Internet Appendix for

"Systematic Risk, Debt Maturity, and the Term Structure of Credit Spreads"

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Abstract

This document is organized as follows. Section A presents additional model results. Section B presents additional empirical findings.

A Additional model results

Sensitivity analysis. We now provide supplemental results for the sensitivity analysis conducted in Section 4.1.3 and Table 6 of our main paper. Figure IA.1 plots the cross-sectional relationship between firms' systematic risk exposure and their effective debt maturity at issue. The plots are for changes in (1) the idiosyncratic cash flow volatility (Panels A and E), (2) changes in the liquidity cost parameter in state G (Panels B and F), (3) changes in the liquidity cost parameter in state B (Panels D and G), and (4) changes in the equity issuance cost parameter (Panes D and H).

Verification of Nash equilibrium. This section provides additional details for the numerical procedure used to solve the model described in Appendix A.2 of our main

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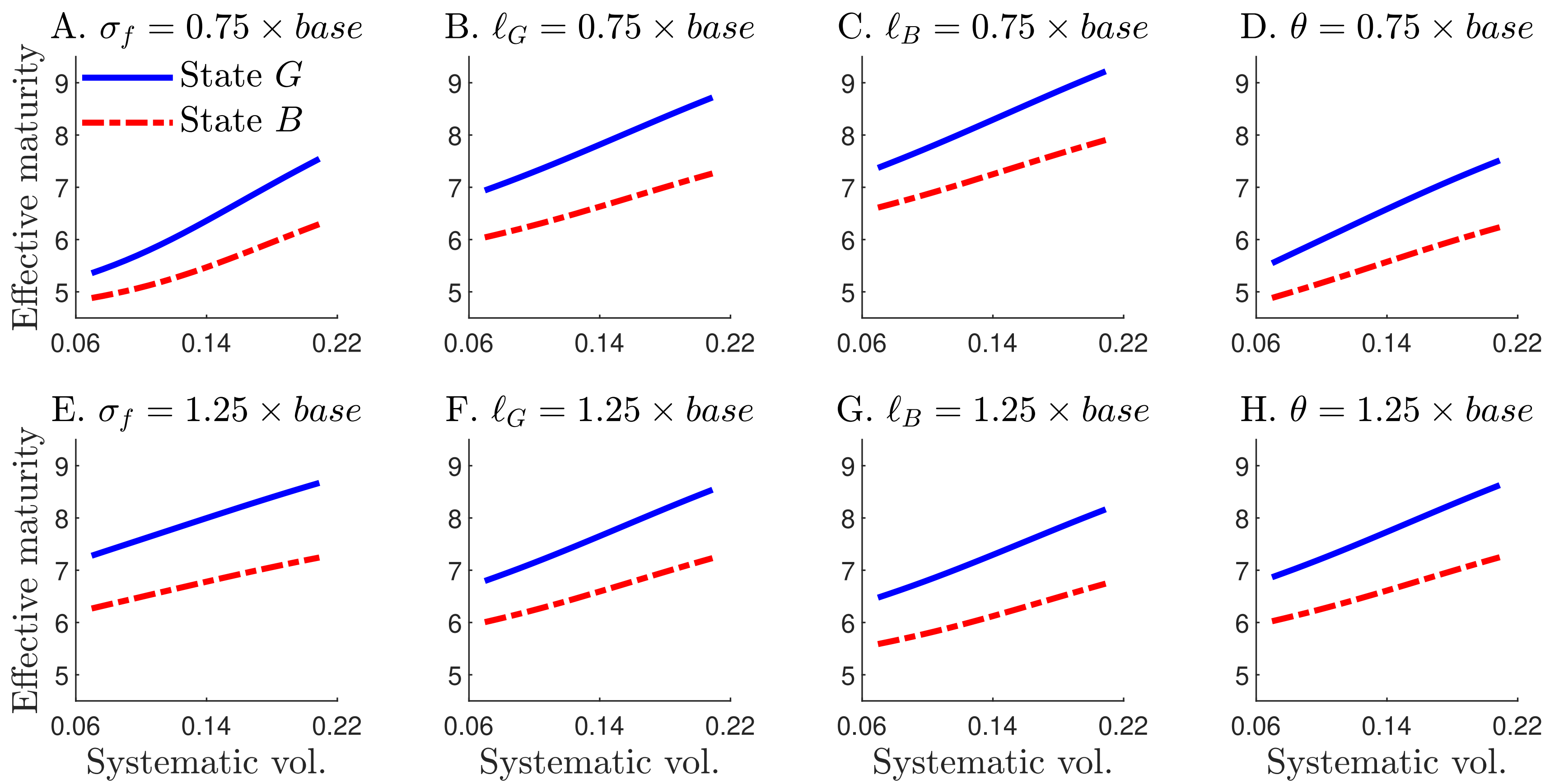

Figure IA.1: Sensitivity analysis. This figure plots the effective maturity at issue across firms in both states. The plots are for changes in the idiosyncratic cash flow volatility (Panels A and E), the liquidity cost parameter in state G (Panels B and F), the liquidity cost parameter in state B (Panels D and G), and the equity issuance cost parameter (Panes D and H).

