BARCLAYS

Quantitative Portfolio Strategy
Cross Asset Research

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Using Aggregate Accounting Data in Managing Bond Portfolios

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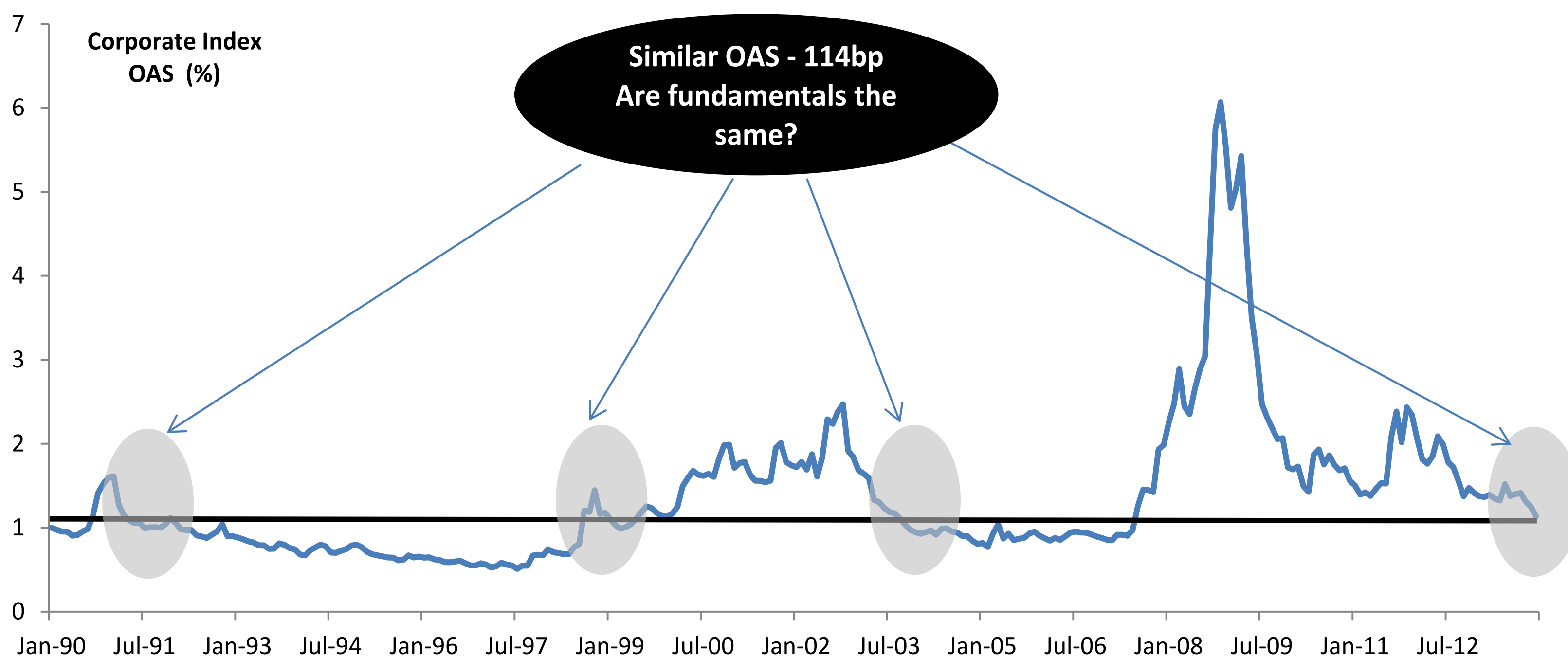
Do Credit Spreads Tell Investors the Entire Story?

- The OAS of the Corporate Index was 114bp in December 2013
- The Index was trading at the same levels at other times
- **Do similar spreads imply similar market conditions?**
- **Are fundamentals in all those periods the same?**

OAS of Barclays Corporate Index



Source: Barclays Research

Can Fundamental Data Be Useful in Managing a Credit Port.?

Aggregate level

- Characterize overall credit market beyond spread?
- Predict systematic credit events (downgrade/default)?

Cross-section

- Generate signals for building portfolios with better return/risk profiles?
- Predict issuer level credit events (front-running rating agencies)?

