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# Navigating Choppy Markets: Safety-First Equity Strategies Based on Credit Risk Signals

Moody's Credit Risk Analytics Group

Authors
**Samuel W. Malone, Ph.D.**
Director of Research
1.212.553.2107
Samuel.Malone@moodys.com

**Yukyung Choi**
Associate Director
1.212.553.0906
Yukyung.Choi@moodys.com

## Introduction

In early October, US equity markets suffered their second major correction this year and their worst fall in more than eight months. Values of stocks worldwide plunged to levels not seen in more than one year.

Widely cited drivers of the rout include the nascent US-China trade war, rising interest rates, and recent concerns related to Italy and several emerging markets. The sustainability of current levels of US growth and low unemployment over the medium term is also a growing concern.

Rising yields in particular increase the potential for equity volatility. Assuming stable expectations for the path of company earnings, upward shifts in the yield curve exert downward pressure on the prices of equities through the valuation channel. For equity prices to remain stable in a rising interest rate environment, therefore, investors must believe that the expected path of earnings continues to improve.

High quality point-in-time measures of credit risk can be useful for evaluating whether such assumptions are reasonable. Specifically, firms for which default risk and the risk of credit quality deterioration are high relative to their peers are those for which optimistic earnings growth assumptions are more likely to be suspect.

In this piece, we show that firms with high credit quality risk and high default risk do tend to underperform their peers in the S&P 500 universe on average. Furthermore, this type of idea back-tests well during the last two years in the tech sector, which was at the center of the recent market swoon. We'll also show that both strategies have tended to succeed in particular during flattening yield curve environments, with the performance of the low credit quality risk strategy tending to be more insulated to interest rate risk on average.

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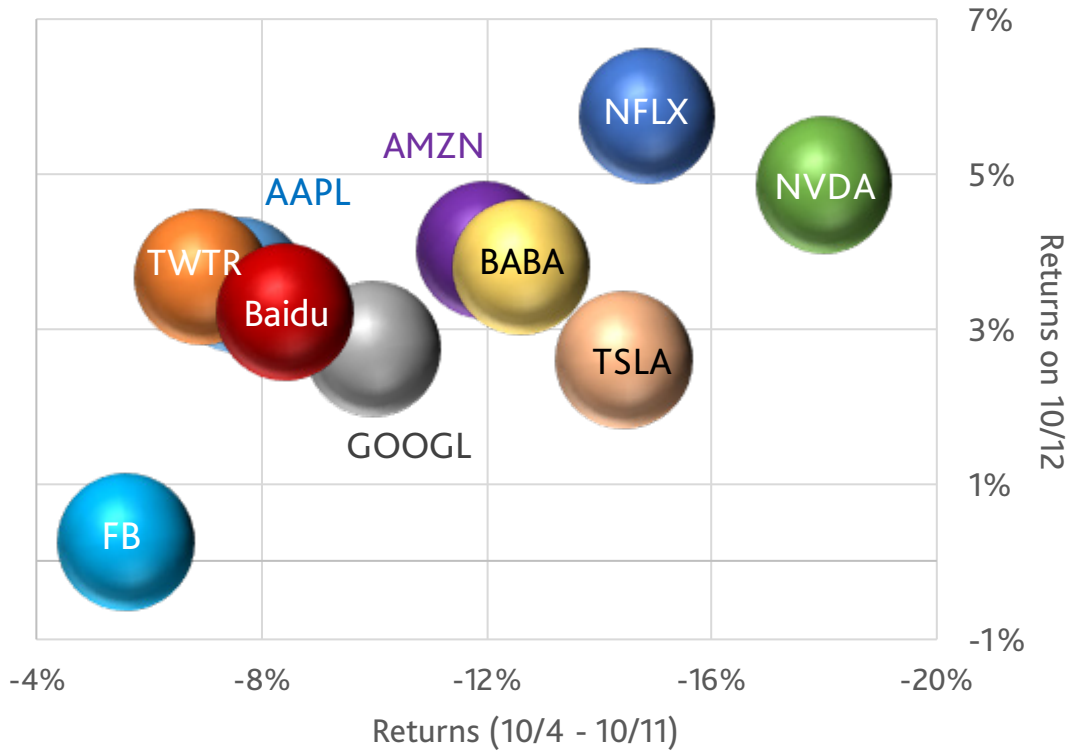
## Recent events

On October 10th, 2018, the tech-heavy Nasdaq Composite dropped more than 4%, its biggest one-day decline since June 2016. Tech stocks were already under pressure since September. Figure 1 plots returns for selected stocks in the NYSE FANG+ Index on October 12th, when there was a broad recovery, against returns during the preceding period from October 4th to October 12th, when the market turmoil occurred. The NYSE FANG+ Index itself fell 11.1% between October 4th and 11th, prior to recovering 3.43% on October 12. As Figure 1 makes clear, the stocks that experienced the largest drops during the selloff also, on average, experienced the largest recoveries on October 12th.

