Authors

YUKYUNG CHOI

GLENN LEVINE

SAMUEL W. MALONE, PH.D.

Contact Us

Americas
+1.212.553.1658
clientservices@moodys.com

Europe
+44.20.7772.5454
clientservices.emea@moodys.com

Asia (Excluding Japan)
+85 2 2916 1121
clientservices.asia@moodys.com

Japan
+81 3 5408 4100
clientservices.japan@moodys.com

The coronavirus (COVID-19) pandemic: Assessing the impact on corporate credit risk

As the coronavirus disease (COVID-19) spreads globally, fear and uncertainty are rising, roiling financial markets and pushing the global economy towards recession. This report uses Moody's Analytics CreditEdge™ public-firm EDF™ (Expected Default Frequency) metrics to assess the impact that the coronavirus has had so far on credit risk. We highlight company-, industry-, and country-level dimensions of the pandemic's repercussions, including both risks and opportunities. In terms of investment ideas, we examine the performance differential between high- and low-EDF bonds in investment grade and high yield, showing that low default risk bonds have strongly outperformed during the international phase of the pandemic. Stocks of low EDF firms also outperform among large cap US and European equities, providing cross-market evidence of the flight-to-credit-quality phenomenon. Finally, we lay out projected paths for default risk conditional on a Pandemic macroeconomic scenario to illustrate which industries are most likely to be affected.

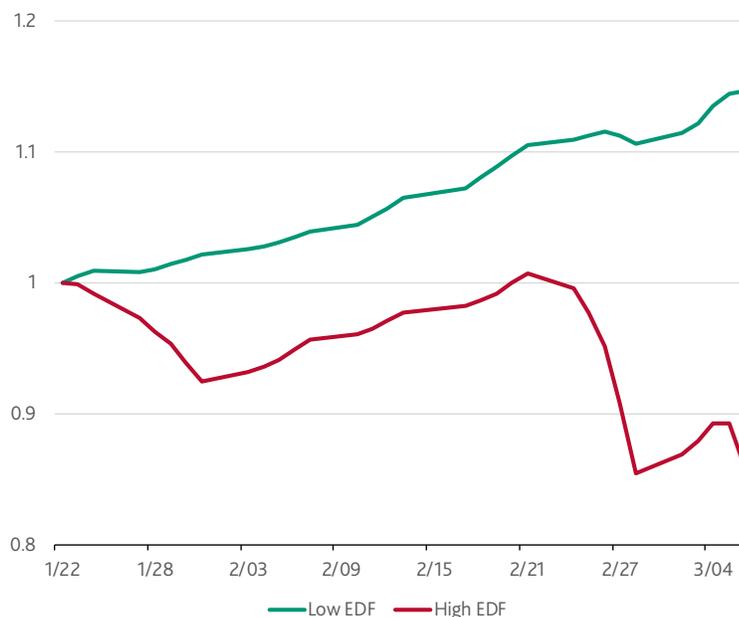**Cumulative total returns of Low EDF/High EDF strategies: US High Yield**

Table of Contents

Introduction

News of the coronavirus began to appear in global media in late December, but it wasn't until mid-January—when reports emerged that the virus was no longer contained within China and had spread to the rest of Asia—that financial markets began to react. Fortune 500 companies such as Samsung and Apple suspended some Chinese production[1] and issued profit warnings,[2] immediately affecting their stock value. The decline in stock prices has since spread to most public companies across all major economies. The CreditEdge public-firm EDF™ (Expected Default Frequency) model takes a company's stock price as an input to its credit-risk metrics. The EDF is the CreditEdge trademarked name for probability of default (PD), and we will use the acronyms EDF and PD interchangeably throughout. We are now seeing EDFs rising in response to stock price declines in many countries since around January 20, 2020, when the coronavirus pandemic began to spread internationally.

One key finding of our research is that while the rise in EDFs is broad and troubling, it is not equally deep. The extent of the rise in default risk varies significantly by industry and country, as well as the country's exposure to the COVID-19 pandemic shock and how risky the corporate sector was before the pandemic.

To place the current situation in context, Figure 1 shows the median EDF for all publicly listed firms, back to 1998. Recent data (as of March 12, after the Dow Jones fell 10%) show a median EDF of 0.74%. This is materially higher than the end-2019 figure of 0.48%, but remains low when when compared to past crises. Indeed, we do not have to look too far into the past to find a period of similar credit stress; in early 2016, in the wake of the oil price bust, the median EDF was slightly higher (0.76%) than it was as of March 12, 2020.

Figure 1. Median EDF, all firms
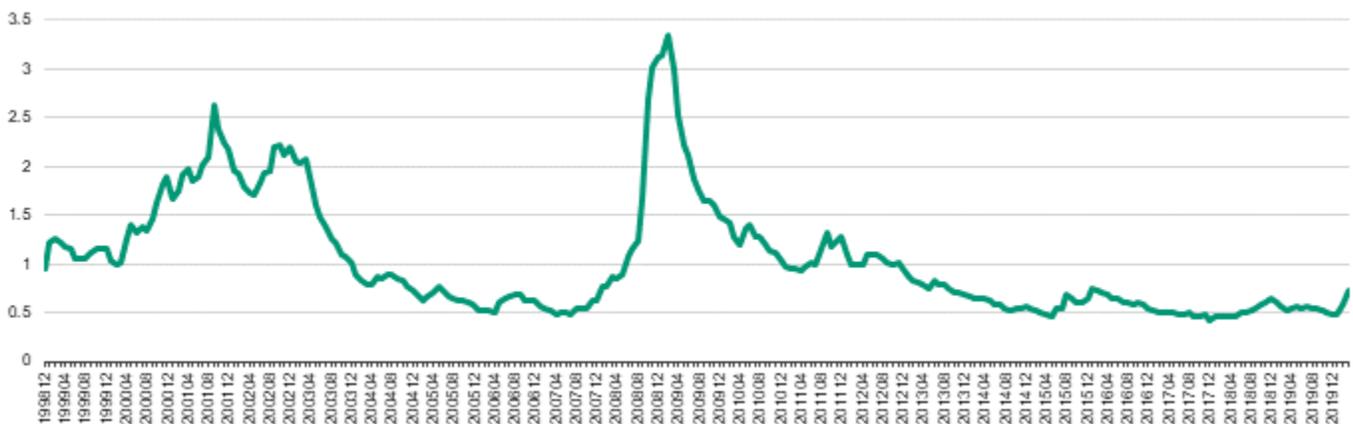
Before we go deeper into an examination of credit risk impacts, let's take a look at what we call the "S-curve" of total infection counts in a set of nine countries. In this graph, log_2 of total official cases is plotted against the number of days since a country's first infection. For China, the data begins on December 31, 2019, with 27 cases recorded at that time, so that's why its curve starts at a higher point on the y-axis.

Data are taken from the European Centre for Disease Prevention and Control as of March 18. The reason it's called the S-curve is that there are three stages apparent in the progression from initial infection to disease control. First, there is seemingly tepid growth in cases. Second, there is an explosion of official cases due to a combination of better testing and unchecked spread of the virus. Third, a few countries have used severe measures to get new cases under control, and cumulative case counts level off.

So why is COVID-19 so costly? The main reason is that the longer a country takes to respond, the starker a choice it faces between damage to human health and damage to the economy. As reported by the New York Times, South Korea stands out due to its demonstrated ability to contain the coronavirus without a total lockdown, in contrast to the ultimately successful, but heavier-handed approach adopted by China.[3] Its ability to do this, however, was enabled by a combination of swift intervention, early testing, and the practice of contact tracing, isolation, and surveillance for infected individuals and those with whom they may have come into contact.[4] For countries such as the United States and affected nations in Western Europe, failure to respond rapidly with widespread testing allowed infections to propagate exponentially, thus obscuring the true scale of the problem until a partial economic lockdown became inevitable.

