

Classifying and Measuring the Performance of Socially Responsible Mutual Funds

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Sharpe [1992] presented factor models as a practical method for classifying mutual funds and measuring their performance. Few data are required for the application of Sharpe's method and such data are widely available. In particular, Sharpe's method requires data on factor returns and each mutual fund's returns, but no data on the contents of each mutual fund, whether the identities of its securities or their weights in the fund. Morningstar and others use Sharpe's factor to classify mutual funds into small capitalization and large capitalization, value and growth, and to measure their performance. Yet Morningstar and others classify mutual funds as socially responsible by nothing more than prospectus statements or membership in organizations such as U.S. SIF (Social Investment Forum).

We add two social responsibility factors to the common four-factor model of market, small-large, value-growth, and momentum, and use those factors to classify and measure the performance of mutual funds along a range from high social responsibility to low social responsibility. We also examine the correspondence between classification by the factors method and classification by the contents method, where we open each fund and examine the identities of its securities, their weights in the fund, and their weighted average social responsibility score.

The first social responsibility factor is the top-bottom factor (TMB), consisting of

the difference between the returns of stocks of companies ranked in the top third and the bottom third by five social responsibility criteria: employee relations, community relations, environmental protection, diversity, and products. The second factor is the accepted-shunned factor (AMS), consisting of the difference between the returns of stocks of companies commonly accepted by socially responsible investors and the returns of stocks of companies they commonly shun. Shunned stocks include those of companies in the alcohol, tobacco, gambling, firearms, military, and nuclear industries.¹

The two factors represent the common criteria for classifying funds as socially responsible. For example, Morningstar notes that socially responsible funds choose companies by criteria such as environmental records and employee relations, corresponding to the TMB factor, and by avoiding shunned companies, corresponding to the AMS factor. Morningstar states: "Socially responsible funds may take a proactive stance by selectively investing in environmentally-friendly companies or firms with good employee relations. This group also includes funds that avoid investing in companies involved in promoting alcohol, tobacco, or gambling, or in the defense industry."²

Classifying mutual funds as socially responsible by the six-factor model corresponds to Morningstar's classification by prospectus statements for some funds, but

not for others. Consider a six-factor model classification method where a fund is classified as socially responsible if both its TMB and AMS betas are positive. The Green Century Equity fund, listed by Morningstar as a socially responsible fund, also qualifies as a socially responsible fund by the six-factor model. The Vice fund, now named the Barrier fund, is not on Morningstar's list and does not qualify by the six-factor model. Reynolds Blue Chip Growth fund is not on Morningstar's list, yet it qualifies by the six-factor model. The Ariel Investor fund is on Morningstar's list, yet it doesn't qualify by the six-factor model (see Exhibit 5 for examples).

Performance measured by the six-factor model is different from performance measured by the four-factor model. For example, the annualized alpha of the socially responsible KLD 400 Index is 0.75% when measured by the four-factor model, but only 0.30% when measured by the six-factor model, implying that some of the alpha under the four-factor model converts into the betas of the TMB and AMS factors. Similarly, the annualized alpha of the conventional S&P 500 Index is 0.44% when measured by the four-factor model but only 0.24% when measured by the six-factor model.

CLASSIFYING SOCIALLY RESPONSIBLE MUTUAL FUNDS

Clear boundaries between socially responsible and conventional funds designate each fund as socially responsible or conventional. Yet it is impossible to draw clear boundaries between socially responsible and conventional funds, because no clear boundaries exist. Instead, funds are arrayed on a scale from high social responsibility to low social responsibility.

A fund that does nothing more than exclude tobacco companies' stocks might be classified by Morningstar or another fund classifier as socially responsible; so might a fund that excludes tobacco companies' stocks as well as stocks of alcohol, gambling, and weapons companies. Yet the first fund ranks relatively low in the social responsibility portion of the social responsibility scale, whereas the second ranks higher.

