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Fundamental bond indexing on solvency criteria

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Fundamental indexing

- **What ?**
  market index construction based on fundamental - as opposed to market data.

- **Why ?**
  growing evidence that market-weighted indices are not return-to-risk efficient.

- **Who ?**
  an increasing number of index providers launch alternative *smart* indices.

- **Where ?**
  by and large applied on equity, we focus on bonds.

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Alternative *smart* indices

Overview

Market weighting

market standard

Smart weighting

"price eliminated from weighting scheme"

Fundamental indexing

"alternative market proxy"

Size-weighted

"appreciation-free criterion"

GDP-weighted country indices

RAFI stock & bond indices

Solvency-weighted

"define market relevance"

- *Fiscal Strength treasuries indices*
- *Macro-weighted treasuries indices*

Risk-based approach

"create a reference point"

- *minimum variance*
- *risk parity*
- *maximum diversification*
- *equal weighting*

Why fundamental indexing

➢ Standing indices criticised

1 - Incompleteness

Roll (1977) "A critique of the asset pricing theory's tests", *JoFE*

2 - Noise in price problem

Summers (1986) "Does the stock market rationally reflect fundamental values?", *JoF*

3 - Bias to high indebtedness

Siegel (2003) "Benchmarks and investment management", *AIMR*

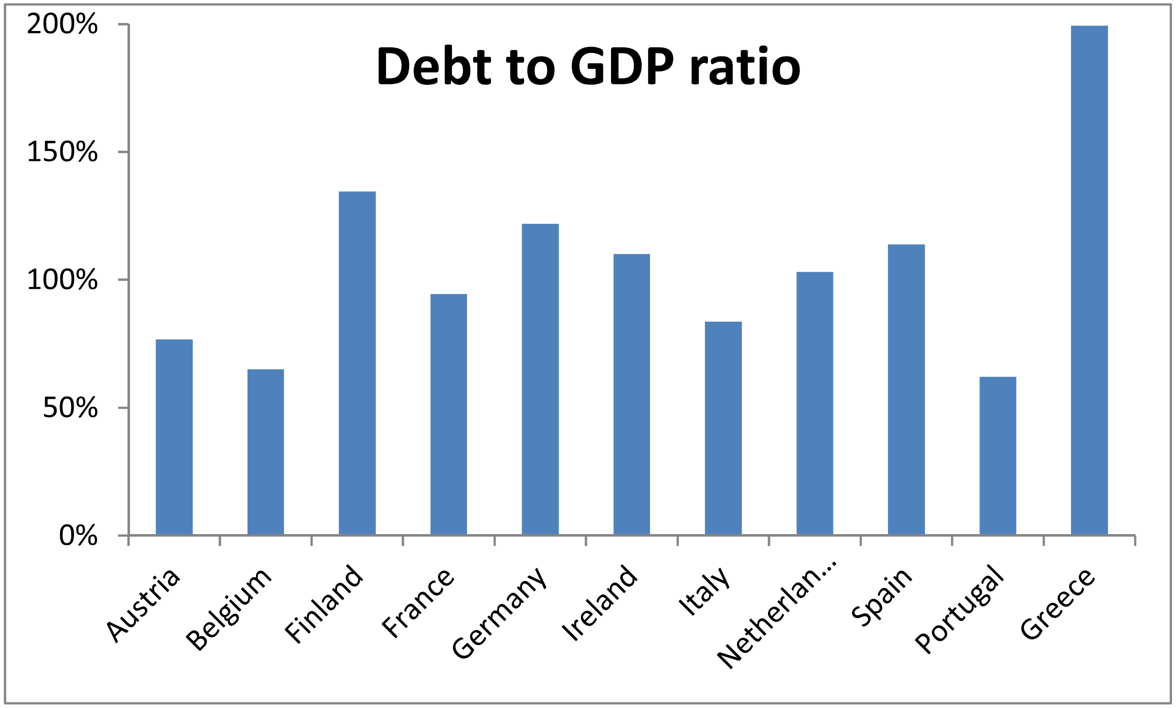
➢ Fundamental indexing offers remedy (to 2 & 3)

In theory   no undue debt levels
In practice distorted prices may not reflect fundamental values efficiently

it makes sense to integrate elementary information on debt issuers in index construction process.