Linking Accounting Data
To U.S. Corporate Issuers

Sample Construction

- All issuers in the Corporate and HY Indices (January 1990 - December 2013) were linked to accounting data from COMPUSTAT
- **Key challenges: Lack of common firm identifiers and corporate events**
- Mapping is based on BEAM (Bonds in Equity Asset Momentum) methodology*

Results

- Mapping success for both IG and HY indices increased consistently over time
- In recent years, mapped sample included ~90% in market cap, almost 100% for IG
- Most unmapped HY issuers had no identifiers (private firms)

Matching of Corporate and High Yield Index Constituents to COMPUSTAT

	Number of Issuers					Market Value ($ Bln)				
	1994	1999	2004	2009	2013	1994	1999	2004	2009	2013
Corporate Index	647	988	985	880	1,016	560	945	1,777	1,963	3,469
Mapped	79%	86%	87%	94%	92%	85%	91%	94%	97%	96%
HY Index	400	1,165	899	800	1,172	144	342	577	447	1,224
Mapped	51%	39%	57%	65%	62%	68%	55%	71%	77%	74%
Agg. Universe (IG + HY)	1,047	2,153	1,884	1,680	2,188	705	1,287	2,354	2,411	4,693
Mapped	68%	60%	73%	80%	76%	81%	82%	88%	93%	90%

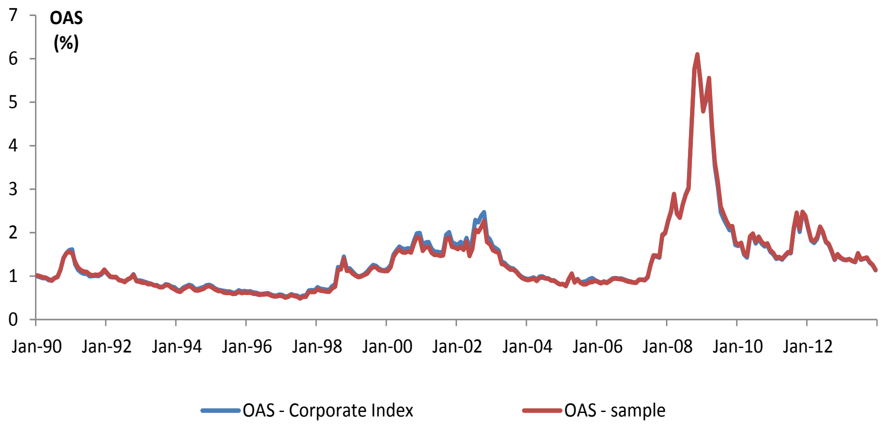
Source: Compustat, Barclays Research

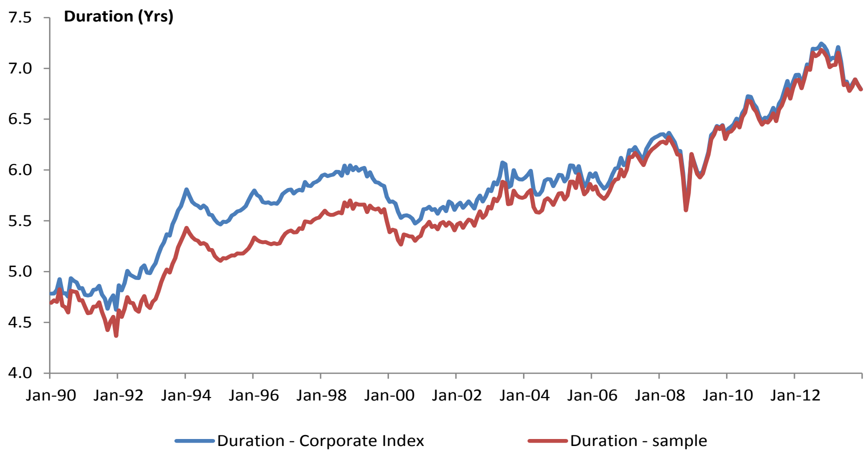
*Ben Dor, A., and Xu, J., "BEAM (Bonds in Equity Asset Momentum) Value of Bond Market Information in Equity Momentum Strategies, Barclays, June 5, 2014.

Mapped Samples Are Similar to Corp. and HY Indices

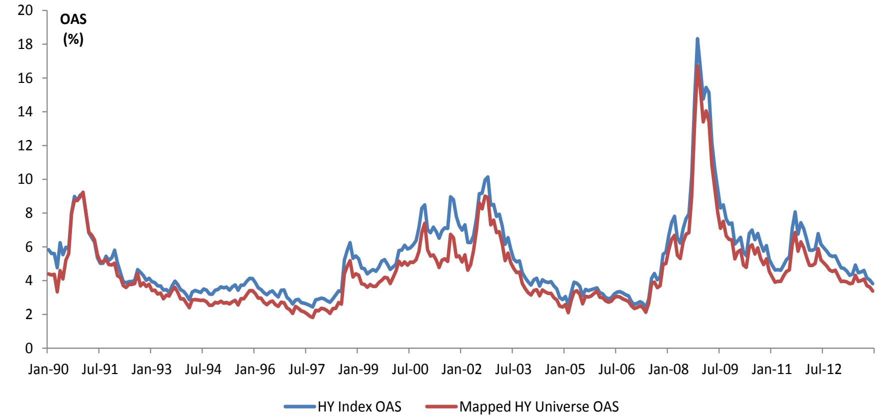
- Spreads of both IG and HY samples were very similar to their respective indices
- Initial duration gap gradually closed as coverage of IG issuers improved over time
- ➢ Overall, both samples were similar to indices in terms of spread and duration

