In Search of Distress Risk

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What is financial distress?

• The idea of financial distress is often invoked to explain anomalous patterns in stock returns
  – Chan and Chen (1991) argue that “marginal firms” among small stocks explain the size effect
  – Fama and French (1996) use the term “relative distress” to capture this idea

• Unanswered questions:
  → How can we measure financial distress?
  → What explains variation in financial distress across firms and over time?
  → Do distressed stocks carry a risk premium?
Our approach

- Measure financial distress as the probability of bankruptcy (Chapter 7 or Chapter 11) or of failure (bankruptcy, delisting, or default as defined by a credit rating agency) at some future date
- Use accounting and equity market data to estimate failure probabilities
- Sort stocks by these estimated probabilities
- Calculate average returns on distressed portfolios
Results

• Differences in accounting and market based firm characteristics explain much of variation in failure rate
• Distressed stocks have high standard deviation, market beta, and loadings on Fama-French HML (value) and SMB (size) factors
• However, they have low average returns
Related literature

• Bankruptcy prediction:
  ➔ We extend the horizon of failure prediction and directly predict failure for different horizons

• Pricing of distressed firms:
  – All except VX find low returns of distressed stocks
  ➔ We confirm results with superior measure of distress
Data summary

- Compustat accounting data and CRSP equity market data
- We have data on almost 1.7 million firm-months and 1600 failures from 1963-2003, but very little data before 1972
Explanatory variables

- We include refinements of existing variables and introduce new variables for failure prediction:
  - Profitability: NITA (net income to total assets) and NIMTA (net income to market value of total assets)
  - Leverage: TLTA (total leverage to total assets) and TLMTA (market value equivalent)
  \[ \text{New: we scale by market value of total assets - market value of equity plus book value of debt} \]
Explanatory variables

- Excess return over the past month: **EXRET**
- Return volatility from daily data over the past three months: **SIGMA**
- Log market capitalization relative to the market value of the S&P 500 index: **RSIZE**
- Short-term assets to market value of total assets: **CASHMTA** (new)
- Market-book ratio: **MB** (new)
- Log share price up to $15: **PRICE** (new)
Probability of failure

• Model probability of failure (indicator equal to 1)

\[ P_t(Y_{t+1} = 1) = F(\alpha + X_t \beta) \]

• We find that firms with higher leverage, lower profitability, lower past stock returns, more volatile past stock returns, lower cash holdings, higher market-to-book ratios, and lower prices per share are more likely to fail

• We also use distance to default (DD) to predict the probability of failure - Merton (1974)
Failure prediction results

- Including refinements of existing variables and introducing new variables improves explanatory power by 16%.
  - The pseudo $R^2$ increases from 0.27 to 0.312
- Variables also explain failure at longer horizons
  - Volatility, the market-to-book ratio MB, and firm size become relatively more important at longer horizons
- Distance to default
  - Adding DD does not improve explanatory power
  - Our model doubles explanatory power relative to DD
Pricing of distressed stocks

• Should we expect high or low average returns on distressed equity?
• High: financial distress is a priced risk factor
• Low: Investors do not understand failure risk
  – Investors have been learning about the variables that predict failure
  – Investors overrate distressed stocks’ prospects
How has distress risk been priced?

- We sort stocks by predicted failure risk each January from 1981 through 2003, using model estimated up to that date
- We form value weighted portfolios of stocks
- Distressed stocks have high standard deviation, market beta, and loadings on Fama-French HML (value) and SMB (size) factors
- So we expect them to have high average returns
- But they tend to have low average returns
**Distressed stock returns**

