Appendix A: Methodological notes

A.1 GIV

A.1.1 Weighted Least-Squares (WLS)

Generalized Least Squares (GLS) estimation is more suitable when errors are not independent across observations, compared to Ordinary Least Squares (OLS). Weighted Least Squares (WLS) can be seen as a special case of GLS, when errors are independently but not identically distributed.

In our specification, the weighting scheme used in this "first stage regression" is motivated by the presence of heteroscedastic errors. This weighting scheme allows us to control for the potential confounding effects of sector-specific shocks on both GDP growth and EPU, which may lead to estimation bias.

The regression weights are defined as follows:

$$w_{j,t} = \frac{1}{\hat{\sigma}^2_{j,t}}$$

A.2 Event Study Methodology

Monthly bond returns are computed as:

$$r_t = \log(P_t) - \log(P_{t-1})$$

Bond 3-factor model

The following are the 3 factors we consider to explain monthly bond returns across tenors:

1. **3-month Treasury bill rate (3mo)**: This factor captures the risk-free rate.

2. **Term spread (term)**: The difference between the 10-year and 2-year Treasury yields. This factor represents the term structure of interest rates.

3. **Credit spread (credit)**: We use the ICE BofA Option-Adjusted Spreads (OASs) as a proxy for credit risk premium.

Table 1 and Table 2 present the summary statistics and regression results, respectively, for our 3-factor model of bond returns. Overall, the results suggest that the risk free rate or level impacts bond returns equally across all tenors and credit risk is only relevant to explain variations in bond returns at the front end of the curve. The term spread capacity to explain returns is non-monotonic: it seems to decrease up to the belly of the curve, to then increase for longer tenors.

For each bond maturity, we estimate the factor model using ordinary least squares (OLS) regression:

$$r_t = \alpha + \beta_1 \times 3mo_t + \beta_2 \times term_t + \beta_3 \times credit_t + \epsilon_t$$

We adjust the standard errors using the Newey-West method, which corrects for both heteroskedasticity and autocorrelation up to a specified lag. To compute the optimal number of lags we follow Wooldridge (2010), and use $T^{\frac{1}{4}}$, with T being the sample size.

Using the estimated factor model, we calculate the expected returns for each bond maturity:

$$\hat{r}_t = \hat{\alpha} + \hat{\beta}_1 \times 3mo_t + \hat{\beta}_2 \times term_t + \hat{\beta}_3 \times credit_t$$

We compute the abnormal returns as the difference between the actual bond returns and the expected returns:

$$AR_t = r_t - \hat{r}_t$$

Next, we calculate the cumulative abnormal returns for each bond maturity during the event window:

$$CAR_t = \sum_{i=1}^{t} AR_i$$

The 95% confidence intervals are computed as:

$$CI_{upper} = CAR_t + SE \times t_{\frac{\alpha}{2},n-1}$$

$$CI_{lower} = CAR_t - SE \times t_{\frac{\alpha}{2},n-1}$$

where SE is the standard error, $t_{\frac{\alpha}{2},n-1}$ is the critical value from the t-distribution with $\frac{\alpha}{2}$ and $n-1$ degrees of freedom, and n is the degrees of freedom.

Table 1: Bond returns 3F model: summary statistics

	mean	std	skew	kurtosis	nobs
3mo	1.942	1.965	0.643	-1.109	316
2yr	0.010	0.451	0.225	2.201	315
5yr	0.033	1.107	-0.115	0.899	315
7yr	0.046	1.431	-0.141	0.802	315
10yr	0.064	1.809	-0.007	1.174	315
DEFRISK	5.428	2.549	2.387	8.501	316
10yr - 2yr	1.076	0.928	0.148	-1.185	316

Table 2: Bond returns 3F model regressions

Table 3

	3mo	2yr	5yr	7yr	10yr
const	0.0000	0.0000	0.0000	0.0000	0.0000
	(0.0545)	(0.0551)	(0.0558)	(0.0559)	(0.0559)
3mo	-0.2644***	-0.2416***	-0.2135***	-0.2132**	-0.2105**
	(0.0805)	(0.0813)	(0.0824)	(0.0825)	(0.0826)
term	0.2133**	0.1162	0.1436*	0.1713**	0.1904**
	(0.0849)	(0.0858)	(0.0869)	(0.0871)	(0.0871)
credit	0.1833***	0.1675***	0.0854	0.0488	0.0356
	(0.0596)	(0.0602)	(0.0610)	(0.0611)	(0.0611)
R-squared	0.0732	0.0541	0.0292	0.0251	0.0247
R-squared Adj.	0.0643	0.0450	0.0199	0.0157	0.0153

References

Wooldridge, Jeffrey M, 2010, *Econometric analysis of cross section and panel data* (MIT press).