

MEASURING AND CONTROLLING YOUR INVESTMENT RISK

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Northfield Information

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The Challenge

Equity portfolios whose selection of securities is subject to social responsibility screening represent a restricted set of economic opportunity and produce different returns from portfolios composed of more broadly based market indices.

Literature

- ∪ Luck (1993, 1998) finds half of the DSI's outperformance since due to stock selection, which was, in turn, a function of the social screens.
- ∪ This raises the possibility that there is a “social factor”, which affects returns. If so, this would need to be estimated and utilized in risk management of socially screened portfolios.

Literature, Continued

- ⌚ Numerous other studies, however, have failed to find such a factor.
- ⌚ Dhrymes (1998) tests 17 of factors in a widely used database of corporate social responsibility and finds “no perceptible and consistent differences in the (expected or mean) rates of return... between SR firms and entire universe”

Literature, Continued

- ⌚ Hamilton, Jo, and Statman (1993) find that the performance of screened and unscreened mutual funds is indistinguishable.
- ⌚ Kurtz, Lloyd and Dan diBartolomeo, “Socially Screened Portfolios: An Attribution Analysis of Relative Performance”, *Journal of Investing*, Fall 1996.
- ⌚ diBartolomeo, Dan and Kurtz, Lloyd, “Managing the Risk of Socially Screened Portfolios”, *www.northinfo.com*, 1999.

Literature Survey: Conclusions

- ∪ There is strong empirical evidence that there is no systematic return factor distinguishing socially screened portfolios and typical investment universe.
- ∪ Therefore, industry standard risk control models and optimization algorithms can be useful in managing socially screened portfolios.

What We Want to Show

- ⌚ That socially responsible portfolios are a very close proxy to conventional (S&P 500, Russell 1000) institutional asset management practice.
- ⌚ That portfolio optimization tools are useful at estimating and controlling the risk of socially responsible funds.

Factor Model Attribution Analysis of Domini Social Index

Our first step was to run a performance attribution of the DSI 400 against the S&P 500 for the period May of 1992 through June 2002, using an endogenous factor model.

Results of Performance Attribution: 1992 through 2002 (June)

- υ Average Beta is 1.10 vs. 1.04 for S&P 500
Note: Beta vs. Northfield's Total Market Benchmark
- υ Return to beta is 2 b.p. (± 0.24) per *month*.
- υ Return to industry exposure is 8 b.p. (± 0.44) per *month*
- υ Return to factor exposure is 0 b.p. (± 0.41) per *month*
- υ Return to stock specific risk is -2 b.p. (± 0.59) per *month*
- υ Realized tracking error is 3.25% per *year*.
- υ Absolute annualized volatility of DSI Fund is 15% vs. 14.1% for S&P 500

Performance Attribution: Factor Exposure

Factor	Mean Value DSI 400	Mean Value S&P 500
Price/Earnings	24.86	23.55
Price/Book	3.7	3.4
Dividend Yield %	1.6	2
Trading Activity	0.08	0.07
Relative Strength	1.15	1.13
Market Cap	56390.07	59513.47
Earnings Variability	0.36	0.42
EPS Growth Rate %	12.92	11.23
Price/Revenue	1.6	1.44
Debt/Equity	0.67	0.89
Price Volatility	0.22	0.21

Performance Attribution: Under Weighted Industries

Industry	Weight DSI 400	Weight S&P 500	Active Weight
General Manufacturing	0.48	4.83	-4.35
Oil Integrated Majors	1.71	5.23	-3.52
Drugs	3.91	7.38	-3.47
Electric Utilities	0.44	3.27	-2.83
Oil Refining & Sales	0.19	1.97	-1.79
Chemicals Basic	0.19	1.85	-1.66
Auto & Truck	0.22	1.85	-1.62
Aerospace	0	1.62	-1.61
Tobacco	0.17	1.78	-1.6

