STOCK RETURNS AND THE DISTRESS PUZZLE

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Abstract. We reshape the distress puzzle (DP, higher default risk stocks realize lower returns). Triple sorts of the returns space—(non)financial distress periods [(N)FDP], credit default swaps spreads (CDSS), credit default swaps spread term structures (CDSSTS)—avoid subset "overwhelmingness" problems. We find that DP exists *only for 22.22% of U.S.-listed stock returns, occurring only during FDP (60/180 months), and only for the two terciles of highest CDSSTS slopes*. Except for these anomalous findings, returns align with asset pricing theory predictions. Within our reshaped DP, the anomaly is enhanced as the 5-year CDSS is significantly higher than the 1-year.

Key Words: Stock Returns, Default Risk, Distress Puzzle, Credit Default Swaps Spread, Subset Overwhelmingness

JEL Codes: G11, G12

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1 Introduction

The relationship between firms' default risk and their stock returns has been a longstanding issue in financial economics, with empirical evidence yielding inconclusive support to risk-return trade-off as implied by asset pricing theory. Several studies find a positive association between default risks and stocks' expected returns, supporting conventional risk-return trade-off (Avramov, Chordia, Jostova, and Philipov 2012; Vassalou and Xing 2004; Chava and Purnanandam 2010). In contrast, other studies find that distressed stocks, with their higher default risk, tend to generate lower expected returns, a phenomenon referred to as the "distress puzzle (DP)" (Dichev 1998; Griffin and Lemmon 2002; Campbell, Hilscher, and Szilagyi 2008; Gao, Parsons, and Shen 2018; Avramov, Chordia, Jostova, and Philipov 2022). Finally, a third strand of research documents lower returns to distress stocks but offers theoretical justifications (Garlappi, Shu, and Yan 2010; George and Hwang 2010; Garlappi and Yan 2011; Friewald, Wagner, and Zechner 2012). In addition, Han, Subramanyam, and Zhou (2017) find an anomalous relationship between credit default swap spreads term structure (CDSSTS) and stocks returns.

We re-examine relationships between default risks and stock returns by incorporating credit default swap spreads (CDSS), credit default swap spreads term structures, and the market's aggregate default risk. The CDSSTS captures the current level and the anticipated trajectory of future default risks, both of which affect stock returns.[1] The aggregate market default risk, in turn, also affects stocks' price of default risk, thus stocks' return. Therefore, accounting jointly for the CDSS, CDSSTS, and the market's aggregate default risk might be necessary for accurate estimation of the relationship between default risks and stock returns.

[1] Avramov, Chordia, Jostova, Philipov (2013), when identifying financially distressed stocks, look at previous credit ratings, in addition to current ones, to estimate a trend predicting future default risk. We are able to use 5-year CDSS level as a market assessment of future default risk.

Studying the U.S.-listed stocks from January 2002 to December 2016, we offer a fresh perspective, reshaping the DP. As in Han, Subramanyam, and Zhou (2017), we use the one-year CDSS as a proxy for current default risk and the difference between the 5-year and 1-year CDSS (slope) as a proxy for expected changes in future default risks. We capture the level of the markets' corporate default risk by the average corporate bond yield spreads. Using these three proxies, we analyze the equilibrium effects of current default risks, expected future default risks, and aggregate market default risks on expected stock returns.

We first examine 1-month future returns, adjusted for the Fama-French 3-factor model, of nine value-weighted stock portfolios—double-sorted monthly, first by CDSSTS slopes and then by 1-year CDSS, terciles. We find that the DP exists only among stocks with the top CDSSTS slopes two terciles. The top tercile CDSS-level portfolio yields significantly lower risk-adjusted returns than the bottom tercile CDSS-level portfolio, with differences of -6.59% annually for the top CDSSTS slope tercile, and -5.62%, for next CDSSTS slope tercile, both statistically significant at the 5% level. In contrast, for stocks in the bottom CDSSTS slope tercile, the top tercile CDSS-level portfolio exhibits an economically and statistically insignificant risk-adjusted return gap with the bottom tercile portfolios, underperforming by only 0.62% (less than one tenth of the difference in the top CDSSTS slope tercile). This analysis suggests that the relationship between current 1-year default risks and stock returns defy conventional risk-return trade-off only when future default risks are expected to increase substantially.

Next, we examine the sensitivity of our results to conditioning on the aggregate market default risks. We identify the market's financial distress periods (FDP) and non-financial distress periods (NFDP) based on the top tercile of corporate bond yield spreads during the sample period. This classification results in 60 months of FDP and 120 months of NFDP, during which we perform the same "double-sort" analysis as described previously. This analysis indicates that our results are highly sensitive to aggregate market default risks.

Thus, we find that DP exists *only* during FDP and *only* for the two terciles of highest CDSSTS slope stocks. Specifically, during FDP, the top terciles CDSS-level portfolio yields *lower* risk-adjusted returns than the bottom tercile one by 16.52% and 12.64% annually, respectively, which are statistically significant at the 1% and 5% level, respectively. In contrast, during NFDP, the top terciles CDSS-level portfolio yields lower risk-adjusted returns than the bottom tercile one by 1.74% and 2.20% annually, respectively, with both results statistically insignificant.

