



Corporate Bond Market and Final Project

The Final Project

- The project asks you to assess the impacts of Brexit on bonds issued by British firms by comparing to bonds issued by US firms during Jan 2015 and Dec 2017.
- The basic idea is that Brexit should have minimal impact on US firms and hence they serve as a good benchmark to highlight the effects on British firms.
- The spreadsheet named "*acf351b_python_data.csv*" provides a list of American and British corporate bonds traded in the US bond markets.

Corporate Bond Market

- The **prices** of bonds are determined by market fundamentals: issuer **supply** and investor **demand**.
- Market participants often find it convenient to compute a **non-linear function** of the bond's price: the bond's annual **yield**.
- A yield for a zero coupon bond bears a rough correspondence to its annual return until maturity if the bond does not default.
- The yield function is not the same for all types of bonds or loans, but depends on **market convention**.
- Yields vary by instrument and, as market prices change, across time.

Corporate Bond Market

- For our purpose, we do not have to understand how to calculate the bond yields. Bond yields are available in TRACE. TRACE is Trade Reporting and Compliance Engine, a database and a system that report bond trading prices and yields for each bond transaction in the US bond markets.

Corporate Bond Market

- Almost every single bond has a maturity, i.e., the date on which the bond issuer has to pay back the promised face value of the bond and the bond expires.
- Bond yield, roughly speaking, is the expected return of holding the bond until its maturity
- The bond yield is inversely related to the bond price.
 - Higher bond yield -> lower bond price, or vice versa.



Corporate Bond Market

Many factors determine the yield of a bond.

Risk/asset volatility: Riskier bonds tend to have higher yields.

Maturity: Bonds with longer time-to-maturity tend to have higher yields.

For this reason, we typically use bond yield spreads rather than bond yields.

Corporate Bond Market

- Bond yield spreads are the yields difference between a corporate bond and a US treasury bond with the same time-to-maturity.
- For example, if a 5-year corporate bond's yield is r_c and a 5-year US treasury bond's yield is r_f , the yield spread of the corporate bond is $r_c - r_f$.
- The yield spreads are typically positive, because investors typically regard US treasury bond as risk-free.
- Higher yield spreads -> Riskier bonds.

Project Part I (a)

- Download monthly corporate bond yield data during Jan 2015 to Dec 2017 for all bonds in the spreadsheet from TRACE on WRDS.
- Note that for each bond issue that is traded at least once within a given month, the daily yield is the last yield that occurs on the trading day. The monthly yield is then calculated as the MEDIAN of daily yields in the month for the bond issue.
- Hint: Use cusip_id as the matching ID.

Project Part I (b)

- Compute 180-day stock return volatility during Jan 2015 to Dec 2017 for all bond issues/issuers in the spreadsheet from CRSP on WRDS. You can download daily stock return data from CRSP on WRDS (crspa.dsf).
- 180-day stock return volatility is the volatility calculated from the past 180-day stock return from the observation date. For example, if observation date is Dec 31st, 2016, then you have to use stock return from July 4th, 2016 – Dec 31st, 2016 to calculate the volatility.
 - Hint: Looking up window Functions and rolling average in Postgresql;
- Use Bond CRSP Link in Linking Suite by WRDS to get the matching IDs.
 - CRSP uses PERMCO/PERMNO as their IDs. Use the Linking table to get PERMCO/PERMNO from CUSIP_IDs.

Project Part I (c)

- Compute quarterly market leverage and book leverage during Jan 2015 to Dec 2017 for all bond issuers in the spreadsheet. You can download the data on outstanding debt, outstanding shares and quarterly closing price (PRCCQ) from Compustat.
- Compustat uses GVKEY as their primary IDs. Once you finish (b), you have PERMNOs/PERMCOs and can use ccmxpf_Inkhist to link PERMNOs/PERMCOs to GVKEYs;
- A Help link for CRSP/Compustat linking: <http://kaichen.work/?p=138>

Project Part I (d)

- *acf351b_ratings.csv* provides historical credit ratings for all bond issues in the spreadsheet. For each bond issue, locate the latest ratings prior to the trade date the yield of which you use as the monthly yield.
- For example, for a bond issue, if the median of daily yields of March, 2016 occurs on March 20th, then you should try to locate the latest credit rating of the bond prior to March 20th, 2016. If multiple credit rating agencies (S&P, Moody's and Fitch) rate the bond issue, select the LOWEST one.
- Appendix 3 regarding how to compare credit ratings across rating agencies

Project Part I (e) credit spreads calculation

- Calculate the time to maturity for each bond issue and trade in your data. For example, if a bond matures on March 31st, 2025 and the median yield trading day of March, 2016 is March 15th, 2016, then the time to maturity for the bond in March, 2016 is 9.04 years.

Project Part I (e)

credit spreads calculation

- For each bond issue and trade, locate the zero-coupon yield of US treasury with the time to maturity closest to the bond issue's. For example, if the median yield trading day of March, 2016 is March 15th, 2016 and the time to maturity is 9.04 years, you should locate the zero-coupon yield on March 15th, 2016 of US 10-year (the closest time to maturity) treasury bond.
- Zero-coupon yield of US treasury:
<http://www.federalreserve.gov/econresdata/researchdata/feds200628.xls>



Project Part I (e) credit spreads calculation

- Once you obtain the appropriate zero-coupon yield, take the difference between the yields of the bond issue and the zero-coupon yield and the result is the credit spreads.

Part II: Analysis

- In this task, the assessment will be carried out primarily based on your academic report in Microsoft Word documents.
 - Conduct data analysis and provide detailed summary statistics on your data
 - Explore relevant questions (but certainly not restricted to) and interpret:
 - What are the average credit spreads of British and American bonds?
 - Does the cross-sectional difference change over time? i.e. plot the monthly time-series data of British and American bonds and observe the trends from 2015 to 2017
 - What are the consequences of Brexit on British bonds traded in the US, including on the bond yields and trading volume? **Please elaborate and justify your arguments.**