CORPORATE BONDS WITH STOCK VOLATILITY

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Consider the data: $r(t) = 3\text{MO}$, $R(t) = 10\text{Y}$, $C(t) = \text{AAA}$, $V(t) = \text{VIX}$. Let $S(t) = R(t) - r(t)$ be the term spread and $Q(t) = C(t) - R(t)$ be the risk spread. Fit the model

$$Y(t) = aY(t-1) + b + cV(t) + V(t)Z(t) \tag{1}$$

for i.i.d. $Z(t)$ and (a) $Y \equiv Q$; (b) $Y \equiv S$; (c) $Y \equiv S + Q$. To do this:

(1) divide (1) by V;
(2) fit the resulting multiple linear regression;
(3) extract residuals Z;
(4) test them for i.i.d.:
   - plot the autocorrelation function (ACF) for Z;
   - plot the ACF for $|Z|$;
   - apply Ljung-Box test for 10 lags for Z;
   - apply the same test for $|Z|$;
(5) test them for normality:
   - apply Shapiro-Wilk normality test;
   - apply Jarque-Bera normality test;
   - show the quantile-quantile (QQ) plot vs the normal law.

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