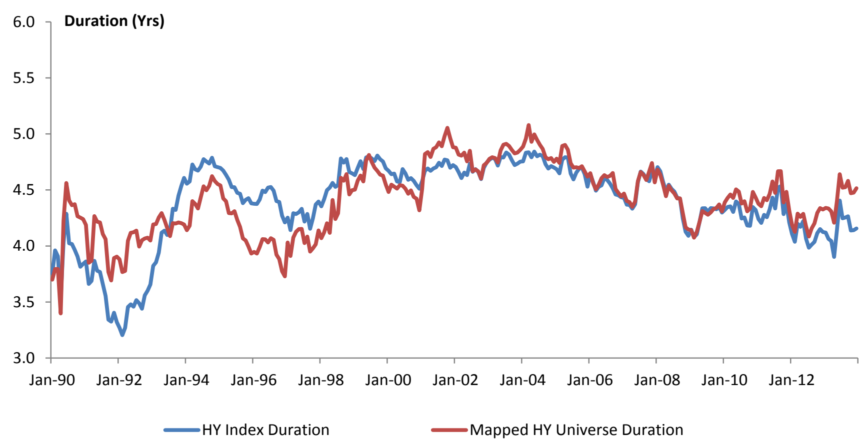
Mapped Univ. vs. Index - IG





Mapped Univ. vs. Index - HY





Source: Compustat, Barclays Research

Aggregate Financial Ratios of Bond Indices: An Historical Perspective

Which Financial Ratios to Use and How to Calculate Them?

Examples of some financial ratios that may be useful for credit investors

Credit quality	Leverage	Liquidity	Profitability
Income to total (net) debt	Total (net) debt to total assets	Cash to total assets	Return on Equity (ROE)
Interest coverage ratio		Current ratio (current assets to current liabilities)	Return on Assets (ROA)
		Quick ratio (current assets minus inventory to liabilities)	Net Profit Margin

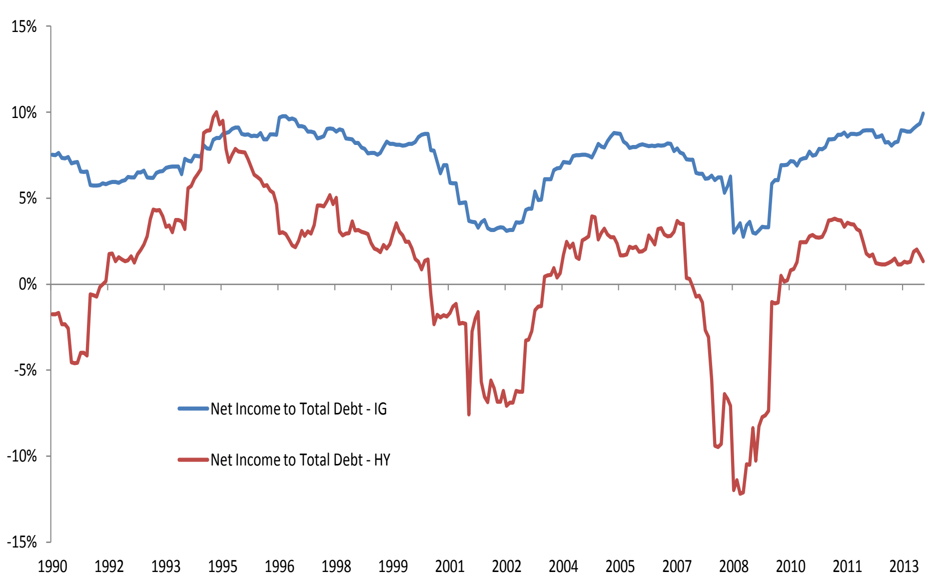
- To avoid combining negative values, ratios are calculated by separately summing the numerator and denominator
- For example, the income to debt ratio for IG would be total income of all issuers divided by total debt of all issuers

$$\mathit{Income\ to\ Debt\ Ratio} = \frac{\sum \text{Net Income}_i}{\sum \text{Debt}_i}$$

