US Bond Markets and Credit Spreads during the Great Depression

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Baum and Thies (1992) use Railroad bonds from 1919-1930. Bond markets expected rising rates at start of 1928 and then falling rates at start of 1930.
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- mid 1937 to mid 1938 - second severe recession, industrial production down 50%.
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- Business Cartels/Rigid Wages (Cole and Ohanian)
Corporate Net Income (1927=100)

- Agriculture
- Construction
- Manufacturing
- Mining
- Finance
- Services
- Trading
- Transport & Utilities
Prices

CPI, PPI, IP (Index Values)

- Consumer Price Index
- Producer Price Index
- Industrial Production

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Depression Bonds
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Municipals were OTC since the 1920s, and Treasuries were transitioning from the NYSE to the Dealer market during the late 1930s.
Turnover

Bond Market Turnover ($m, log scale)

- U.S. Government
- Corporate
- Foreign
- Stocks

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Depression Bonds
NYSE versus Curb market

Bond Market Turnover ($m)

- NYSE
- Curb
- Ratio

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- Match with CUSIPs from CRSP.
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- Apply Fama-Bliss filtering (on Treasuries) to remove outliers for each yield curve.
Upgrades and Downgrades

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Depression Bonds
New Issues of bonds

Number of issues

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Depression Bonds
Average rating of new issues

Average rating of new bond

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Depression Bonds
Average maturity of new issues

Average maturity of new issue

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Portion of new issues with optionality

Portion of new issues callable

Portion of new issues convertible
Yield curve fitting

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  - Zero curve gives us a discount rate which would be used to value a zero coupon bond at different times (i.e. not contaminated by coupon effects).
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Yield curve fitting for plain vanilla bonds

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If I have a yield curve, the implied bond price would be:

$$\hat{P}_i = \sum_{j} e^{-r(t_{ij})t_{ij}c} + 100e^{-r(T)T}.$$
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Ideally, $\hat{P}_i = P_i$. 

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- We have one parameter to play with for each $t_k$. 
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This is important, since long maturity bonds will be very sensitive to interest rate changes, and we might otherwise end up fitting these, but not the short maturities.
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- Most have notice periods (e.g. firm must give 2 months notice to call bond).
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Depression Bonds
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  - Of the “simple” callables, 164 are Semi-American, 33 are American.
Pricing callable bonds

- Use Hull-White model

\[ dr = \kappa(\theta(t) - r)dt + \sigma dW \]

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- Can include these bonds in with the plain-vanilla bonds, but now we must also choose \( \kappa \) and \( \sigma \) (mean reversion and volatility).
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  - Estimating $\kappa$ and $\sigma$ are useful in their own right, since they tell us about market participants’ opinions about volatility (implied volatility).
Methodology

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Work only when we have at least 1 noncallable per day, and 2+ noncallables.
Sample output: Treasury curves

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Depression Bonds
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Sample output: Pennsylvania Railroad volatility
Sample output: Canadian National Railway Snapshot Dec 1927

CANADIAN NATIONAL RY CO

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Depression Bonds
Sample output: Canadian National Railway Snapshot Dec 1931

CANADIAN NATIONAL RY CO

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CANDIAN NATIONAL RAILROAD

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Depression Bonds
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  - Other suggestions?