Undue debt levels?

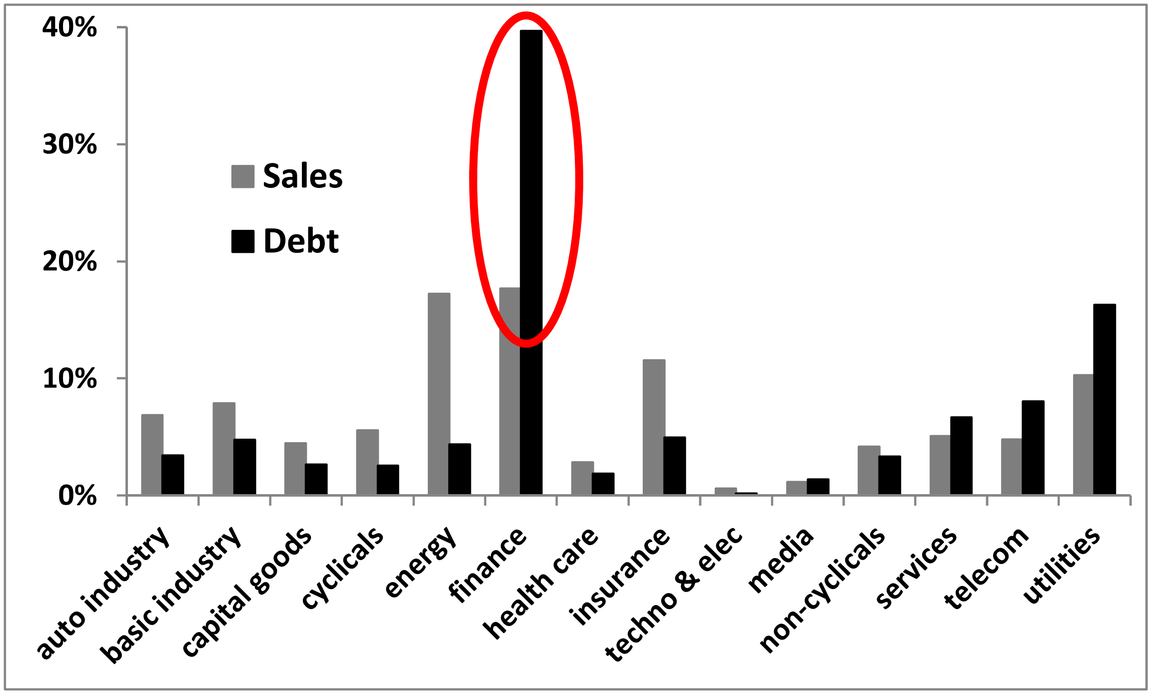
- Greece highest indebted member state in Euro zone - 2011



Data source: Eurostat for GDP, Barclays Euro Treasuries index for debt

Undue debt levels?

- Banking industry highest indebted sector - 2014



Investment philosophy

Fundamental indexing

- The premise that
  - an index that respects the proportions between tradable assets, best represents the market as a whole
  - (from an investor's perspective) a firm's debt size defines its market-neutral *beta* position
- is founded on Capital Asset Pricing Theory
  - which assumes strongly efficient prices.

- If the efficiency assumption is relaxed, so is the principle of strict proportionality in the market index
  - over-the-counter trading is not conducive to information-efficient pricing
  - the notorious lack of market liquidity in the corporate bond markets neither

- Fundamental indexing inverses the induction process
  - Instead of using market data to infer information on fundamental values,
  - it uses fundamental data to infer information on the market.