The difficulty of delineating clear boundaries between socially responsible and conventional mutual funds is evident in the inconsistent lists of socially responsible funds in studies comparing the performances of socially responsible and conventional mutual funds. Hamilton, Jo, and Statman [1993] used Lipper's list;

Statman [2000] and Bello [2005] used Morningstar's list; Benson, and Humphrey [2008] used Social Investment Forum (SIF)'s list; and Renneboog, Ter Horst, and Zhang [2008] used a modified S&P list.

Geczy, Stambaugh, and Levin's [2005] painstaking attempt illustrates the difficulty in delineating boundaries. Geczy, Stambaugh, and Levin defined socially responsible funds as those having non-financial, "social" goals, and proceeded to identify "twenty classification categories representing in some sense the 'best practice' screening standards in the available literature and the asset management industry." They classified as socially responsible funds those that enforce one or more social screens, with no distinction between funds at the high end of the social responsibility scale and those at the low end. Geczy, Stambaugh, and Levin chose to include in their list of socially responsible funds those that specify screens in their prospectuses or apply screens by active policy. But they did not include funds, such as the California Investment S&P Mid-Cap Index fund, that employ *de facto* screens that are not part of active policy. It is unclear, however, whether there is a difference in social responsibility between funds that exclude tobacco stocks *de facto* and those that exclude them by policy.

Fund classifiers rarely examine fund contents to ascertain that contents are indeed consistent with prospectus statements. Morningstar classifies mutual funds as socially responsible solely by prospectus statements. The U.S. SIF (Social Investment Forum) list of socially responsible funds is incomplete, consisting only of funds offered by U.S. SIF's institutional member firms. For example, its May 2012 list includes funds by members Legg Mason and TIAA-CREF, but not by non-members Vanguard or Fidelity.

All the funds in the May 2012 SocialFunds list of socially responsible mutual funds are also in Morningstar's list, but the SocialFunds list is not up to date, as it includes funds that have been merged or liquidated. For example, Calvert Mid Cap Value I (CMDIX) was merged into Calvert Capital Accumulation I on November 29, 2010, and Winslow Green Solutions Inv (WGSIX) was liquidated on April 12, 2010.

Classifying Socially Responsible Mutual Funds by the Betas Method

The betas method classifies mutual funds as socially responsible by their social responsibility factor betas.

We might place a fund high on the social responsibility scale if its TMB beta is high, implying that its managers explicitly or implicitly favor the stocks of companies that rate high on social responsibility criteria. Or we might place a fund high on the social responsibility scale if both its TMB and AMS betas are high, implying that its managers also tend to exclude (explicitly or implicitly) the stocks of shunned companies. The two social responsibility factor betas capture well the social responsibility features of indices and mutual funds. For example, TMB and AMS betas are higher in the socially responsible KLD 400 Index than in the conventional S&P 500 Index.

The betas method reveals closet socially responsible funds that make no social responsibility claims in their prospectuses. Hong and Kostovetsky [2012] found that managers of conventional mutual funds who contribute to Democratic campaigns often create closet socially responsible funds, holding fewer stocks of companies such as those associated with tobacco or poor employee relations than do managers of conventional mutual funds, who tend either to contribute to Republican campaigns or make no campaign contributions.

Consider classifying mutual funds into the social responsibility list by three fund classification services—Morningstar, U.S. SIF, and Social Invest—and by positive TMB and AMS betas. The Domini Social Equity Inv fund is classified into the social responsibility list by all classifiers and by their TMB and AMS betas. The Parnassus Workplace fund is classified into Morningstar and U.S. SIF, social responsibility lists, as well as by its TMB and AMS betas, but not by Social Invest. Only Morningstar classifies the Ave Maria fund, which follows the precepts of Catholicism, into the social responsibility list.

Classifying Socially Responsible Mutual Funds by the Contents Method

Classifying funds by their betas might be biased if betas do not match contents. For example, a Las Vegas supermarket that, by itself, scores high in social responsibility might be judged low in social responsibility by betas because its place on the Strip increases the correlation between its returns and those of its casino neighbors. The same problem besets all classifications by betas, including the widely used classifications into small, large, value, and growth mutual funds.