Performance Attribution: Over Weighted Industries

Industry	Weight DSI 400	Weight S&P 500	Active Weight
Medical Supplies	3.6	2.35	1.26
Soaps & Toiletries	3.49	2.2	1.29
Electronics	5.71	4.16	1.55
Beverages	4.96	3.19	1.77
Financial Services	4.83	2.89	1.94
Insurance Other	5.25	3.11	2.14
Telecommunications	10.61	8.34	2.27
Computers	7.91	5.43	2.48
Retail Soft Goods	6.79	3.75	3.04

Reweighting Using Fundamental Model

- ∪ The reweighted portfolios were designed to mimic the behavior of the S&P 500 by matching the factor loadings of the revised DSI to factor loadings of the S&P 500 and to minimize stock specific (non factor) risk as much as possible.
- ∪ The initial "optimized" DSI portfolio was constructed on December 31, 1992 and was rebalanced at the end of each month.
- ∪ Rebalancing procedures involved no constraint on position sizes or number of securities.
- ∪ Transaction costs were assumed at 2% per share, one-way.

Results of Performance Attribution: Reweighted Portfolio

- υ Average Beta is 1.03 vs. 1.04 for S&P 500
- υ Return to beta is 0 b.p. (± 0.06) per *month*.
- υ Return to industry exposure is 4 b.p. (± 0.28) per *month*
- υ Return to factor exposure is -2 b.p. (± 0.24) per *month*
- υ Return to stock specific risk is +2 b.p. (± 0.50) per *month*
- υ Realized tracking error is 2.0% per *year*.
- υ Absolute annualized volatility of DSI Fund is 13.6% vs. 14.1% for S&P 500

Factor Exposure: Optimized

Factor	Mean Value DSI 400	Mean Value S&P 500
Price/Earnings	23.5	23.55
Price/Book	3.34	3.4
Dividend Yield %	1.96	2.00
Trading Activity	0.07	0.07
Relative Strength	1.11	1.13
Market Cap	47598.53	59513.47
Earnings Variability	0.42	0.42
EPS Growth Rate %	11.4	11.23
Price/Revenue	1.48	1.44
Debt/Equity	0.82	0.89
Price Volatility	0.20	0.21