In summary, the puzzling negative relationship between 1-year default risks and expected returns is confined to a small subset, 22.22% of the sample (the US-listed stock-months). This small subset is composed of stocks where future default risks are anticipated to increase most, and only during periods where aggregate market default risks are high. Thus, our analysis (triple sorting) overcomes a subset overwhelmingness problem, not previously identified in this context.[2]

Our findings might suggest that the DP would have been moderated if the increase in default risks, from 1-year to 5-year of portfolios with a high 1-year CDSS level and a steep CDSSTS slope were expected to be less than that of portfolios with a low CDSS level and steep CDSSTS slopes. This is because we find to the contrary. The anomalous returns are for the stocks with the highest 1-year CDSS *and* the steepest increase from 1-year to 5-year CDSS, making DP even more puzzling. Otherwise, for the non-anomalous returns, plotting the CDSSTS of the nine portfolios during both FDP and NFDP, manifests properly priced "fan" patterns [monotonically ordered (not crossing) CDSSTS with increasing positive slopes] in line

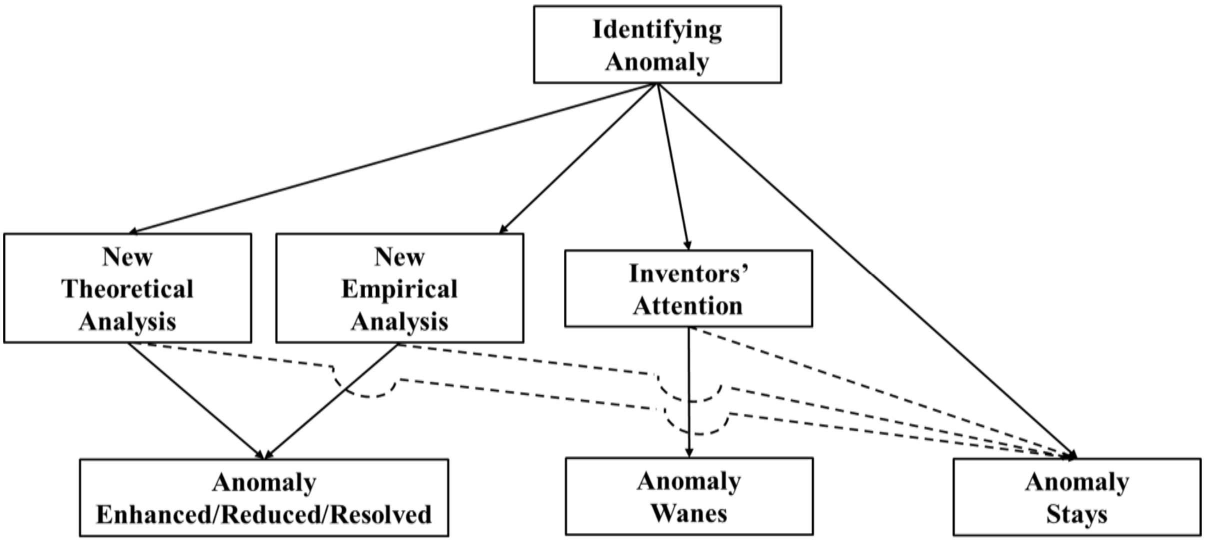
[2] Avramov, Chordia, Jostova, Philipov (2013) find that the subset of financially distressed stocks drives pricing anomalies, an example to a subset overwhelmingness problem.

with conventional risk-return trade-off (please see Figures 1 and 2). An interesting exception to the fan-pattern is the lowest CDSSTS slope tercile portfolio, in which the highest CDSS-level stocks face such extreme 1-year default risks that the CDSSTS becomes inverted. Still, these are also "appropriately" priced. Consistent with asset pricing theory, these non-anomalous patterns support the general robustness of CDSSTS as a measure of default risk. In summary, on one hand, our findings narrow the puzzle to a considerably smaller subset of stock returns, under shorter periods and specific conditions; on the other hand, they highlight a "stronger puzzle."

We run several robustness checks. First, instead of using the 1-year CDSS, we use the average of 1-year and 5-year CDSS, as a proxy for stocks' default risk level. The results are highly consistent with our earlier findings. Next, we examine the systematic default risks of each of the nine portfolios during FDP and NFDP. By regressing monthly changes in the 1-year CDSS of individual firms on monthly changes in the 5-year high-yield credit default swap index (CDX), we compute default risk CDX betas of stocks as proxies for stocks' systematic default risks. By computing stocks' default risk CDX betas we quantify their sensitivities to market-wide credit risk fluctuations. We find that, during both FDP and NFDP, the top CDSS-level tercile has a significantly higher default risk CDX beta than the bottom tercile across all CDSSTS slope terciles, confirming that our reshaped distress puzzle is even more perplexing. During FDP, stocks in the top CDSS-level tercile and top CDSSTS slope have much higher systematic default risks while yielding lower returns than other stocks, contradicting conventional risk-return trade-off.

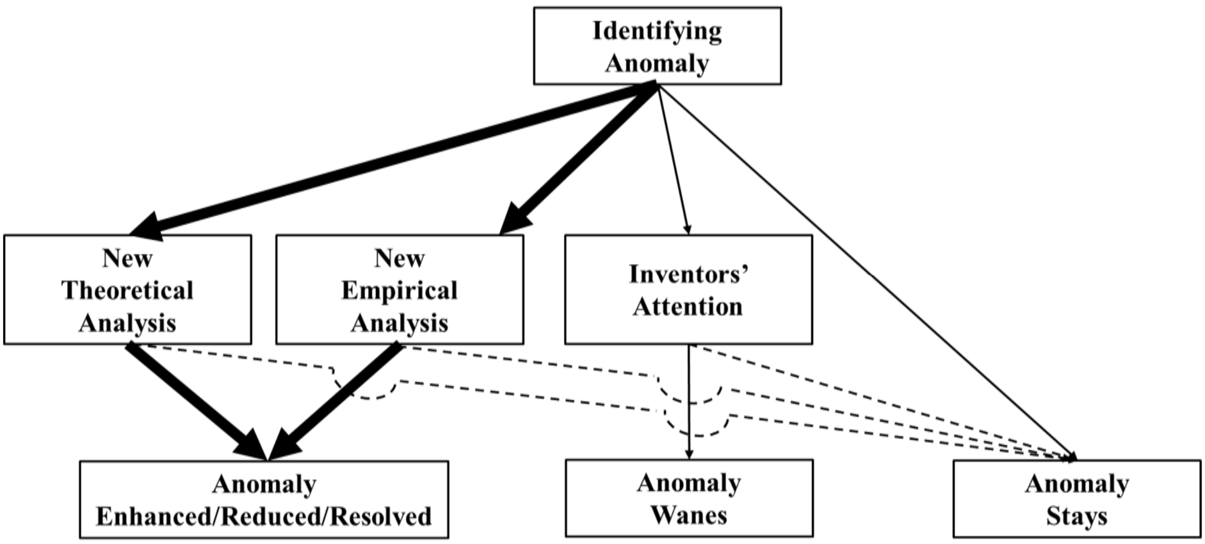
Diagrams 1 and 2 below show our contribution to the anomalies literature generally, and the DP literature specifically. Diagram 1 describes a general anomalies lifecycle. Once investors identify an anomaly, it might draw attention, induce theoretical analysis, and induce empirical analysis. The diagram's latter three (remedying) activities might leave the anomaly unchanged, enhanced/reduced/modified, or eliminated.

