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Quantitative Portfolio Strategy

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Low-Risk Anomaly Investing in Corporates DTS or Beta?

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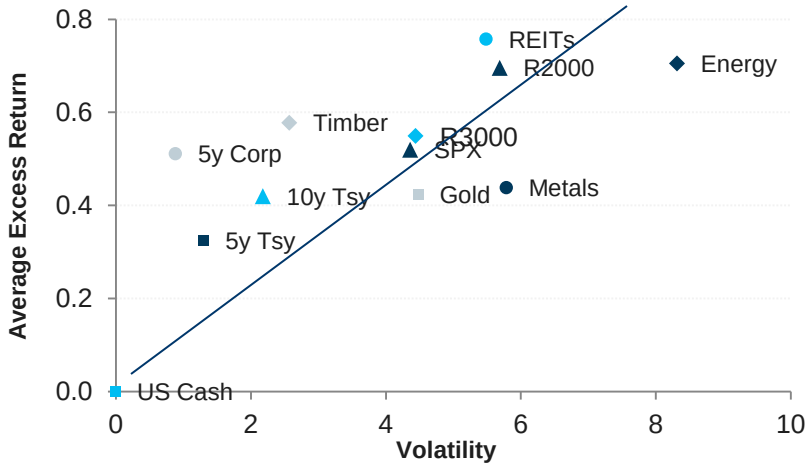
A Fundamental Challenge to Our Core Beliefs

- Intuition argues that assets with more risk should earn higher returns over time
  - We observe such a risk–return relationship *across asset classes*

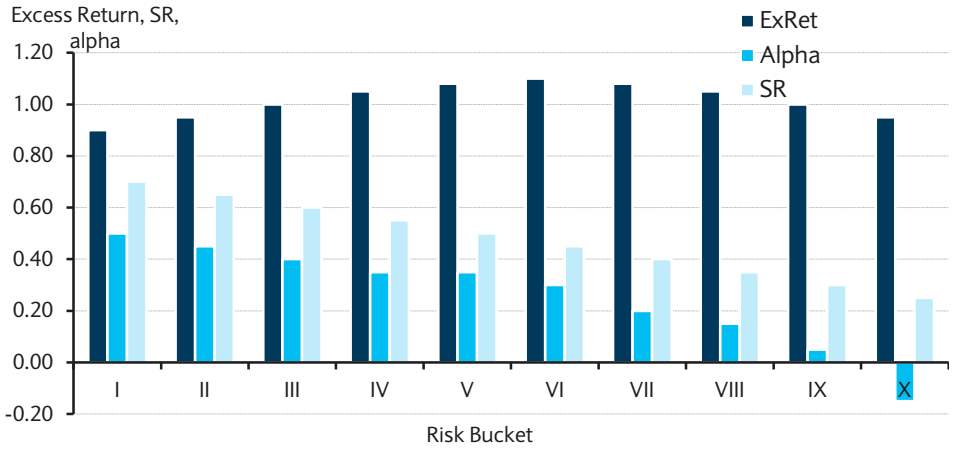


Source: Barclays Research
11/1990 – 10/2011

- From finance theory:
  - Cross-sectionally, equities with higher risk (i.e., higher β), should earn higher returns, and
  - Risk-adjusted returns (i.e., Jensen's alpha) should be zero and not vary with the level of risk (i.e., β)

Schematic Representation of the Low-Risk Anomaly for US Equities

- However, for equities, researchers have found a weak (or even negative) cross-sectional risk-return relationship:
  - Low-risk (i.e., low beta) equities outperform high-risk equities
  - As beta increases, risk-adjusted returns monotonically decrease



Source: Barclays Research

Do Returns Reflect Risk in the Corporate Market?

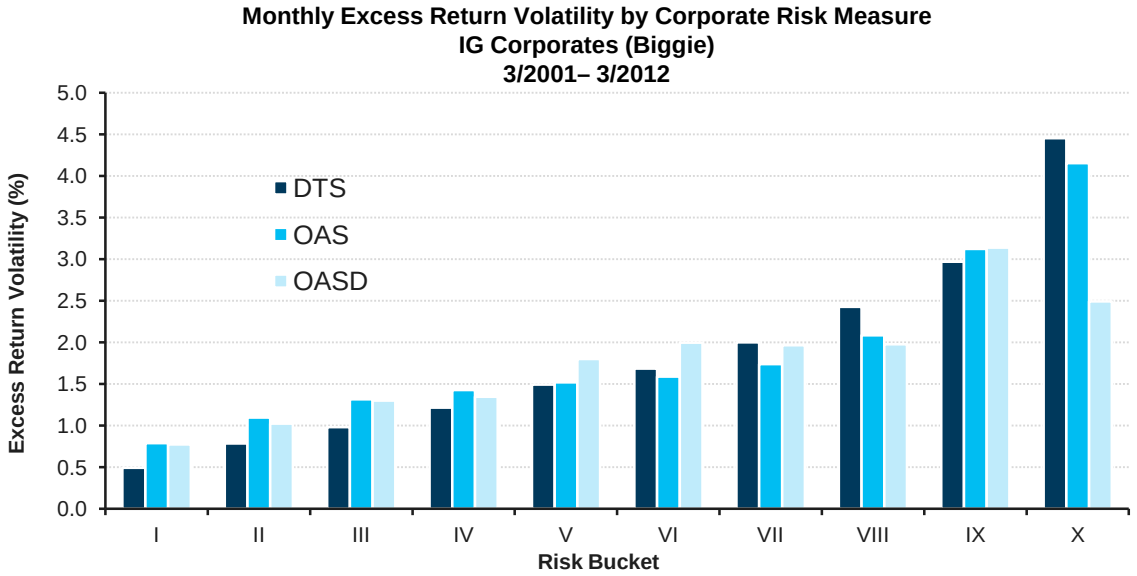
- Some claim that the “Anomaly” is present in corporate bonds – as well as in other asset classes
  - The *apparent* ubiquity of the anomaly supports various investment strategies:
    - Risk parity & alternative portfolio construction
    - Long-short “betting-against-beta” active strategies

- These studies suffer from some limitations
  - Index-level, rather than bond-level data
  - Inadequate measures of risk (*e.g.,* quality or duration)
  - Non-neutral sample period selection

- Let’s see what the data say…

How to Measure Corporate Bond Risk?