---

[1] https://techbriefly.com/2020/01/28/apple-and-samsung-factories-stopped-in-china-due-to-coronavirus/, Accessed on 3/13/2020
[2] https://www.theverge.com/2020/2/7/21128307/coronavirus-outbreak-tech-industry-production-supply-chain-delay-impact, Accessed on 3/13/2020
[3] https://www.nytimes.com/2020/03/23/world/asia/coronavirus-south-korea-flatten-curve.html, Accessed on 3/31/2020
[4] Ibid.

Figure 2. The S-curve of total infections: Initial detection lag, testing and unrestrained growth, and slowing growth*
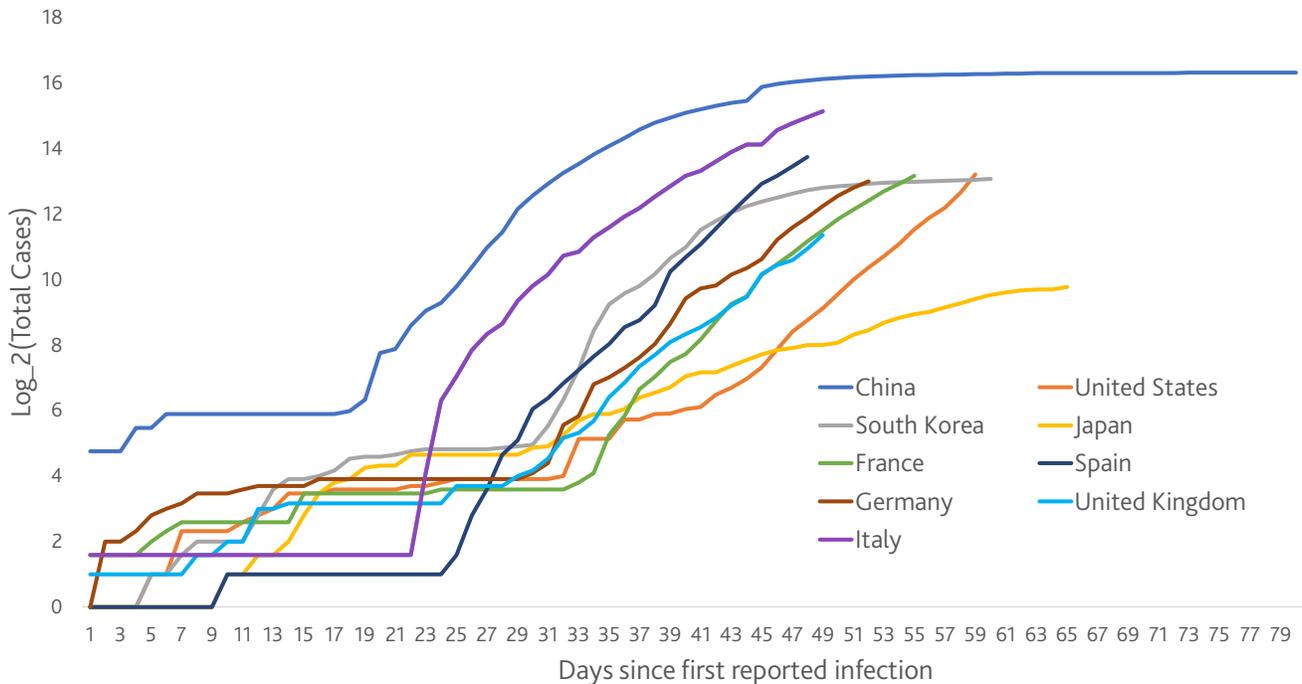
*Data as of March 19, 2020.

The set of countries that have most successfully managed to "flatten the curve" of new infections includes China, South Korea, Singapore, Hong Kong, and Taiwan.[5] These countries have focused on achieving virus suppression, as opposed to simply mitigating the spread of infections. The distinction between mitigation and suppression strategies was set out clearly in a widely cited working paper by Neil Ferguson and co-authors at Imperial College London.[6] They write:

> "(a) mitigation, … focuses on slowing but not necessarily stopping epidemic spread – reducing peak healthcare demand while protecting those most at risk of severe disease from infection, and (b) suppression, … aims to reverse epidemic growth, reducing case numbers to low levels and maintaining that situation indefinitely." (p. 1, ibid)

In their paper, they present model results indicating that in the United States, the United Kingdom, and many other countries, suppression is the strongly preferred policy option, and will require some combination of social distancing of the entire population, home isolation of cases, and household quarantine of family members of infected individuals, as well as potentially other measures such as school and university closures. At the time of writing, many countries in North America and Western Europe appear to have adopted measures generally consistent with the suppression strategy outlined in the Imperial College paper. The primary challenge with the suppression approach, as noted by that study's authors, is that it or something equally effective would need to be maintained to prevent a ramp-up of infections until a vaccine becomes available, which could involve a timeline of 18 months or more. Absent testing and treatment or other innovations that lower the health impact of COVID-19 during that window, the economic cost of such prolonged, reduced economic activity would be potentially without precedent for many countries.

Pivoting back to credit risk, we now look at how far EDFs have risen in relative terms for the countries in Figure 2 since the day of their first recorded infections. To do this, we plot the EDF, or default probability, at the 75th percentile of each country's distribution relative to the same figure on the day of the first infection for that country. The result is the J-shaped curve shown in Figure 3. Italy's credit risk rose faster and earlier in relative terms than any other country shown during the course of its experience with COVID-19. This is consistent with its failure to contain the spread of the virus initially, which overwhelmed the hospital infrastructure and necessitated an economic lockdown.

---

[5] https://www.nytimes.com/interactive/2020/03/19/world/coronavirus-flatten-the-curve-countries.html, Accessed on 3/31/2020

[6] https://www.imperial.ac.uk/media/imperial-college/medicine/sph/ide/gida-fellowships/Imperial-College-COVID19-NPI-modelling-16-03-2020.pdf, Accessed on 3/31/2020

Figure 3. The J-curve of default risk*: 75th percentile EDF relative to 75th percentile EDF at first infection date
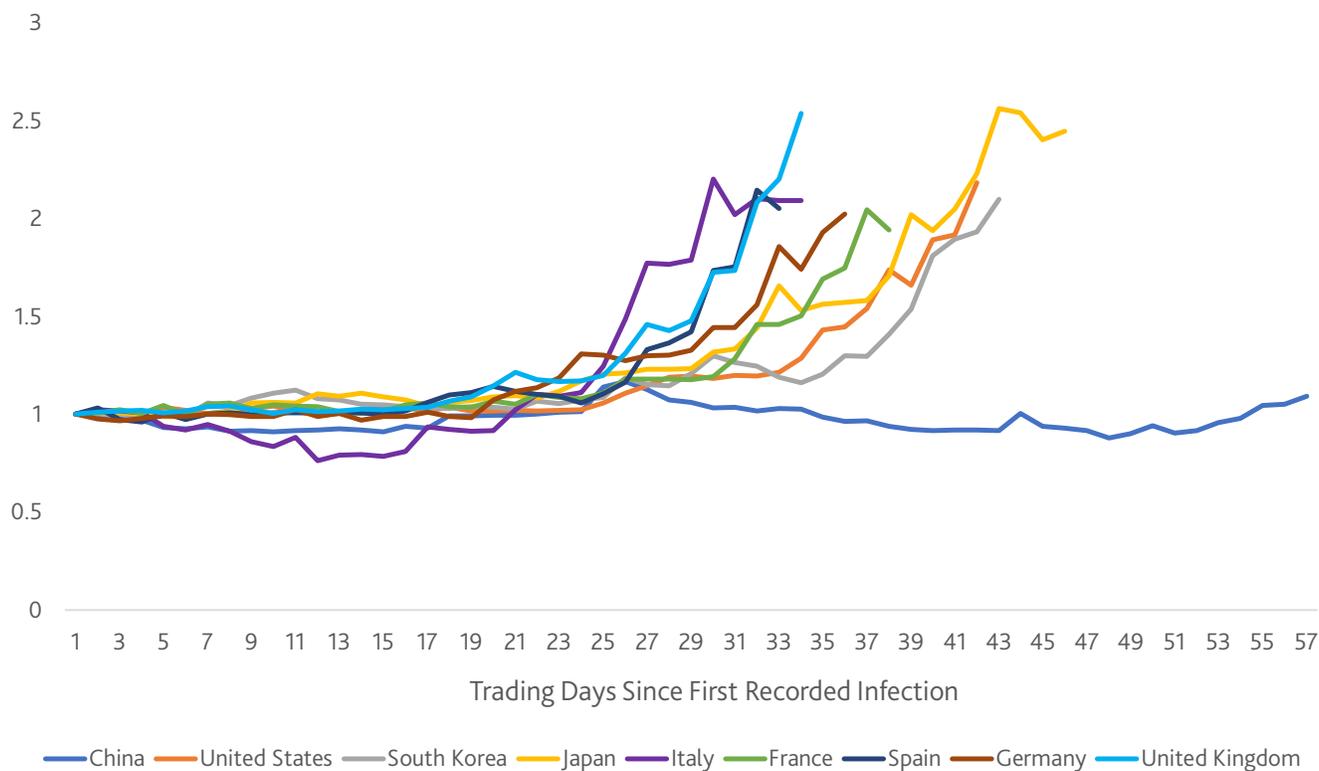
*Data as of March 19, 2020, showing CreditEdge data up to March 18, 2020. Day 1 for China begins on January 1, 2020.