Figure 1: Returns of the NYSE FANG+ Index[1] members during the October 2018 sell-off and partial recovery




Incidentally, for the three FANG+ group stocks with the lowest EDFs on October 3rd, the average loss during the selloff was 9.2% , which was below average for the group. Idiosyncratic risk dominates returns for such a small handful of stocks. But the larger question stands: for tech and other stocks in the vanguard of this bull market, could credit risk metrics aid investors in sorting the wheat from the chaff?

[1] The NYSE FANG+ index includes 10 highly liquid stocks that represent the top innovators across today's tech and internet/media companies.

## Investment strategy performance and clouds gathering over the technology sector

The two metrics we employ for this purpose are Moody's Analytics' proprietary Deterioration Probability (DP)[2] and Expected Default Frequency (EDF)[3].

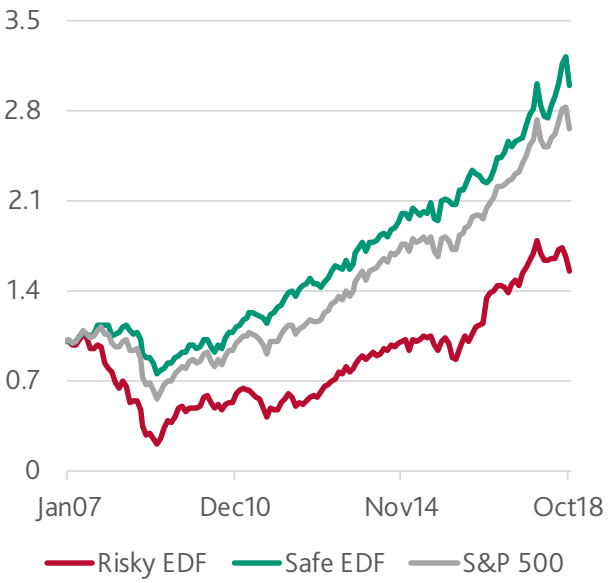
Figures 2a and 2b plot cumulative returns over time for DP and EDF factor style strategies. The figures show cumulative returns for long only DP and EDF style portfolios. To implement each strategy, we sort by quintile, forming "Safe" and "Risky" portfolios based on each metric. The Safe EDF portfolio consists of the 20% of stocks in the S&P 500 universe with the lowest values of the EDF metric, whereas the Risky EDF portfolio consists of the 20% of stocks with the highest EDFs. The Safe DP and Risky DP portfolios are defined similarly using the DP.

As shown in Figures 2a and 2b, the Safe DP and Safe EDF portfolios outperform the Risky DP and Risky EDF portfolios, respectively, during the period from January 2007-October 2018. This gives a clear indication that stocks with lower risk of default and credit quality deterioration tend to outperform the index and higher credit (quality) risk stocks on average.

Figure 2. Cumulative returns of top and bottom quintiles formed on DP and EDF (Jan. 2007- Oct. 2018) vs. the S&P 500 benchmark