- A good measure of corporate risk should do a good job sorting bonds by their *excess return volatility*
- We examine three measures of *ex ante* risk, DTS, OAS and OASD
  - For each measure, we sort all bonds in the US IG Corporate Index ("Biggie") into equal buckets (by number of bonds) according to their beginning-of-the-month risk measure
  - We then measure the realized excess return volatility of each risk bucket
- Duration times spread (DTS) cleanly and sharply sorts bonds by excess return volatility
  - OASD does a poorer job than OAS or DTS
- What is the relationship between DTS risk and return? Is there a low-risk anomaly in corporate bonds?



We filter the US IG Corporate Index by first removing bonds with OASD < 0 or OAS => 5000). The "Biggie" index is constructed with the larger issues. To do so, each month we find out the median outstanding amount. Bonds eligible for the Biggie are those with an amount outstanding greater than or equal to the median amount. Our sample period is from March 2001 – March 2012. This period experienced no net change in the level of OAS for both short maturity and long maturity bonds in the Biggie index. Source: Barclays Research

DTS Risk & Return

- There is only a hint of a low-risk anomaly
  - Average excess returns relatively flat across risk, but increase sharply for highest risk bucket
  - Sharpe ratios (return per unit of absolute vol) are high for low risk buckets, then relatively flat
  - Estimated alphas (return adjusted for market risk) are positive for low risk buckets, negative for high risk (but not for the highest)
  - However, no alphas are statistically significant

- Do these results support the existence of a "low risk anomaly" in IG Corporates?

Average Monthly Corporate Excess Returns and Alpha by DTS Buckets
IG Corporates (Biggie)
3/2001– 3/2012

	low (DTS)	II	III	IV	V	VI	VII	VIII	IX	High (DTS)	Total
Avg OASD	1.78	2.73	3.64	4.53	5.31	6.00	6.89	8.17	10.23	10.66	5.98
Avg OAS	0.87	1.15	1.30	1.42	1.56	1.72	1.85	2.03	2.26	3.42	1.74
Avg DTS	1.49	2.94	4.36	5.88	7.58	9.45	11.65	14.86	19.97	29.54	10.59
Avg ExRet	0.03	0.04	0.05	0.03	0.01	0.02	0.04	0.03	0.03	0.22	0.04
Stdev	0.49	0.78	0.98	1.22	1.49	1.69	2.00	2.43	2.97	4.45	1.71
Ann SR	0.23	0.17	0.17	0.09	0.01	0.04	0.07	0.04	0.03	0.17	0.08
alpha	0.02	0.02	0.03	0.00	-0.03	-0.02	-0.01	-0.03	-0.04	0.12	
(t-stat)	*(0.89)*	*(0.70)*	*(0.77)*	*(0.10)*	*(-0.82)*	*(-0.82)*	*(-0.32)*	*(-0.96)*	*(-0.81)*	*(0.81)*	

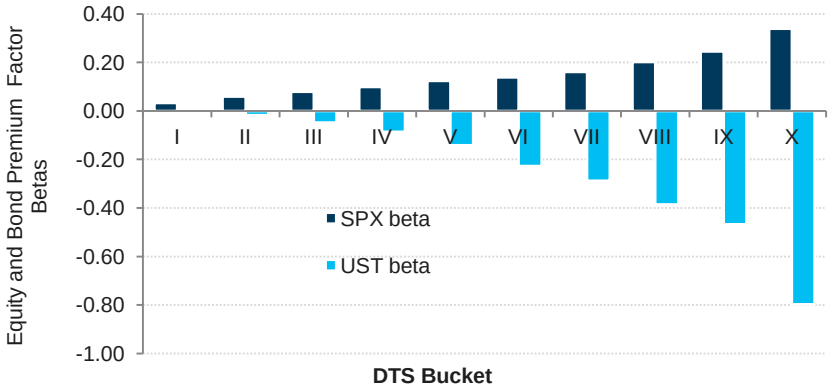
Alpha (Jensen's) is measured against the Biggie index. Source: Barclays Research

Doubt #1: Perceived Anomaly May Not Be "Anomalous"

- Observed risk bucket performance can be due simply to fundamental factor exposures
- We construct a replicating factor portfolio for each DTS risk bucket using two factors:
  - Equity factor (SPX total return – 1m T-bill return) loading (β)
  - Bond factor (UST index total return – 1m T-bill return) loading (φ)

$$ExRet(risk\ bucket_i)_t = \alpha_i + \beta_i \times ExRet(SPX)_t + \varphi_i \times ExRet(Tsy)_t + \varepsilon_t$$

Equity and Bond Premium Betas; DTS Risk Buckets
IG Corporates (Biggie) March 2001 - March 2012



Equity and Bond Premium Factor Returns
March 2001 - March 2012

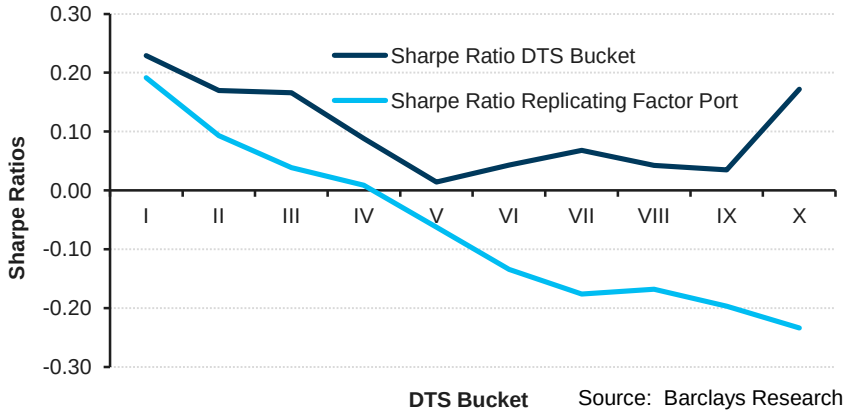
	Equity Factor	Bond Factor
Avg Monthly Ret (bp)	5.1	30.0
Volatility (bp)	464	144
Ann. Sharpe Ratio	0.04	0.72
Correlation	-0.36	