China is interesting: its credit risk metric is the least affected of all countries shown. This likely reflects its ability to contain infections, which was facilitated by the quick ramping up of hospital bed capacity in Wuhan and ability to contain the spread of the virus nationally through strict, early lockdown measures.

The rest of this paper proceeds as follows. First, we'll take a deeper dive into the industry- and country-level impacts of the pandemic. We'll then focus on firm-level effects, as well as the flight-to-credit-quality phenomenon in bond and equity markets. The last section will examine a possible path of default probabilities under a stress scenario. For that purpose, we use a pandemic scenario produced by our economics team.

Industry and country impacts

Asset returns, equity returns, and leverage

Our basic framework for understanding credit risk is linked to equity valuation. Effectively, pandemic-induced demand shocks will translate into lower current and expected earnings, which induce a negative shock to the market value of the firm's assets. For levered firms, equity market values fall faster than the shock to firm-level assets, leading to higher leverage, and increased vulnerability to shocks.

As we shall see, global industry shocks affect countries that specialize in those industries. Let's first examine average asset and equity shocks at the industry/country level from January 20 to March 18. In the next section, we define asset returns at the aggregate group level (that is, global, industry, or country) as the growth in the sum total asset and equity market values, respectively, for the group during the period under study. In each of Figures 4 through 6, a line of best fit is depicted as well.

Figure 4. Average equity vs. asset returns by industry: Global public firms, January 20 to March 18, 2020
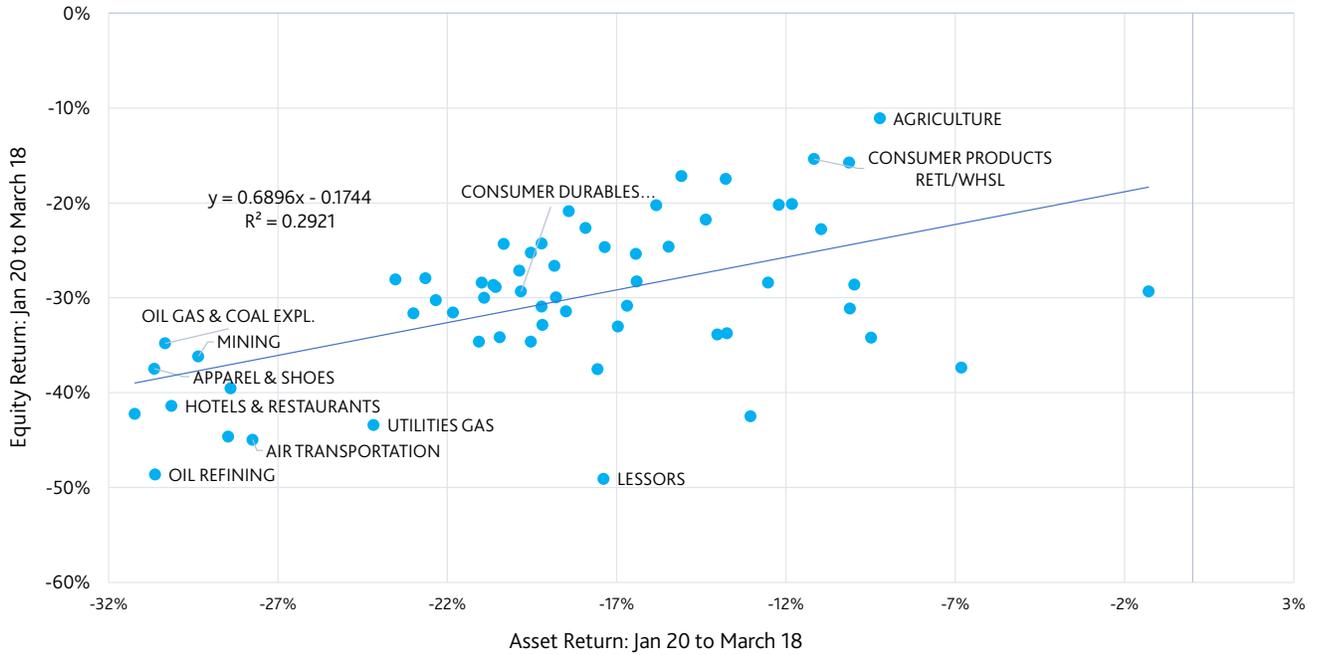

Figure 4 plots average equity market returns versus asset value returns for a set of 61 global industries during the period from January 20 to March 18. The first, most important point to note about this figure is that the numbers on both the x-axis and y-axis are negative for every industry. The global market impact on the corporate sector of COVID-19 has been bad. Further, note that equity returns are more negative that asset returns due to leverage. If we focus on the bottom-left corner of the graph, several of the hardest-hit industries jump out. In particular, Oil & Gas, Hotels & Restaurants, and Air Transportation are industries that will show up repeatedly in our analysis.

Figure 5. Average equity vs. asset returns by country: Global public firms, January 20 to March 18, 2020
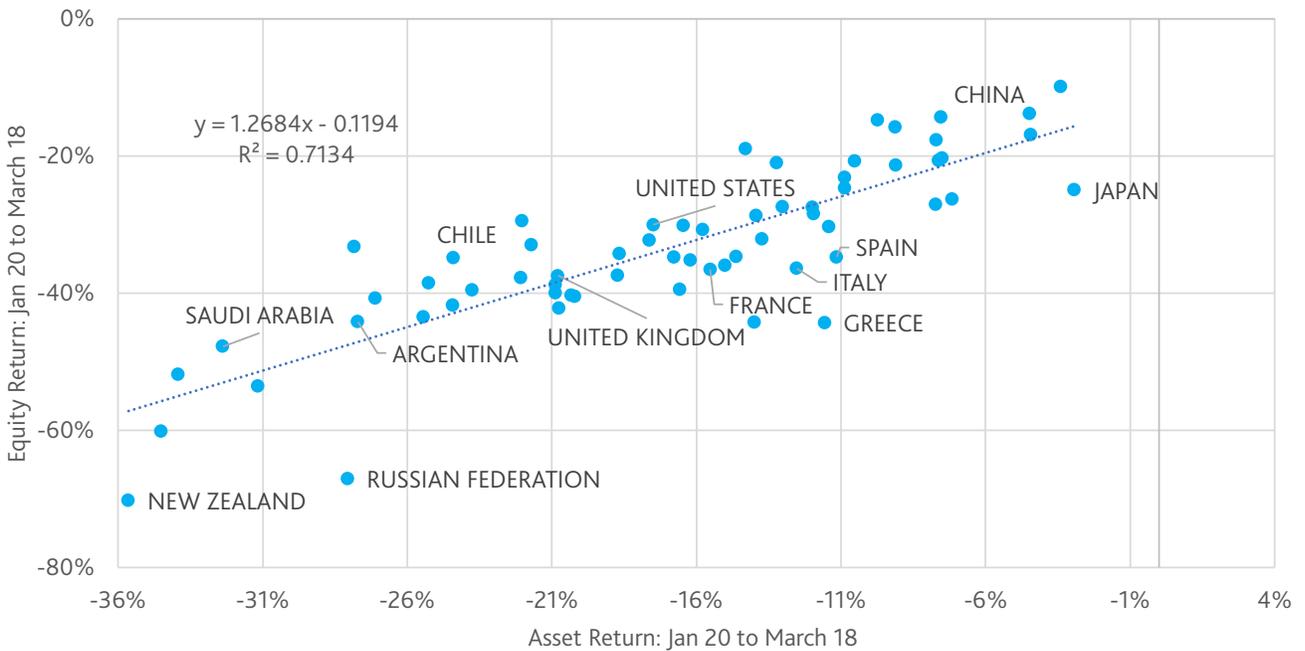
Figure 5 plots average equity and asset returns by country. As in Figure 4 for industries, we see that all countries display negative equity and asset returns during the early international phase of the pandemic.