Figure 2a. DP factor strategy


Figure 2b. EDF factor strategy

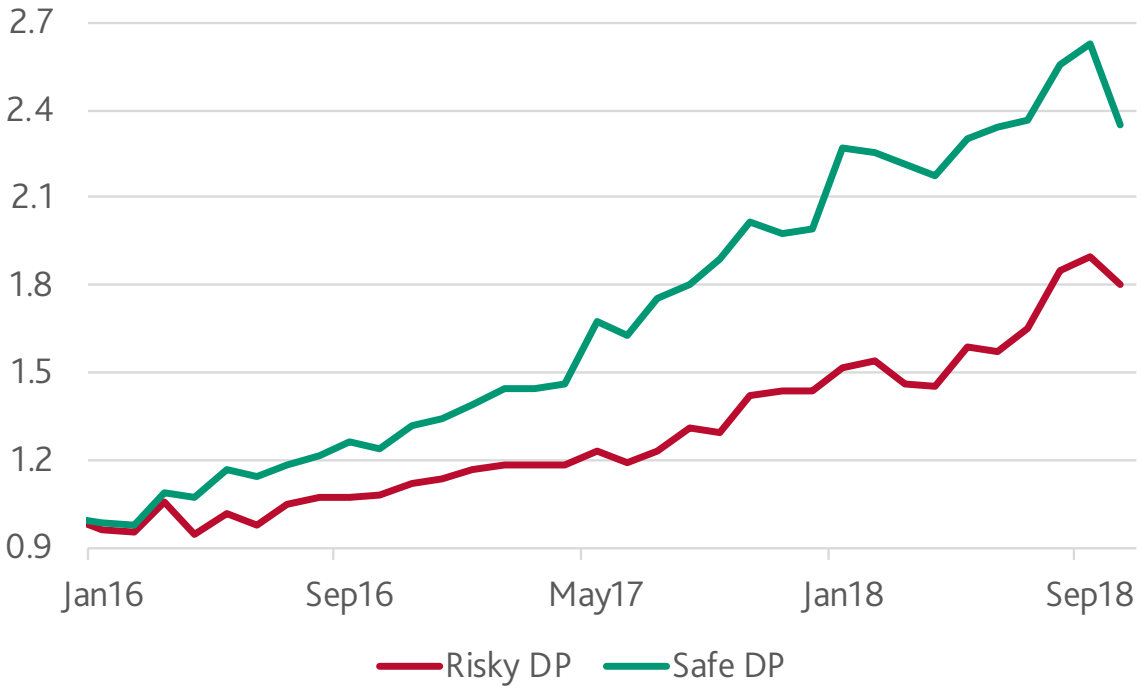



[2] Deterioration Probability (DP) is Moody's Analytics' CreditEdge quantitative model for the 1-year probability of downgrade or credit quality deterioration for public firms.

[3] Expected Default Frequency (EDF) is Moody's Analytics' CreditEdge model for the probability of default for public firms.

In addition to the evidence in Figure 2 for the S&P 500 overall, we find that sorting by Deterioration Probability helps us to differentiate firms by cumulative returns for the technology sector specifically during the past two years. This can be seen in Figure 3, which displays cumulative returns over time for Safe and Risky DP factor style strategies for the US technology sector. Not all the technology firms performed alike, and the DP factor clearly helped to differentiate outperformers from underperformers during this recent period.

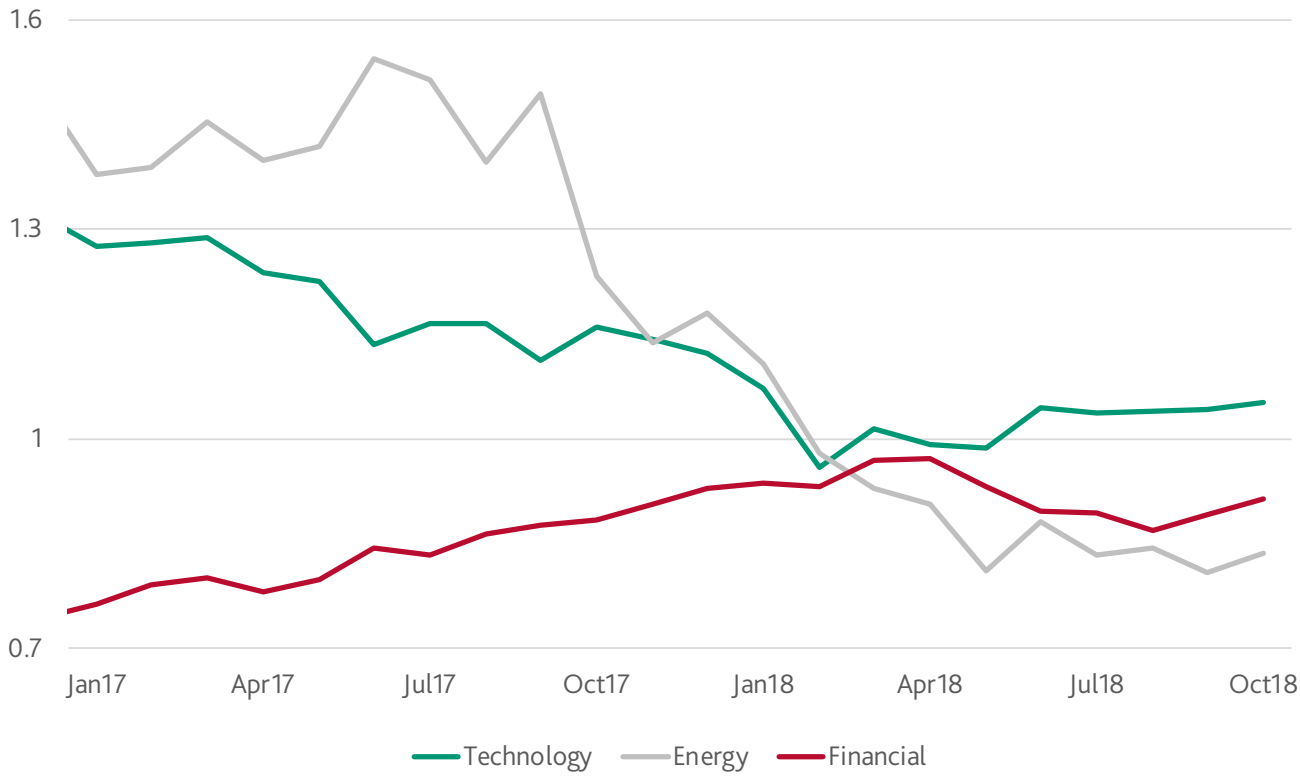
Figure 3. Cumulative returns of top and bottom quintiles formed on DP – Technology Sector (Jan. 2016- Oct. 2018)