- We use the two betas to construct, each month, a "replicating factor portfolio" for each risk bucket

$$ExRet(DTS\_bucket_i) = \Sigma_k\ (\beta_i \times F_k)$$

- Lower risk buckets have better SRs
  - Not an "anomaly", but reflects relative factor performance
- Higher DTS buckets seem to have better risk-adjusted performance relative to replicating factor portfolios

Sharpe Ratio by DTS Bucket
IG Corporates (Biggie) Replicating Factor Portfolio
March 2001 – March 2012



Source: Barclays Research

Doubt #2:
Interaction Effects w/in Buckets Do Not Reveal the Anomaly

- Controlling for DTS, does the volatility of a bucket change significantly as we vary OAS?
  - Another way to search for the low-risk anomaly
- Within a DTS bucket, excess return volatility generally *increases* with OAS (or, *decreases* with OASD)
- Is the low-risk anomaly supported within DTS buckets?
  - Alphas generally *increase* as OAS, and volatility, increase; ρ(alpha, volatility) = +0.20
  - Not supportive of a low-risk anomaly
- For investors using DTS as their single risk measure, these results provide some helpful guidance
  - The "sweet spot" in the corporate market ➔ Low-OASD, High-OAS bonds
  - The "sour spot" in the corporate market ➔ High-OASD, Low-OAS bonds

Alpha by Two-Way (DTS × OAS) Sorts; IG Corporates (Biggie)
March 2001- March 2012

	Alpha (by OAS)										
(by DTS)	I	II	III	IV	V	VI	VII	VIII	IX	X	Total
I (low)	-0.11	0.00	0.03	0.01	0.04	0.02	0.04	0.03	0.07	0.11	0.02
II	-0.07	0.01	0.01	-0.01	0.04	0.07	0.09	0.05	0.04	-0.03	0.02
III	-0.08	-0.02	-0.02	0.06	0.03	0.03	0.02	0.09	0.09	0.05	0.03
IV	-0.08	-0.03	-0.05	0.01	0.04	-0.05	0.04	0.09	0.06	-0.08	0.00
V	-0.15	-0.08	-0.08	-0.01	-0.04	0.03	0.05	0.03	0.06	-0.07	-0.03
VI	-0.11	-0.05	-0.05	-0.03	-0.10	-0.01	0.07	0.08	0.03	-0.06	-0.02
VII	-0.08	-0.01	-0.08	-0.10	0.09	0.05	-0.05	-0.01	-0.07	0.18	-0.01
VIII	-0.05	-0.06	-0.08	0.01	0.00	0.02	-0.11	-0.05	-0.09	-0.02	-0.03
IX	0.05	-0.06	-0.04	-0.08	-0.09	-0.01	-0.02	-0.01	-0.10	0.05	-0.04
X (high)	0.07	0.11	0.10	0.25	0.32	0.25	-0.18	0.28	0.07	0.09	0.12
Total	-0.07	-0.03	-0.02	0.00	0.02	0.03	-0.02	0.04	0.01	-0.01	

increasing volatility →

Source: Barclays Research

Doubt #3: Weak Long-Short Strategy Performance

- We construct "DTS-neutral" Long/Short strategy portfolios
  - We use either the one, two and three lowest/highest DTS risk buckets, and weight accordingly so as to remove DTS exposure (i.e., strategy DTS = 0)
  - L/S strategy is rebalanced each month
- Weak L/S strategy performance
  - Alphas are not significantly different from zero
  - Modest correlation with the market

IG Corporate (Biggie) Long/Short DTS Strategy Performance
March 2001 – March 2012

L/S Strategy: (DTS Risk Buckets; DTS = 0 Portfolio)			
	1 & 10	(1+2) & (9+10)	(1+2+3) & (8+9+10)
Avg Monthly Ret (%)	0.02	0.03	0.03
Stdev (%)	0.39	0.41	0.42
Ann. Sharpe Ratio	0.21	0.23	0.27
alpha (%)	0.02	0.02	0.03
alpha (t-stat)	*(0.64)*	*(0.72)*	*(0.85)*
Min (%)	-3.69	-3.85	-3.82
Max (%)	1.18	1.08	1.11
real. corr. w/ mkt	0.34	0.39	0.38
realized beta w/ mkt	0.08	0.09	0.09

Source: Barclays Research

Doubt #4: Poor Comparison with Short Corporate Index

- There are other “low-risk” Corporate alternatives
- How does the L/S DTS Strategy compare?
  - IG Corporate 1-3y Index. Similar risk as the lowest three DTS buckets together or the DTS L/S Strategy
  - Yet better performance
  - Where is the advantage of the “low-risk anomaly” strategy designed to capitalize on mis-pricing in the corporate market?