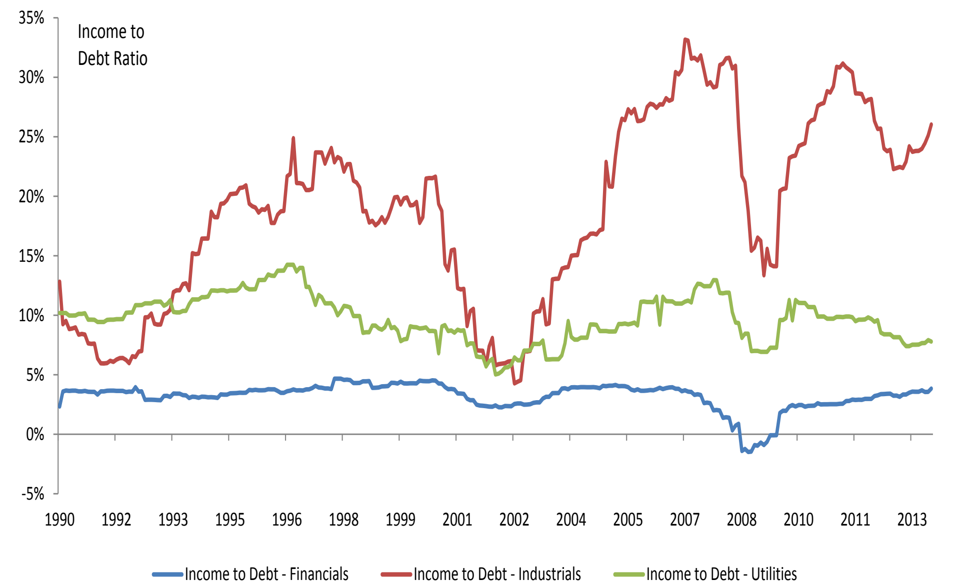
Financial Ratios for Indices – A Historical Perspective

- Example: **Income to total net debt ratio**
- The income to total debt ratio at the end of 2013 was at a historical high for IG issuers but below the median for HY issuers
- Industrial issuers exhibited the greatest variation over time, as their income is most sensitive to the business cycle

Net Income to Debt Ratio – IG vs. HY



Net Income to Debt (IG) – by Industry

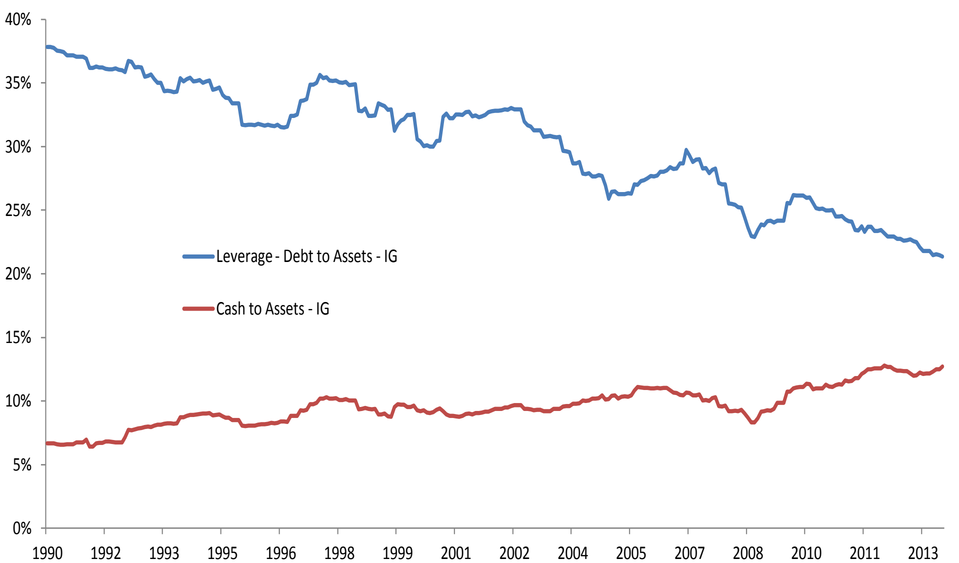


Source: Compustat, Barclays Research

Leverage and Cash Holdings

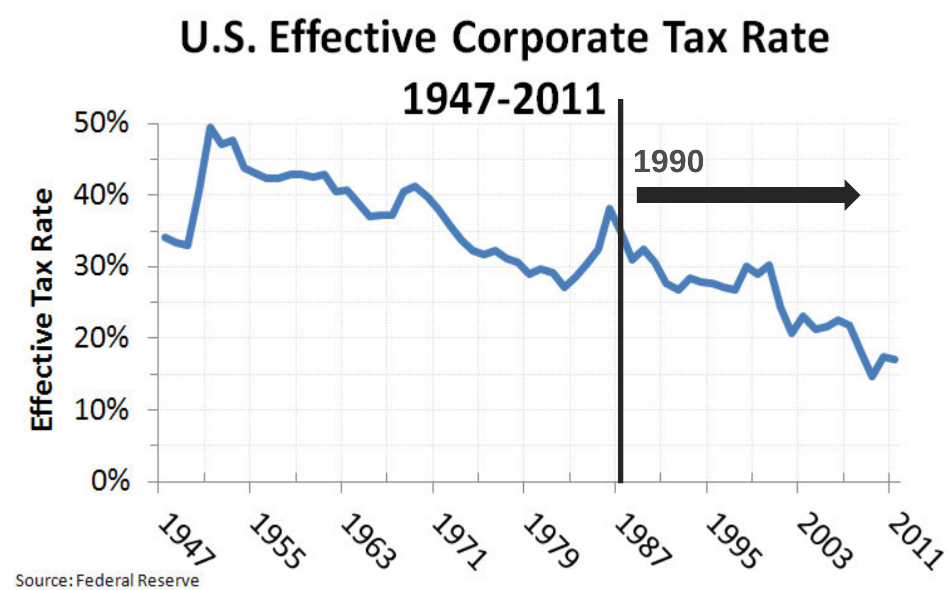
- **Net debt to assets ratio** exhibited a consistent trend of deleveraging
- The decline in leverage coincided with a decrease in the U.S. effective corporate tax rate, implying lower benefits of holding debt (tax shield)
- Increase in **cash and short-term investments** consistent with deleveraging and a low rate environment