From a look at the bottom-left corner of Figure 5, we see that equities of commodity exporters, such as Saudi Arabia, Russia, and Chile, have been hit especially hard. This is in line with the large impact to Oil & Gas globally. Furthermore, highly levered corporate sectors in Southern Europe, such as Italy, Spain, and Greece, have seen large negative shocks to equity values relative to the size of negative asset shocks experienced as a result of COVID-19 impacts to businesses.

Figure 6. Corporate book and market leverage by country: Global public firms, March 18, 2020
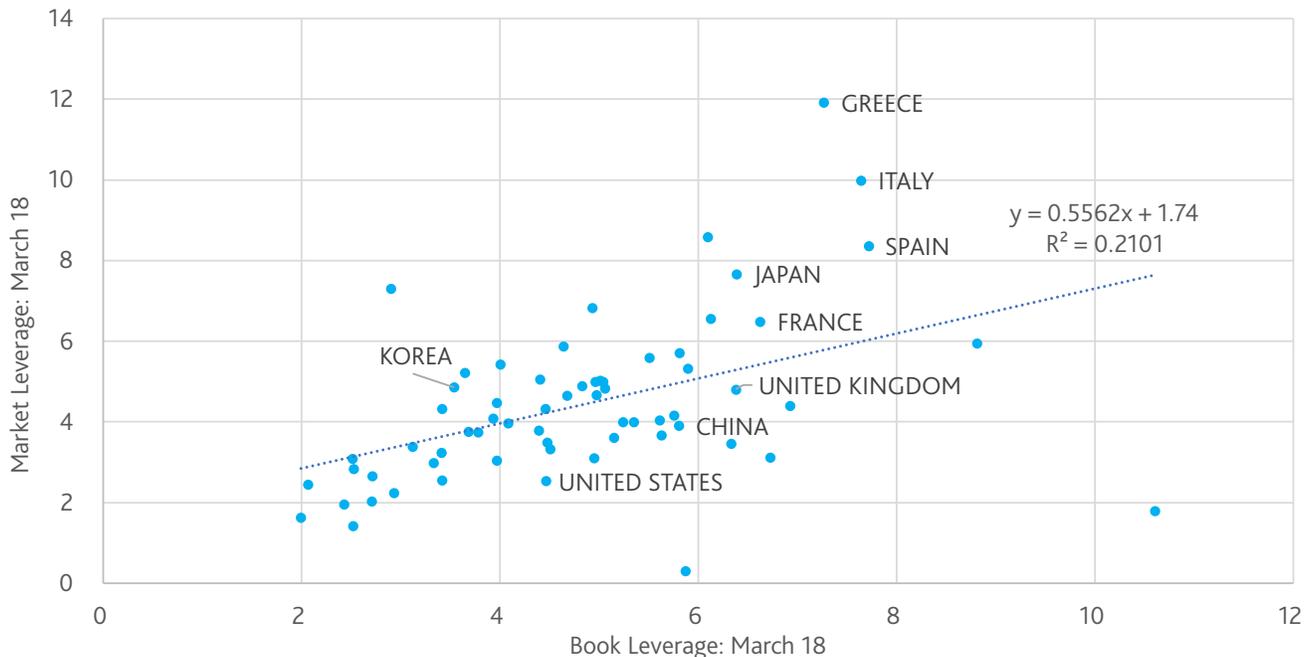
If we chart the market leverage for countries—defined here as total market value assets over total market value equity for the country's public firms—against similarly defined book leverage, we notice an interesting pattern emerges as of March 18, at the end of our period of study. Specifically, since lowering the equity of highly levered corporate sectors increases leverage, and this makes those same firms more vulnerable to further shocks, large shocks to equity leave market leverage ratios in Southern Europe especially high. Greece, Italy, and Spain jump out in Figure 6 as having especially high levels of market leverage, even after controlling for their book leverage.

Top 5 lists: Identifying the countries and industries with the highest impact on the tail of PDs

The mean and 75th percentile of the PD distribution for an industry or country reveals a lot about likely defaults ahead. We now examine where the tail of default risk has been most sensitive to the effects of the COVID-19 pandemic.

In Table 1 and those that follow, we focus on Top 5 lists for changes in these risk metrics. Results are displayed based on risk changes from January 20 to each of two end dates: March 12, when a bear market officially began, and March 18, the date when the Dow Jones wiped out all of the Trump era market gains.

Since there are multiple ways to measure the increase in aggregate credit risk for a sector or country, we checked several metrics for robustness. The broad conclusions are similar for multiple measures. We focus on results for three of them: the change in the 75th minus 50th percentile EDF metric of risk dispersion, the absolute change in the 75th percentile EDF, and the change in the mean EDF. In each of the following tables, names of entities are color-coded to help signal the grouping of similar entities (such as countries or industries) into related sets.

At the country level, shown in Table 1, changes in risk metrics during the pandemic period point squarely to the United States as the single highest credit risk concern. Developed-world oil producers, led by Norway and Canada, are also a major concern, although the United States, a significant oil producing and refining country in its own right, is also affected by those concerns. Select emerging markets such as Argentina and Greece, with already vulnerable corporate sectors before the shock, round out the list.

Table 1. Top 5 countries by increased default risk in the tail

1a. January 20 to March 12

Delta (q75-q50)	Delta q75	Delta mean
BERMUDA	CANADA	ARGENTINA
UNITED STATES	UNITED STATES	CANADA
CANADA	BERMUDA	NORWAY
POLAND	POLAND	SOUTH AFRICA
SINGAPORE	GREECE	UNITED STATES

1b. January 20 to March 18

Delta (q75-q50)	Delta q75	Delta mean
UNITED STATES	UNITED STATES	ARGENTINA
BERMUDA	CANADA	BERMUDA
CANADA	ARGENTINA	CANADA
ARGENTINA	BERMUDA	NORWAY
SINGAPORE	GREECE	UNITED STATES

3/12

3/18
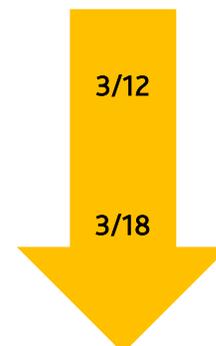
Turning to industries, shown in Table 2, Oil & Gas has experienced the largest default risk shock globally so far. This is the result of a perfect storm: the supply glut caused by Saudi Arabia and Russia, coupled with the negative demand shock caused by the measures enacted to combat COVID-19.