Competing "Low-Risk" Corporate (Biggie) Portfolios
3/2001 - 3/2012

	Corp 1-3y Index	DTS L/S (3 buckets)	DTS (low 1, 2, 3 buckets only)
Avg Mo ExRet	0.14	0.03	0.04
Volatility	0.74	0.42	0.75
Ann. Sharpe	0.64	0.27	0.18
Min	-3.93	-3.82	-4.92
Max	3.34	1.11	2.46
Corr. (1-3y Corp)	1.00	0.49	0.92
alpha	0.00	-0.01	-0.09
alpha (t-stat)		*(-0.17)*	*(-3.42)*

Source: Barclays Research

Doubt #5: Strategy Performance is Period Dependent

- We would expect L/S performance to be sensitive to
  - corporate market returns (*i.e.,* spread level moves)
  - corporate spread slope
  - the reason why we chose the particular period for our study

- Removing these macro exposures from the L/S strategy's performance, we see that performance depends on the period selected

- There have been periods when the low-risk anomaly has been present, absent and inverted

Dependent Variable: 2-bucket DTS L/S Strategy Returns; IG Corporates (Biggie)

			Regression Results					
Period	**L/S Strategy Avg Ret Sharpe Ratio**	**Sample period**	**constant**	**Corp ExRet**	**Chg Corp OAS curve Slope**	**Chg 10y Tsy Yield**	**Chg 2-10 Tsy Slope**	**R^2**
5/91 - 10/14	0.01 *0.12*	full period 282 months	0.00 *0.09*	**0.04** ***3.06***	**1.28** ***8.15***	**-0.17** ***-2.95***	**-0.25** ***-2.81***	0.39
5/91 - 2/98	-0.03 *-0.81*	low idio period 82 months	**-0.04** ***-3.43***	**0.14** ***2.89***	-0.43 *-1.60*	-0.06 *-1.54*	**-0.37** ***-4.62***	0.35
3/98 - 11/03	0.04 *0.69*	high idio 69 months	0.03 *1.77*	-0.01 *-0.51*	**0.96** ***3.87***	**-0.17** ***-2.37***	-0.10 *-0.81*	0.32
12/03 - 7/07	0.03 *1.71*	low idio 44 months	**0.03** ***4.72***	**0.07** ***4.21***	**0.44** ***2.90***	**-0.21** ***-6.63***	0.03 *0.41*	0.61
8/07 - 2/10	-0.05 *-0.20*	high idio 31 months	0.03 *0.23*	-0.04 *-0.51*	**2.29** ***3.00***	-0.27 *-0.65*	-0.76 *-1.43*	0.53
3/10 - 10/14	0.07 *1.80*	"post crisis" 56 months	**0.04** ***3.45***	**0.05** ***5.59***	**0.92** ***6.56***	-0.10 *-0.78*	-0.03 *-0.18*	0.61
5/91 - 11/03	0.00 *0.03*	1st Half 151 months	0.00 *-0.08*	-0.02 *-0.94*	**0.47** ***2.45***	**-0.09** ***-2.16***	**-0.27** ***-3.41***	0.18
12/03 - 10/14	0.02 *0.19*	2nd Half 131 months	0.01 *0.40*	**0.05** ***2.03***	**1.42** ***5.56***	-0.22 *-1.65*	-0.26 *-1.45*	0.46
3/01 - 3/12	0.03 *0.23*	our sample 133 months	0.02 *0.80*	0.02 *0.96*	**1.61** ***6.32***	**-0.28** ***-2.43***	-0.19 *-1.17*	0.45

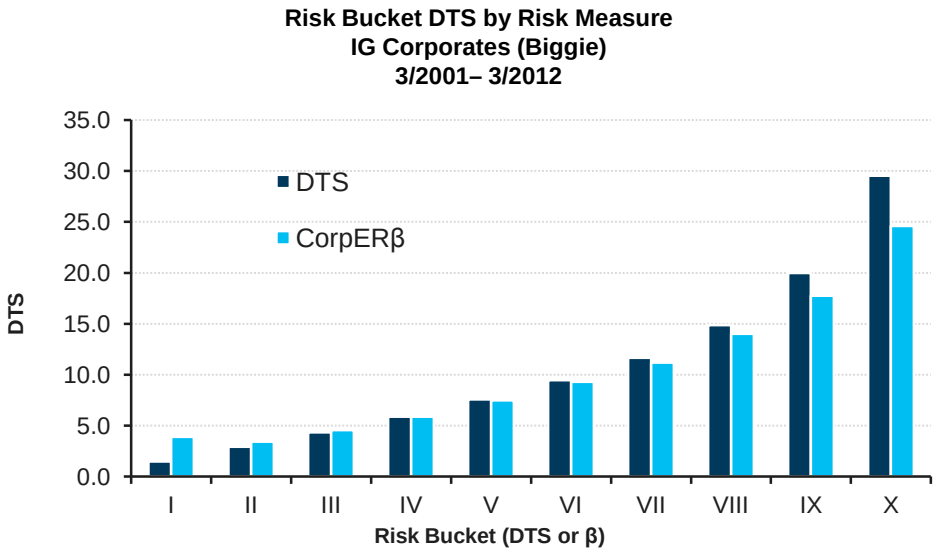
Source: Barclays Research

But Isn't Beta the Proper Measure of Risk?