Diagram 1. General anomalies lifecycle



The bold heavy lines in Diagram 2 describe the contribution of our paper. Our theoretical and empirical analysis reshapes the anomaly. We focus a similar more perplexing anomaly on a smaller subset of stock returns, during shorter periods, and only during special market conditions.

Diagram 2. Contribution of our paper



2 Data and methodology

2.1 Sample construction

Our sample consists of CDSS and return data of U.S. firms listed in the NYSE, AMEX, and NASDAQ from 2002 to 2016.[3] As of December 2016, our sample consists of 429 stocks with $12.8 trillion market capitalization, which is about 46.8% of total market capitalization of US listed firms. Our primary data sources include the Markit Credit Default Swap (CDS) database for price information of corporate credit default swaps, the Federal Reserve Economic Database (FRED) for corporate bond yield spread (BBB–AAA), and the CRSP U.S. stock database for historical stock returns of U.S. listed firms.

We measure firms' current and expected future default risks using their CDSSTS. CDSS, typically quoted in basis points, represents the *annual* cost of insuring certain debts amount against default. For instance, CDSS quoted at 100 bp means that a swap buyer pays 100 bp of the insuring debt amount annually. A CDS may cover a broader set of debt obligations or multiple entities rather than an individual bond. As in Han, Subramanyam, and Zhou (2017), we focus on 1-year CDSS (*spread1y*) and 5-year CDSS (*spread5y*). Specifically, we use 1-year CDSS as a proxy for current default risks and the CDSSTS slope, defined as the difference between 5-year and 1-year (*spread5y* – *spread1y*), as a proxy for the expected change in future default risks.

As a measure of the aggregate market default risks, we use the average corporate bond yield spread, defined as the yield difference in BBB-rated bonds and AAA-rated ones. We define FDP as months within the top tercile of the average corporate bond yield spread during the sample period. We classify the other months as NFDP. Out of the total 180 months in our sample period, 60 months are FDP, and the remaining 120 months are NFDP.

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[3] We include only firms in our sample for which CDS spread information is available. This makes our sample start from 2002, when CDS data became more available and reliable.

This classification method effectively captures market-wide distress events. The primary FDPs identified in our sample fall into the periods around the dot-com bubble burst (January 2002–January 2003), the global financial crisis (January 2008–September 2009), the flash crash period (June–July 2010), the U.S. debt ceiling crisis and European sovereign debt crisis (September 2011–September 2012), and the stock market sell-off (September 2015–March 2016).[4] The method captures periods of significant market correction, economic uncertainty, credit market freezes, and global financial interconnectedness. The global financial crisis of 2008–2009 stands out as the most severe and prolonged period of financial distress in our sample. This robust identification of FDP enables us to conduct a nuanced analysis of how the relationship between default risks and expected stock returns manifests differently during periods of heightened aggregate market default risks.

2.2 Methodologies

We employ a three-dimensional sorting approach. We sort stock-months based on the FDP/NFDP indicator, the 1-year CDSS level (*spread1y*), and the CDSSTS slope (*slope*). Specifically, for each month, we construct nine stock portfolios by first sorting stocks into three terciles based on their CDSSTS slopes and then sorting stocks in each tercile into another three terciles based on their 1-year CDSS levels. We then classify the portfolios into those constructed in FDP and others. Our sorting method, resulting in $18\ (= 3\ x\ 3\ x\ 2)$ portfolio types, allows us to examine the interplay between current default risks (1-year CDSS levels), expected change in future default risks (CDSSTS slope), and aggregate market default risks (the FDP/NFDP classification). Moreover, by analyzing the characteristics of finely sorted portfolios, we can see whether a certain relationship between default risks and expected stock

[4] This identification of FD periods aligns closely with major financial crises and market stress events documented in existing literature.

returns exist consistently in a broad set of stocks or, alternatively, only in a small set. Our analysis is immune to a case where a small subset overwhelms statistics of the entire sample.

Table 1 presents the summary statistics of our sample firms during the 2002–2016 period, offering detailed insights into the characteristics of firms sorted by CDSSTS slope terciles. We observe distinct patterns across these terciles. Firms in the top slope tercile tend to be smaller, with an average size of $7.13B compared to $31.09B for the bottom tercile. The book-to-market (*B/M*) ratio increases monotonically from the lowest to the highest slope tercile (0.56 to 0.73), suggesting that firms with steeper CDSSTS slopes tend to be value firms. There is an increasing trend in leverage ratios across slope terciles, with the top tercile having a substantially higher average leverage (0.39) compared to the bottom tercile (0.27).

Return on assets (ROA) and investment tend to decrease with CDSSTS slopes, but we consider the differences to be immaterial. Past 1-year returns (lret1y) show no clear pattern across terciles, with all terciles showing similar average returns around 11–14%. Interestingly, default probabilities do not show a monotonic pattern. The middle tercile has the lowest average default probability (0.17%), while the top and bottom slope terciles have relatively higher probabilities (0.41% and 0.28%, respectively). As shown later, the high default probability of the bottom slope tercile is due to stocks having such a high current default probability that the CDSSTS is inverted.