Leverage vs. Cash Ratio - IG



Source: Compustat, Barclays Research

U.S. Effective Tax Rate



Comparing Fundamental Data in Periods With Same OAS

- Despite similar spreads, fundamental ratios exhibited wide variability
- Issuers in December 2013 had better coverage ratios, lower leverage, and higher profit margin compared with 1998
- However, they also had lower ROA and much lower ROE

➢ **The use of fundamental data offers insights about market conditions that are not captured by spreads**

Annual Financial Ratios

	Dec. 1991	Dec. 1998	Aug. 2003	2013.12
Bond/Equity Mapping Statistics - Investment Grade				
Index OAS (bp)	111.7	117.8	117.2	113.6
Index Duration	4.6	6.0	5.8	6.8
Mapped as % of Total Index MV	75%	62%	82%	94%
Mapped Univ. OAS (bp)	114.8	112.7	114.9	114.6
Mapped Univ. Duration	4.4	5.6	5.7	6.8
Coverage Ratio				
Net Income to Tot. Debt	5.8%	8.2%	4.4%	10.2%
Operating Income to Tot. Debt	14.2%	14.8%	10.2%	16.0%
Free Cash Flow to Tot. Debt	2.1%	6.0%	5.0%	7.9%
Interest Coverage	2.58	2.82	3.71	7.27
Leverage Ratio				
Total Debt to Assets	36.9%	32.8%	31.3%	21.4%
Net Debt to Assets	30.6%	24.0%	22.5%	10.2%
Liquidity Ratio				
Cash to Assets	7.0%	9.4%	9.3%	12.7%
Current Ratio	93.5%	89.9%	95.5%	136.2%
Profitability Ratio				
Net Profit Margin	3.8%	6.7%	5.0%	8.6%
ROA	2.1%	2.7%	1.4%	2.2%
ROE	9.2%	16.4%	9.3%	12.7%
Cashflow to Assets Ratio				
Operating Cashflow	5.5%	4.3%	3.7%	3.7%
Financing Cashflow	0.3%	0.7%	0.0%	-0.8%
Investing Cashflow	-5.5%	-4.8%	-3.4%	-2.9%
Equity Relative Value				
P/E	22.18	25.60	25.18	17.74