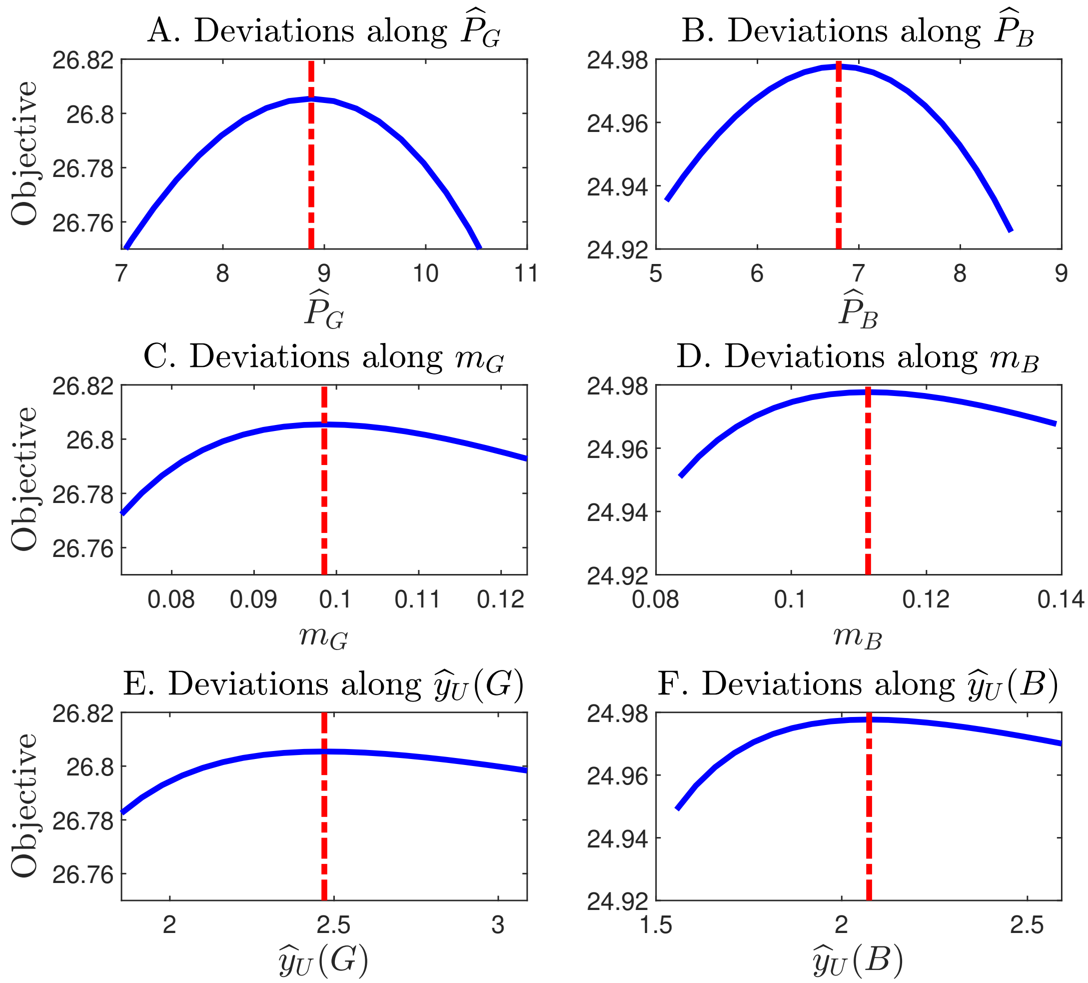

Figure IA.2: Verification of Nash equilibrium. This figure illustrates the verification of a Nash equilibrium for the benchmark firm. The first (second) column plots all single-dimensional deviations for choices in state G (B) while holding fixed choices in state B (G). In all figures, all default boundaries are chosen in an ex-post optimal fashion and the coupon rate is adjusted such that debt is issued at par in the choice state.

paper. Step 3 of the algorithm described in that section verifies whether or not a candidate solution does indeed satisfy the Nash equilibrium for a time-consistent capital structure (Definition 1 in our main paper). Figure IA.2 illustrates this verification process for the benchmark firm.

Determinants of default. In this section, we compare the model-implied determinants of default to those documented by Duffie, Saita, and Wang (2007), henceforth DSW. Following the proportional hazards specification in DSW, we run the following panel regression using simulated data from the model:

$$\log(h_{it}) = \alpha + \beta \times DTD_{it} + \boldsymbol{\gamma}'\mathbf{X}_{it} + \varepsilon_{it}, \tag{IA.1}$$

where h_{it} is the model-implied one year default hazard rate,[1] and

$$DTD_{it} \equiv \frac{\log\left(\frac{V_{it}}{L_{it}}\right) + \mu_{iV} - \frac{1}{2}\sigma_{iV}^2}{\sigma_{iV}}, \tag{IA.2}$$

is the one-year Merton Distant to Default (DTD), where V_{it}, μ_{iV}, and σ_{iV} are, respectively, the value, drift, volatility of firm i's assets. We follow DSW in the choice of covariates $\mathbf{X}_{it}$; these include the short rate, one-year trailing firm returns, and one-year trailing market returns.

To implement regression (IA.1), we simulate repeated panels using parameters from our baseline calibration. Each simulated panel consists of 1000 firms (with replacement in the case of defaulting firms), and is at a quarterly frequency over a horizon of 200 quarters. Firms' initial cashflows y_{0i} are chosen so that the initial cross-sectional distribution of model-implied quasi-leverage, $P_{0i}/(P_{0i} + E_{0i})$, matches that of the data.[2] All firms are otherwise ex-ante identical to the benchmark firm. This procedure is then repeated to obtain one hundred panels from which we obtain bootstrapped point estimates and confidence intervals.