The contents method of classification overcomes the possible bias the betas method may introduce, because it opens each mutual fund and examines its contents. The contents method grades each security by the social responsibility score of its company and grades each mutual fund's social responsibility by the average scores of companies, weighted by the proportion of each company's security in the mutual fund.

We find that classification by the contents method corresponds well to classification by the betas method. The TMB and AMS betas of indices and mutual funds correspond well to the TMB and AMS scores of the companies whose securities these funds contain. The Spearman correlation between funds' TMB betas and their content's TMB scores is 0.37, whereas the correlation between funds' AMS betas and their content's AMS scores is 0.22, both highly statistically significant. Yet the correspondence is far from perfect.

DATA AND METHODOLOGY

We build our social responsibility factors with data from the MSCI ESG KLD STATS database available through WRDS.³ MSCI-ESG produces social investment research and rates companies on strengths and concerns in the following criteria:⁴

- corporate governance (e.g., limited compensation to executives and members of the board, lack of tax disputes)
- community relations (e.g., generous giving, support for housing)
- diversity (e.g., promotion of women and minorities, outstanding family benefits)
- employee relations (e.g., strong union relations, cash profit sharing)
- environment (e.g., pollution prevention, recycling)
- human rights (e.g., labor rights in outsourcing, no operations in Burma)
- products (e.g., product quality and safety, provision of products to the economically disadvantaged)

We exclude from our analysis the criterion of corporate governance, because data on this criterion have not been consistent over the years. Most of the coverage starts in 2003, the first year MSCI-ESG included Russell 3000 companies. We also exclude from our analysis

the criterion of human rights, because of the paucity of data about strengths and concerns related to this criterion. The database also includes indicators of companies associated with activities commonly shunned by socially responsible investors: alcohol, firearms, gambling, military, nuclear power, and tobacco.

The MSCI-ESG STATS ratings have been published at the end of each calendar year since the end of 1991. Initially, the MSCI-ESG (formerly known as KLD) database contained only ratings of companies in the KLD 400 Social Index and the S&P 500 Index. In 2001, ESG expanded its coverage to include all companies in the Russell 1000; in 2003, it expanded its coverage further to include all the companies in the Russell 3000. The coverage peaked in 2004 at 3,034 companies and declined somewhat to 2,847 companies by the end of 2011.

The staff of MSCI-ESG analyzes information relevant to each company's strengths and concerns. It assigns a score of 1 when a company demonstrates strength on an indicator on the list (e.g., charitable giving) and zero if it does not. Similarly, it assigns a score of 1 when a company's record raises concern on an listed indicator (e.g., investment controversies) and zero otherwise.

Historical ticker and CUSIP are the primary identifying information for a company in the MSCI-ESG database⁵. MSCI-ESG began providing CUSIP data only in 1995. For the earlier period, we use companies' historical tickers and dates to match MSCI-ESG data to CRSP. We restrict our attention to U.S. common stocks in CRSP (share code 10 and 11). When a company has several stock classes, we select the class with the largest market capitalization. We excluded from the analysis MSCI-ESG-covered REITs and companies with common stock incorporated outside the U.S., such as Accenture Plc (Ireland) or Barrick Gold Corp (Canada).⁶ These criteria match 4,904 distinct stocks out of total 5,576 names in MSCI-ESG between 1991 and 2011.⁷

Approximately 14% of all CRSP-matched MSCI-ESG sample (4,669 company-year observations for 1,999 companies) had zero strengths and concerns on all five social responsibility criteria during our sample period, and 51% of the sample (16,148 company-year observations for 4,102 companies) have zero strengths and concerns data on at least three of our five social responsibility criteria. We further screen our sample to exclude companies with zero strengths and concerns in at least three of our five social responsibility criteria. This results in a final sample of 17,180 company-year

observations between 1991 and 2011, for which each firm has non-zero strengths or concerns on at least two of five criteria.