Investment philosophy continued

Fundamental indexing

- What matters most: fundamental- or market value?
  - Fundamental value
    - ignores the macroeconomic context
    - data is backward-looking and untimely
  - Market value
    - distorted by market friction

- What matters is your choice of reference
  - upon which to base investment decisions
  - choice determined by investment horizon

We study a solvency-weighted index

- Intent
  - Best effort to stand in for market pricing
  - Measures the economic footprint of firms
- Design
  - Index weights based on annual balance sheet data
  - A fixed set of solvency criteria is used
  - Index construction method transparent and universal
- Analysis
  - Tested on US bond market between 2000 and 2015
  - Comparison with debt-weighted market index

Solvency criteria

Five categories*

	industrials	financials
➢ Firm size	asset value equity value sales revenues	
➢ Profitability	earnings growth earnings margin	return on equity operating margin
➢ Leverage	debt over earnings	debt over equity
➢ Cash position	cash over short debt	
➢ Asset quality	interest coverage ratio	loss provisions over loans tier 1 capital reserves ratio

➢ We take Z-scored sums

* In the spirit of Altman (1968) « Financial ratios, discrimination analysis and the prediction of corporate bankruptcy » *JoF*

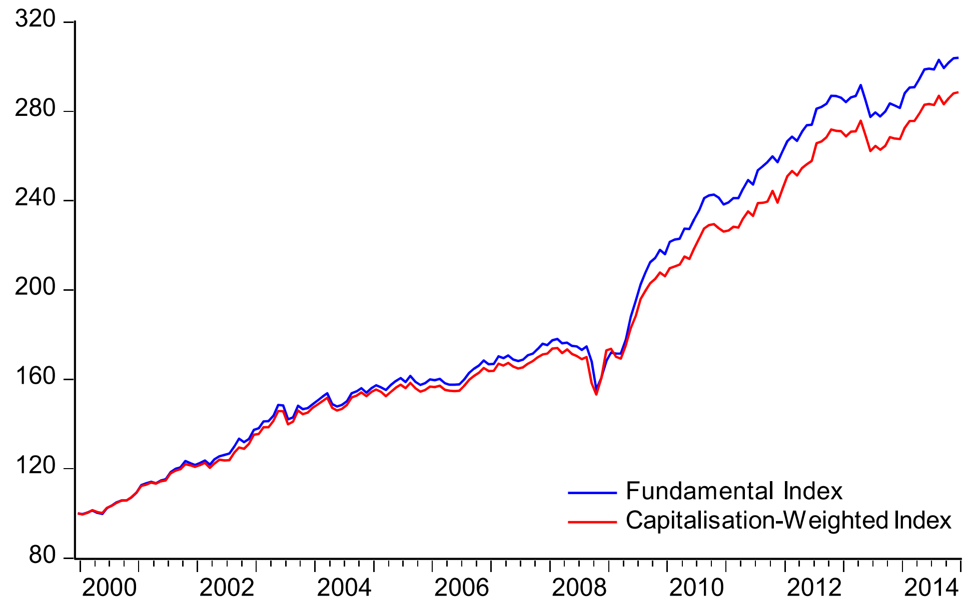
Index construction process

- Index membership
  - Universe defined by BoA Merrill Lynch US Large Cap corporate bond index
  - Semi governments, e.g. endowment funds, state companies, discarded (7%)
  - As-of balance sheet data collected for 655 firms
- Firm weighting scheme
  - Annual rebalance: in March all firm weights reset to their solvency scores
  - Usual index dynamics conserved otherwise
- Bond weighting scheme
  - Firms' debt structures conserved