We estimate the one-year DTD_{it} for each firm in our simulated panel by following the procedure in DSW and Vassalou and Xing (2004). In particular, we set the default point to be equal to short term debt (maturity of one year or less) plus one half of long term debt:

$$L_{it} = P_{it}\left(1 - \frac{1}{2}e^{-m_{\mathcal{R}_{it}}}\right), \tag{IA.3}$$

where P_{it} is the face value of outstanding debt and $\mathcal{R}_{it}$ is the restructuring state. We then

[1] The one year default hazard rate h_{it} is equal to $-\log(1 - p_{D,it})$, where $p_{D,it}$ is the one year default probability. Appendix A.3.2 in our main paper provides details for computing p_D.

[2] Observations for quasi-leverage are taken from the end of the 1979 fiscal year (this corresponds to the start of the sample in DSW) and is computed using COMPUSTAT data according to $(dlc + dltt)/(dlc + dltt + seq)$.

Table IA.I: Determinants of default in the model. This table reports results for regression (IA.1) based on simulations of the baseline model from the main text. The left hand side variable is the model implied log one year default hazard rate. The explanatory variables include Merton DTD, the short rate, and trailing one year firm and market equity returns. Each simulated panel is at quarterly frequency and consists of 1000 firms over 200 quarters. Square brackets enclose 95% confidence intervals, which are bootstrapped across 100 simulated panels.

	Covariate					
	DTD	Short rate	Firm return	Market return	Constant	R^2
(1)	-2.54				-1.12	0.895
	[-2.62,-2.46]				[-1.36,-0.93]	[0.872,0.916]
(2)	-2.56	1.48	-0.07	-0.06	-1.10	0.89
	[-2.65,-2.48]	[-3.20,9.03]	[-0.10,-0.04]	[-0.18,0.04]	[-1.55,-0.83]	[0.861,0.914]

obtain estimates for μ_{iV}, σ_{iV}, and V_{it} by solving the following fixed point problem:

$$E_{it} = V_{it}\Phi(d_{1it}) - L_{it}\Phi(d_{2it}) \tag{IA.4}$$

$$\sigma_{iV} = sdev\left(\log(V_{it}) - \log(V_{i,t-1})\right) \tag{IA.5}$$

where E_{it} is the model-implied equity value, $\Phi(\cdot)$ is the standard normal CDF, $sdev(\cdot)$ denotes the sample standard deviation, and

$$d_{1it} \equiv \frac{\log(V_{it}/L_{it}) + r(s_t) + \frac{1}{2}\sigma_{iV}^2}{\sigma_{iV}}, \tag{IA.6}$$

$$d_{2it} \equiv d_{1it} - \sigma_{iV}. \tag{IA.7}$$

Since the Merton model assumes constant values for asset drift and volatility, we apply the above fitting procedure over the full time-series for each firm (as in DSW).

Table IA.I shows the results for regression (IA.1). Row (1) shows that there is a negative relation between DTD and default probabilities in our model, which is in agreement with the findings from DSW (see their Table 2). The R^2 is around 90% because the Merton DTD is not a sufficient statistic for default in our model (e.g., our model features jumps in the default boundary when the macro state switches or when debt matures, both of which are not captured by the Merton DTD). Row (2) shows the results with the full set of covariates. The estimated coefficient for firm trailing returns is negative, which agrees with results reported in DSW. The coefficients for the short rate and trailing market returns are not significantly different from zero. Therefore, the model cannot capture the negative sign for the short rate and the positive sign for trailing market returns reported in DSW.

B Empirical analysis

B.1 Variable Definition and Data Sources

The variables used in the paper are defined as follows:

- *tdebt* (total debt): debt in current liability (*dlc*) + long-term debt (*dltt*). Data source: COMPUSTAT Annual Industrial file.
- $ldebt1y$ (the percentage of total debt that matures in more than 1 year): long-term debt (*dltt*) / *tdebt*. Data source: COMPUSTAT Annual Industrial file.
- $ldebt2y$ (the percentage of total debt that matures in more than 2 years): $(dltt - dd2)$ / *tdebt*. Data source: COMPUSTAT Annual Industrial file.
- $ldebt3y$ (the percentage of total debt that matures in more than 3 years): $(dltt - dd2 - dd3)$ / *tdebt*. Data source: COMPUSTAT Annual Industrial file.
- $ldebt4y$ (the percentage of total debt that matures in more than 4 years): $(dltt - dd2 - dd3 - dd4)$ / *tdebt*. Data source: COMPUSTAT Annual Industrial file.
- $ldebt5y$ (the percentage of total debt that matures in more than 5 years): $(dltt - dd2 - dd3 - dd4 - dd5)$ / *tdebt*. Data source: COMPUSTAT Annual Industrial file.
- *lncash* (the natural logarithm of the sum of cash and short-term investments (*che*) / assets (*at*)). Data source: COMPUSTAT Annual Industrial file.
- *mke* (market value of equity): share price ($prcc_f$) × common share outstanding (*csho*). Data source: COMPUSTAT Annual Industrial file.

- *bke* (book value of equity): stockholders' equity (shareholder's equity (*seq*), if not available, common equity (*ceq*) + par value of preferred shares (*pstk*), if not available, total asset (*at*) - total liability (*lt*)) + deferred tax and investment tax credit (*txditc*) - book value of preferred shares (redemption value (*pstkrv*), if not available, liquidation value (*pstkl*), if not available, par value (*pstk*)). Data source: COMPUSTAT Annual Industrial file.