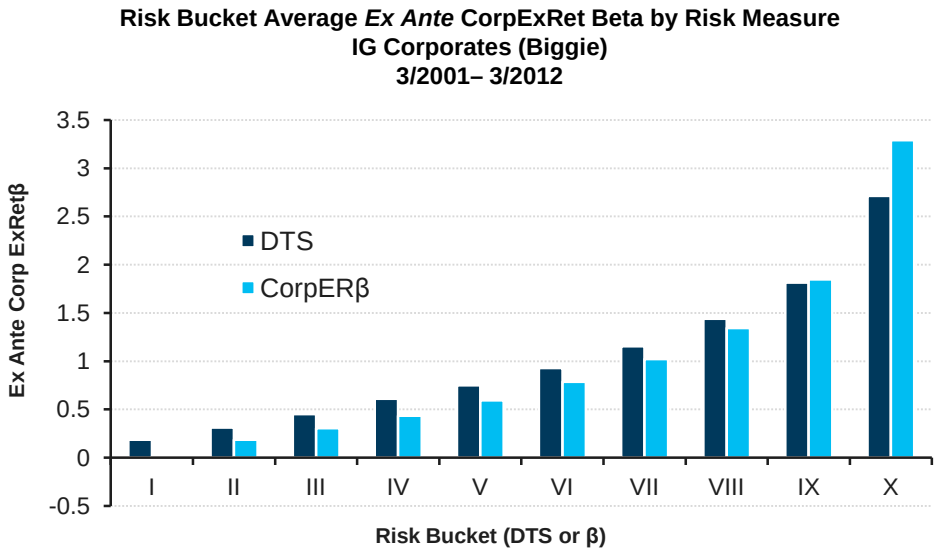
- Risk should somehow be related to how the asset correlates with the market
  - Studies of the low-risk anomaly have covered the equity market, and they use beta as the risk measure, not individual asset volatility
- We all learned that investors should earn compensation only for correlated market risk, not absolute volatility risk or idiosyncratic risk
  - For the low-risk anomaly, the argument would be that high-CorpExRetβ bonds (*i.e.,* high beta) are overpriced and low-CorpExRetβ bonds are underpriced
- In our search for the low-risk anomaly, we have been using an absolute measure of risk (DTS)
  - DTS does not measure correlation to the market
  - However, many credit investors think of risk in terms of absolute excess return volatility, not beta to the corporate index
- Nevertheless, to properly test the low-risk anomaly some argue we need to construct zero-β portfolios

DTS and Beta Sorting Produce Similar Risk Profiles!

- Sorting bonds by either DTS or CorpExRetβ produces
  - Similar DTS pattern across buckets
    - For low-CorpERβ buckets there is little differentiation by DTS
    - Probably many high-OAS bonds (aka higher DTS bonds) have relatively low-CorpExRetβ due to idiosyncratic events
  - Similar CorpExRetβ pattern across buckets
    - DTS risk bucketing produces a very nice differentiation of CorpExRetβs across buckets



We estimate bond-level CorpERβs using 12m equal weighted history.

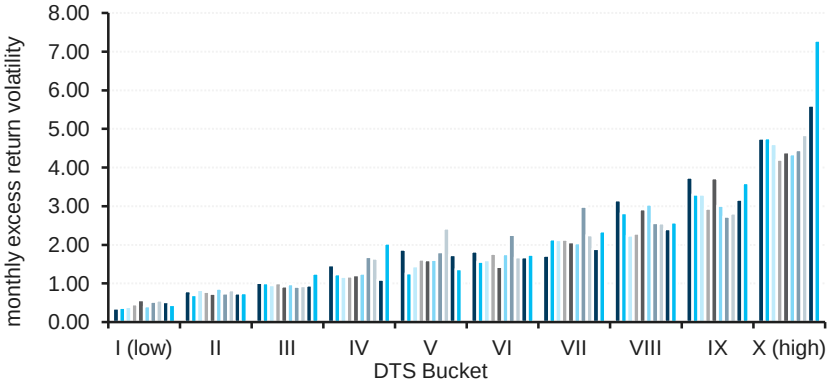


We estimate bond-level CorpERβs using 12m equal weighted history.

Source: Barclays Research

Given DTS, a Bond's Beta Provides Little New Information

- Given DTS, sorting bonds by their CorpExRetβ does not seem to add information regarding volatility
- Nor is there a pattern of significant alphas across CorpExRetβ, given DTS
- Let's see if CorpExRetβ do a better job constructing profitable Long-Short zero-risk portfolios to test for the low-risk anomaly in corporates



We estimate bond-level CorpERβs using 12m equal weighted history.
Source: Barclays Research

Alpha by Two-Way (DTS × CorpExRetβ) Sorts; IG Corporates (Biggie)
March 2001- March 2012

	Alpha (by CorpExRetβ)										
(by DTS)	I	II	III	IV	V	VI	VII	VIII	IX	X	Total
I (low)	0.02	0.03	0.03	0.02	0.01	0.05	0.04	0.02	0.03	0.02	0.03
II	0.03	0.04	0.02	0.05	0.04	0.03	0.04	0.03	0.01	0.01	0.03
III	0.02	0.03	0.06	0.04	0.03	0.04	0.06	0.05	0.03	-0.03	0.03
IV	-0.02	0.04	0.04	0.04	0.06	0.02	-0.12	-0.03	0.04	-0.07	0.00
V	-0.08	-0.02	-0.03	-0.08	-0.04	-0.02	0.00	-0.17	-0.06	0.10	-0.04
VI	-0.07	-0.04	0.02	0.01	0.03	0.06	-0.09	0.02	0.00	0.08	0.01
VII	0.01	-0.05	-0.01	0.01	0.01	0.04	-0.26	-0.04	0.02	-0.05	-0.05
VIII	-0.26	-0.14	0.00	0.07	-0.07	-0.02	-0.01	0.03	0.06	0.04	-0.01
IX	-0.36	-0.27	-0.06	-0.06	-0.13	0.20	0.02	0.07	-0.09	0.02	-0.06
X (high)	-0.30	-0.08	-0.04	0.03	0.09	0.25	0.23	0.23	0.24	0.39	0.11
Total	-0.08	-0.04	-0.01	0.01	-0.01	0.05	-0.03	0.01	0.02	0.02	

Source: Barclays Research

We Sort Bonds by Their *Ex-Ante* CorpExRetβ

- Sorting by CorpExRetβ we see only some hint of the low-risk anomaly
  - Excess returns fall, then rise
  - Sharpe ratios fall, but then rise as we move to higher risk buckets
  - Alphas are also not monotonic with risk
  - Lowest/highest risk buckets do not have significant positive/negative alphas