Table 2 presents the characteristics of constituent stocks of double-sorting portfolios based on 1-year CDSS level and CDSSTS slope. We focus on the top and bottom 1-year CDSS-level terciles. The double-sorting portfolios reveal more nuanced relationships between firm characteristics, credit risk levels, and the term structure of credit risk. The top CDSS-level tercile stocks tend to be smaller with higher book-to-market ratio and leverage.

Interestingly, stock of the top CDSS level and the bottom CDSSTS slope portfolio exhibit an inverted CDSSTS, with average 1-year and 5-year CDSS of 5.32% and 4.42%, respectively. For this portfolio, both 1-year and 5-year CDSS increase over the previous one year (*Δspread1y* and *Δspread5y*), disproportionately more than other portfolios. Moreover, 1-year CDSS tends to increase more than 5-year one, leading to lower slopes. This pattern is also prominent in the default probability measures.

Overall, the summary statistics highlight the complex relationships between firm characteristics and the CDSSTS. They suggest that the CDSSTS slope may capture some aspects of firm risks not fully reflected in traditional measures, setting the stage for our subsequent analyses of the distress puzzle.

3 Results

3.1 Returns of double-sorting portfolios based on CDSS level and CDSSTS slope

We first examine 1-month value-weighted stock returns of nine double-sorting portfolios based on CDSS level and CDSSTS slope. Table 3 provides returns of portfolios in the full sample period (Panel A), FDP (Panel B) and NFDP (Panel C). In each panel, the left half reports raw returns while the right half presents the Fama-French 3-factor adjusted returns.

Panel A shows that DP exists only in risk-adjusted returns and only in the top and middle CDSSTS slope tercile stocks. When examining the raw return difference between the top and bottom 1-year CDSS (*spread1y*) terciles, presented in the bottom row, the top CDSS tercile yields higher returns by 0.32% for the bottom CDSSTS slope tercile while earning lower returns by 0.19% and 0.30% for the top and middle slope terciles. However, all these return differences are not statistically significant.

The risk-adjusted returns show a significant DP in the top and middle CDSSTS slope terciles. The top CDSS tercile portfolio yields lower returns than the bottom CDSS tercile one by 0.55% for the highest CDSSTS slope tercile and 0.47% for the second highest slope tercile, with both statistically significant at 5% level. In contrast, for the lowest CDSSTS slope tercile, the top CDSS tercile stocks underperform the bottom tercile merely by 0.05%, which is statistically insignificant. In sum, DP of risk-adjust returns exists only for the top and middle CDSSTS slope tercile stocks.

Panel B presents portfolio returns during FDP, when the aggregate market default risk is heightened. Interestingly, DP of risk-adjusted returns manifests as much stronger during these periods. The top CDSS-level tercile stocks yield lower returns than the bottom tercile ones for the top and middle CDSSTS slope terciles. The return gap records 1.38% for the top slope tercile and 1.05% for the middle slope tercile, with both statistically significant at 5% level. The bottom slope tercile also reveals underperformance of the top CDSS-level tercile by 0.3%, but this return difference is not statistically significant. In sum, DP of risk-adjusted returns for the top and middle slope tercile stocks is more than doubled during FDP.

Panel C shows portfolio returns during NFDP. In contrast to FDP, the distress puzzle of risk-adjusted returns does not manifest during these periods. The top CDSS-level tercile portfolio yields lower returns than the bottom tercile one only by 0.15% for the highest CDSSTS slope tercile and 0.18% for the middle slope tercile, with both statistically insignificant. For the lowest slope tercile, the top and bottom CDSS-level tercile stocks exhibit a return gap by 0.07%, which is economically and statistically immaterial. Overall, DP is not observed in any CDSSTS slope terciles during NFDP.

Our analysis reveals that DP is not a universal phenomenon but is confined to specific market conditions (FDP) and a subset of firms (those with high CDSSTS slopes).

3.2 CDSSTS of portfolios

Next, we examine CDSSTS of each portfolio. Figure 1 provides a detailed view of how the CDSSTS varies across 1-year CDSS-level terciles, within each CDSSTS slope tercile, during NFDP (Panel A) and FDP (Panel B).

Panel A shows that, within each slope tercile, stocks in higher CDSS-level terciles exhibit higher 5-year CDSS, as expected. Furthermore, within each slope tercile, stocks in higher CDSS-level terciles tend to have steeper CDSSTS slopes, except for the bottom slope tercile. In this case, the 1-year CDSS of the stocks in the top tercile is high enough to invert the CDSSTS. Overall, the findings suggest that, during NFDP, firms with higher 1-year default risk not only have higher expected future default risks but also face larger expected increases in future default risk, resulting in a steeper CDSSTS.

Panel B shows similar patterns of CDSSTS during FDP, though the overall CDSS levels are much higher than those in NFDP. Within each slope tercile, stocks in higher 1-year CDSS-level terciles also have higher 5-year CDSS. Additionally, the CDSSTS slope increases monotonically from the bottom to the top CDSS-level terciles, except for the top CDSS tercile in the bottom slope tercile, which exhibit an inverted CDSSTS due to elevated current default risks. Overall, during FDP, higher 1-year CDSS-level terciles tend to show more elevated 5-year CDSS, with this progression in CDSSTS slope being most pronounced for the highest slope tercile.

These figures collectively highlight the complex interplay between CDSS levels and CDSSTS slopes, and the way this relationship changes under different market conditions. Deviations from the orderly CDSSTS primarily emerge in stocks with extremely high current default risks, resulting in an inverted CDSSTS. However, it is important to note that the market evaluates these stocks consistently with conventional risk-return trade-off.

The orderly CDSSTS in the higher slope tercile makes our reshaped distress puzzle even more puzzling. In the highest two CDSSTS slope terciles, stocks in the top 1-year CDSS-level tercile have even more elevated 5-year CDSS compared to those in the bottom tercile, yet they yield lower returns.