- *mkat* (market value of total assets): (the market value of equity (*mke*) + the book value of total assets (*at*) - the book value of equity (*bke*) / GDP deflator, in logs. Data source: COMPUSTAT Annual Industrial file.

- *abnearn* (abnormal earning): (earnings in year $t+1$ (*ibadj*) - earnings in year t) / (share price ($prcc_f$) $\times$ outstanding shares (*cshpri*) in year t). Data source: COMPUSTAT Annual Industrial file.

- *bklev* (book leverage): total debt (debt in current liability (*dlc*) + long-term debt (*dltt*)) / assets (*at*). Data source: COMPUSTAT Annual Industrial file.

- *mklev* (market leverage): total debt (debt in current liability (*dlc*) + long-term debt (*dltt*)) / the market value of total assets (*mkat*, not in logs). Data source: COMPUSTAT Annual Industrial file.

- *mk2bk* (market-to-book ratio): the market value of total assets (*mkat*, not in logs) / the book value of total assets (*at*). Data source: COMPUSTAT Annual Industrial file.

- *profit* (profitability): operating income before depreciation (*ebitda*) / assets (*at*). Data source: COMPUSTAT Annual Industrial file.

- *profitvol* (profit volatility): volatility of past 5 years of profit growth (operating income before depreciation in year t (*ebitda*) - operating income before depreciation in year $t-1$)) / assets (*at*). Data source: COMPUSTAT Annual Industrial file.

- *tangible* (tangibility): gross property, plant, and equipment (*ppent*) / assets (*at*). Data source: COMPUSTAT Annual Industrial file.

- *assetmat* (asset maturity): book value-weighted average of the maturities of property, plant and equipment and current assets, computed as (gross property, plant, and equipment (*ppegt*)/total assets (current assets (*act*) + *ppegt*) × (gross property, plant, and equipment (*ppegt*) /depreciation expense (*dp*)) + (current assets (*act*)/total assets (current assets (*act*) + *ppegt*)) × (current assets (*act*)/cost of goods sold (*cogs*)). Data source: COMPUSTAT Annual Industrial file.

- *mktbeta* (asset market beta): equity market beta computed using past 36 months of equity returns, which is then unlevered based on the Merton model (for details, see Vassalou and Xing (2004) and Bharath and Shumway (2008)).

- *bankbeta* (asset bank beta): equity bank beta (with respect to the banking industry portfolio) computed using past 36 months of equity returns, which is then unlevered based on the Merton model (for details see Acharya, Almeida, and Campello (2013)).

- *tailbeta* (asset tail-risk beta): equity tail-risk beta defined as the ratio between (1) the firm average return from the days when the market had the 5% worst returns in the past year and (2) the average market return on the same days, which is then unlevered based on the Merton model (for details see Acharya, Almeida, and Campello (2013)).

- *cfbeta* (cash-flow beta): defined as the covariance between firm-level and aggregate cash flow changes (normalized by total assets (*at*) from the previous year) divided by the variance of aggregate cash flow changes; computed using at least 15 years of past 20 years of cash flow data (*ib*).

B.2 Liquidity spreads in the data

In this section, we provide direct evidence for how the liquidity component of credit spreads change with debt maturity.

We compute liquidity spreads at different maturities as follows. First, we compute the bond-CDS spread as the difference between the bond spread and the CDS spread for the same company at the same maturity. Bond transaction data and characteristic information such as coupon rates, issue dates, maturity dates, and issue amounts are obtained from

Table IA.II: Liquidity Spread and Bond Maturity. Regression results of the bond-CDS spread on bond maturity. We adjust standard errors by clustering the observations at the bond issue level. Robust t-statistics are presented in parentheses below parameter estimates. Significance at the 10%, 5%, and 1% levels is indicated by *, **, ***, respectively.

	Jan 04 - Jul 07	Aug 07 - Jun 09
bndmat	0.012**	0.161*
	(2.67)	(2.13)
beta	0.022	3.197***
	(0.33)	(12.28)
spltratg	0.052**	-2.245***
	(2.11)	(-12.80)
bndage	-0.001	0.370**
	(-0.33)	(3.14)
offamt	-0.015**	0.827**
	(-2.25)	(2.70)
coupon	0.037***	-1.218**
	(3.59)	(-2.73)
mkat	0.208	-32.305***
	(1.69)	(-17.64)
bklev	-0.644	32.187***
	(-1.34)	(5.48)
mk2bk	0.074***	7.279***
	(2.88)	(6.40)
profitvol	-7.774**	608.899***
	(-2.52)	(23.46)
Observations	794	143
R^2	0.062	0.689

the Mergent Fixed Income Securities Database for the period between 2004 and 2010. To compute the bond-CDS spread, we focus on senior-unsecured fixed-rate straight corporate bonds with semi-annual coupon payments. We keep bonds with investment grade ratings as Mergent's coverage of transactions on speculative grade bonds is small. We delete bonds with embedded options such as callable, puttable, and convertible. We also delete bonds with credit enhancement and less than one year to maturity. The corporate spread is computed as a parallel shift of the riskless zero curve, constructed from the libor-swap rates with maturity of 3 months to 10 years, such that the present value of future cash flows equals to the current bond price under the assumption of no default. The corresponding CDS spread with the same maturity is computed by interpolating CDS spreads with maturity of 6 months, 1 year, 2years, 3 years, 4 years, 5 years, 7 years and 10 years.