In addition to sorting stocks within the tech sector by risk of credit quality deterioration, it's useful to observe relative trends in the average DP of different sectors as well. For this purpose, Figure 4 plots the ratio of the mean sector DP divided by the mean DP for each of three major sectors in the S&P 500 index.

While credit deterioration risk in the energy sector has gone down substantially during the last 18 months, the average credit deterioration risk for the technology sector has moved to the top spot relative to other sectors since January of 2018. The financial sector saw its credit deterioration risk rise slightly with respect to peers from January 2017 to April 2018, only to fall somewhat thereafter.

Figure 4. Ratio of DP for Technology, Energy and Financial sectors




US Tech companies are growing rapidly and have been big beneficiaries of tax reform. However, they led the sell-off during the recent pullback. According to the results of Figure 4, their role in leading the market down is not entirely surprising.

## Strategy alpha in different yield environments

In our final analysis, we decompose results for the Deterioration Probability - and EDF-based sorting strategies using the CAPM, and examine whether performance depends on the yield environment. We find that it does: the performance of different strategies has tended to vary significantly with changes in the level and slope of the yield curve. In particular, safety-first strategies based on selecting stocks with low EDFs or DPs tend to outperform in environments of flattening yield curves and underperform when the yield curve steepens. Risk-on strategies, which select stocks with high DPs or EDFs, behave in the opposite manner. Changes in the yield curve level, whether we measure that using the 2-year or 10-year Treasury yield, also affect strategy performance in some significant ways, although the effects are not quite as stark as with respect to changes in the yield curve slope.

Our findings here are likely to be relevant for the implementation of cross-asset strategies like the ones we propose, given the central importance of the yield curve level and slope as economic state variables and for pricing and hedging a variety of assets. In an environment of rising short rates and curve flattening, such as the one we're in now, the risk of a near-term recession is typically increasing and, as we show, the alpha of our safety-first strategies has historically been high. We now look at these issues in more detail.

Figures 5-7 display various CAPM model results obtained by regressing the excess returns of the Safe and Risky EDF and DP portfolios, respectively, onto market excess returns in different yield environments. All regressions use monthly data spanning the period from January 2007 to October 2018, inclusive.

Specifically, we run regressions of the form

$$R_{strategy,t} - r_f = \alpha + \beta(E(R_{Mkt,t}) - r_f) + \varepsilon_t,$$

where $R_{strategy,t}$ is the portfolio return for a strategy in period *t*, $r_f$ is the risk free rate, $R_{Mkt,t}$ is the return for the market in period *t*, $\alpha$ is the intercept term, $\beta$ is a measure of systematic risk related to covariance of strategy returns with the return of the market, and $\varepsilon_t$ is the residual term.

The strategies whose returns we examine include the Risky DP strategy, the Safe DP strategy, the Risky EDF strategy, and the Safe EDF strategy. "Safe" strategies initiate long positions in the 20% of the stocks in the index with the lowest values of their respective risk metric (DP or EDF), whereas "Risky" strategies select the 20% of stocks in the index with the highest values of the strategy's risk metric. We define the yield curve slope as the 10-year Treasury yield minus the 2-year Treasury yield.