3.3 The role of aggregate market default risks

We examine the systematic default risks of each of the nine portfolios during FDP and NFDP. By regressing monthly changes in the 1-year CDSS of individual firms on changes in the 5-year high-yield corporate default swap spread index (CDX), we compute default risk CDX betas as proxies for stocks' systematic default risks, thereby quantifying stocks' sensitivities to market-wide credit risk fluctuations.

Table 4 presents CDX beta during FDP (Panel A) and NFDP (Panel B). Panel A shows that one–year CDSS levels are well aligned with systematic default risk levels during FDP. The last row, which displays CDX beta differences between the top and bottom CDSS-level terciles, indicates that the top tercile consistently has a higher CDX beta across all CDSSTS slope terciles. This difference is most pronounced in the top slope tercile (5.98), followed by the bottom slope tercile (4.38) and the middle tercile (1.75). All differences are statistically significant at the 1% level.

Panel B shows the results during NFDP. Similar to the findings in FDP, the top CDSS-level tercile portfolio consistently exhibits a higher CDX beta, indicating a higher level of systematic default risk, than the bottom CDSS-level tercile across all CDSSTS slope terciles, with all differences being statistically significant at 1% level. As in FDP, the largest CDX beta difference between the two CDSS-level terciles occurs in the top slope tercile (5.35).

These findings suggest the distress puzzle in the higher slope terciles is even more perplexing. During FDP, stocks in the highest CDSSTS slope and CDSS-level terciles have much higher systematic default risks yet yield lower returns than other stocks, contradicting conventional risk-return trade-off.

3.4 Robustness to alternative proxies for current default risk levels

We check the robustness of results to an alternative proxy for the default risk level—the mean of 1-year and 5-year CDSS levels. Specifically, we double-sort stocks into $(3\ x\ 3)$ portfolios based on the CDSSTS slope first and then based on the mean of 1-year and 5-year CDSS levels. Table 4 presents the portfolio returns in the full sample period (Panel A), FDP

(Panel B) and NFDP (Panel C). In each panel, the left half reports raw returns while the right half presents the Fama-French 3-factor adjusted returns.

Panel A shows that, as in the portfolios constructed by 1-year CDSS level, DP exists only for risk-adjusted returns and for the top and middle CDSSTS slope terciles. When examining raw returns, the top CDSS-level tercile stocks underperform the bottom tercile ones by 0.17% and 0.26% for the top and middle slope terciles, respectively, with both statistically insignificant. In contrast, the top CDSS-level tercile portfolio outperforms by 0.44% for the lowest CDSSTS slope tercile, but the return gap is also statistically insignificant.

DP of risk-adjust returns, however, is evident for the top and middle CDSSTS slope terciles. The top CDSS-level tercile portfolio yields lower returns than the bottom-level tercile by 0.59% and 0.48% for the top and middle slope terciles, respectively, with both statistically significant at 5% level. By contrast, for the bottom slope tercile, the return gap between the top and bottom CDSS-level tercile portfolios is merely 0.03%, which is both economically and statistically immaterial. Overall, the results align well with those presented in Table 3.

Panels B and C show that the results in the FDP and NFDP are also highly consistent with those of portfolios based on 1-year CDSS level. In Panel B, DP is observed only for risk-adjusted returns and for the top and middle CDSSTS slope terciles. The top CDSS-level tercile stocks yield lower risk-adjusted returns than the bottom level tercile ones by 1.45% and 0.92% for the top and middle slope terciles, respectively, with both statistically significant at 5% level. By contrast, Panel C shows that DP is not observed, neither in raw returns nor in risk-adjusted returns, for any CDSSTS slope tercile. Overall, we confirm that our results are not confined to using the 1-year CDSS level as a proxy for the default risk level.

4 Conclusion

We introduce a refined perspective on the distress puzzle (DP). We focus on the nuanced roles of credit default swap spreads (CDSS), their term structures, and aggregate market default risk levels. We use a triple-sort procedure to overcome the problem of subset overwhelmingness. We find that the known puzzling negative relationship between default risk and expected stock returns is not a universal phenomenon but, instead, is confined only to financial distress periods (60 out of 180 months) and only to a subset of stocks, those with steeper CDSS term structures (CDSSTS) slopes. This subset accounts for only 22.22% of our total sample, suggesting that the distress puzzle is far less pervasive than previously thought.

Our findings indicate that these anomalous returns are driven only by stocks with high short-term CDSS *and* anticipating significant increases in their CDSS from the 1-year to the 5-year horizons. Thus, we find that the DP is confined to a small (22.22%) subset of returns, but within this subset the puzzle is intensified. In contrast, other stock returns are largely consistent with conventional expected risk-return trade-off, supported by properly priced "fan patterns" in CDSSTS [monotonically ordered (not crossing) CDSSTS with increasing positive slopes]. Robustness checks reinforce our conclusions, as alternative proxies for default risk levels and systematic risks yield consistent results. Our findings emphasize the critical role of considering multiple dimensions of default risk—current levels, future trajectories, and market-wide conditions—in understanding this asset pricing anomaly.

In summary, our research narrows the scope of the distress puzzle to a well-identified small (22.22%) subset of returns. Further, within this subset the puzzle is intensified. These findings challenge existing asset-pricing theories and pave the way for future inquiries into the dynamic interplay between default risk measures and stock returns.

References

Avramov, D., Chordia, T., Jostova, G., and Philipov. A., 2012. The world price of credit risk. Review of Asset Pricing Studies, 2:112–152.

Avramov, D., Chordia, T., Jostova, G., and Philipov. A., 2013. Anomalies and Financial Distress. Journal of Financial Economics, 108:139–159.

Avramov, D., Chordia, T., Jostova, G., and Philipov, A., 2022. The distress anomaly is deeper than you think: Evidence from stocks and bonds. Review of Finance, 26: 355–405.

Campbell, J., Hilscher, J., and Szilagyi, J., 2008. In search of distress risk. Journal of Finance, 63: 2899–2939.

Chava, S. and Purnanandam, A., 2010. Is default risk negatively related to stock returns? Review of Financial Studies, 23: 2523–2559.