Before running regressions to investigate the relation between the bond-CDS spread and bond maturity, we need to address a possible sample selection bias: firms facing higher long-term liquidity spreads will likely choose to issue short-term bonds. Following Helwege and Turner (1999), we restrict the data to firms issuing both short-term bonds (maturity less than 3 years) and long-term bonds (maturity longer than 7 years) during the sample period.[3] We then run a regression of the bond-CDS spread on bond maturity, bond characteristics (bond age, issuing amount, and coupon rate), and firm characteristics (systematic beta, size, book leverage, market-to-book ratio, and profit volatility). We identify liquidity conditions in normal times by running the regression using the pre-crisis sample (January 2004 to June 2007). The regression results are presented in Table IA.II. We then use the coefficient estimates to compute average bond-cds spreads during normal times for maturities of 1, 5, and 10 years. For completeness, Table IA.II also shows the regression for the crisis sample (August 2007 - June 2009).

B.3 Robustness Checks

Firm characteristics and the impact of business cycles. We allow the impact of business cycles on debt maturity to depend only on firms' exposure to systematic risk in the paper. However, changes in macroeconomic conditions could also affect the relation between debt maturity and other firm characteristics. We run a regression that includes additional interaction terms between firm characteristics and the recession dummy. Table IA.III shows that, in addition to low beta firms, firms with low idiosyncratic volatility, large size, low market-to-book ratio and long asset maturity reduce their debt maturity more from expansions to recessions.

Cash holdings. Firms are not allowed to hold cash in our model. In practice, firms with high systematic risk exposures can not only choose longer debt maturity, but also maintain a larger cash reserve to reduce the rollover risks. For example, Harford, Klasa, and Maxwell (2014) show that firms increase their cash holdings and save more cash to mitigate the refinancing risk caused by shorter debt maturity. Thus, we expect the impact of firms' systematic risk exposure on debt maturity to become stronger after controlling

[3]However, restricting the sample to firms that have issued both short-term and long-term bonds introduces another selection bias in that it rules out firms with really high liquidity spreads for long-term bonds. Our estimate can be biased downward.

for cash holdings. Following Harford, Klasa, and Maxwell (2014), we test this hypothesis in a 2SLS regression with the following three instrumental variables for cash holdings: the ratio of intangible to sales, the ratio of R&D expenditures to book assets, and a dividend payment dummy. Table IA.IV reports the first-stage results which show that the instrumental variables in the debt maturity equation are significant in explaining cash holdings. Moreover, the under-identification and weak-identification tests reject the hypothesis that the instruments suffer from such problems. Table IA.V reports the second-stage estimation results on debt maturity. Panel A shows that the coefficients of firms' betas all increase after controlling for cash holdings, supporting the hypothesis that controlling for cash holdings indeed strengthens the effect of firms' systematic risk exposure on debt maturity. However, the increases are small, due to the insignificant effect of cash holdings on debt maturity. Panel B shows that stronger relation between systematic risk and debt maturity in bad times continues to hold after controlling for cash holdings.

Maturity choice for low leverage firms. Our asset betas are computed by unlevering the equity betas according to the Merton model in which debt maturity is assumed to be 1 year. One concern is that our result may be sensitive to this assumption. Debt maturity is less a concern for firms with low leverage, so one would expect that any bias coming from this assumption is not significant for firms with low leverage. We run regressions with a sub-sample of firms with below-median leverage each year, and obtain almost identical results to those using the full sample (Table IA.VI).

Callable bonds. Callability of bonds in general reduces effective debt maturity. Our findings could be undermined if high-beta firms are more likely to issue callable bonds. To address this concern, we collect bond characteristics from the FISD database, and categorize the bonds as either callable or non-callable according to their callability reported by the FISD. We then run logit regressions of callable bond issuance on firms characteristics, year and industry dummies. The results in Table IA.VII show that the tendency to issue callable bonds is unrelated to our beta measures.

Alternate measures of long-term debt maturing in 2008. In the paper, we investigate the impact of lumpy debt maturity choice on the term structure of credit spreads by studying the relation of the proportion of long-term debt maturing in 2008 and changes in CDS spreads from 2007 to 2008. The cross-firm measures of the proportion of long-term debt maturing in 2008 are obtained from the fiscal year 2007 balance sheet. To address the concern that our measure of long-term debt structure in 2007 could be endogenous to subsequent CDS changes, we compute the proportion of long-term debt maturing in 2008 using the balance sheet information in fiscal year 2004-2006, respectively. The regression results are presented in Table IA.VIII. We obtain almost identical results based on the fiscal year 2006 information. The results are slightly weaker for 2005 but no longer significant for 2004.

