Asset Growth Anomaly of Corporate Bonds: A Decomposition Analysis

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Motivation

- High asset growth firms tend to have low stock and bond performance; i.e., $Corr(AG_t, R_{t+1}) < 0$
  - Cooper, Gullen and Schill (2008) – stocks
  - Chordia, Goyal, Nozowa, Subrahmanyam, and Tong (2017); Choi and Kim (2018) – bonds
- Unclear driver
  - High asset growth firms are less risky, thus lower return
    - High asset growth firms are better collaterized, thus less risky
  - High asset growth firms could be overvalued, leading to poor subsequent performance
- Goal: To differentiate between two explanations by studying corporate bonds

Why to Study Corporate Bonds?

- In reduced form, only discount rate channel matters to bonds
- Bond performance can be decomposed to yield and a term related to the change in yield

Asset Growth and Bond Performance

	Euqal-Weighted Portfolios				Value-Weighted Portfolios			
Asset Growth Decile	Full	HI	LI	JK	Full	HI	LI	JK
1 (Low)	6.98	4.01	6.41	12.88	6.07	4.45	5.80	11.95
2	5.41	4.00	4.84	8.66	5.14	4.35	4.37	8.84
3	5.08	3.72	4.43	9.67	5.78	5.18	5.08	9.03
4	3.67	3.64	4.17	6.59	4.01	5.08	4.74	7.43
5	4.14	3.64	4.18	7.62	4.27	3.57	4.14	8.56
6	4.17	3.26	5.08	4.37	4.43	4.00	5.35	4.18
7	4.04	3.64	4.24	6.59	4.34	3.88	4.57	6.30
8	3.86	3.46	4.05	5.80	4.21	3.69	3.95	5.36
9	3.63	3.73	3.49	6.69	3.35	3.91	3.10	5.21
10 (High)	4.01	3.57	4.84	5.10	3.91	4.11	3.97	5.55
Spread (10-1)	-2.97***	-0.44*	-1.57***	-7.78***	-2.16***	-0.34	-2.03***	-6.41***
t(spread)	(-9.09)	(-1.66)	(-2.72)	(-4.80)	(-6.24)	(-1.27)	(-2.65)	(-4.08)

HI: high investment (A- and above) grade bonds
LI: low investment grade (BBB) bonds
JK: junk bonds

Decomposition

Decomposing Bond Performance

Given:

$$R_{t+1} = \frac{C + P_{t+1} - P_t}{P_t} \tag{1}$$

$$y_{t+1} = y_t + \Delta y_{t+1} \tag{2}$$

Decomposition:

$$R_{t+1} = y_t - \frac{D_{t+1}^{y_t}}{1 + c_{t+1}^{y_t}} \Delta y_{t+1}$$

$$R_{t+1} = y_t - \eta_t \Delta y_{t+1}$$

$$E_t(R_{i,t+1}) = b_{i,t} + s_{i,t} - \eta_{i,t} E_t(\Delta b_{i,t+1}) - \eta_{i,t} E_t(\Delta s_{i,t+1})$$

- b: benchmark rate = yield of treasury bonds w/ matching maturity
- s: yield spread
- Δ b: change in treasury bond yields
- Δ s: change in yield spread

Bond Return Decomposition (time series)

$$E_t(R_{i,t+1}) = b_{i,t} + s_{i,t} - \eta_{i,t} E_t(\Delta b_{i,t+1}) - \eta_{i,t} E_t(\Delta s_{i,t+1})$$

	β		α		R^2	
Panel A. Treasury Yield (b)						
	HI	JK	HI	JK	HI	JK
1 (Low)	-0.000	-0.002	0.005**	0.016**	0.001	0.003
	(-0.60)	(-1.11)	(2.03)	(2.39)		
5 (High)	-0.000	-0.003	0.005	0.013*	0.001	0.014
	(-0.38)	(-1.30)	(1.36)	(1.91)		
Panel B. Yield Spread (s)						
1 (Low)	0.006	0.005*	-0.000	-0.011	0.073	0.169
	(1.51)	(1.84)	(-0.13)	(-1.08)		
5 (High)	0.010	0.002	-0.004	-0.003	0.063	0.055
	(1.42)	(1.30)	(-0.69)	(-0.50)		
Panel C. Δ Treasury Yield (Δb)						
1 (Low)	-0.040***	0.013	0.003***	0.011***	0.423	0.004
	(-10.31)	(0.54)	(4.41)	(3.96)		
5 (High)	-0.048***	0.011	0.002***	0.006**	0.413	0.004
	(-7.95)	(0.80)	(2.81)	(2.39)		
Panel D. Δ Yield Spread (Δs)						
1 (Low)	-0.025***	-0.025***	0.006***	0.010***	0.196	0.851
	(-3.92)	(-9.07)	(5.94)	(8.33)		
5 (High)	-0.044***	-0.029***	0.005***	0.007***	0.220	0.811
	(-3.77)	(-15.69)	(4.55)	(6.78)		

