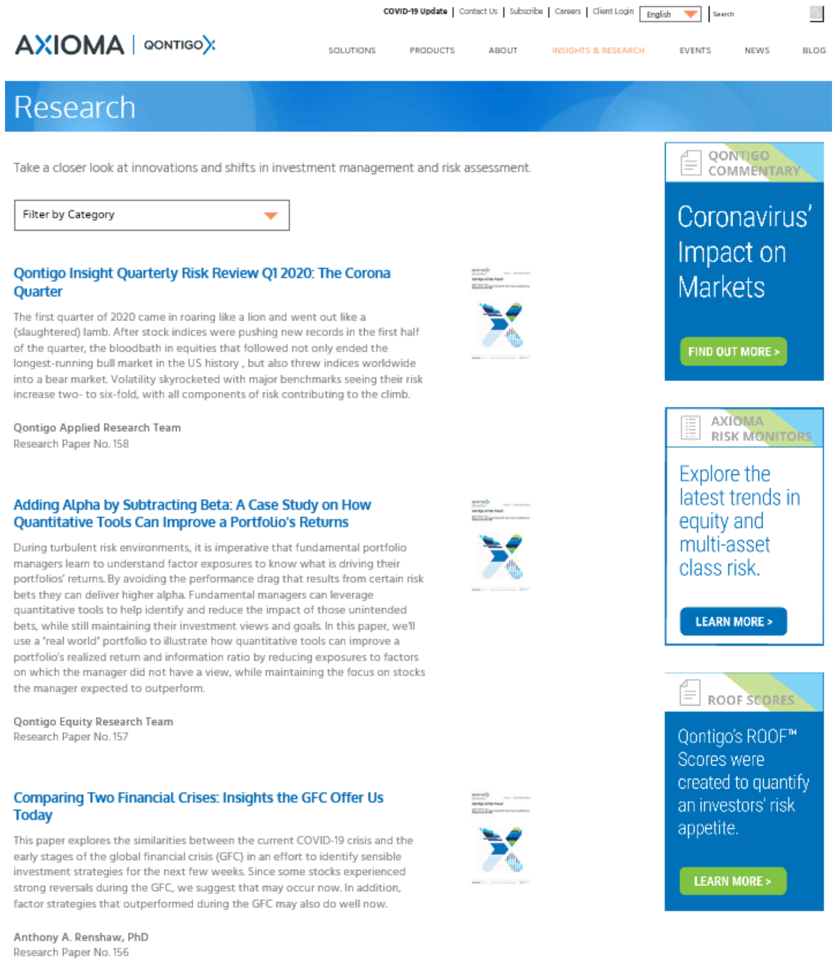
Whitepapers



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Qontigo Insight Quarterly Risk Review Q1 2020: The Corona Quarter

The first quarter of 2020 came in roaring like a lion and went out like a (slaughtered) lamb. After stock indices were pushing new records in the first half of the quarter, the bloodbath in equities that followed not only ended the longest-running bull market in the US history , but also threw indices worldwide into a bear market. Volatility skyrocketed with major benchmarks seeing their risk increase two- to six-fold, with all components of risk contributing to the climb.

Qontigo Applied Research Team
Research Paper No. 158

Adding Alpha by Subtracting Beta: A Case Study on How Quantitative Tools Can Improve a Portfolio's Returns

During turbulent risk environments, it is imperative that fundamental portfolio managers learn to understand factor exposures to know what is driving their portfolios' returns. By avoiding the performance drag that results from certain risk bets they can deliver higher alpha. Fundamental managers can leverage quantitative tools to help identify and reduce the impact of those unintended bets, while still maintaining their investment views and goals. In this paper, we'll use a "real world" portfolio to illustrate how quantitative tools can improve a portfolio's realized return and information ratio by reducing exposures to factors on which the manager did not have a view, while maintaining the focus on stocks the manager expected to outperform.

Qontigo Equity Research Team
Research Paper No. 157

Comparing Two Financial Crises: Insights the GFC Offer Us Today

This paper explores the similarities between the current COVID-19 crisis and the early stages of the global financial crisis (GFC) in an effort to identify sensible investment strategies for the next few weeks. Since some stocks experienced strong reversals during the GFC, we suggest that may occur now. In addition, factor strategies that outperformed during the GFC may also do well now.

Anthony A. Renshaw, PhD
Research Paper No. 156

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- Download research papers for free from Axioma Research site: https://axioma.com/insights/research/
- Axioma's research falls outside the purview of MiFID II

High-Yield Bonds: Analyzing the Risk and Return Tradeoff When Rates are Negative

In a world where some investors pay the government for the privilege of lending it money—and where even fixed income securities with the lowest investment-grade credit ratings yield barely more than 1% per annum—the "hunt for yield" becomes ever more challenging. Using a combination of risk analysis and stress testing, we examine the risk characteristics of corporate bond portfolios, with particular attention on the differences between investment-grade and high-yield securities.

Christoph V. Schon, CFA, CIPM Executive Director, Applied Research
Research Paper No. 153

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Thank You

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