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SUBJECT: Weekly Report on Bankruptcies Prediction Project

# Objective

The objective of our project is to first replicate the result from the paper “In Search of Distress Risk” by systematically evaluating the data collected from WRDS databases and building a predicting model before attempting to extend the paper. To make a stronger, more accurate model, the team will continue to explore a more diverse range of features, including features generated from SEC filings in addition to the original prediction features.This section of the project focused on accurate data collection, with an emphasis put on replicating the data outlined in the paper.

# Approach and Methodology

## Data Collection

Our approach begins with collecting data from the Wharton Research Data Services system from four primary sources: CRSP/COMPUSTAT Merged Fundamentals (Quarterly), CRSP Stock File (Monthly), CRSP Stock File (Daily), and CRSP Index File on S&P500. Additional non-fundamental data was obtained like cosine similarity, Jaccard similarity, and minimum edit distance across 10-Q filings and 10-K filings.

## Data Manipulation

After gathering a large number of firm-level data points from 1960-2019 (monthly), we filter companies using the following criteria:

1. Exclude Companies with SIC CODE within 6000-6999 range
2. Include Companies with SHRCD 10 or 11 (Ordinary Common Shares - Securities which have not been further defined OR Securities which need not be further defined)
3. Include Companies with SHRCLS = ‘A’ or NaN
4. Include Companies within following Exchange Code Range (US): 11-20
5. Exclude Companies with Returns less than -50 (missing return codes)

Additionally, we were required to manipulate the accounting variables as they were only available in quarterly intervals. Thus, we calendarized all fiscal quarters and lagged each variable by two months to account for the delay in publishing quarterly results (60 days).

## Explanatory Variables Creation

The team obtained several fundamental and market driven variables to compute established indicators supported by the paper referenced. We obtain pertinent financial information to compute net income per adjusted total assets, net income per enterprise value, total liabilities per adjusted total assets, total liabilities per enterprise value, excess return, relative size, standard deviation of returns, and cash per enterprise value. Detailed Descriptions of the aforementioned features are provided in the Appendix.

## Predictor Variable Choice

### CRSP: Delisting Code (DLSTCD)

The delisting code variable is sourced from the CRSP dataset. The variable is a 3-digit integer code. They indicate that the security is active on an exchange or is inactive for a particular reason. Specifically, the delisting code 574 is categorized as ”delisted by current exchange - bankruptcy, declared insolvent.”

### CRSP/Compustat Merged: Research Company Reason for Deletion (DLRSN)

This variable provides reasons for why a company has been deleted from a data source. The variable takes on discrete integers which represent various different reasons for deletion. Specifically, the code ‘02’ indicates that a company was deleted from the data source due to Bankruptcy.

# Results

Through the above mentioned methodology, our team was able to create a universe of assets as shown in FIGURE 1 in the Appendix - Figures. While our universe tracks the paper's universe well up until the mid 70s, it then begins to diverge with our universe containing a considerable number fewer securities than the paper’s.

Similar to the universe of securities, our measure for bankruptcy showed fewer firms going bankrupt than the papers (as shown in FIGURE 2 in the Appendix - Figures). Part of this discrepancy is undoubtedly due to the difference in Bankruptcy sources. Because our team only had access to WRDS we tested a variety of indicators in an attempt to match the paper’s indicator as closely as possible.

# Conclusion

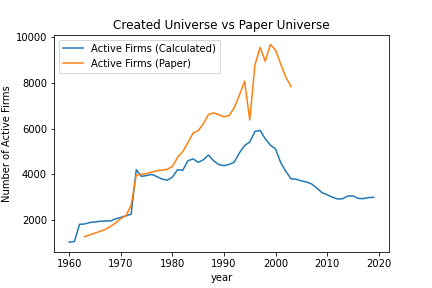
The next steps in the project are to finalize a bankruptcy indicator (to be discussed in class), expand variables to ones not mentioned in the paper, and implement an adequate baseline model (logistic regression) before moving on to various Machine Learning models.