Daniel, K., Grinblatt, M., Titman, S., and Wermers, R., 1997. Measuring mutual fund performance with characteristic-based benchmarks. Journal of Finance, 52: 1035–1058.

Dichev, I. D., 1998. Is the risk of bankruptcy a systematic risk? Journal of Finance, 53: 1131–1148.

Fama, E. F. and French, K. R., 1996. Multifactor explanations of asset pricing anomalies, Journal of Finance, 51: 55–84.

Friewald, N., Wagner, C., and Zechner. J., 2014. The cross-section of credit risk premia and equity returns. Journal of Finance, 69: 2419–2469.

Gao, P., Parsons, C. A., and Shen, J., 2018. Global relation between financial distress and equity returns. Review of Financial Studies, 31: 239–277.

Garlappi, L., Shu, T., and Yan, H., 2008. Default risk, shareholder advantage, and stock returns. Review of Financial Studies, 21: 2743–2778.

Garlappi, L. and Yan. H., 2011. Financial distress and the cross-section of equity-returns. Journal of Finance, 66: 789–822.

George, J. T. and Hwang, C.-Y., 2010. A resolution of the distress risk and leverage puzzles in the cross section of stock returns. Journal of Financial Economics, 96: 56–79.

Griffin, J. M. and Lemmon, M., 2002. Book-to-market equity, distress risk, and stock returns. Journal of Finance, 57: 2317–2336.

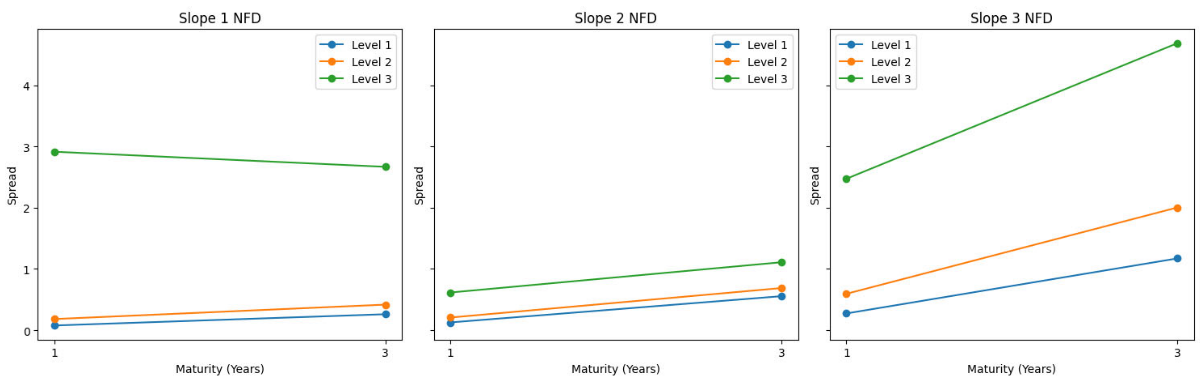
Han, B., Subrahmanyam, A., and Zhou, Y., 2017. The term structure of credit spreads, firm fundamentals, and expected stock returns. Journal of Financial Economics, 124: 147–171.

Vassalou, M. and Xing, Y., 2004. Default risk in equity returns. Journal of Finance, 59: 831–868.

Figure 1. CDS Term Structure Across Spread Terciles Within Slope Terciles

This figure illustrates the CDS term structure for different 1–year CDSS-level terciles within each CDSSTS slope tercile. Panel A shows the results for NFDP, while Panel B presents the results for FDP. Each line represents a CDSS-level tercile, displaying the 1-year CDSS, 5-year CDSS, and the resulting slope.

Panel A. NFD Period



Panel B. FD Period

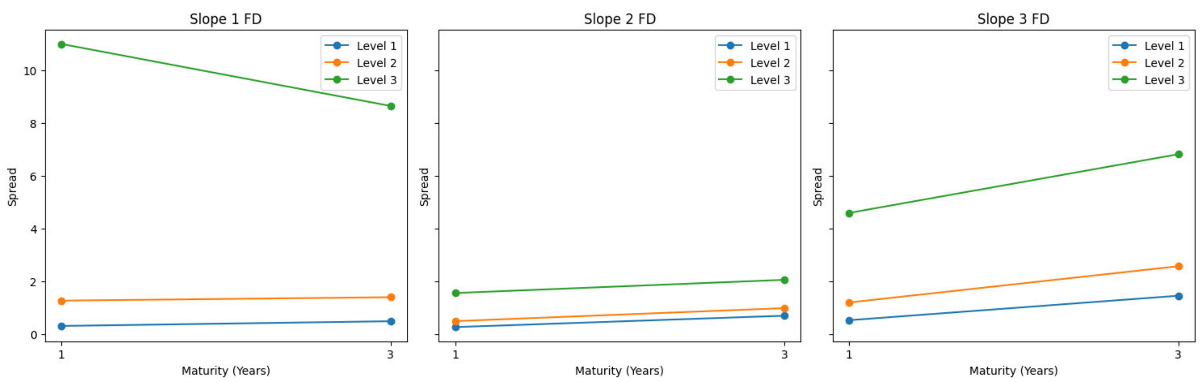


Table 1. Summary Statistics: CDSSTS Slope Tercile Portfolios

This table presents summary statistics for U.S. listed companies sorted into terciles based on their CDSSTS during the period from 2002 to 2016. The statistics include key firm characteristics such as Size, Book-to-Market ratio (B/M), Leverage, Return on Assets (ROA), Investment, Institutional Ownership, and Default Probability. The table highlights how these characteristics vary across different CDSSTS slope terciles, providing insights into the relationship between the term structure of credit risk and firm fundamentals.