Back-test

Performance of fundamental index compared to market index

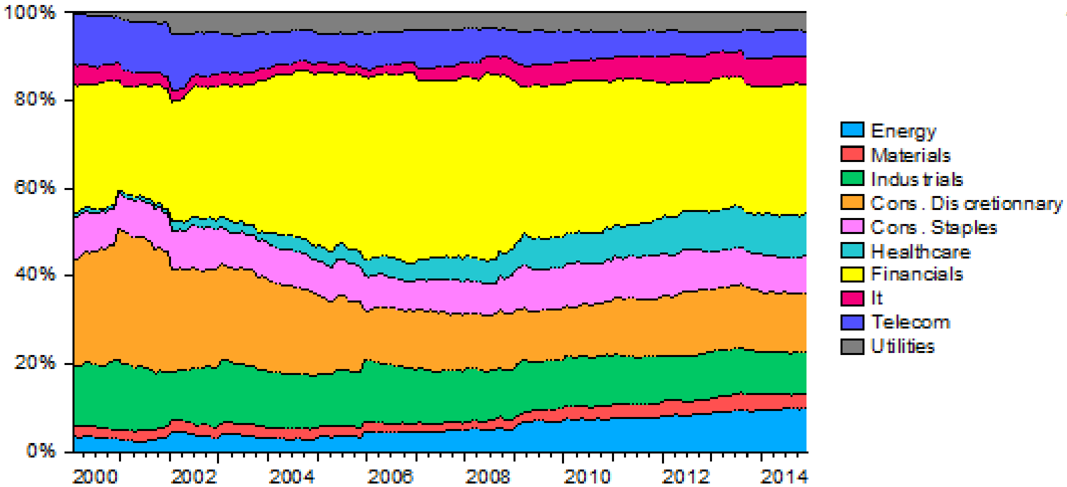
	fundamental index	market index
total return	7.7%	7.3%
Volatility	5.4%	5.4%
Sharpe	1.1	1.0
Duration	6.1	6.0
Rating	A/BBB	A/BBB
TE	0.6%	-
IR	0.6	-



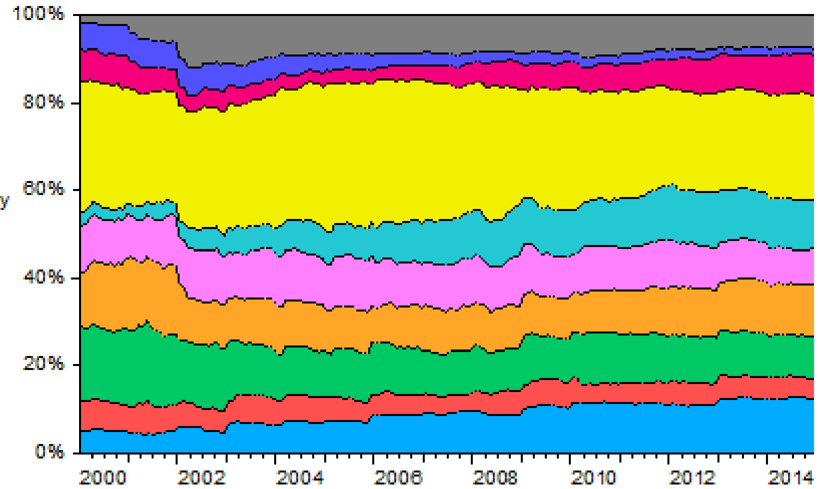
Back-test

Economic sector weights

market index



fundamental index



When applying fundamental weights

- The financial sector shrinks
- Telecom shrinks
- Healthcare expands
- Utilities expand

If sector biases were cancelled

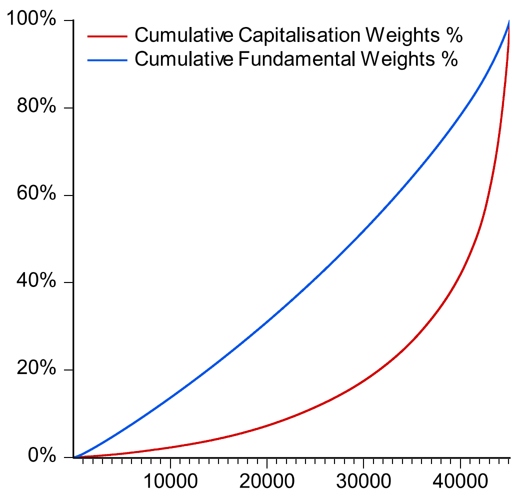
- the outperformance of the fundamental index remains

➡ **gain of fundamental weighting lies <u>within</u> sectors**

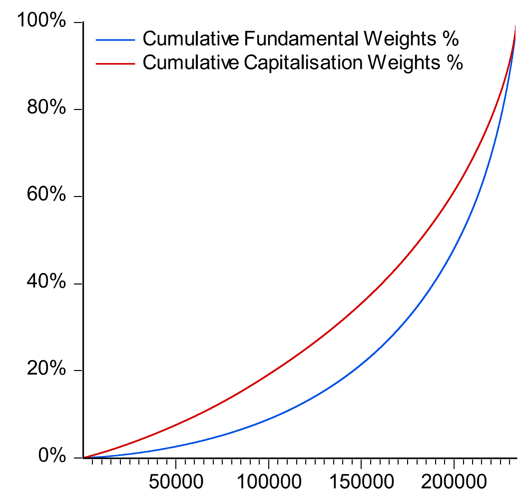
Back-test

Index concentration

on firm level



on bond level



The fundamental index is less concentrated on firm level, yet on bond level it is more concentrated