ANALYSIS OF FACTORS

We begin our construction of the two social responsibility factors by calculating each company's TMB-related score (total strengths minus total concerns) as of the end of each year, based on the five social responsibility criteria: employee relations, community relations, environmental protection, diversity, and products, and its AMS-related score, based on whether it is "shunned" or accepted. We match these year-end scores with monthly stock returns, derived from CRSP, in the subsequent 12 months. This yields a sample of 196,316 company-month observations with non-missing MSCI-ESG scores from January 1992 through June 2012. The long side of the TMB factor is a value-weighted portfolio of stocks of firms that rank in the top third of companies by industry-adjusted net scores in at least two of five social responsibility criteria and not in the bottom third by any criterion. The short side is a value-weighted portfolio of stocks of firms that rank in the bottom third of companies by industry-adjusted net scores in at least two of five social responsibility criteria and not in the top third by any criterion. Similarly, the long side of the AMS is a value-weighted portfolio of accepted companies' stocks and the short side is a value-weighted portfolio of shunned companies' stocks. We construct the TMB and AMS portfolios at the end of each year.

The long and short sides of the TMB portfolio each include approximately 50 to 60 stocks at the end of 1991, increasing to approximately roughly 280 stocks by mid-2009 and dropping to 130 to 140 by June 2012. The long and short sides of the AMS factor are also well populated, with an average of 133 shunned stocks per month in the portfolio. The accepted portfolio includes common stocks (CRSP share code 10 and 11) that are not classified as shunned. The number of accepted stocks ranges from 5,755 in January 1992 to 3,612 in June 2012, with an average of 5,547 stocks.

Exhibit 1 shows factor returns during the overall period of January 1992 through June 2012, as well as four sub-periods. On average, the top social responsibility stocks' returns exceeded those of the bottom social responsibility stocks, and the returns of accepted stocks fell short of the returns of shunned stocks. The TMB factor's mean annualized return was positive, at 2.82% during the

EXHIBIT 1

Factor Returns, January 1992–June 2012

TMB is the zero-investment value-weighted portfolio long in stocks of top socially responsible companies and short stocks of bottom socially responsible companies. Top (bottom) stocks are stocks of companies that rank in the top third (bottom) of companies by industry-adjusted net scores in at least two of five social responsibility criteria at year end and not in the bottom (top) third by any criterion. The five criteria are community relations, employee relations, environment, diversity, and products. AMS is the zero-investment value-weighted portfolio long in stocks of accepted companies and short stocks of shunned companies. Shunned companies are companies with operations in tobacco, alcohol, gambling, firearms, nuclear, and military. Market is the return of the CRSP value-weighted index in excess of the return of Treasury bills. SMB, HML, and UMD are factor returns of small-large, value-growth, and momentum, respectively. S&P 500 and KLD 400 factor returns are S&P 500 and KLD 400 index returns in excess of the return of Treasury bills. (KLD 400 index returns are supplemented by total returns of DSI exchange-traded fund after September 2007.)