Slope Tercile	1 (Low)	2	3 (High)
Size	31.090	15.673	7.131
B/M	0.555	0.616	0.725
Leverage	0.266	0.301	0.392
ROA	0.136	0.122	0.107
Investment	0.073	0.078	0.056
lret1y	0.111	0.143	0.130
Inst. Ownership	0.692	0.700	0.723
Default Prob. (%)	0.414	0.168	0.276
N	30720	30840	30782

Table 2. Summary Statistics: CDSSTS Slope Tercile Portfolios of Top/Bottom Current CDSS Tercile Stocks

This table provides detailed summary statistics for firms sorted into CDS slope terciles. Within each slope tercile, firms are further divided into the lowest (1) and highest (3) terciles based on their 1-year CDSS levels. The data highlights differences in firm characteristics, such as Size, B/M, and Leverage, between firms in the top and bottom 1-year CDSS-level terciles within each CDS slope tercile. It also shows how these characteristics vary across all CDS slope terciles, offering insights into the interplay between the level and term structure of credit risk.

Slope Tercile	1 (Low)	2	3 (High)	1 (Low)	2	3 (High)
Spread Tercile (Cond.)	1 (Low)			3 (High)		
Size	48.903	19.954	9.756	15.556	12.066	4.463
B/M	0.408	0.530	0.621	0.746	0.707	0.861
Leverage	0.194	0.263	0.317	0.356	0.343	0.487
ROA	0.164	0.135	0.120	0.105	0.107	0.089
Investment	0.080	0.073	0.067	0.065	0.083	0.027
lret1y	0.141	0.162	0.141	0.060	0.120	0.101
Inst. Ownership	0.691	0.698	0.726	0.703	0.705	0.726
Spread1y (%)	0.143	0.165	0.345	5.321	0.881	3.128
Spread5y (%)	0.320	0.582	1.229	4.419	1.366	5.335
Slope (%)	0.178	0.418	0.884	-0.902	0.484	2.207
Δspread1y (%)	-0.006	-0.017	-0.038	0.544	0.019	-0.063
Δspread5y (%)	-0.012	-0.013	-0.012	0.261	0.011	0.086
Δslope (%)	-0.006	0.005	0.025	-0.283	-0.008	0.149
Default Prob. (%)	0.304	0.169	0.195	0.754	0.129	0.423
N	10184	10220	10202	10236	10280	10262

Table 3. One-Month Delisting Adjusted Returns Across CDS Spread and Slope Terciles

This table presents one-month delisting-adjusted stock returns for portfolios formed by sorting firms first into CDS slope terciles (columns) and then within each slope tercile, further sorting them into 1-year CDSS-level terciles (rows). Each cell represents the value-weighted average return for the corresponding portfolio. The left panel shows raw returns, while the right panel displays Fama-French 3-factor alphas. The last row and column (3-1) represent the difference between the highest and lowest terciles. Panel A reports returns for the full sample period, Panel B shows returns during FDP, and Panel C displays returns during NFDP. T-statistics are reported in parentheses.

Panel A. Full Sample Period

	Raw return				Fama-French 3-factor alpha			
	Slope				Slope			
Spread1y (Cond.)	1 (Low)	2	3 (High)	3-1	1 (Low)	2	3 (High)	3-1
1 (Low)	0.628	0.829	0.634	0.006	0.245	0.219	-0.093	-0.338
	(2.54)	(2.79)	(1.70)	(0.03)	(2.66)	(1.95)	(-0.60)	(-1.85)
2	0.703	0.629	0.774	0.071	0.147	-0.030	-0.288	-0.434
	(1.85)	(1.97)	(1.78)	(0.27)	(1.05)	(-0.26)	(-1.46)	(-1.86)
3 (High)	0.948	0.532	0.444	-0.504	0.193	-0.249	-0.642	-0.835
	(1.62)	(1.40)	(0.83)	(-1.32)	(0.73)	(-1.52)	(-2.50)	(-2.51)
3-1	0.321	-0.297	-0.190		-0.052	-0.468	-0.549	
	(0.72)	(-1.40)	(-0.63)		(-0.17)	(-2.17)	(-2.11)	

Panel B. FD Period

	Raw return				Fama-French 3-factor alpha			
	Slope				Slope			
Spread1y (Cond.)	1 (Low)	2	3 (High)	3-1	1 (Low)	2	3 (High)	3-1
1 (Low)	0.317	0.461	0.147	-0.171	0.418	0.415	-0.030	-0.448
	(0.58)	(0.67)	(0.17)	(-0.35)	(2.08)	(1.65)	(-0.10)	(-1.21)
2	0.296	0.053	-0.131	-0.426	0.238	0.013	-0.579	-0.817
	(0.29)	(0.07)	(-0.12)	(-0.65)	(0.66)	(0.05)	(-1.26)	(-1.50)
3 (High)	0.337	-0.422	-0.866	-1.203	0.117	-0.638	-1.407	-1.524
	(0.21)	(-0.48)	(-0.67)	(-1.24)	(0.16)	(-1.88)	(-2.55)	(-1.91)
3-1	0.020	-0.883	-1.012		-0.301	-1.053	-1.377	
	(0.02)	(-1.88)	(-1.43)		(-0.35)	(-2.19)	(-2.50)	

Panel C. NFD Period

	Raw return				Fama-French 3-factor alpha			
	Slope				Slope			
Spread1y (Cond.)	1 (Low)	2	3 (High)	3-1	1 (Low)	2	3 (High)	3-1
1 (Low)	0.779	1.009	0.871	0.092	0.161	0.124	-0.124	-0.285
	(3.10)	(3.46)	(2.34)	(0.38)	(1.69)	(1.10)	(-0.68)	(-1.39)
2	0.901	0.910	1.215	0.314	0.102	-0.051	-0.145	-0.247
	(3.17)	(3.28)	(3.12)	(1.34)	(0.92)	(-0.43)	(-0.77)	(-1.11)
3 (High)	1.246	0.998	1.082	-0.164	0.230	-0.060	-0.269	-0.499
	(3.47)	(2.73)	(2.24)	(-0.53)	(1.44)	(-0.33)	(-1.01)	(-1.64)
3-1	0.467	-0.011	0.211		0.069	-0.183	-0.145	
	(1.84)	(-0.05)	(0.76)		(0.36)	(-0.85)	(-0.53)	

Table 4. CDX Beta Analysis: Systematic Default Risk During Financial Distress and Non-Financial Distress Periods

This table presents the results of CDX beta analysis, a measure of systematic default risk, for firms across different CDS spread and slope terciles. The CDX beta is calculated by regressing changes in individual firm CDS 1-year spreads on changes in the 5-year high-year CDS index (CDX). Panel A shows the beta values during FDP. Panel B displays the results for NFDP. Each cell represents the average CDX beta for the corresponding portfolio. The portfolios are formed by dependent sorts on CDS spread (rows) and CDS slope (columns) into terciles. The last row and column (3-1) show the difference between the highest and lowest terciles.