# Appendix

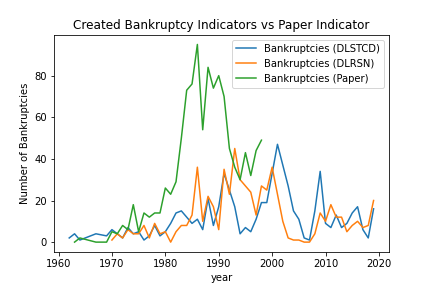
## Tables

|  |  |  |
| --- | --- | --- |
| **Source** | **Variable** | **Variable Code** |
| CRSP/COMPUSTAT Merged | Linking Permanent Company Code | LPERMNO |
| Calendarized Quarter | DATACQTR |
| Total Assets | ATQ |
| Common/Ordinary Equity - Total | CEQQ |
| Cash and Short-Term Investments | CHEQ |
| Total Liabilities | LTQ |
| Net Income | NIQ |
| Exchange Code | EXCHG |
| SIC Code | SIC |
| Research Company Reason For Deletion | DLRSN |
| Research Company Deletion Date | DLDTE |
| CRSP Stock File (Monthly) | Permanent Company Code | PERMNO |
| Date | DATE |
| SIC Code | SICDD |
| Share Code | SHRCD |
| Share Class | SHRCLS |
| Price (Closing) | PRC |
| Cumulative Factor to Adjust Price | CFACPR |
| Number of Shares Outstanding | SHROUT |
| Holding Period Returns | RET |
| CRSP Stock File (Daily) | Permanent Company Code | PERMNO |
| Date | DATE |
| Holding Period Return (Including Dist) | RET |
| CRSP Index File on S&P500 | Date | CALDT |
| Value Weighted Return (Including Dist) | VWRETD |
| Total Value | TOTVAL |

## Figures



**FIGURE 1**



**FIGURE 2**

## Calculations

### Explanatory Variables

#### Net income per adjusted total assets (NITA)

Dividing net income of a company by their adjusted total assets will convey a relative value for return on assets. A higher number indicates a greater ability to generate revenue from their assets. Companies that generate income effectively should not typically experience financial constraints when paying loan obligations.



#### Net income per enterprise value (NIMTA)

Dividing net income by liabilities and firm market equity is a similar form of efficiency on assets. Specifically, this variable obtains current market performance through the firm’s equity market value. This variable provides current market conditions which will reflect a firm’s income driven by market events.

#### Total liabilities per adjusted total assets (TLTA)

This debt-to-assets ratio will provide a common-sized figure for a firm's exposure to debt. You would expect that companies with a greater degree of leverage would battle financial distress to a greater extent. A value for this variable above one indicates that the company has more debt than assets.

#### Total liabilities per enterprise value (TLMTA)

Total liabilities divided by the summation of firm’s equity market value and total liabilities is a relative figure for capital structure. Values closer to one would indicate that the firm is largely funded through debt, with little equity. Companies with high amounts of debt would be more likely to experience financial trouble than a company with little exposure to debt.

#### Excess return (EXRET)

The difference between a firm’s equity return and an index will show how much shareholders received from the security on a market-adjusted basis. Similar companies by industry and sector tend to show similar excess returns in the same periods. Adjusting the for the return on the market will reduce some of the magnitude of firm return influenced by the market return.



#### Relative size (RSIZE)

Often there are similar characteristics among large firms. The firm’s impact on the S&P 500 index is obtained to captivate the aspect of a large company. Very large companies tend to be stable in nature when backed by positive fundamentals.

#### Standard deviation of returns (SIGMA)

A firm’s historical volatility can indicate market uncertainty or firm uncertainty. Market prices reflect future expectations, and therefore could be used to determine future financial distresses.

#### Cash per enterprise value (CASHMTA)

A firm’s liquidity is important to maintain when profits aren’t as stable. To make debt payments, companies must have sources of cash. Providing a relative scale figure for a liquidity measure will permit the comparability of firm liquidity.