Factor	N	Mean Return	Std Dev	Minimum	Maximum
Overall period (January 1992–June 2012)					
TMB	246	0.23%	2.95%	−8.82%	10.53%
AMS	246	−0.14%	2.03%	−6.86%	7.83%
KLD 400	246	0.51%*	4.49%	−19.53%	10.93%
S&P 500	246	0.49%*	4.32%	−16.88%	10.93%
Market	246	0.51%*	4.51%	−18.55%	11.53%
SMB	246	0.23%	3.48%	−16.39%	22.00%
HML	246	0.35%*	3.33%	−12.60%	13.84%
UMD	246	0.54%	5.27%	−34.74%	18.39%
Subperiod 1: January 1992–December 1996					
TMB	60	0.34%	1.78%	−3.96%	5.92%
AMS	60	−0.22%	1.64%	−5.57%	5.13%
KLD 400	60	0.92%***	2.55%	−4.93%	7.41%
S&P 500	60	0.87%***	2.48%	−4.87%	7.15%
Market	60	0.84%***	2.47%	−5.83%	6.15%
SMB	60	0.06%	2.53%	−6.10%	8.47%
HML	60	0.65%**	2.50%	−4.05%	6.45%
UMD	60	0.78%***	2.09%	−4.71%	4.82%
Subperiod 2: January 1997–December 2001					
TMB	60	−0.15%	4.28%	−8.82%	10.11%
AMS	60	−0.12%	2.86%	−6.86%	7.83%
KLD 400	60	0.68%	5.55%	−15.24%	10.04%
S&P 500	60	0.58%	5.17%	−14.89%	9.31%
Market	60	0.51%	5.45%	−16.21%	7.99%
SMB	60	0.15%	5.56%	−16.39%	22.00%
HML	60	0.37%	5.16%	−12.60%	13.84%
UMD	60	1.23%	6.93%	−24.97%	18.39%
Subperiod 3: January 2002–December 2006					
TMB	60	0.29%	2.50%	−6.00%	5.84%
AMS	60	−0.05%	1.84%	−3.87%	4.18%
KLD 400	60	0.34%	3.71%	−10.49%	10.38%
S&P 500	60	0.37%	3.58%	−11.01%	8.66%
Market	60	0.54%	3.61%	−10.14%	8.18%
SMB	60	0.49%	2.61%	−5.15%	5.84%
HML	60	0.75%***	2.01%	−6.45%	4.44%
UMD	60	0.30%	4.34%	−16.29%	9.65%
Subperiod 4: January 2007–June 2012					
TMB	66	0.44%	2.73%	−4.56%	10.53%
AMS	66	−0.18%	1.60%	−3.34%	4.62%
KLD 400	66	0.12%	5.40%	−19.53%	10.93%
S&P 500	66	0.16%	5.35%	−16.88%	10.93%
Market	66	0.21%	5.66%	−18.55%	11.53%
SMB	66	0.23%	2.33%	−4.21%	5.77%
HML	66	−0.31%	2.75%	−9.78%	7.59%
UMD	66	−0.11%	6.24%	−34.74%	12.53%

Note: ***, **, and * indicate 1%, 5%, and 10% levels of statistical significance, respectively.

overall period, whereas the AMS factor's mean annualized return was negative, at -1.71% . The signs of the two factors' returns are consistent with Statman and Glushkov's [2009] and Hong and Kacperczyk's [2009] findings. The two social responsibility factors' returns during sub-periods are generally consistent with returns during the overall period: a positive average return for the TMB factor and a negative average return for the AMS factor. Factor returns are positive during the overall period for market, small-large (SMB), value-growth (HML), and momentum (UMD) factors.

Exhibit 2 shows correlations between factor returns. We see a very low and negative correlation, -0.04 , between the TMB and AMS factors' returns. We see a positive correlation between the SMB factor's returns and the returns of both the TMB and AMS factors and a negative correlation between the HML factor's returns and the returns of both the TMB and AMS factors.

Analysis of Indices and Mutual Funds by the Betas Methods

Exhibit 3 shows a comparison of the four-factor and six-factor models of KLD 400 and Calvert Social, two socially responsible indices, and the S&P 500, a conventional index.⁸ The KLD 400 and Calvert Social indices have positive and statistically significant TMB and AMS betas, controlling for the market, SMB, HML, and UMD factors. The S&P 500 has a positive TMB beta, but its magnitude and statistical significance is

EXHIBIT 2

Correlations among Factor Returns, January 1992–June 2012

Factor	AMS	MARKET	SMB	HML	UMD
TMB	-0.04 (0.57)	-0.00 (0.97)	0.26^{***} (0.01)	-0.45^{***} (0.01)	0.02 (0.73)
AMS		0.19^{***} (0.01)	0.37^{***} (0.01)	-0.33^{***} (0.01)	0.23^{***} (0.01)
MARKET			0.25^{***} (0.01)	-0.23^{***} (0.01)	-0.27^{***} (0.01)
SMB				-0.35^{***} (0.01)	0.07 (0.27)
HML					-0.14^{**} (0.03)

Notes: TMB and AMS factors are described in Exhibit 1. Market, SMB, HML, and UMD factors are from Ken French website. ***, **, and * indicate 1%, 5%, and 10% levels of significance, respectively. P-values are in parentheses.

lower than that of the corresponding beta in the KLD 400 and Calvert Social indices. The S&P 500 has a negative AMS beta, consistent with the inclusion in the S&P 500 of stocks of companies in tobacco, alcohol, and other shunned industries.