Table IA.III: Firm Characteristics and the Impact of Business Cycles. This table presents regression results of the fraction of debt that matures in more than 3 years on a recession dummy, firm characteristic (asset beta, total asset volatility, firm size, abnormal earning, book leverage, market-to-book ratio, asset maturity and profit volatility), an interaction between the dummy variable and asset beta, and industry dummies. We also add another interaction between the recession dummy and each other firm variable one-by-one. A quadratic time trend is also included. Standard errors of the coefficients are adjusted for clustering of observations at both the firm and year levels. Robust t-statistics are presented in parentheses below parameter estimates. Significance at the 10%, 5%, and 1% levels is indicated by *, **, ***, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
rec	-0.059***	-0.002	-0.044***	-0.047**	-0.047***	-0.038***	-0.050***
	(-3.11)	(-0.10)	(-3.17)	(-2.14)	(-3.19)	(-2.58)	(-3.22)
mktbeta	0.052***	0.051***	0.051***	0.051***	0.051***	0.051***	0.051***
	(9.38)	(9.26)	(9.33)	(9.34)	(9.32)	(9.35)	(9.36)
$mktbeta \times rec$	0.018*	0.029**	0.026**	0.026**	0.024**	0.025**	0.025**
	(1.66)	(2.12)	(2.14)	(2.55)	(1.99)	(2.09)	(2.09)
assetvol	-0.110***	-0.104***	-0.106***	-0.106***	-0.106***	-0.106***	-0.105***
	(-4.35)	(-4.19)	(-4.25)	(-4.24)	(-4.24)	(-4.24)	(-4.18)
$assetvol \times rec$	0.062**						
	(2.49)						
mkat	0.047***	0.048***	0.047***	0.047***	0.047***	0.047***	0.047***
	(14.96)	(15.30)	(14.93)	(14.94)	(14.93)	(14.92)	(14.97)
$mkat \times rec$		-0.007*					
		(-1.72)					
abnearn	-0.019**	-0.018**	-0.018*	-0.019**	-0.019**	-0.019**	-0.019**
	(-2.57)	(-2.50)	(-1.90)	(-2.52)	(-2.52)	(-2.55)	(-2.52)
$abnearn \times rec$			-0.004				
			(-0.34)				
bklev	0.256***	0.256***	0.256***	0.256***	0.256***	0.256***	0.256***
	(7.06)	(7.06)	(7.07)	(6.80)	(7.07)	(7.05)	(7.07)
$bklev \times rec$				0.006			
				(0.14)			
mk2bk	-0.019***	-0.019***	-0.019***	-0.019***	-0.019***	-0.018***	-0.019***
	(-4.34)	(-4.33)	(-4.34)	(-4.36)	(-4.49)	(-4.35)	(-4.34)
$mk2bk \times rec$					0.003**		
					(2.09)		
assetmat	0.005***	0.005***	0.005***	0.005***	0.005***	0.005***	0.005***
	(7.59)	(7.60)	(7.57)	(7.57)	(7.58)	(7.85)	(7.59)
$assetmat \times rec$						-0.001**	
						(-2.10)	
profitvol							0.147
							(1.41)
$profitvol \times rec$	-0.300***	-0.301***	-0.300***	-0.300***	-0.300***	-0.300***	-0.314***
	(-3.58)	(-3.60)	(-3.57)	(-3.57)	(-3.57)	(-3.58)	(-3.61)
N	48,200	48,200	48,200	48,200	48,200	48,200	48,200
R^2	0.222	0.222	0.222	0.222	0.222	0.222	0.222

Table IA.IV: First-Stage Regression Results of Cash Holdings in the 2SLS Regressions. This table presents the first-stage regression results of the logarithm of the ratio of cash holdings to assets on firms characteristics (asset beta, the ratio of intangible to sales, the ratio of R&D expenditures to book assets, a dividend paying dummy, total asset volatility, firm size, abnormal earning, book leverage, market-to-book ratio, asset maturity and profit volatility), industry dummies and a year dummy. The sample period is 1974 to 2017. Standard errors of the coefficients are adjusted for clustering of observations at both the firm and year levels. Robust t-statistics are presented in parentheses below parameter estimates. Significance at the 10%, 5%, and 1% levels is indicated by *, **, ***, respectively.

	(1)	(2)	(3)	(4)
mktbeta	0.127***			
	(3.85)			
bankbeta		0.118***		
		(2.79)		
tailbeta			0.0878***	
			(2.82)	
cfbeta				0.018**
				(2.11)
xrdexp	0.977***	0.990***	0.982***	2.412***
	(5.83)	(5.82)	(5.77)	(2.79)
intangible	-1.116***	-1.134***	-1.127***	-1.336***
	(-4.85)	(-4.86)	(-4.88)	(-4.69)
dvddummy	-0.134***	-0.137***	-0.132***	-0.137**
	(-2.86)	(-2.89)	(-2.78)	(-2.32)
assetvol	0.294***	0.426***	0.440***	
	(2.76)	(3.73)	(4.13)	
mkat	0.036**	0.041**	0.037**	0.051**
	(1.96)	(2.10)	(1.97)	(2.43)
abnearn	0.085***	0.082**	0.085**	0.133**
	(2.64)	(2.58)	(2.62)	(2.40)
bklev	-1.358***	-1.383***	-1.375***	-1.422***
	(-7.93)	(-8.08)	(-7.87)	(-7.39)
mk2bk	0.185***	0.188***	0.182***	0.170***
	(8.35)	(8.67)	(8.04)	(6.30)
assetmat	-0.033***	-0.033***	-0.033***	-0.046***
	(-6.95)	(-6.95)	(-6.96)	(-6.35)
profitvol	0.316	0.291	0.277	0.660
	(1.12)	(1.04)	(0.98)	(0.90)
underidentification test (Kleibergen-Paap rk LM statistic)				
	8.16**	8.15**	8.10**	8.24**
weak identifcation test (Kleibergen-Paap Wald rk F statistic)				
	27.33**	26.64**	26.40**	16.06**

Table IA.V: The Effect of Cash Holdings on Debt Maturity. This table presents the second-stage regression results for the structural equation that explain debt maturity using the 2SLS methodology. The second-stage structural equation that explains debt maturity has the fraction of total debt maturing in more than 3 years as the dependent variable and the independent variables are the predicted value of the natural logarithm of cash holdings, asset beta, and firm controls (total asset volatility, firm size, abnormal earning, book leverage, market-to-book ratio, asset maturity and profit volatility) and industry dummies. In Panel A, year dummies are included to control for year fixed effects. In Panel B, dependent variables include a recession dummy dated by NBER, an interaction term of beta and the recession dummy, and either a quadratic time trend or an aggregate trend generated by the H-P filter on the aggregate long-term debt share. Standard errors of the coefficients are adjusted for clustering of observations at both the firm and year levels. Robust z-statistics are presented in parentheses below parameter estimates. Significance at the 10%, 5%, and 1% levels is indicated by *, **, ***, respectively.