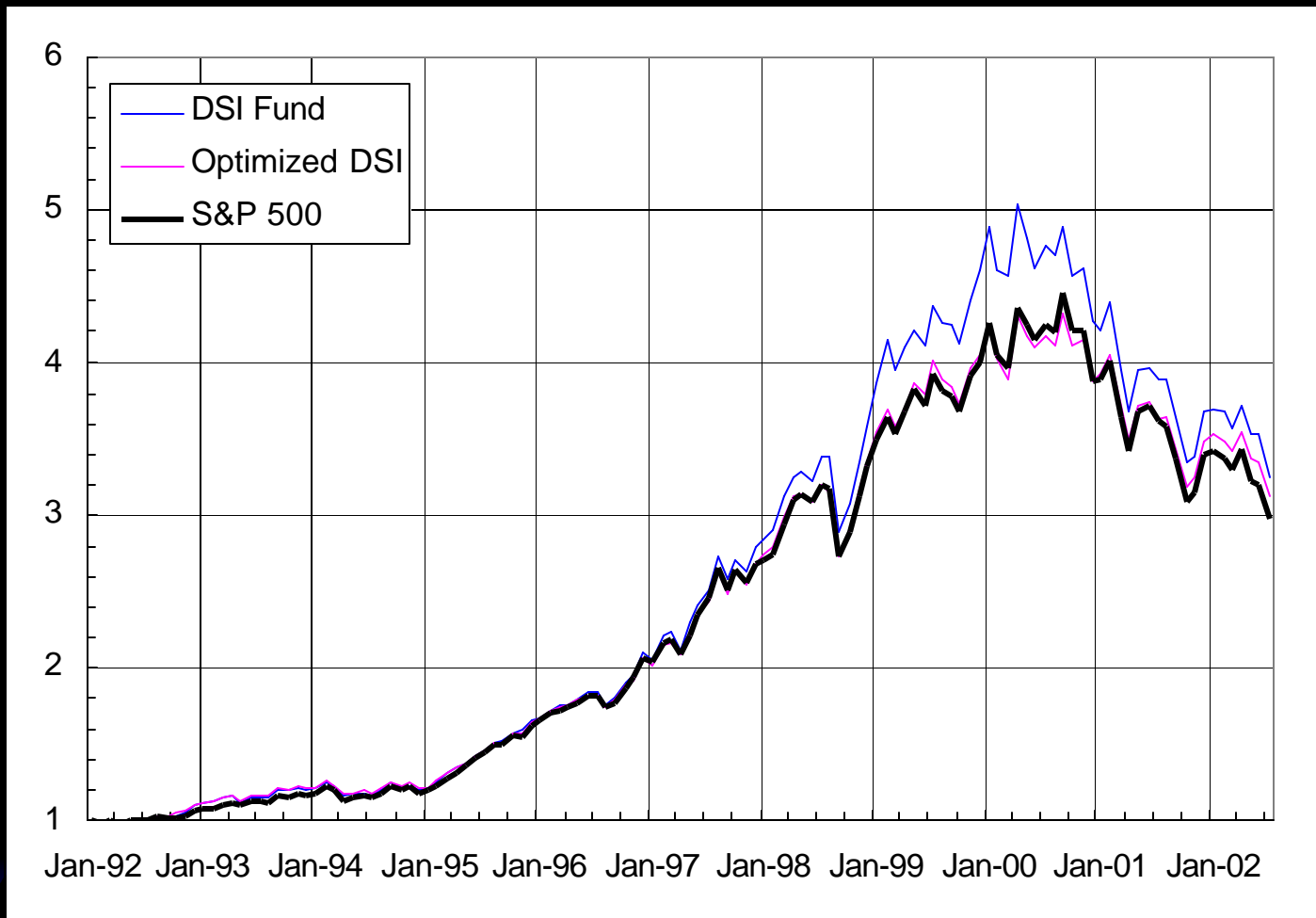
Performance Attribution: Optimized Under Weighted Industries

Industry	Weight DSI 400	Weight S&P 500	Active Weight
General Manufacturing	0.96	4.83	-3.87
Drugs	3.86	7.38	-3.52
Tobacco	0.12	1.78	-1.65
Aerospace	0	1.62	-1.61
Electric Utilities	1.74	3.27	-1.52
Auto & Truck	0.62	1.85	-1.23
Oil Refining & Sales	0.85	1.97	-1.13
Oil Integrated Majors	4.37	5.23	-0.85
Chemicals Basic	1.01	1.85	-0.84