In addition, we see weakness in Entertainment & Leisure giving way to pressure on Consumer Durables. This sort of pattern is consistent with heightened recession fears, as prospects for cyclical industries dim.

Table 2. Top 5 global industries by increased default risk in the tail

2a. January 20 to March 12

Delta (q75-q50)	Delta q75	Delta mean
BROADCAST MEDIA	OIL GAS & COAL EXPL/PROD	OIL GAS & COAL EXPL/PROD
OIL GAS & COAL EXPL/PROD	BROADCAST MEDIA	PRINTING
CABLE TV	ENTERTAINMENT & LEISURE	ENTERTAINMENT & LEISURE
ENTERTAINMENT & LEISURE	CABLE TV	BROADCAST MEDIA
UTILITIES GAS	AIR TRANSPORTATION	OIL REFINING

2b. January 20 to March 18

Delta (q75-q50)	Delta q75	Delta mean
OIL GAS & COAL EXPL/PROD	OIL GAS & COAL EXPL/PROD	OIL GAS & COAL EXPL/PROD
BROADCAST MEDIA	BROADCAST MEDIA	CONSUMER DURABLES RETL/WHSL
TELEPHONE	ENTERTAINMENT & LEISURE	BROADCAST MEDIA
CONSUMER DURABLES RETL/WHSL	TELEPHONE	TRANSPORTATION EQUIPMENT
ENTERTAINMENT & LEISURE	CONSUMER DURABLES RETL/WHSL	AEROSPACE & DEFENSE

Another less obvious but noteworthy area of heightened credit risk is industries that were already in structural decline before COVID-19 hit. This includes Cable TV (of cutting-the-cord fame), Printing, and Broadcast Media. These industries can be seen prominently in Table 2 as well.

We now focus on identifying the most affected industries within the United States and Europe. For the United States specifically, Oil & Gas and several consumer industries rise to the top of the list of biggest credit risk increases. The full table of Top 5 industries in the United States is shown in Table 3, with results for Western Europe shown in Table 4.

Table 3. Top 5 industries by increased default risk in the tail: United States

3a. January 20 to March 12

Delta (q75-q50)	Delta q75	Delta mean
PRINTING	PRINTING	PRINTING
TEXTILES	OIL GAS & COAL EXPL/PROD	OIL GAS & COAL EXPL/PROD
OIL REFINING	OIL REFINING	OIL REFINING
CHEMICALS	TEXTILES	ENTERTAINMENT & LEISURE
OIL GAS & COAL EXPL/PROD	CONSUMER PRODUCTS RETL/WHSL	BROADCAST MEDIA

3b. January 20 to March 18

Delta (q75-q50)	Delta q75	Delta mean
CONSUMER DURABLES RETL/WHSL	AUTOMOTIVE	PRINTING
CONSUMER PRODUCTS	ENTERTAINMENT & LEISURE	CONSUMER DURABLES RETL/WHSL
PLASTIC & RUBBER	CONSUMER DURABLES RETL/WHSL	CONSUMER PRODUCTS
ENTERTAINMENT & LEISURE	CONSUMER PRODUCTS	PLASTIC & RUBBER
APPAREL & SHOES	PLASTIC & RUBBER	OIL REFINING

Table 4. Top 5 industries by increased default risk in the tail: Western Europe

4a. January 20 to March 12

Delta (q75-q50)	Delta q75	Delta mean
OIL GAS & COAL EXPL/PROD	OIL GAS & COAL EXPL/PROD	OIL GAS & COAL EXPL/PROD
AUTOMOTIVE	APPAREL & SHOES	PLASTIC & RUBBER
APPAREL & SHOES	AUTOMOTIVE	COMPUTER HARDWARE
AGRICULTURE	AGRICULTURE	CONSUMER PRODUCTS RETL/WHSL
SEMICONDUCTORS	SEMICONDUCTORS	AUTOMOTIVE

4b. January 20 to March 18

Delta (q75-q50)	Delta q75	Delta mean
CABLE TV	CABLE TV	OIL GAS & COAL EXPL/PROD
AIR TRANSPORTATION	AIR TRANSPORTATION	UTILITIES NEC
OIL GAS & COAL EXPL/PROD	OIL GAS & COAL EXPL/PROD	CONSUMER PRODUCTS RETL/WHSL
APPAREL & SHOES	APPAREL & SHOES	AIR TRANSPORTATION
ENTERTAINMENT & LEISURE	CONSUMER PRODUCTS RETL/WHSL	ELECTRONIC EQUIPMENT

For Europe, the industry set presents more of a mix, but Oil & Gas is again the highest concern. Further, European automakers, Airlines, and Apparel & Shoes have experienced large jumps in default risk.

Figure 7. Increased sovereign default risk: CDS-implied EDF for Top 10 countries from January 20 to March 18, 2020
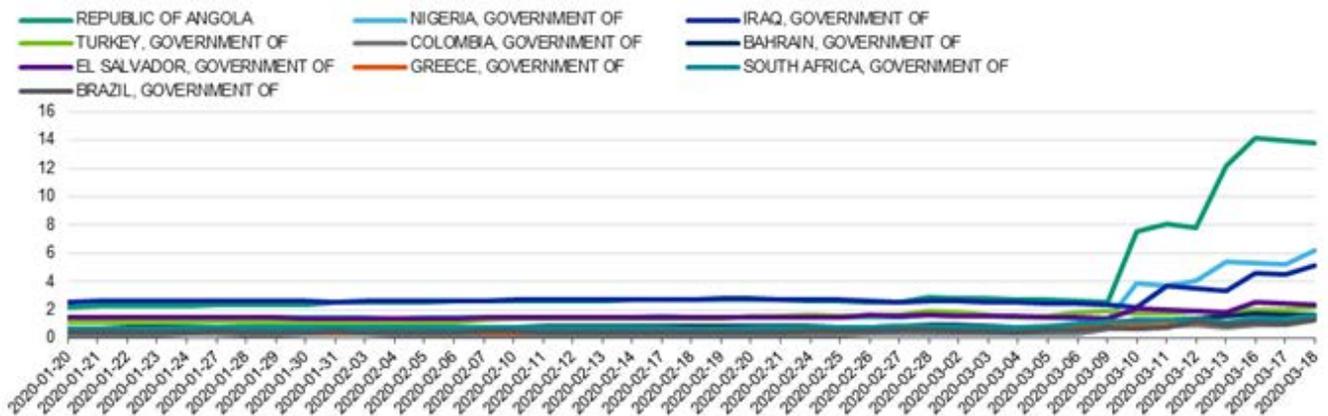
As a complement to results for corporates, it pays to look at sovereign credit default swap (CDS) spreads, too. Time series for the Top 10 countries by increased CDS-implied EDF during 2020 are shown in Figure 7. Based on the CDS-implied default probabilities for countries during the pandemic period, two countries that have seen nontrivial bumps upward in both sovereign and corporate sector credit risk are South Africa and Greece. Such dual vulnerabilities are worth monitoring closely in emerging market portfolios. Also, some emerging markets with significant oil production, such as Brazil, Colombia, Iraq, Nigeria, and Angola, make the list.

Turning on the microscope: Firm-level results

To shine a spotlight on select companies in affected industries, Figure 8 plots percentage changes in EDFs for companies with significant exposure to the COVID-19 pandemic from January 20 to March 18, based on the general prominence of these names in financial news sources at the time of this article.