A. Year-Fixed Effects

	(1)	(2)	(3)	(4)
lncash	-0.029	-0.023	-0.028	-0.051*
	(-0.96)	(-0.79)	(-0.94)	(-1.71)
mktbeta	0.049***			
	(6.60)			
bankbeta		0.044***		
		(3.99)		
tailbeta			0.044***	
			(6.58)	
cfbeta				0.006***
				(3.11)
N	42,895	42,895	42,765	15,097
R^2	0.190	0.198	0.191	0.114

B. Macroeconomic Condition

	(1)	(2)	(3)	(4)
lncash	-0.025	-0.010	-0.019	-0.024
	(-0.84)	(-0.43)	(-0.64)	(-0.82)
macro	-0.046***	-0.041***	-0.041***	-0.038**
	(-3.29)	(-4.59)	(-2.82)	(-2.54)
mktbeta	0.055***	0.051***		
	(6.12)	(6.80)		
$mktbeta \times macro$	0.022*	0.027*		
	(1.70)	(1.91)		
bankbeta			0.050***	
			(3.93)	
$bankbeta \times macro$			0.034	
			(1.57)	
tailbeta				0.049***
				(5.91)
$tailbeta \times macro$				0.013*
				(1.96)
Quadratic Trend	Yes	No	Yes	Yes
HP Trend	No	Yes	No	No
N	42,895	42,895	42,895	42,765
R^2	0.190	0.212	0.197	0.190

Table IA.VI: Fama-MacBeth Regressions of Long-Term Debt Share for Firms with Low Book Leverage. This table presents regressions of the fraction of debt that matures in more than 3 years on firm-specific variables: asset beta, asset volatility, firm size, abnormal earning, book leverage, market-to-book ratio, asset maturity and profit volatility. We only use observations of firms with below median book leverage each year. In the regressions, we compute robust t-statistics using Newey-West standard errors with 2 lags, except in column (8) we use 20 lags. Robust t-statistics are presented in parentheses below parameter estimates. Significance at the 10%, 5%, and 1% levels is indicated by *, **, ***, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
mktbeta	0.094***	0.098***	0.046***			
	(12.57)	(12.80)	(7.37)			
bankbeta				0.049***		
				(4.56)		
tailbeta					0.035***	
					(6.76)	
cfbeta						0.003**
						(2.20)
assetvol	-0.644***	-0.607***	-0.096***	-0.057*	-0.041*	
	(-19.38)	(-19.20)	(-3.21)	(-1.87)	(-1.73)	
mkat			0.045***	0.046***	0.045***	0.040***
			(10.06)	(10.13)	(10.94)	(7.56)
abnearn			-0.019*	-0.019*	-0.020*	-0.031
			(-1.69)	(-1.72)	(-1.72)	(-1.28)
bklev		0.656***	0.509***	0.505***	0.502***	0.518***
		(27.94)	(13.96)	(13.67)	(14.60)	(9.32)
mk2bk			-0.026***	-0.026***	-0.026***	-0.052***
			(-5.69)	(-5.63)	(-5.63)	(-8.32)
assetmat			0.008***	0.008***	0.007***	0.006***
			(14.36)	(14.00)	(13.73)	(8.63)
profitvol			-0.266***	-0.267***	-0.296***	-0.204*
			(-5.11)	(-5.04)	(-5.45)	(-1.91)
N	26,622	26,622	24,285	24,285	24,227	9,496
R^2	0.083	0.101	0.186	0.185	0.185	0.168

Table IA.VII: Callable Bond Issuance. This table presents Logit regression results of issuance of callable bonds on asset beta, firm controls (total asset volatility, firm size, abnormal earning, book leverage, market-to-book ratio, asset maturity, profit volatility and credit rating), industry and year dummies. Standard errors of the coefficients are adjusted for clustering of observations at the industry level. Robust t-statistics are presented in parentheses below parameter estimates. Significance at the 10%, 5%, and 1% levels is indicated by *, **, ***, respectively.