Average Monthly Excess Return and Alpha by CorpExRetβ Risk Measure
IG Corporate (Biggie)
3/2001– 3/2012

	low (βeta)	II	III	IV	V	VI	VII	VIII	IX	High (βeta)	Total
Avg OASD	2.96	2.81	3.46	4.20	4.99	5.83	6.64	7.65	8.77	9.34	5.77
Avg OAS	1.24	1.17	1.30	1.43	1.55	1.67	1.80	1.95	2.20	3.11	1.76
Avg DTS	3.90	3.44	4.58	5.88	7.47	9.30	11.19	14.01	17.75	24.61	10.39
Avg ExRet	0.07	0.05	0.05	0.05	0.04	0.01	0.00	0.04	0.14	0.20	0.06
Stdev	0.72	0.88	1.01	1.16	1.52	1.78	2.03	2.45	2.55	3.57	1.66
Ann SR	0.33	0.20	0.16	0.15	0.09	0.01	0.01	0.05	0.18	0.19	0.13
alpha	0.05	0.02	0.01	0.01	-0.01	-0.06	-0.07	-0.05	0.05	0.08	
(t-stat)	*(1.42)*	*(0.63)*	*(0.35)*	*(0.25)*	*(-0.35)*	*(-1.70)*	***(-2.01)***	*(-1.53)*	*(0.77)*	*(0.60)*	

Source: Barclays Research

Using Corpβ – Weak Long-Short Strategy Performance

- We examine the performance of a "CorpExRetβ-neutral" L/S strategy

$$\beta\_adj_i = 0.7 \times \beta_i + (1 - 0.7) \times (\beta = 1)$$

  - We recognize that estimated bond betas are noisy and apply a shrinkage factor of 0.7 towards 1.0
  - We use the one, two, and three lowest/highest risk buckets, and weight accordingly so that CorpExRetβ = 0)
  - L/S strategy is rebalanced each month
- Weak L/S Strategy performance
  - Alphas are not statistically significant

IG Corporates (Biggie) Long/Short CorpExRetβStrategy Performance

Mar 2001 – Mar 2012

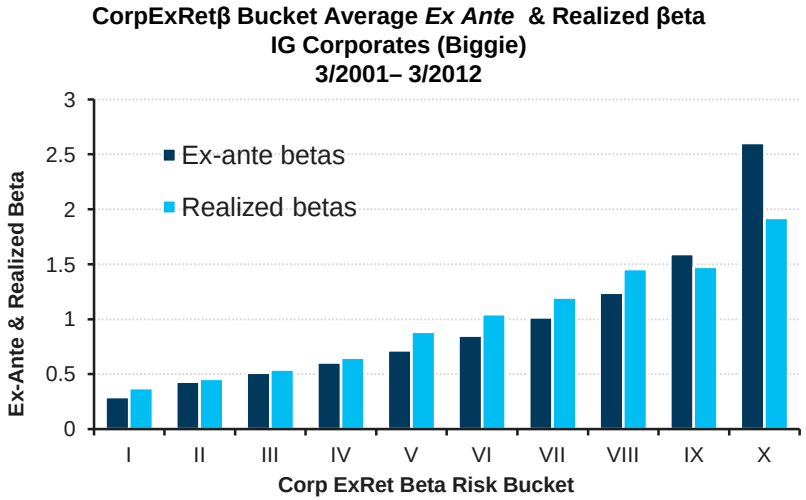
L/S Strategy: (CorpERβ Risk Buckets; CorpERβ = 0 Portfolio)

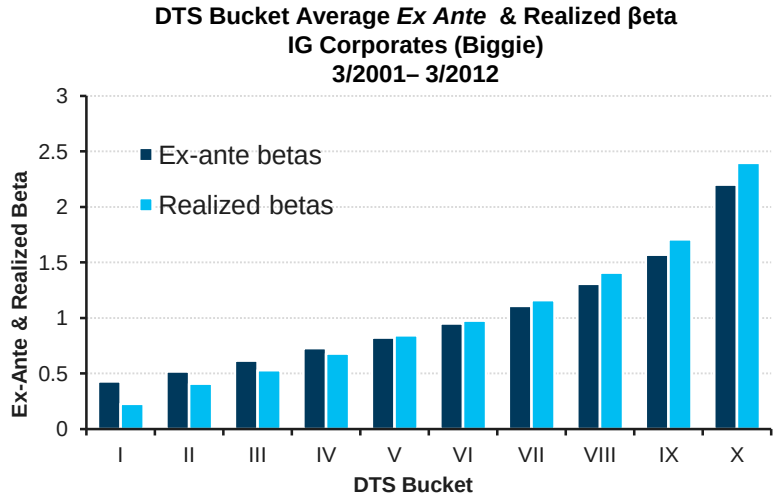
	1 & 10	(1+2) & (9+10)	(1+2+3) & (8+9+10)
Avg Monthly Ret (%)	0.02	0.01	0.01
Stdev (%)	0.53	0.54	0.54
Ann. Sharpe Ratio	0.13	0.05	0.03
alpha (%)	0.02	0.01	0.01
alpha (t-stat)	*(0.40)*	*(0.16)*	*(0.15)*
Min (%)	-4.62	-5.02	-4.92
Max (%)	0.95	0.91	0.92
real. corr. w/ mkt	0.11	0.01	-0.10
realized beta w/ mkt	0.04	0.00	-0.03

We estimate bond-level CorpERβs using 12m equal weighted history. To reduce the influence of bond-level beta outliers, we shrink the estimated bond betas by a factor of 0.7 towards 1.0. Shrinkage factor of 0.7 was selected to produce a realized beta of 0.0 for the 2 bucket strategy. The βeta for each CorpExRetβ risk bucket is computed each month using market value weighted estimated betas for bonds in each bucket. L/S Strategy CorpExRetβ = 0 portfolio is constructed each month. Source: Barclays Research

Comparing Ex-Ante & Realized CorpExRetβ

- We compute realized, in sample, CorpExRetβs for each risk *bucket*
- DTS risk sorting produced a closer relationship between ex-ante bucket average betas and the bucket's realized betas
- However, *bond-level* beta estimates for either risk measure did not match realized *bucket* betas
  - This makes producing a realistic zero-beta portfolio difficult when using bond-level betas