Panel A. CDX Beta: FD Period

Average	Slope			
	Slope Tercile			
Spread1y Tercile (Cond.)	1 (Low)	2	3 (High)	3-1
1 (Low)	0.322	0.697	1.300	0.978
	(8.39)	(10.58)	(9.47)	(7.75)
2	0.946	1.165	2.792	1.846
	(4.71)	(9.18)	(8.18)	(4.82)
3 (High)	4.699	2.445	7.280	2.581
	(4.85)	(8.34)	(8.37)	(2.11)
3-1	4.377	1.748	5.980	
	(4.68)	(6.66)	(7.59)	

Panel B. CDX Beta: NFD Period

Average	Slope (Cond.)			
	Slope Tercile (Cond.)			
Spread1y Tercile	1 (Low)	2	3 (High)	3-1
1 (Low)	0.226	0.717	1.875	1.649
	(9.03)	(9.97)	(8.79)	(8.31)
2	0.351	0.970	3.484	3.133
	(8.71)	(12.01)	(11.59)	(11.65)
3 (High)	0.835	1.810	7.222	6.387
	(7.79)	(9.73)	(8.34)	(7.87)
3-1	0.609	1.094	5.348	
	(6.58)	(8.06)	(6.31)	

Table 5. One-Month Delisting Adjusted Returns Across CDS Spread and Slope Terciles

This table presents one-month delisting-adjusted stock returns for portfolios formed by sorting firms first into CDS slope terciles (columns) and then within each slope tercile, further sorting them into average CDSS-level terciles (rows). Each cell represents the value-weighted average return for the corresponding portfolio. The left panel shows raw returns, while the right panel displays Fama-French 3-factor alphas. The last row and column (3-1) represent the difference between the highest and lowest terciles. Panel A reports returns for the full sample period, Panel B shows returns during FDP, and Panel C displays returns during NFDP. T-statistics are reported in parentheses.

Panel A. Full Sample Period

	Raw return				Fama-French 3-factor alpha			
	Slope				Slope			
Avg Spread (Cond.)	1 (Low)	2	3 (High)	3-1	1 (Low)	2	3 (High)	3-1
1 (Low)	0.598	0.784	0.661	0.063	0.220	0.180	-0.073	-0.293
	(2.46)	(2.67)	(1.77)	(0.28)	(2.42)	(1.67)	(-0.49)	(-1.64)
2	0.741	0.664	0.667	-0.074	0.156	0.007	-0.349	-0.506
	(1.93)	(2.00)	(1.50)	(-0.27)	(1.13)	(0.05)	(-1.65)	(-2.13)
3 (High)	1.036	0.522	0.495	-0.541	0.254	-0.298	-0.665	-0.920
	(1.74)	(1.41)	(0.91)	(-1.39)	(0.91)	(-1.89)	(-2.44)	(-2.62)
3-1	0.438	-0.262	-0.166		0.034	-0.478	-0.593	
	(0.96)	(-1.32)	(-0.56)		(0.11)	(-2.37)	(-2.22)	

Panel B. FD Period

	Raw return				Fama-French 3-factor alpha			
	Slope				Slope			
Avg Spread (Cond.)	1 (Low)	2	3 (High)	3-1	1 (Low)	2	3 (High)	3-1
1 (Low)	0.307	0.342	0.094	-0.213	0.377	0.283	-0.097	-0.474
	(0.56)	(0.51)	(0.11)	(-0.43)	(1.90)	(1.17)	(-0.33)	(-1.25)
2	0.306	0.102	-0.127	-0.434	0.275	0.084	-0.547	-0.823
	(0.30)	(0.13)	(-0.12)	(-0.66)	(0.75)	(0.32)	(-1.19)	(-1.56)
3 (High)	0.462	-0.412	-0.963	-1.425	0.252	-0.638	-1.545	-1.797
	(0.28)	(-0.47)	(-0.74)	(-1.44)	(0.32)	(-1.89)	(-2.57)	(-2.13)
3-1	0.155	-0.754	-1.057		-0.124	-0.922	-1.448	
	(0.12)	(-1.65)	(-1.50)		(-0.14)	(-1.96)	(-2.49)	

Panel C. NFD Period

	Raw return				Fama-French 3-factor alpha			
	Slope				Slope			
Avg Spread (Cond.)	1 (Low)	2	3 (High)	3-1	1 (Low)	2	3 (High)	3-1
1 (Low)	0.740	0.999	0.937	0.198	0.144	0.130	-0.061	-0.205
	(3.02)	(3.47)	(2.58)	(0.84)	(1.52)	(1.18)	(-0.37)	(-1.06)
2	0.952	0.938	1.054	0.102	0.098	-0.031	-0.253	-0.351
	(3.35)	(3.16)	(2.59)	(0.41)	(0.94)	(-0.24)	(-1.13)	(-1.44)
3 (High)	1.316	0.978	1.205	-0.110	0.255	-0.132	-0.237	-0.492
	(3.42)	(2.84)	(2.45)	(-0.35)	(1.52)	(-0.79)	(-0.86)	(-1.55)
3-1	0.576	-0.022	0.268		0.111	-0.262	-0.175	
	(2.06)	(-0.11)	(0.99)		(0.54)	(-1.36)	(-0.64)	