	(1)	(2)	(3)	(4)
mktbeta	-0.166			
	(-1.08)			
bankbeta		-0.405**		
		(-2.40)		
tailbeta			0.111	
			(0.95)	
cfbeta				0.021
				(0.47)
assetvol	-0.590	-0.603	-1.034**	-1.721**
	(-0.96)	(-1.13)	(-2.03)	(-2.16)
mkat	-0.071	-0.071	-0.083	0.001
	(-0.96)	(-0.98)	(-1.14)	(0.01)
abnearn	-0.307	-0.292	-0.299	-0.636
	(-1.03)	(-0.97)	(-1.01)	(-1.61)
bklev	0.569	0.561	0.717	1.163**
	(1.22)	(1.24)	(1.51)	(2.00)
mk2bk	-0.012	-0.020	-0.022	-0.090
	(-0.26)	(-0.41)	(-0.48)	(-1.35)
assetmat	0.010	0.011	0.010	0.015
	(0.56)	(0.61)	(0.57)	(0.53)
profitvol	-0.088	-0.226	-0.327	-0.460
	(-0.04)	(-0.12)	(-0.16)	(-0.11)
rating	0.055*	0.054*	0.051	0.046
	(1.73)	(1.73)	(1.63)	(1.06)
N	4,004	4,004	3,999	2,493

Table IA.VIII: Credit Spreads and Long-Term Debt Structure Measured with Balance Sheet Information in Fiscal Years 2004-2006. This table presents cross-sectional regressions of yearly changes of CDS spreads from fiscal year 2007 to 2008 on the proportion of firms' long-term debt maturing in 2008. Additional firm level controls (asset market beta, asset volatility, firm size, market leverage, market-to-book ratio, profit, tangibility, past 12-month equity return and S&P credit rating) along with industry fixed effects are also included in the regressions. The regressions are estimated for the entire sample and separately for sub-samples of firms formed on the basis of firm characteristics at the end of fiscal year 2004-2006. For the three firm characteristics, the sub-samples comprise firms with market leverage, book leverage, and cash flow beta above and below the sample median, respectively. Standard errors of the coefficients are adjusted for heteroskedasticity. Robust t-statistics are presented in parentheses below parameter estimates. Significance at the 10%, 5%, and 1% levels is indicated by *, **, ***, respectively.

		Book leverage		Market leverage		Cash flow beta	
	All	High	Low	High	Low	High	Low
			A. Fiscal Year 2006				
			A.1. Changes in 1-year CDS spreads				
*ldebt*08	0.048**	0.065	0.032*	0.108**	0.003	0.056*	-0.005
	(2.12)	(1.31)	(1.69)	(2.23)	(0.33)	(1.81)	(-0.57)
N	248	118	130	121	127	81	78
R^2	0.384	0.477	0.360	0.484	0.279	0.575	0.464
			A.2. Changes in 5-year CDS spreads				
*ldebt*08	0.044**	0.073*	0.026	0.093**	0.001	0.039	-0.006
	(2.34)	(1.84)	(1.52)	(2.35)	(0.15)	(1.65)	(-0.72)
N	259	127	132	128	131	86	79
R^2	0.355	0.440	0.347	0.464	0.249	0.539	0.463
			A.3. Changes in 10-year CDS spreads				
*ldebt*08	0.038**	0.065*	0.023	0.086**	-0.000	0.037*	-0.006
	(2.17)	(1.91)	(1.46)	(2.38)	(-0.02)	(1.86)	(-0.97)
N	250	119	131	121	129	83	76
R^2	0.350	0.454	0.349	0.486	0.250	0.556	0.436

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Table IA.VIII Continued

	All	Book leverage High	Book leverage Low	Market leverage High	Market leverage Low	Cash flow beta High	Cash flow beta Low
		B. Fiscal Year 2005					
		B.1. Changes in 1-year CDS spreads					
*ldebt*08	0.021	0.022	0.014	0.051	-0.001	0.076**	0.017
	(1.53)	(0.84)	(0.88)	(1.58)	(-0.20)	(2.22)	(0.83)
N	238	114	124	117	121	80	73
R^2	0.302	0.414	0.261	0.370	0.334	0.536	0.368
		B.2. Changes in 5-year CDS spreads					
*ldebt*08	0.020*	0.025	0.011	0.043	0.001	0.058**	0.010
	(1.75)	(1.31)	(0.79)	(1.65)	(0.15)	(2.18)	(0.67)
N	249	120	129	123	126	83	75
R^2	0.291	0.412	0.245	0.339	0.310	0.524	0.391
		B.3. Changes in 10-year CDS spreads					
*ldebt*08	0.015	0.013	0.009	0.033	0.000	0.047**	0.008
	(1.52)	(0.83)	(0.79)	(1.40)	(0.03)	(2.16)	(0.63)
N	239	113	126	116	123	81	72
R^2	0.293	0.435	0.264	0.352	0.326	0.541	0.384

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Table IA.VIII Continued

		Book leverage		Market leverage		Cash flow beta	
	All	High	Low	High	Low	High	Low
C. Fiscal Year 2004							
C.1. Changes in 1-year CDS spreads							
*ldebt*08	-0.012	-0.013	0.011	0.004	-0.014	-0.060	0.015
	(-0.95)	(-0.66)	(0.61)	(0.20)	(-1.16)	(-1.38)	(0.84)
N	241	119	122	118	123	80	78
R^2	0.211	0.267	0.183	0.290	0.317	0.286	0.415
C.2. Changes in 5-year CDS spreads							
*ldebt*08	-0.010	-0.010	0.008	0.007	-0.012	-0.035	0.005
	(-0.93)	(-0.60)	(0.59)	(0.45)	(-1.02)	(-1.20)	(0.35)
N	248	122	126	122	126	84	79
R^2	0.206	0.239	0.217	0.261	0.294	0.289	0.437
C.3. Changes in 10-year CDS spreads							
*ldebt*08	-0.011	-0.011	0.005	0.001	-0.011	-0.043	0.003
	(-1.25)	(-0.81)	(0.43)	(0.04)	(-1.10)	(-1.57)	(0.29)
N	239	117	122	117	122	81	75
R^2	0.214	0.263	0.244	0.284	0.317	0.291	0.438

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