Bond Return Decomposition (time series)

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Yield spread changes matter to performance of low-quality bonds

Predictions

Prediction 1: Risk or Misprcing?

$$E_t(R_{i,t+1}) = y_{i,t} - \eta_{i,t} E_t(\Delta y_{i,t+1})$$

Case 1: Yield correctly reflects bond credit risk: $Corr(\Delta y_{i,t+1}, CG_{i,t}) = 0$

Case 2: Yield does not correctly reflect credit risk, e.g., CG over-extrapolated: $Corr(\Delta y_{i,t+1}, CG_{i,t}) > 0$

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Case 2: Yield does not correctly reflect credit risk, e.g., CG over-extrapolated: $Corr(\Delta y_{i,t+1}, CG_{i,t}) > 0$

$\Delta y_{i,t+1} = \beta CG_{i,t}$
$\beta = 0$ supports the risk explanation; $\beta > 0$ supports over extrapolation

Prediction 2: Bond Quality Matters

- Low-quality bonds can be less accurately priced
  - They may be rationally evaluated
    - Credit risk accounts for a much larger fraction of yield spreads for junk bonds than investment grade bonds (e.g., Huang and Huang, 2012; Longstaff, Mithal, and Neis, 2005).
  - They are more likely to be mispriced
- β is greater for low quality bonds when mispricing holds

Sample

Sample

- 4,448 bonds issued by 455 unique firms from TRACE and FISD
- July 2002 to June 2020
  - Augment the sample using Mergent NAIC data
- Unsecured bonds (97% of corporate bonds in TRACE)
- Include callable & puttable bonds
- Exclude convertible, ABS, MBS, privately placed

Test 1. Collateral Growth Effect on Bond Performance, Yield and Yield Changes

Cross Sectional Regressions: Full Sample

Dep Var: Annual Bond Performance

AG	-0.031**	-0.009**	-0.009**	-	-
	(-2.50)	(-2.26)	(-2.60)	-	-
TG				-0.086**	-0.050**
				(-2.52)	(-2.77)
IG				0.006	0.014
				(0.49)	(1.06)
YS		0.010**	0.008*		0.008*
		(2.37)	(1.79)		(1.82)
LEV			0.003		0.004
			(1.68)		(1.69)
ΔLEV			-0.015		-0.015
			(-1.61)		(-1.68)
$Adj.R^2$	0.013	0.195	0.410	0.015	0.197

TG: tangible asset growth; IG: intangible asset growth
Include *Size*, *Rating*, *Duration*, *Coupon*, *Par*, *Put*, *Call* as control variables

Cross Sectional Regressions of Bond Performance: Subsample

	Full Sample	HI	LI	JK
TG	-0.050**	-0.018	-0.037**	-0.155***
	(-2.77)	(-1.32)	(-2.26)	(-3.02)
IG	0.014	-0.001	0.018	0.010
	(1.06)	(-0.12)	(1.21)	(0.17)
YS	0.008*	0.001	0.011*	0.015**
	(1.82)	(0.95)	(1.86)	(2.43)
$Adj.R^2$	0.452	0.380	0.354	0.365

YS is used to control for credit risk

Changes in Expected Default Probability (ΔEDF_t)

	All	HI	LI	JK	All	HI	LI	JK
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
AG	-0.047***	-0.017*	-0.014**	-0.068***				
	(-6.00)	(-2.06)	(-2.53)	(-3.15)				
TG					-0.111***	-0.020**	-0.056**	-0.153***
					(-5.79)	(-2.50)	(-2.63)	(-3.13)
IG					-0.066	0.003	-0.014	-0.155**
					(-1.10)	(0.83)	(-0.37)	(-2.22)
YS	-0.003	-0.001	-0.009	-0.003	-0.003	-0.002	-0.010	-0.004
	(-1.54)	(-0.83)	(-1.54)	(-1.01)	(-1.67)	(-0.90)	(-1.62)	(-1.34)
LEV	-0.015	-0.015	-0.020*	-0.014	-0.017	-0.014	-0.022*	-0.017
	(-0.70)	(-1.06)	(-1.79)	(-0.23)	(-0.78)	(-1.06)	(-1.92)	(-0.29)
ΔLEV	0.612***	0.075**	0.276**	1.024***	0.620***	0.059	0.275**	1.040***
	(6.07)	(2.43)	(2.54)	(9.11)	(6.36)	(1.72)	(2.61)	(8.84)
Observations	3,891	1,451	1,737	703	3,891	1,451	1,737	703
$Adj.R^2$	0.304	0.193	0.314	0.487	0.314	0.194	0.319	0.509