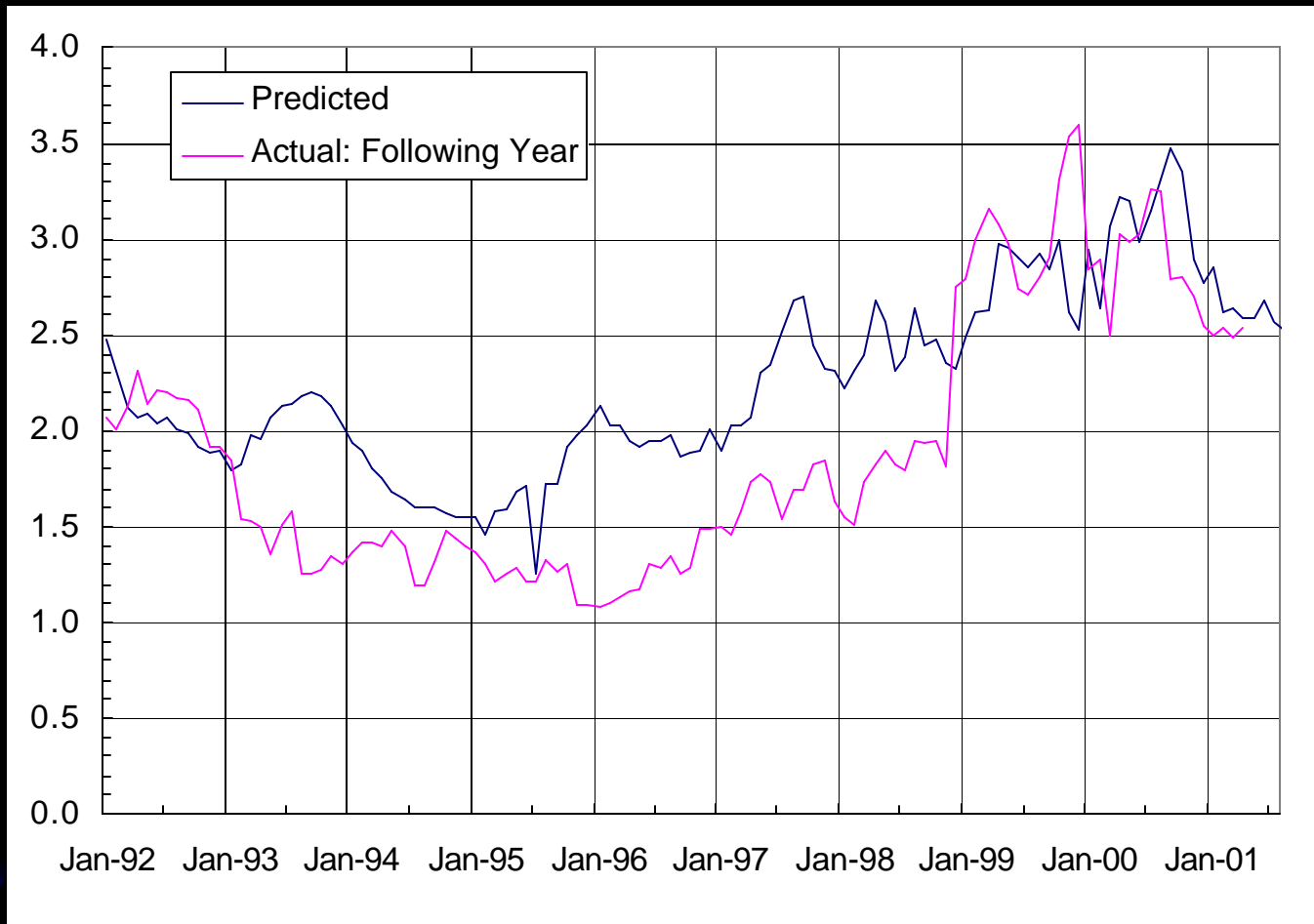
Performance Attribution: Optimized Over Weighted Industries

Industry	Weight DSI 400	Weight S&P 500	Active Weight
Oil Extraction	1.13	0.24	0.89
Soaps & Toiletries	3.17	2.2	0.97
Railroads & Shipping	1.88	0.86	1.02
Gas & Water Utilities	1.92	0.84	1.08
Insurance Other	4.28	3.11	1.18
Computers	6.78	5.43	1.35
Telecommunications	9.73	8.34	1.4
Financial Services	4.31	2.89	1.43
Medical Supplies	3.87	2.35	1.53

Optimized Portfolio: Lower Tracking Error and Volatility



Optimized Portfolio: Predicted vs. Realized Tracking Error



Conclusions

- ⌚ It is possible to reduce the tracking error of a socially screened portfolio to the level of an enhanced index fund (2% or so) using portfolio optimization.
- ⌚ Portfolio optimization does a good job at predicting the realized tracking error over the next year, assuming the portfolio is periodically rebalanced.