We estimate bond-level CorpERβs using 12m equal weighted history. To reduce the influence of bond-level beta outliers, we shrink the estimated bond betas by a factor of 0.7 towards 1.0. Shrinkage factor of 0.7 was selected to produce a realized beta of 0.0 for the 2 CorpERβs bucket strategy. The βeta for each CorpExRetβ risk bucket is computed each month using market value weighted estimated betas for bonds in each bucket. Realized βeta is the in-sample beta for the period. Source: Barclays Research

- This suggests another way to construct a zero-beta portfolio to test the low-risk anomaly
  - After the risk sort (either DTS or βeta), CorpExRetβs are estimated at the *bucket level,* rather than at the bond level
  - Then, construct a L/S zero-βeta portfolio using these estimated bucket CorpExRetβs

Zero-Beta Portfolios to Test the Anomaly

- Consider:
  - First sort bonds by risk factor (DTS or βeta)
  - Estimate bucket-level βetas (no looking ahead)
  - Construct L/S zero-βeta portfolio
- We use 1, 2 and 3 lowest/highest risk (DTS or Beta) buckets, and weight them so that CorpExRetβ = 0)
  - L/S strategy is rebalanced each month
- Weak strategy performance
  - Correlation and βeta exposure to the market is largely removed
  - Results are not that sensitive to the bucket-level CorpExRetβ estimation methodology (not shown)
  - Little evidence of the low-risk anomaly

IG Corporate (Biggie) Long/Short CorpExRetβ Neutral Strategy Performance
March 2001 – March 2012

	L/S Strategy: (DTS Risk Buckets; CorpERβ = 0 Portfolio)			L/S Strategy: (CorpERβ Risk Buckets; CorpERβ = 0 Portfolio)		
	1 & 10	(1+2) & (9+10)	(1+2+3) & (8+9+10)	1 & 10	(1+2) & (9+10)	(1+2+3) & (8+9+10)
Avg Monthly Ret	-0.02	-0.02	0.00	0.00	-0.02	-0.02
Stdev	0.49	0.50	0.47	0.52	0.55	0.54
Sharpe Ratio	-0.15	-0.11	-0.03	-0.02	-0.13	-0.10
alpha	-0.02	-0.02	0.00	-0.01	-0.02	-0.02
alpha (t-stat)	*(-0.52)*	*(-0.38)*	*(-0.12)*	*(-0.16)*	*(-0.51)*	*(-0.44)*
min	-3.69	-3.72	-3.63	-4.51	-5.16	-5.27
max	1.72	1.65	1.55	1.08	0.94	0.94
corr. w/ Corp Mkt	0.04	0.06	0.08	0.17	0.17	0.20
beta w/ Corp Mkt	0.01	0.02	0.02	0.05	0.06	0.06

Source: Barclays Research

Summary

- **Using a reliable single spread risk measure (DTS), we find little evidence supporting a low-risk anomaly**
  - While risk bucket SRs and alphas tend to decline with risk, they do not do so monotonically – high risk buckets have high SRs and alphas.
  - Alphas are not significantly different from zero
  - Observed SR and alpha behavior across buckets could simply reflect realized performance of broad macro factors over the period, not evidence of an anomaly
  - Accounting for interaction effects among risk factors does not uncover the anomaly
  - Long/Short "zero-risk" strategy performance is not strong
  - Long/Short strategy underperforms a comparable risk, long-only index
  - Long/Short strategy performance is sensitive to the time period selected

- **Overall, a reassuring result for PMs**
  - Investors are adequately compensated for taking DTS risk

- **Using a traditional asset risk measure (i.e., beta to the market), we also find little evidence supporting a low-risk anomaly**
  - Using bucket-level CorpExRetβs to size the L/S strategy portfolio (whether we use DTS or CorpERβ as the bond-level risk measure) does a good job removing correlation (and beta) to the corporate market
  - Unlike results for the equity market, here is little support for the low-risk anomaly in corporates

Idiosyncratic Risk and Return

A Possible Risk-Return Anomaly?

- Are investors rewarded for idiosyncratic risk?

- Researchers have debated whether the idiosyncratic risk of *stocks* is related to their risk-adjusted returns
  - Why should idiosyncratic risk be related to returns even though it is an avoidable risk?
  - Behavioral reasons (*e.g.,* lottery seeking) – argue for a *negative relationship* between idiosyncratic risk and returns
  - Inability to hold market portfolio – argues for a *negative relationship* as investors demand higher returns for bearing idiosyncratic risk

- Ang, *et al.* (*Journal of Finance*, 2006)
  - Found a *negative* link – lower risk-adjusted returns for higher realized idiosyncratic risk
  - Cited as further support for the low-risk anomaly

- Do we find that corporate bond investors are compensated for idiosyncratic risk?

Defining Idiosyncratic Return and Volatility

- We define a bond's monthly idiosyncratic excess return ($IdioER_t$) as the residual from the following cross-sectional regression:

$$\text{ExRet}_{i,t} = \underbrace{\beta \times (DTS_{i,t} \times \text{SecDum}_{i,t})}_{\text{Sector Return}} + \underbrace{\varepsilon_{i,t}}_{\text{IdioER}}$$

- Estimating $\mathbf{IdioER_{i,t}} = e_{i,t}$
  - We use 9 sector dummies and a subordinate dummy
  - We run separate monthly cross-sectional regressions

- We estimate a bond's idiosyncratic volatility, $\mathbf{IdioVol_{i,t}}$, using the standard deviation of its $IdioER_{i,t}$ over the *prior* twelve months (not including current month)

Is IdioVol Related to Expected Returns?