Exhibit 4 shows a comparison of the four-factor and six-factor models of two mutual funds that emulate socially responsible indices, the Vanguard FTSE Social Index fund and the Calvert Social Index A fund, and two mutual funds with special characteristics, the Ave Maria Catholic Values fund and the Vice fund, which emulates the S&P 500 Index.

The Vanguard FTSE Social Index fund has a positive TMB beta, as does the Vanguard 500 fund. Yet neither beta is statistically significant. The Vanguard FTSE Social Index fund has a positive AMS beta that is both statistically significant and much larger than the Vanguard 500 fund's corresponding beta. The Calvert social Index A fund has both positive and statistically significant TMB and AMS betas that are much larger than the corresponding Vanguard 500 fund betas.

The Ave Maria Catholic Values fund excludes stocks of companies with practices that are inconsistent with Catholic teachings, such as those that produce contraceptives or provide abortions. It does not exclude companies with low scores on social responsibility criteria such as employee relations or the environment, or shunned companies such as those that produce tobacco or alcohol. The Ave Maria fund has a negative and statistically significant TMB beta, whereas the Vanguard 500 fund has a positive TMB beta. The Ave Maria fund has a positive AMS beta that is larger than the corresponding Vanguard 500 AMS beta, but neither are statistically significant.

The Vice fund takes pride in concentrating its holdings of shunned companies' stocks, primarily in weapons, gambling, tobacco, and alcohol. Consistent with this preference, the Vice fund has a negative and statistically significant AMS beta, whereas the Vanguard 500 fund's AMS beta is positive. The Vice fund also has a negative TMB beta, in contrast to the the Vanguard 500 fund's positive TMB beta, yet neither beta is statistically significant.

Analysis of Indices and Mutual Funds by the Contents Method

TMB and AMS betas might be biased measures of indices or mutual funds' social responsibility if they do not match the contents of these indices or funds. We can

EXHIBIT 3

A Comparison of TMB and AMS Betas of the KLD and Calvert Indices of Stocks of Socially Responsible Companies and the S&P 500 Index of Stocks of Conventional Companies

	01/31/1992–06/30/2012				05/31/2000–06/30/2012			
	KLD 400		S&P 500		Calvert Social		S&P 500	
Average TMB Score	2.08		1.26		1.51		1.26	
Average AMS Score	0.71		0.39		0.57		0.39	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Alpha (annualized)	0.75% (0.86)	0.30% (0.37)	0.44% (1.23)	0.24% (0.68)	−1.17% (−1.22)	−1.34% (−1.5)	−0.41% (−0.85)	−0.56% (−1.14)
MARKET	0.98*** (56.08)	0.99*** (60.79)	0.98*** (137.06)	0.98*** (137.02)	0.99*** (52.13)	1.01*** (55.54)	0.96*** (100.11)	0.96*** (96.60)
SMB	−0.16*** (−7.33)	−0.21*** (−9.71)	−0.20*** (−21.53)	−0.19*** (−20.51)	−0.03 (−0.87)	−0.09*** (−3.05)	−0.14*** (−9.65)	−0.14*** (−8.77)
HML	−0.03 (−1.23)	0.06** (2.31)	0.02* (1.75)	0.02** (2.03)	−0.08** (−3.45)	−0.02 (−0.63)	0.02* (1.68)	0.03** (2.01)
UMD	−0.02 (−1.43)	−0.03* (−1.89)	−0.02*** (−3.06)	−0.01** (−2.37)	−0.06*** (−4.05)	−0.06*** (−4.22)	−0.02*** (−2.99)	−0.02** (−2.44)
TMB		0.17*** (6.56)		0.02* (1.95)		0.12*** (4.31)		0.02 (1.40)
AMS		0.16*** (4.35)		−0.03* (−1.90)		0.16*** (3.82)		−0.02 (−0.78)
N (months)	246		246		145		145	
Adj R-sq	0.94		0.99		0.97		0.99	