- EDF: Expected default frequency is estimated following Bharath and Shumway (2008)

Cross-sectional Regressions of Yield Spreads and Change in Yield Spreads

	$YieldSpread_t$	$\Delta YieldSpread_{t+1}$	
$TG * Low$	-0.020***	0.014**	0.012**
	(-3.47)	(2.47)	(2.58)
$TG_{t+1} * Low$			-0.008
			(-1.70)
$\Delta LEV_{t+1} * Low$			0.010**
			(2.73)
TG	0.001	0.013**	0.006*
	(-0.09)	(2.46)	(1.94)
TG_{t+1}			-0.007**
			(-2.42)
ΔLEV_{t+1}			0.021***
			(3.83)
Adj. R^2	0.688	0.308	0.495

- low: Dummy for bonds below A-
- Controls: YS, leverage (LEV), ΔLEV, firm size, rating, duration, coupon, issue size, put, call

Test 2. Effect of Investor Sentiment

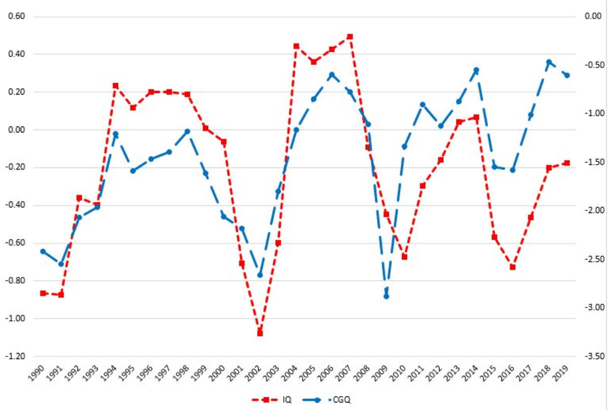
Measuring Bond Market Sentiment

- If it is a mispricing, we expect a stronger effect when market sentiment is high
- Numerous ways to measure sentiment and we need a bond market specific measure
- Greenwood and Hansen (2013, RFS): issuer quality (IQ)
  - Default risk of high-debt issuers with that of low-debt issuers
  - Credit quality of firms that issue large amounts of debt to that of firms that issue little debt

$$IQ_t = \frac{\sum_{i \in High\ d_{it}} EDF_{it}}{N_t^{High\ d_{it}}} - \frac{\sum_{i \in Low\ d_{it}} EDF_{it}}{N_t^{Low\ d_{it}}}$$

    $d_{it} = \Delta D_{it} / A_{it}$ (debt issuance)
  - IQ takes on high values when debt issuers are of relatively poor credit quality

Bond Issuer Quality and Collateral Growth Quality



CGQ (collateral growth quality) is constructed in the same way as IQ

Sentiment Effect on Cov(AG_t, Ret_{t+1})

	Full	HI	LI	JK
$TG * Sent$	-0.023**	-0.000	-0.011*	-0.025**
	(-2.63)	(-0.42)	(-1.94)	(-2.14)
TG	-0.032***	-0.014	-0.014*	-0.109**
	(-3.77)	(-1.07)	(-2.03)	(-2.24)
$Adj.R^2$	0.417	0.378	0.370	0.376

Sent: High sentiment years

Sentiment Effect on $Cov(AG_t, \Delta YS_{t+1})$

	Full	HI	LI	JK
$TG * Sent$	0.005*	0.002	0.008*	0.010**
	(3.07)	(1.36)	(1.89)	(2.45)
TG	0.055*	0.001	0.017	-0.013*
	(-2.03)	(-1.30)	(-2.03)	(2.62)
$Adj.R^2$	0.280	0.148	0.237	0.371

- The evidence supports the mispricing story

Summary

- We decompose the bond return to yield spread and yield spread change
- The asset growth anomaly in bond market is driven by yield spreads and yield spread changes
- Asset growth anomaly is stronger when the bond market sentiment is higher