**Panel A - Portfolio alphas**

<table>
<thead>
<tr>
<th>Portfolios</th>
<th>0005</th>
<th>0510</th>
<th>...</th>
<th>9095</th>
<th>9599</th>
<th>9900</th>
<th>LS1090</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Excess return</strong></td>
<td>3.39</td>
<td>2.36</td>
<td>-8.07</td>
<td>-6.63</td>
<td>-16.30</td>
<td>10.1988</td>
<td></td>
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<tr>
<td></td>
<td>(1.45)</td>
<td>(1.08)</td>
<td>(1.72)</td>
<td>(1.24)</td>
<td>(1.98)*</td>
<td>(1.90)</td>
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<tr>
<td><strong>CAPM alpha</strong></td>
<td>2.74</td>
<td>2.04</td>
<td>-10.96</td>
<td>-9.45</td>
<td>-18.71</td>
<td>12.5976</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.17)</td>
<td>(0.92)</td>
<td>(2.40)*</td>
<td>(1.79)</td>
<td>(2.27)*</td>
<td>(2.36)*</td>
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<tr>
<td><strong>3-factor alpha</strong></td>
<td>5.70</td>
<td>5.30</td>
<td>-18.15</td>
<td>-16.13</td>
<td>-24.25</td>
<td>22.8852</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2.95)**</td>
<td>(2.85)**</td>
<td>(5.75)**</td>
<td>(3.93)**</td>
<td>(3.35)**</td>
<td>(6.15)**</td>
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<tr>
<td><strong>4-factor alpha</strong></td>
<td>2.37</td>
<td>2.66</td>
<td>-10.01</td>
<td>-8.19</td>
<td>-20.39</td>
<td>12.1752</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.19)</td>
<td>(1.37)</td>
<td>(3.26)**</td>
<td>(1.96)</td>
<td>(2.64)**</td>
<td>(3.45)**</td>
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**Panel B - 3-factor regression coefficients**

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<th>Portfolios</th>
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<th>9599</th>
<th>9900</th>
<th>LS1090</th>
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<tbody>
<tr>
<td><strong>RM</strong></td>
<td>-0.083</td>
<td>-0.111</td>
<td>0.476</td>
<td>0.431</td>
<td>0.254</td>
<td>-0.563</td>
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<tr>
<td></td>
<td>(2.22)*</td>
<td>(3.10)**</td>
<td>(7.81)**</td>
<td>(5.45)**</td>
<td>(1.82)</td>
<td>(7.82)**</td>
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<tr>
<td><strong>HML</strong></td>
<td>-0.474</td>
<td>-0.499</td>
<td>0.918</td>
<td>0.831</td>
<td>0.608</td>
<td>-1.396</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(9.68)**</td>
<td>(10.61)**</td>
<td>(11.50)**</td>
<td>(8.02)**</td>
<td>(3.32)**</td>
<td>(14.82)**</td>
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<tr>
<td><strong>SMB</strong></td>
<td>0.212</td>
<td>0.037</td>
<td>1.466</td>
<td>1.538</td>
<td>1.964</td>
<td>-1.394</td>
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<tr>
<td></td>
<td>(3.89)**</td>
<td>(0.71)</td>
<td>(16.51)**</td>
<td>(13.34)**</td>
<td>(9.64)**</td>
<td>(13.31)**</td>
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Factor loadings of distressed stocks
Sources of underperformance?

• Are return differences driven by differences in size and value?
  → *No: Underperformance of distressed stocks is present in all size and value quintiles*
  → *It is strongest in small stocks and growth stocks*

• Are negative returns to distressed stocks clustered around news events?
  → *No: We do not find negative excess returns on distressed stocks around earnings announcements*
Institutional holdings and returns

• The distress anomaly may result from the preferences of institutional investors

• If institutions prefer to hold safe stocks and sell stocks that enter financial distress we may observe underperformance of distressed stocks

  ➔ Returns to safe relative to distressed stocks are high when institutional holdings have large increases

  ➔ The correlation of the return to the long-short portfolio and the change in holdings is 31%
Institutional holdings and returns

Share of institutional holdings (year end)

Cumulative LS1090 log return


YearEndHolding
LS1090
Conclusions

• Failures can best be predicted using a reduced-form econometric model
• Distance to default does well given its tight theoretical structure, but does not capture all relevant data
• Distressed stocks have risk characteristics that normally imply high returns
• Yet they have delivered low average returns in 1981-2003
• The effect is present in all size and value quintiles and is not concentrated around earnings announcements
Conclusions

- It is hard to imagine a risk-based story that will explain this finding
- It may be an anomaly that will be corrected once widely understood
- It may also be a transitional effect of the shift to institutional investing, combined with institutions’ preferences for safe stocks