Notes: 1) is the four -factor model (Market, SMB, HML, and UMD); 2) - the six-factor model (Market, SMB, HML, UMD, TMB, and AMS) A mutual fund's TMB score is the value-weighted average of its stocks' TMB grades during the last four quarters ending on or before June 2012. Each stock the fund holds in a given quarter is graded on each of the five social responsibility criteria as top, bottom, or middle by industry-adjusted score (a grade of 1 if a company is among the top third of companies by a criterion, a grade of −1 if the company is among the bottom third by a criterion, and a grade of zero if the company is among the middle third of companies by a criterion or has a missing rating. A stock's maximum grade is 5, if it is graded 1 on each of the 5 criteria, and a stock's minimum grade is −5. The AMS score is constructed similarly. ***, ** and * indicate 1%, 5%, and 10% levels of significance, respectively. t-Statistics are in parentheses.

overcome this potential bias by examining the contents of indices and funds. We find that the contents of indices and funds generally correspond to their betas.

Consider opening a mutual fund and examining its contents. We grade each stock the fund holds in a given quarter as top, bottom, or middle, by industry-adjusted scores, on each of the five social responsibility criteria.⁹ For example, a stock earns a grade of 1 on employee relations if its company is among the top third of companies for employee relations, a grade of −1 if its company is among the bottom third of companies for employee relations, and a grade of zero if its company is among the middle third of companies for employee relations. Stocks of companies without a rating on employee relations earn a grade of zero. We grade each stock similarly on the four other criteria: community relations, environmental protection, diversity, and products. A stock's maximum grade is 5—a grade of 1 on each of the five criteria—and its minimum grade is −5.

A mutual fund's TMB score is the weighted average of its stocks' TMB grades, where market value serves as weight. For example, during the four quarters ending in June 2012, Parnassus Workplace fund had a relatively high TMB score—1.65—on its contents and a corresponding high TMB beta: 0.198. LKCM Aquinas Small Cap fund had a negative TMB score—−0.27—on its contents and a corresponding negative TMB beta: −0.19.

We calculate a mutual fund's AMS score similarly. A stock is graded 1 if its company is in the accepted group and −1 if its company is in the shunned group because it is associated with tobacco, military, gambling, or other shunned operations.¹⁰ A fund's AMS score is the weighted average of the grades of the stocks it contains, where market value serves as weight.

We calculate socially responsible indices' TMB and AMS scores from the contents of index mutual funds and an exchange-traded fund (ETF). Exhibit 3 shows that the TMB score of the iShares KLD 400 ETF (ticker DSI),