Figure 5. CAPM regression results based on sign of the change in the slope of the Treasury yield curve

| Macro Scenario | Result | RiskyDP | SafeDP | RiskyEDF | SafeEDF |
|---|---|---|---|---|---|
| All months | $\alpha$ | -0.20<br>(0.17) | 0.23**<br>(0.11) | -0.66**<br>(0.31) | 0.27**<br>(0.12) |
| | $\beta$ | 1.19***<br>(0.04) | 0.88***<br>(0.03) | 1.67***<br>(0.07) | 0.71***<br>(0.03) |
| Yield Curve steepens | $\alpha$ | 0.12<br>(0.34) | 0.05<br>(0.18) | 0.32<br>(0.56) | -0.07<br>(0.21) |
| | $\beta$ | 1.21***<br>(0.07) | 0.88***<br>(0.04) | 1.67***<br>(0.11) | 0.72***<br>(0.04) |
| Yield Curve flattens | $\alpha$ | -0.44***<br>(0.15) | 0.38***<br>(0.13) | -1.41***<br>(0.33) | 0.53***<br>(0.14) |
| | $\beta$ | 1.16***<br>(0.04) | 0.88***<br>(0.04) | 1.65***<br>(0.09) | 0.68***<br>(0.04) |

Standard errors are shown in parentheses below point estimates. Significance Levels are denoted as follows: 1% (***), 5% (**), 10% (*).

Figure 5 focuses on strategy performance by change in the yield curve slope. Figures 6 and 7 focus on strategy results by the change in the 2-Year Treasury yield and the change in the 10-Year Treasury yield, respectively.

From Figure 5, a few noteworthy findings emerge. The top panel of figure 5 reports results from CAPM-style regressions over the entire sample for reference. The results are simple and intuitive: Risky DP and Risky EDF strategies have negative alpha estimates and betas that are significantly greater than one, whereas Safe DP and Safe EDF strategies have positive alphas and betas that are less than one. The alpha estimates for both safety-first strategies are significantly different from zero, with p-values below the 1% level. For the Safe DP strategy, the 0.23% monthly alpha translates into an annualized alpha of 2.76%, whereas the 0.27% monthly alpha for the Safe EDF strategy translates into an annualized alpha of 3.24%. These alphas are before transaction costs, but are nonetheless economically significant given the typical levels of transaction costs that apply to stocks in the S&P 500 universe. Historically, at least, safety-first strategies pay.

In the second and third panels of Figure 5, we see results for steepening and flattening yield curve environments, respectively. The performance differences of the strategies in these two environments are stark: Safe DP and EDF strategy alphas are positive and statistically significant at conventional levels in flattening yield curve environments, whereas Risky strategy alphas are negative and statistically significant in those environments. In steepening yield curve environments, we can no longer reject the null of zero alpha for any of the strategies, although strategy betas appear largely unchanged. Steepening yield curve environments account for 44% of the sample, as opposed to 56% for flattening yield curve environments, so this may explain in part why the standard errors of the alpha estimates are somewhat higher in the former case than the latter.

Figure 6. CAPM regression results based on sign of change in 2-year Treasury yield

| Macro Scenario | Result | RiskyDP | SafeDP | RiskyEDF | SafeEDF |
|---|---|---|---|---|---|
| Yields up | $\alpha$ | -0.45<br>(0.28) | 0.23<br>(0.17) | 0.23<br>(0.48) | -0.15<br>(0.18) |
| | $\beta$ | 1.36***<br>(0.07) | 0.86***<br>(0.04) | 1.68***<br>(0.12) | 0.77***<br>(0.16) |
| Yields down | $\alpha$ | -0.13<br>(0.20) | 0.26<br>(0.14) | -1.45***<br>(0.40) | 0.58***<br>(0.16) |
| | $\beta$ | 1.09***<br>(0.04) | 0.89***<br>(0.03) | 1.62***<br>(0.09) | 0.68***<br>(0.04) |

Standard errors are shown in parentheses below point estimates. Significance Levels are denoted as follows: 1% (***), 5% (**), 10% (*).