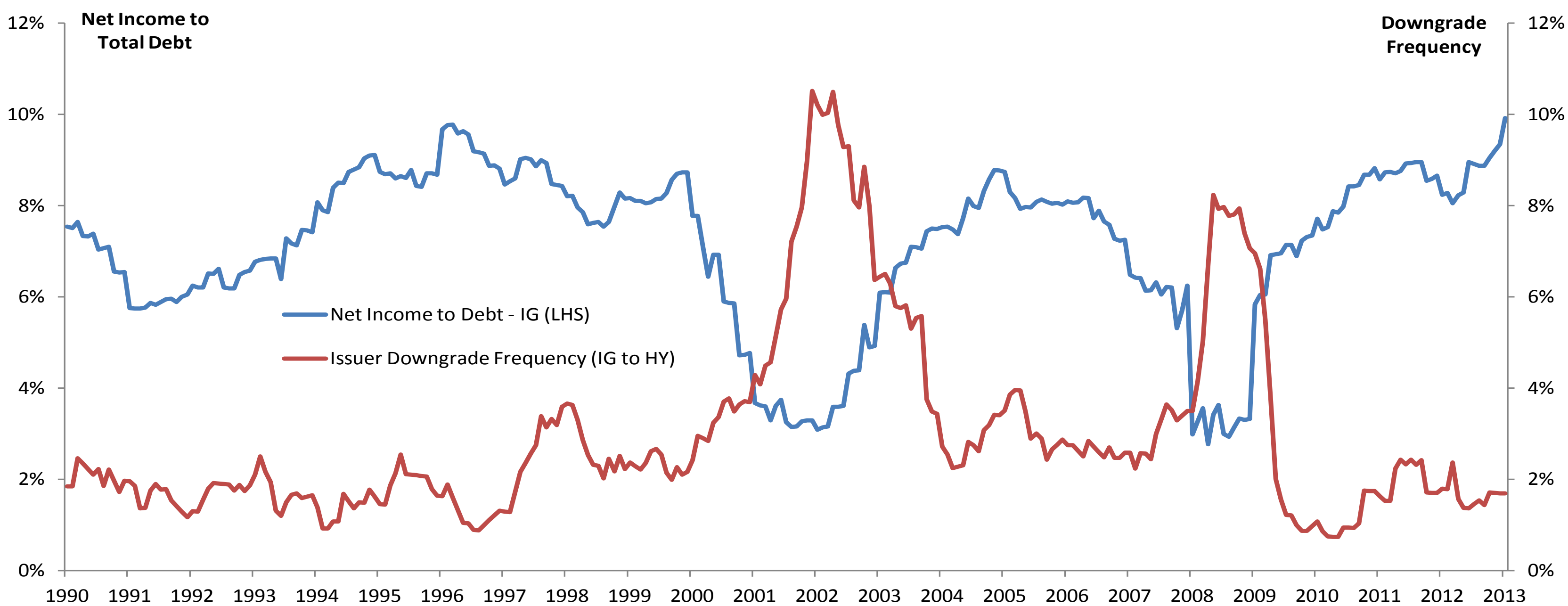
Source: Compustat, Barclays Research

Using Aggregate Financial Ratios as Predictors

Corporate Fundamentals and Downgrade Frequency

- The **income to debt ratio** seems to co-move with the downgrade frequency (based on number of issuers) from IG to HY over a trailing 12-month period
- Does **Income to debt ratio have predictive power?**

Income to Debt Ratio vs. Downgrade Frequency (IG to HY)

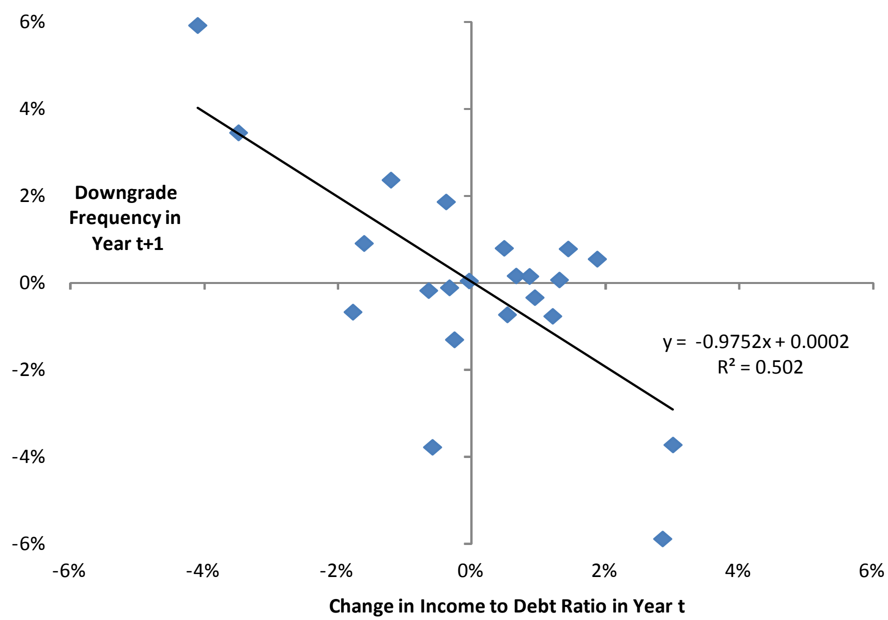


Source: Compustat, Barclays Research

Is the Aggregate Downgrade Frequency Predictable?

- The change in income to debt ratio in year *t* predicted half the variation in downgrade frequency (R^2=50%) in the following year (t+1)
- A 1% increase in income to debt ratio led to a 1% drop in downgrade frequency
- The ratio was still significant after controlling for market spread
- Market spread had little marginal explanatory power and was insignificant