Figure 8. Selected companies with relative EDF change (January 20 to March 18, 2020)
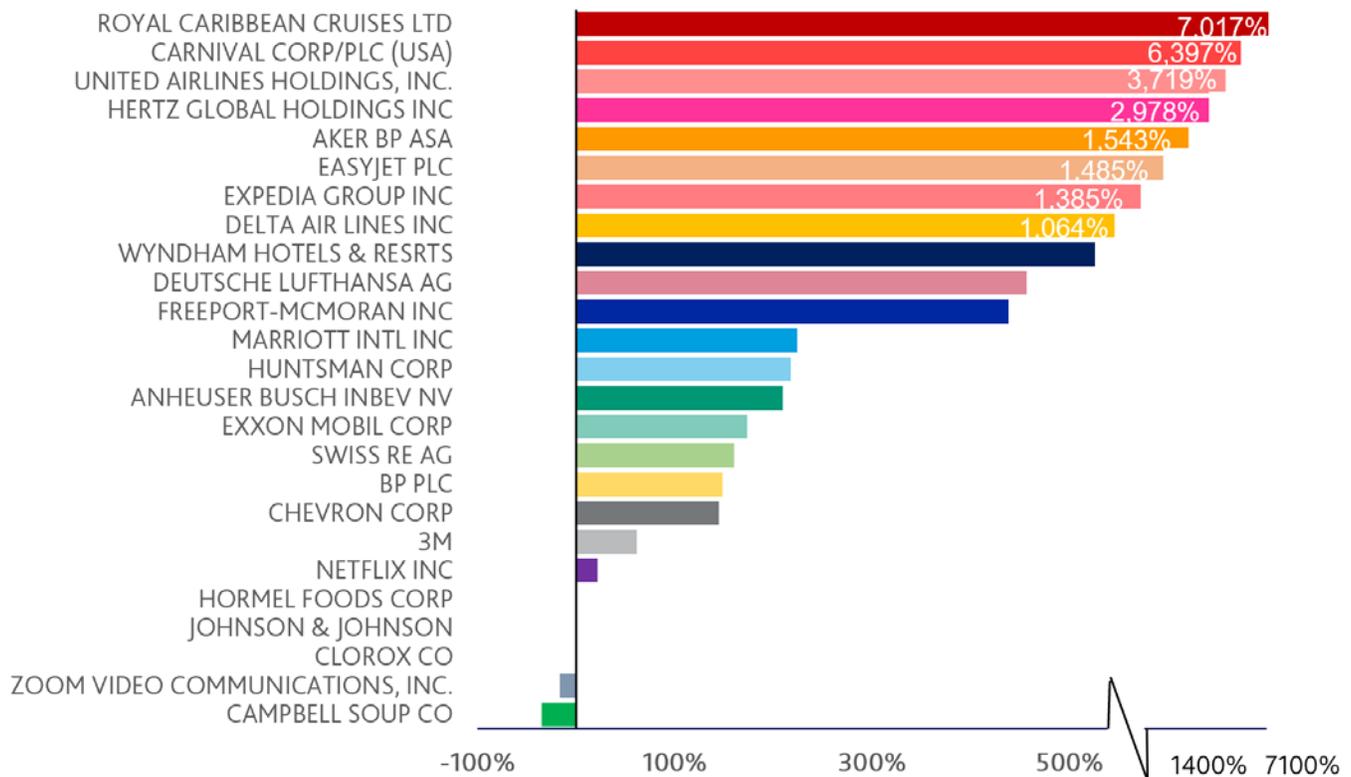
As apparent from Figure 8, the cruise industry is currently under extreme scrutiny. In particular, EDFs for Royal Caribbean Cruises jumped 7,017% from January 20 to March 18. Airline sector profits are under severe pressure as people cancel or reduce flights due to restrictive measures implemented by entities ranging from countries to corporations all trying to contain the virus. Other travel companies such as Expedia are seeing a decline in their returns. Even the energy sector has been affected. However, not all sectors are negatively affected by this crisis. As companies transition their employees to working from home, we see an increase in demand in the food sector—and perhaps not surprisingly, in entertainment company Netflix. Makers of nonperishable food items such as Campbell Soup and Zoom Video Communications, which facilitates work-from-home arrangements, have seen their EDFs fall during the 1/20/2020–3/18/2020 period.

The flight-to-credit-quality effect in equities and fixed income: Outperformance of low PD firms

This section examines the implications of the large EDF changes previously discussed for equity and fixed income investment strategies. Specifically, we measure the performance differences between simple, rule-based strategies that go long on either high or low EDF assets. In general, flight to credit quality has been a major theme of the COVID-19 pandemic in both fixed income and equities. Mohamed El-Erian, in a recent Bloomberg Opinion piece published on March 28, 2020, essentially recommends a strategy in line with those we test in this section, involving moving exposure from low to high credit quality assets in both fixed income and equities.[7]

We begin with Figure 9, which presents our results for large cap US equities.

---

[7] https://www.bloomberg.com/opinion/articles/2020-03-28/coronavirus-don-t-read-too-much-into-stocks-sudden-rebound

Figure 9: S&P 500, total returns of low EDF/high EDF strategies

Total Return

High EDF Companies

Corporate	Financial
Mylan NV	Citizens Financial Group Inc
Alliance Data Systems Corp	Comerica Inc
American Airlines Group Inc	E*TRADE Financial Corp
Apache Corp	Lincoln National Corp
DXC Technology Co	Principal Financial Group Inc
L Brands Inc	Regions Financial Corp
Macy's Inc	SVB Financial Group
Nordstrom Inc	State Street Corp
Western Digital Corp	Unum Group

The strategy driving the results in Figure 9 is as follows. Given the beginning of the international phase of the COVID-19 pandemic on or around January 20 for the United States and many other countries, we believe that even many prescient investors might have waited until mid-February before taking positions. For robustness, we therefore examine returns through March 18 for portfolios formed on each of two dates: December 27, 2019 and February 14, 2020. Portfolios are formed as follows. First, we sort stocks in the S&P 500 index in decreasing order by EDF, and then divide firms into quintile buckets. Second, we form two portfolios: one for the top quintile stocks by EDF (the "Risky" portfolio) and one for the bottom quintile stocks by EDF (the "Safe" portfolio).

The red bars in Figure 9 correspond to the Risky portfolios, and the green bars depict performance for the Safe portfolios. As you can see, two main stylized facts jump out of Figure 9. The Safe strategies significantly outperform the Risky strategies, and the choice of portfolio formation date is not very important in this example. Thus, an investor could have waited to act until February 14 and still managed to outperform the market by buying the quintile of lowest EDF large cap firms on that date. The S&P 500 index fell by 29% from February 18 to March 18. Some of the highest EDF non-financial corporate and financial firms in the S&P 500 index (and the Risky portfolio) are listed on the right of the table.

Figure 10: Europe STOXX 600, total returns of low EDF/high EDF strategies

Total Return

High EDF Companies

Corporate	Financial
AMS AG	CaixaBank SA
K+S AG	TP ICAP PLC
Faurecia SE	Royal Bank of Scotland Group
Cineworld Group PLC	Quilter PLC
John Wood Group PLC	Phoenix Group Holdings PLC
NMC Health PLC	Bank of Ireland Group PLC
TechnipFMC PLC	AIB Group PLC
Pirelli & C SpA	
ArcelorMittal SA	Aegon NV
Altice Europe NV	Santander Bank Polska SA

We repeat the exercise for European large cap equities, using the European STOXX 600 index. The results are shown in Figure 10. During the January 1–March 18 period, the European STOXX 600 fell by 32%.

The year-to-date returns are nearly equal to those for the period from February 18 to March 18, of -34%. The divergence between the returns of the low EDF and high EDF portfolios is not quite as large as we saw in the US portfolio, but it's still substantial.

Looking at some of the high-EDF companies within the corporate sector, we see Cineworld Group, one of the largest movie theater chains in the world. Within the financial sector, we see Aegon, an insurer, and CaixaBank, a major Spanish lender.

Having established the flight-to-credit-quality effects in US and European equity markets, we now turn to fixed income. Here, we focus on the US market only, and examine US investment grade (USIG) and US high yield (USHY). We depict results for both markets in Figure 11.

We explored the potential to use our default probability measures to generate outperformance in bond markets. Using a simple strategy that controls for duration and broad sector risk, we group bonds into sector and duration buckets, sort by EDF within each bucket, and track performance of the long top and bottom EDF quintile portfolios. Portfolios use market weights for the selected bonds and are formed with a fixed set of bonds on January 20, 2020.