Back-test

Top 20

Capitalisation Weighted Index				Fundamental Index					
No.	Description	Weight	Score	No.	Description	Weight	Score	Score size	Score cycle
1	General Electric	3.91%	11.1	1	Apple	0.34%	13.1	6.9	6.2
2	Bank of America	3.90%	12.7	2	MidAmerican Energy	0.34%	13.0	7.3	5.7
3	Bank One	3.59%	10.0	3	BNSF Railway	0.34%	13.0	7.3	5.7
4	Verizon Communications	3.48%	12.4	4	Google	0.34%	13.0	6.3	6.7
5	Goldman Sachs	3.33%	11.4	5	Chevron	0.34%	12.8	7.0	5.8
6	Citigroup	2.59%	10.8	6	Microsoft	0.33%	12.7	6.4	6.3
7	Morgan Stanley	2.56%	11.0	7	Bank of America	0.33%	12.7	7.6	5.1
8	Wells Fargo	2.05%	9.6	8	HSBC	0.33%	12.6	7.5	5.2
9	AT&T	2.03%	12.3	9	Santander	0.33%	12.5	7.0	5.5
10	Time Warner	1.92%	10.6	10	Johnson & Johnson	0.33%	12.5	6.4	6.1
11	Comcast	1.85%	11.6	11	Verizon	0.32%	12.4	6.7	5.7
12	Wal-Mart	1.50%	12.1	12	Motiva Enterprises	0.32%	12.3	7.3	5.0
13	Ford	1.42%	10.6	13	AT&T	0.32%	12.3	6.7	5.6
14	AIG	1.02%	12.0	14	Occidental Petroleum	0.32%	12.3	5.9	6.4
15	IBM	1.00%	11.5	15	Intel	0.32%	12.2	6.1	6.0
16	MetLife	0.97%	11.8	16	Oracle	0.32%	12.2	6.0	6.1
17	American Express	0.92%	11.6	17	Cisco	0.32%	12.1	6.1	6.0
18	Pepsi	0.89%	11.1	18	Kohlberg Kravis Roberts	0.32%	12.1	5.4	6.8
19	Oracle	0.87%	12.1	19	Wal-Mart	0.32%	12.1	7.2	4.8
20	Amgen	0.82%	11.0	20	AIG	0.31%	12.0	6.7	5.3

Back-test

Turnover & market liquidity

Turnover

- Rebalancing back to fundamental levels produces 23% extra turnover per year.

Measured by 3 liquidity indicators

– Average size of debt issues	*fundamental index seems less liquid*
– Average time-to-maturity	*fundamental index seems more liquid*
– Proportion of on-the-run bonds	*fundamental index seems more liquid*

Solvency versus size weighting

- We have studied a size-weighted corporate bond index as well where issuers are proportional to their fiscal-year-end sales revenues.

- Index close to RAFI designed by Research Affiliates®

- Intention is to weigh by an appreciation-free measure, a remote proxy for fundamental value

- Index construction is less data intensive and therefore less data dependent

- Superior return-to-risk due to sector reweighing, not as much by individual firm reweighing

Marielle de Jong and Hongwen Wu (2014) « Fundamental indexation for bond markets »
Journal of Risk Finance 15, n° 3.

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Conclusion

– **Solvency-weighted indices seem a sound candidate for representing bond markets**

– **weighting scheme coherent with fundamental valuation philosophy**

Value of assets eventually determined by fundamental value of issuer

– **Debt weighting presupposes information-efficient prices**

As many investors pursue a benchmarked strategy, new bond issues by an indebted entity seem to get absorbed without price impact

- This was the case for Euro Treasuries in 2009.

– **Time for fundamentally-weighted corporate bond indices ?**

One caveat: it is cumbersome to put in place