Downgrade Frequency vs. ΔIncome to Debt



Predictive Regression

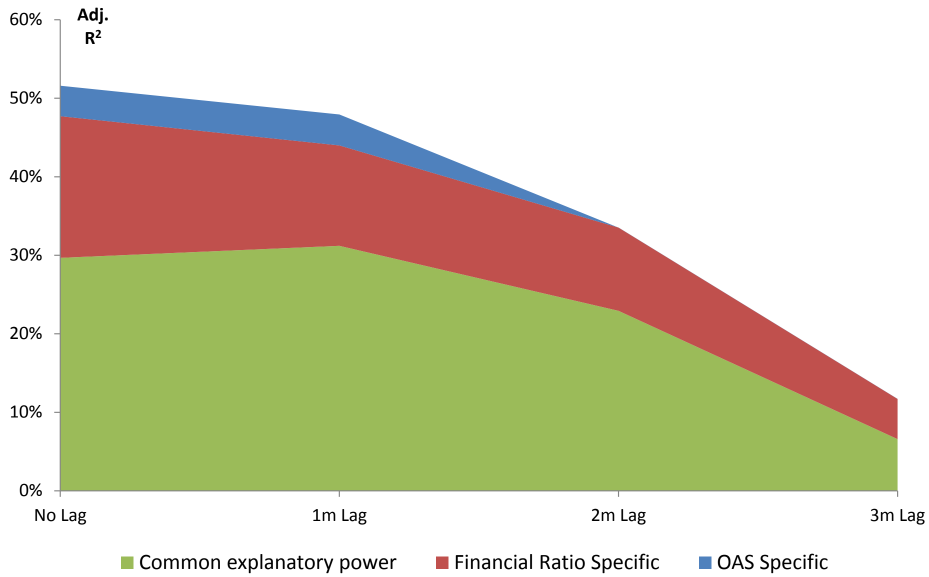
	Model 1		Model 2	
	Coef.	*t-Stat*	Coef.	t-Stat
Intercept	0.00	*0.05*	0.00	*0.04*
Δ Income to Debt Ratio (year t)	-0.98	*-4.49*	-0.74	*-2.91*
Δ OAS (year t)			0.60	*1.61*
# of Obs.	22		22	
Adj. R Square	48%		52%	

Source: Compustat, Barclays Research

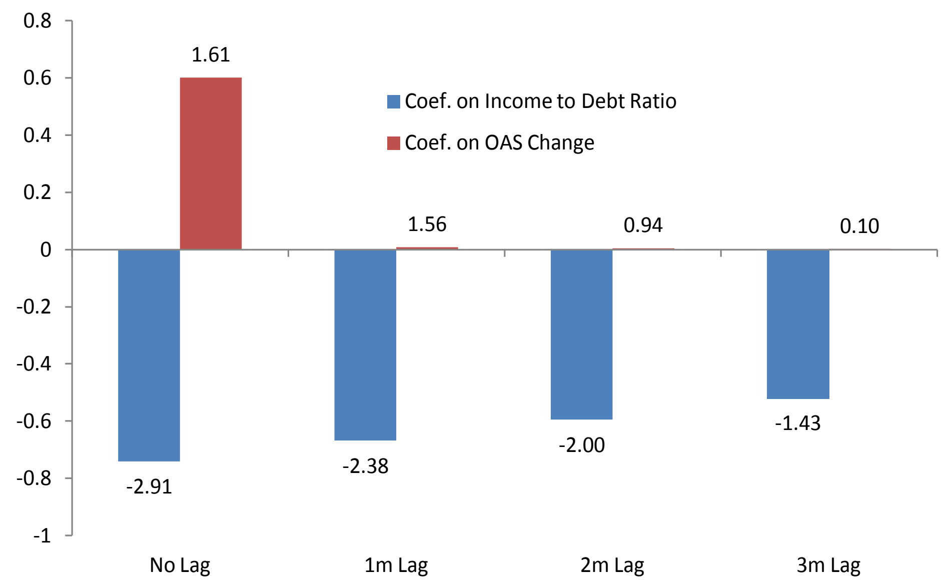
What About the Lag in Reporting?

- Accounting data are available with a delay, which may affect their predictive power
- We vary the reporting lag (one-month lag implies using Q4 data at the end of January)
- A one-month lag results only in a small reduction in predictive power (R-square)
- The importance of income-to-debt supersede that of spreads, which also include non-default components (e.g., liquidity)

Adj. R-Square as Function of Lag



Estimated Coef. as Function of Lag



Source: Compustat, Barclays Research

Forming Portfolios Using Fundamental Data

Constructing Portfolios with Fundamental Data

- Accounting measures may predict credit events beyond spread, but not necessarily performance
- For example, the quarterly correlation between change in income to debt ratio and downgrade frequency or OAS change indicates slow decay of accounting information relative to downgrade, with the first two quarters exhibiting the highest correlation
- In contrast, the relationship with OAS is more contemporaneous and suggests that the market moved in tandem with the release of accounting info

Correlation: Income to Debt and DG. Freq.