When we apply this strategy in the US investment grade and US high yield markets, the outperformance of low PD bonds over high PD bond portfolios is evident in both. Further, we see that the extent of the outperformance of higher credit quality bonds, measured by their PDs, in high yield is significant and highly material. In general, we find that in both equity and fixed income markets, securities with low initial default risk are noticeably outperforming their peers during the COVID-19 pandemic period. This strong evidence of a flight to credit quality across markets will likely drive results for the foreseeable future as companies' liquidity and solvency are tested in the face of a shock to the real economy of nearly unprecedented scale.

Figure 11. Cumulative total returns of top quintile vs. bottom quintile EDF strategies in USIG and USHY markets
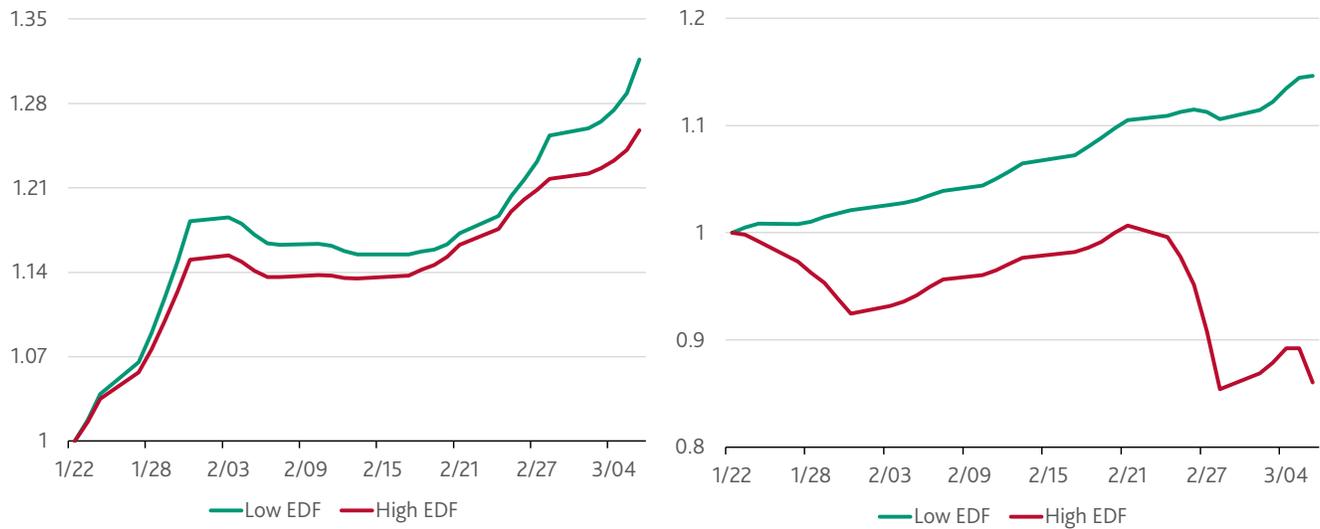
What does Stressed EDF have to say about the top industries and countries at risk?

Having squared our industry/country-level views against the CreditEdge EDF data, we now examine the outputs of our Stressed EDF (SEDF) model, which projects EDFs versus time, conditional on specific macroeconomic scenarios.

In early March, our economics division produced three COVID-19 scenarios: Baseline, Downside, and Pandemic. At the time of scenario production, all three scenarios were possible. Now, with the WHO having declared COVID-19 a pandemic[8] on March 11, 2020, the Pandemic scenario is the most likely and the focus of our analysis. Under the current Pandemic scenario, the S&P 500 stock index falls 26%, US GDP falls 2% peak-to-trough, and the US unemployment rate rises from 3.5% to 5.4% by the end of 2020. Given the job losses already seen in some industries and the near-daily stock market gyrations, this scenario underestimates the economic impacts of COVID-19. Nevertheless, the numbers form a useful basis for examining the possible credit implications of the crisis.

Figure 12. 75th percentile Stressed EDF: Select countries, Pandemic scenario
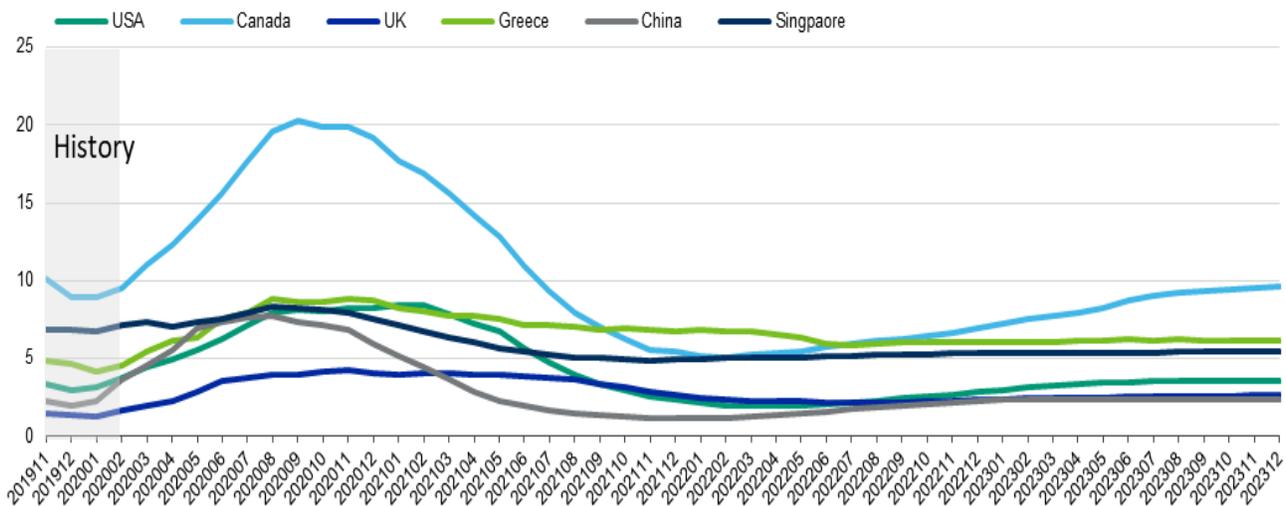
Figure 12 shows the 75th percentile Stressed EDF under the coronavirus Pandemic scenario for several of the high-risk countries identified in Table 1, as well as China and the United Kingdom. Canada shows the highest peak under this scenario, with the 75th percentile EDF edging toward 20% by mid-2020 as its large cohort of oil, gas, and mining companies are hit by falling prices and

---

[8] https://www.cnbc.com/2020/03/11/who-declares-the-coronavirus-outbreak-a-global-pandemic.html

weaker demand as the global economy enters recession. Singapore, which is the second-riskiest country heading into the scenario, shows only a mild increase in risk. This reflects its sizeable pharmaceutical sector, which should perform well during a pandemic, as well as its government's ability to respond quickly to an economic downturn. The United States and the United Kingdom both show material increases in credit risk. Compared to the most recent 2009 recession, the United States' peak 75th percentile EDF of 8.4% under this Pandemic scenario is still below the 10.3% peak seen in February 2009. China, which has until now shown little change in aggregate EDFs, would see a sharp rise in risk under this scenario. Note, however, that the scenario assumes that the Chinese government's fiscal and monetary response, while still sizeable, would be smaller than its 2009 stimulus.

Figures 13 and 14 plot the 75th percentile SEDF for five of the riskiest industries (as defined in Tables 3 and 4) for both North America and Europe. The scenario results in an increase in credit risk across all industries as the Pandemic scenario takes hold and the global economy enters recession.