Figure 6 displays the CAPM results for each strategy for two subsets of the data: "Yields down" months in which the month-on-month change in the 2-year Treasury yield is negative, and "Yields up" months in which the change is positive. We use the 2-year yield as a proxy for the yield curve level, with changes representing level-shifts in the yield curve. The results are noteworthy: the alphas and betas of the Safe DP strategy are very similar during the two subsamples, whereas the alphas and betas of the EDF strategies change significantly in rising versus falling 2-year yield environments. In particular, the Safe EDF strategy performs significantly better in falling yield environments, during which it attains a CAPM alpha of 0.58% per month. The Risky EDF strategy, in contrast, attains a negative monthly CAPM alpha of -1.45% per month during falling yield environments. Both of these alpha estimates are highly significant statistically.

The results we find for the 2-year yield are quite similar to the results we find when we use the 10-year yield, which are displayed in Figure 7.

Figure 7. CAPM regression results based on sign of change in 10-year Treasury yield

| Macro Scenario | Result | RiskyDP | SafeDP | RiskyEDF | SafeEDF |
|---|---|---|---|---|---|
| Yields up | $\alpha$ | -0.24<br>(0.28) | 0.23<br>(0.15) | 0.20<br>(0.45) | -0.10<br>(0.17) |
| | $\beta$ | 1.20***<br>(0.06) | 0.88***<br>(0.03) | 1.62***<br>(0.10) | 0.75***<br>(0.04) |
| Yields down | $\alpha$ | -0.17<br>(0.21) | 0.24<br>(0.15) | -1.56***<br>(0.41) | 0.62***<br>(0.17) |
| | $\beta$ | 1.17***<br>(0.05) | 0.87***<br>(0.04) | 1.66***<br>(0.11) | 0.67***<br>(0.05) |

Standard errors are shown in parentheses below point estimates. Significance Levels are denoted as follows: 1% (***), 5% (**), 10% (*).

As we see from Figure 7, the Safe DP strategy has quite similar alpha and beta estimates in "Yields up" versus "Yields down" periods, echoing the results we obtained in Figure 6 based on the 2-year Treasury yield. Also as in Figure 6, the Safe EDF strategy performs quite differently in these two environments: its high and positive alpha in falling yield environments contrasts with a slightly negative alpha, which is statistically indistinguishable from zero, in months when yields are rising. CAPM parameter estimates don't change much between Figures 6 and 7, which suggests that our results are robust to the choice of yield curve level variable.

To probe how meaningful these differences in alpha across yield environments were for the EDF-based strategies, we ran a separate regression, not shown, on the pooled data with dummy variables for the yield environment in the intercept and slope terms. We find that standard t-tests of the difference in alphas allow us to reject the null hypothesis of zero difference for both the Risk EDF and Safe EDF strategies with p-values of less than 1%. This confirms that alphas for both strategies are significantly different in rising versus falling yield environments.

For context, it's useful to examine how yields have evolved during the last several years. The slope of the yield curve, measured as the 10-year Treasury Constant Maturity yield minus the 2-year Treasury Constant Maturity yield, has been falling steadily since 2014, with the 10-year yield rising more slowly during the past couple of years as the 2-year rate has begun to rise more quickly in line with interest rate increases by the Fed[4] . The differential, at around 0.28 percentage points, was last at the same level in a falling yield curve slope environment back in July 2005.

[4] https://fred.stlouisfed.org/, Accessed on 10/26/2018

## Conclusion

The recent volatility that has roiled US equity markets will likely recur. Persistent flattening in the yield curve during the past several years, as well as high equity valuations, have set the stage for a market correction. In such an environment, safety-first investment strategies have typically performed well. We propose and test the performance of two such strategies in this piece: low default risk (low EDF) and low credit deterioration risk (low DP) portfolios.

We find that the alpha for the Safe EDF portfolio is slightly larger in magnitude than the Safe DP portfolio on average, whereas the DP-based strategy is better hedged against interest rate risk due to changes in the 2-year or 10-year Treasury rate. In flattening yield curve environments, when the gap between the 10-year and 2-year Treasury rates narrows, both safety-first strategies significantly outperform their "risk-on" high EDF and high DP strategy counterparts.

In addition, we show that the DP strategy helps to differentiate sectors in terms of their overall risk, with the technology sector at the forefront of recent market turmoil displaying the highest average DP at a sector level. The low DP strategy that outperforms on the S&P 500 market as a whole also tends to outperform when restricted to the technology sector.

Cross-asset strategies that leverage high quality credit risk metrics, in other words, can be a useful tool in equity investing—especially in the current interest rate environment.

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