Correlation: Income to Debt and OAS

Source: Compustat, Barclays Research

Constructing Portfolios with Fundamental Data - Approach

We look at measures that are potentially forward-looking:

- ❖ Financing cash flow
- ❖ Investment cash flow
- ❖ Earnings ‘surprise’

Methodology

- o Issuers are ranked based on the relevant measures and assigned into five quintiles
- o Ranking is done within a rating x industry* bucket
- o Portfolios are rebalanced annually
- o Rankings are implemented 3 months after the accounting data date

Note: *: Industry classifications are based S&P’s GICS (10 industries)

Ranking on Financing Cash Flow (FIC)

- FIC measures net issuance of debt and equity (net borrowing is positive)
- Discretionary issuance may represent the issuer's view on its own securities
- Issuers with the lowest financing cash flow outperformed those with the highest financing (aggressive borrower) consistently
- Results are consistent with findings in ***Issuance Patterns and Performance of Credit Indices***

Portfolio Formed on Financing Cash Flow

Quintile (5 with highest FIC)	OAS (%)	Duration	DTS	Ex. Return (%/mo)	Ex. Return Vol. (%/mo)	Infor. Ratio
Full Sample: IG Issuers (1991 - 2013)						
1 (Conservative)	1.44	5.82	8.38	0.10	1.30	0.26
2	1.25	6.15	7.68	0.07	1.12	0.20
3	1.28	6.03	7.70	0.04	1.07	0.15
4	1.36	5.83	7.92	0.06	1.15	0.18
5 (Aggressive)	1.37	5.59	7.67	0.04	1.27	0.10
Most Recent 10 Years: IG Issuers (2004 - 2013)						
1 (Conservative)	1.90	6.44	12.22	0.15	1.84	0.28
2	1.57	6.59	10.35	0.09	1.58	0.20
3	1.56	6.45	10.09	0.09	1.48	0.20
4	1.75	6.24	10.91	0.08	1.62	0.17
5 (Aggressive)	1.81	6.09	11.03	0.03	1.76	0.06

Source: Compustat, Barclays Research

Ranking on Investing Cash Flow (IVC)

- Investing cash flow measures net cash from investing activities, which include investment (-), capex (-), acquisition (-), divestment (+) etc.
- Issuers with the highest IVC (lower capex, acquisition) outperformed those with the lowest (higher capex, acquisition) on both an absolute and a risk-adjusted basis
- During the last decade, quintile 5 (high investing cash flow, average 84 names) outperformed quintile 1 by 180bp annually

Portfolio Formed on Investing Cash Flow

Quintile (5 with highest IVC)	OAS (%)	Duration	DTS	Ex. Return (%/mo)	Ex. Return Vol. (%/mo)	Infor. Ratio
Full Sample: IG Issuers (1991 - 2013)						
1 (Aggressive)	1.35	5.77	7.76	0.05	1.25	0.14
2	1.29	6.04	7.77	0.05	1.17	0.15
3	1.34	5.95	7.97	0.07	1.14	0.23
4	1.33	5.86	7.77	0.05	1.09	0.15
5 (Conservative)	1.58	5.43	8.58	0.12	1.32	0.33
Most Recent 10 Years: IG Issuers (2004 - 2013)						
1 (Aggressive)	1.74	6.43	11.20	0.04	1.75	0.08
2	1.62	6.60	10.70	0.10	1.61	0.21
3	1.70	6.25	10.62	0.11	1.62	0.25
4	1.69	6.23	10.51	0.07	1.52	0.17
5 (Conservative)	2.11	5.90	12.44	0.19	1.87	0.36

Source: Compustat, Barclays Research

Ranking on Change in Net Profit Margin

- Market reacts to the ‘earnings surprises’. We use the change in net profit margin (net income/sales) relative to the same quarter last year as a naive proxy for ‘surprise’
- Issuers that experienced a large improvement in net margin outperformed other issuers with higher return and lower volatility
- Measuring ’surprise’ more accurately using ‘consensus’ estimates may improve results

Portfolio Formed on Change in Net Margin (Quarterly Rebalancing)

Quintile (5 with highest Net Margin Chg)	OAS (%)	Duration	DTS	Ex. Return (%/mo)	Ex. Return Vol. (%/mo)	Infor. Ratio
Full Sample: IG Issuers (1991 - 2013)						
1 (Deteriorating)	1.53	5.73	8.75	0.07	1.38	0.17
2	1.32	5.81	7.67	0.05	1.16	0.13
3	1.28	5.81	7.46	0.05	1.13	0.14
4	1.29	5.75	7.39	0.07	1.15	0.21
5 (Improving)	1.36	5.73	7.78	0.14	1.17	0.42
Most Recent 10 Years: IG Issuers (2004 - 2013)						
1 (Deteriorating)	2.05	6.25	12.79	0.08	1.97	0.14
2	1.70	6.24	10.61	0.06	1.61	0.13
3	1.61	6.37	10.27	0.02	1.59	0.05
4	1.63	6.36	10.35	0.08	1.63	0.18
5 (Improving)	1.77	6.35	11.25	0.19	1.67	0.39

Source: Compustat, Barclays Research

Summary

- The use of fundamental data offers insights about market conditions that are not captured by spreads

- Allows to predict systematic credit events (downgrade/default)

- Can generate signals for building portfolios with better return/risk profiles

- Can help construct fundamentally weighted credit indices

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