Figure 13. 75th percentile Stressed EDF: Select North American industries, Pandemic scenario
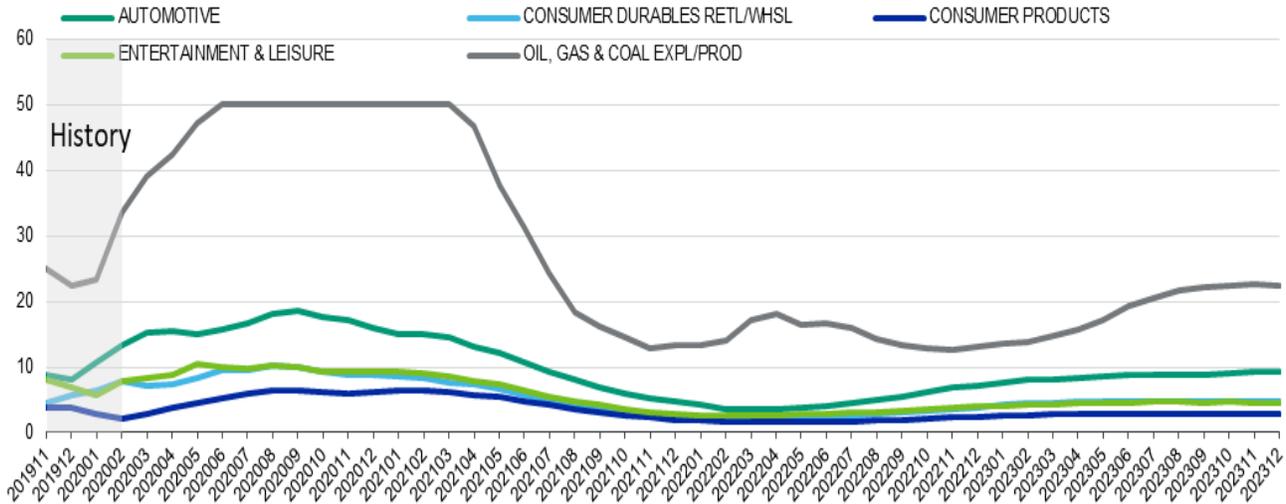
Figure 14. 75th percentile Stressed EDF: Select European industries, Pandemic scenario
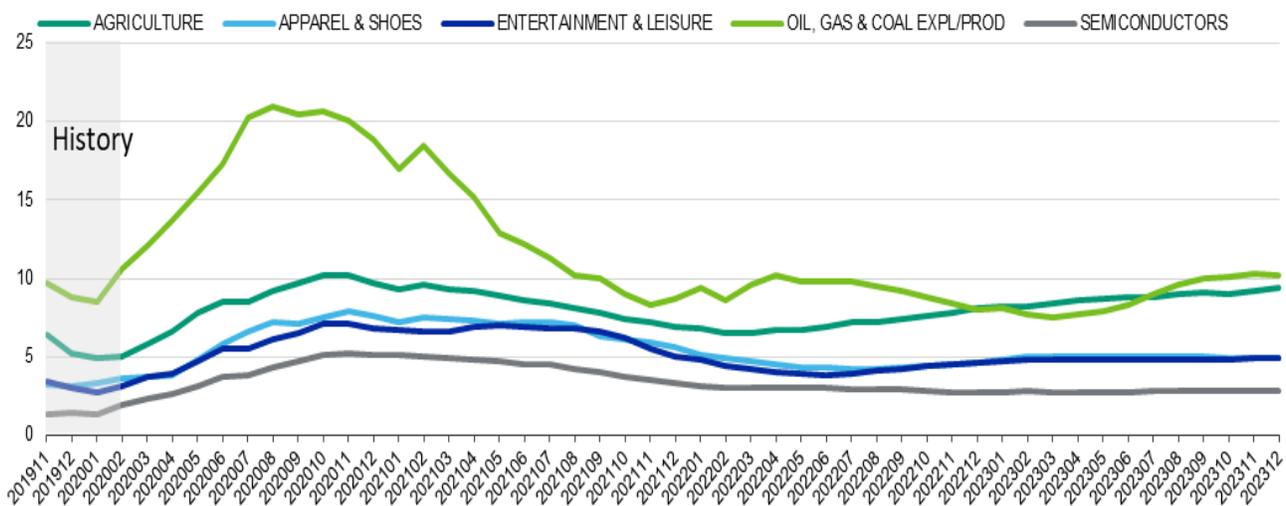
Industry trends under stressed economic conditions appear broadly similar in North America and Europe. Oil and gas firms, which display high credit risk heading into the crisis, would be hit particularly hard, with EDFs rising sharply in Europe and quickly hitting the 50% EDF maximum in North America. Consumer-facing industries, such as Consumer Durables and Entertainment and Leisure, show a rise in EDFs in both regions as unemployment rises and consumer confidence declines materially in this scenario. In North America, the Automotive sector shows a sharp rise in EDFs, with both consumer and business demand turning lower and some US factories already cutting back on production. In Europe, the Apparel & Shoes industry would be hit by falling consumer demand and disrupted supply links to Asia, with the industry showing a sizeable increase in EDFs under the Pandemic coronavirus scenario.

Conclusion

A look at the credit risk impact of the COVID-19 pandemic across industries, the corporate sector of countries, and governments reveals the potential for major consequences going forward if governments and civil society do not take effective measures to limit the spread of the virus. Airlines, cruise lines, and oil and gas firms have been particularly hard-hit due to recent developments. Among developed nations in North America and Europe, our results confirm that the United States and Italy are two countries especially vulnerable to further, potentially sharp increases in the credit risk of their corporate sectors if appropriate measures are not taken quickly. We present evidence suggesting that overweighting bonds with lower default risk, as well as identifying stable firms that supply products whose demand may increase during the pandemic, are reasonable strategies for investors.

Appendix

Testing your "Top 5" industry/country analyst intuition against the CreditEdge model

As consumers of financial news media, we found it useful to form initial hypotheses about which industries and countries should see their credit risk most affected by the coronavirus outbreak, and then test those hypotheses formally using CreditEdge data.

Our "analyst hunch" list of Top 5 most affected industries was as follows, as of March 6, in no particular order:

- AIR TRANSPORTATION
- ENTERTAINMENT & LEISURE
- HOTELS & RESTAURANTS
- OIL GAS & COAL EXPL/PROD
- TRANSPORTATION

Our list of top-of-mind industries embraces availability bias generated by our frequent consumption of news media. We are trying to understand the extent to which a list formulated in such a manner lines up with model outputs, as well as the implications of significant differences between the two.

Under the null hypothesis that each of the N industries (or countries) has an equal probability of being selected in a generic list of five names when drawn sequentially without replacement, we can calculate the probability $P(k,N)$ that exactly k names from our "analyst hunch" list are selected, for $k = 0, \ldots, 5$:

$$P(k, N) = Pr(k \text{ of } 5 \text{ names selected}, N \text{ categories}) = \left(\binom{5}{k} \binom{N-5}{5-k} \Big/ \binom{N}{5} \right)$$

The p-value of our test is the probability that k or more names are selected under the null:

$$pval(k, N) = \sum_{t=k}^{5} P(t, N)$$

The p-values given by this formula for k in the range from 0 to 5 are displayed in Table 1, for N=61 industries and N=65 countries, respectively:

Table 1. P-values for tests of picking skill

	N=61		N=65	
k	P(k,61)	pval(k,61)	P(k,65)	pval(k,65)
0	0.642077932	1.0000000	0.661208966	1.0000000
1	0.308691313	0.3579221	0.295182574	0.3387910
2	0.046594915	0.0492308	0.041429133	0.0436085
3	0.002588606	0.0026358	0.002142886	0.0021793
4	4.70656E-05	0.0000472	3.63201E-05	0.0000364
5	1.68091E-07	0.0000002	1.21067E-07	0.0000001

This means that guessing even 2 out of the Top 5 industries or countries correctly would happen less than 5% of the time by chance alone; guessing 3 or more industries/countries correctly would occur less than 1% of the time. After a brief review of the Top 5 tables in the paper, we're happy to report that we didn't do too badly! Model-driven output is useful, as it helps analysts constantly question, refine, and improve the results of our own intuition and synthesis of the facts.