- At the beginning of each month, we sort corporate bonds according to their **IdioVol$_{i,t}$**
  - We see some good evidence of a low-risk anomaly
  - Alphas and Sharpe ratios are somewhat more consistent with the anomaly
    - All low-risk buckets have positive alphas
    - All high-risk buckets have negative alphas
  - Long-Short strategy (3 buckets) performance
    - Weighting by IdioVol: return = 7.1bp/m; SR = 0.44; alpha = 6.2bp (t – 1.42); correlation = 0.46; beta = 0.15
    - Weighting by bucket betas: return = 6.2bp/m; SR = 0.22; alpha = 3.3bp (t – 0.68); correlation = 0.13; beta = 0.04

Average Monthly Corporate Excess Returns and Alpha by IdioVol Buckets
IG Corporates (Biggie)
3/2001 – 3/2012

	low (IdioVol)	II	III	IV	V	VI	VII	VIII	IX	High (IdioVol)	Total
Avg OASD	2.18	3.22	3.97	4.73	5.45	6.09	7.00	7.92	8.62	8.60	5.77
Avg OAS	0.94	1.14	1.28	1.42	1.56	1.70	1.88	2.05	2.39	3.37	1.76
Avg DTS	2.26	3.74	5.04	6.53	8.15	9.81	12.30	14.92	18.37	23.82	10.39
Avg ExRet	0.07	0.07	0.08	0.06	0.05	0.04	0.00	0.01	0.05	0.08	0.06
Stdev	0.61	0.88	1.05	1.33	1.50	1.66	2.11	2.42	2.70	3.63	1.66
Ann SR	0.40	0.28	0.27	0.15	0.11	0.09	0.00	0.01	0.06	0.07	0.13
alpha	0.05	0.04	0.05	0.01	-0.01	-0.01	-0.07	-0.08	-0.05	-0.04	
(t-stat)	*(1.77)*	*(1.25)*	*(1.37)*	*(0.29)*	*(-0.20)*	*(-0.52)*	***(-2.46)***	***(-2.46)***	*(-0.84)*	*(-0.29)*	

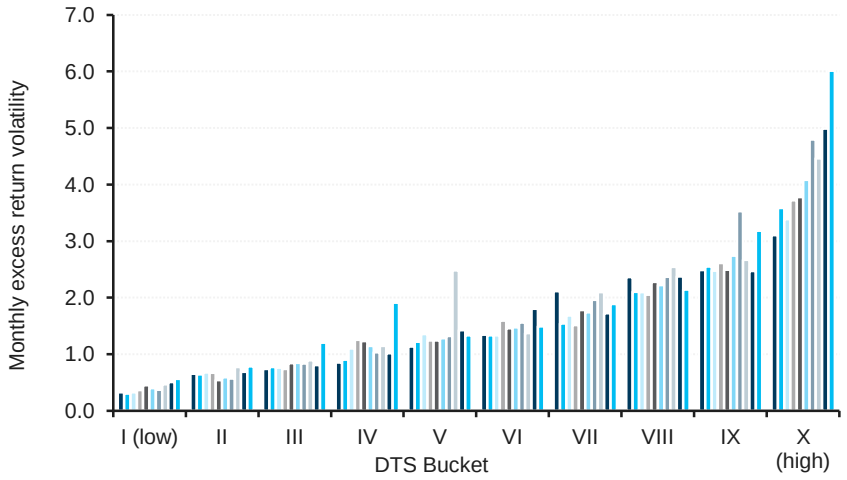
Source: Barclays Research

IdioVol Is Related to Other Risk Measures

- Increasing IdioVol is associated with increased exposure to other risk factors (e.g., DTS)
  - However, while DTS and IdioVol are related, they sort bonds differently

- Let's control for DTS to see if returns are still negatively related to IdioVol
  - For a given DTS, risk-adjusted returns still tend to decrease with IdioVol
  - Also, controlling for DTS we see that absolute excess return volatility tends to increase with IdioVol
  - Within the DTS × IdioVol sorts, the correlation between alpha and volatility is **-0.24**

- Supportive of the low-risk anomaly



Alpha by Two-Way (DTS × IdioERVol) Sorts; IG Corporates (Biggie)
March 2001- March 2012

	Alpha (by IdioERVol)										
(by DTS)	I	II	III	IV	V	VI	VII	VIII	IX	X	Total
I (low)	0.04	0.05	0.05	0.03	0.02	0.03	0.03	0.01	-0.02	-0.09	0.02
II	0.06	0.06	0.05	0.02	0.04	0.03	0.04	0.01	-0.02	-0.02	0.03
III	0.07	0.06	0.06	0.05	0.03	0.03	0.01	0.01	0.01	-0.02	0.03
IV	0.08	0.07	0.05	-0.01	-0.02	-0.01	-0.01	-0.02	-0.03	-0.09	0.00
V	0.05	0.01	0.03	0.02	0.00	-0.05	-0.03	-0.19	-0.02	0.03	-0.02
VI	0.07	0.09	0.06	-0.01	0.01	-0.02	0.00	0.00	-0.04	0.07	0.02
VII	0.01	0.05	-0.02	0.02	-0.10	0.01	-0.08	-0.08	0.02	0.03	-0.02
VIII	0.01	0.03	0.00	-0.07	0.01	-0.06	-0.08	-0.18	-0.04	0.12	-0.02
IX	0.00	-0.02	-0.05	0.03	0.03	-0.06	-0.23	-0.18	-0.05	0.05	-0.06
X (high)	0.17	0.09	0.02	0.12	0.08	0.01	-0.11	0.00	-0.08	0.02	0.05
Total	0.06	0.04	0.03	0.01	0.01	-0.01	-0.04	-0.07	-0.02	0.01	

increasing volatility →

Source: Barclays Research

Summary

- **Using a simple measure (realized IdioVol) of bond-level idiosyncratic risk, we see that bonds with *higher* realized idiosyncratic risk tend to have *lower* risk-adjusted returns**
  - Controlling for DTS exposure, we see lower risk-adjusted returns for bonds with higher IdioVol
  - Gives some limited support to the low-risk anomaly when risk is measured using realized IdioVol

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