EXHIBIT 4

Betas and Scores of the Contents of Selective Index and Active Mutual Funds

	01/31/2006-06/30/2012			07/31/2000-06/30/2012			06/30/2001-06/30/2012			09/30/2002-06/30/2012		
	Vanguard FTSE Social Index	Vanguard 500 Index	Calvert Social Index A	Vanguard 500 Index	Ave Maria Catholic Val	Vanguard 500 Index	Vice Investor Fund	Vanguard 500 Index	Vanguard 500 Index	Vanguard 500 Index	Vanguard 500 Index	Vanguard 500 Index
Expense Ratio	0.29%	0.17%	0.75%	0.17%	1.50%	0.17%	1.76%	0.17%	0.17%	0.17%	0.17%	0.17%
Average TMB Score	1.33	1.26	1.51	1.26	0.59	1.26	0.09	1.26	1.26	1.26	1.26	1.26
Average AMS Score	0.72	0.39	0.57	0.39	0.65	0.39	-0.51	0.39	0.39	0.39	0.39	0.39
Alpha (annualized)	-2.63** (-1.91)	-0.06 (-0.10)	-2.11** (-2.28)	-0.53 (-1.13)	0.4 (0.24)	-0.72 (-1.51)	2.09 (0.82)	-0.57 (-1.31)	-0.72 (-1.62)	2.09 (0.82)	-0.52 (-1.07)	-0.68 (-1.37)
MARKET	0.99*** (37.02)	0.96*** (77.67)	0.99*** (53.77)	0.96*** (101.79)	0.87*** (24.40)	0.96*** (98.16)	0.89*** (16.23)	0.98*** (104.85)	0.98*** (100.82)	0.87*** (15.51)	0.98*** (94.65)	0.98*** (90.59)
SMB	0.01 (0.11)	-0.13*** (-5.30)	-0.04 (-1.39)	-0.14*** (-9.04)	0.39*** (6.98)	0.14*** (-8.62)	0.02 (0.24)	-0.14*** (-9.81)	-0.15*** (-9.64)	0.15 (1.39)	-0.15*** (-8.10)	-0.16*** (-7.66)
HML	0.11** (2.28)	0.06*** (2.61)	-0.07*** (-2.81)	0.02 (1.56)	0.28*** (5.12)	0.03** (2.16)	-0.02 (-0.23)	0.00 (0.12)	0.01 (0.78)	-0.11 (-1.17)	0.00 (0.21)	0.01 (0.66)
UMD	-0.09*** (-4.40)	0.01 (1.25)	-0.06*** (-4.32)	-0.02*** (-2.62)	-0.07*** (-2.44)	-0.02** (-2.03)	0.11** (2.46)	-0.01 (-0.78)	0.00 (0.46)	0.11*** (2.62)	0.00 (-0.59)	0.00 (-0.41)
TMB	0.01 (0.19)	0.02 (0.64)	0.11*** (3.72)	0.03* (1.84)	-0.20*** (-3.62)	0.03* (1.84)	-0.05 (-0.54)	0.03* (1.94)	0.03* (1.94)	-0.05 (-0.54)	0.03* (1.80)	0.03* (1.80)
AMS	0.19** (2.49)	0.00 (0.00)	0.14*** (3.32)	-0.01 (-0.61)	0.06 (0.67)	-0.01 (-0.61)	-0.40*** (-2.83)	0.01 (0.37)	0.01 (0.37)	-0.40*** (-2.83)	0.01 (0.44)	0.01 (0.44)
N (months)	78	78	147	147	133	147	118	133	133	118	118	118
Adj R-sq	0.97	0.99	0.97	0.99	0.91	0.99	0.75	0.99	0.99	0.76	0.99	0.99

Note: ***, ** and * indicate 1%, 5%, and 10% levels of significance, respectively. t-Statistics are in parentheses.

which emulates the KLD 400 Index, was 2.08 during the four quarters ending in June 2012, higher than the Vanguard 500 fund's corresponding score of 1.26. The average AMS score of the iShares KLD 400 ETF was 0.71, higher than the Vanguard 500 fund's corresponding score of 0.39.

The TMB and AMS betas of the KLD 400 and S&P 500 indices correspond to their scores. The TMB beta of the KLD 400 Index from January 1992 to June 2012 was 0.17, higher than the S&P 500 Index's 0.02 TMB beta. The AMS beta of the KLD 400 Index was 0.16, higher than the S&P 500 Index's -0.03 AMS beta. A comparison of fund contents and betas between the Calvert and FTSE indices and the Vanguard S&P 500 Index gives similar results, as Exhibit 4 shows.

ANALYSIS OF PERFORMANCE ASSOCIATED WITH SOCIAL RESPONSIBLY

Early studies on performance associated with social responsibility used the CAPM to compare the returns of socially responsible mutual funds with those of conventional funds. More recent studies used the three- and four-factor models. In general, these studies report no statistically significant differences in the two groups of funds' performance. Studies include Hamilton, Jo, and Statman [1993], Diltz [1995], Goldreyer and Diltz [1999], Statman [2000], Derwall, Gunster, Bauer, and Koedijk [2005], and Bauer, Koedijk, and Otten [2005].

We learn more about performance associated with social responsibility by comparing the performance of social responsibility stock indices with that of conventional stock indices. Statman [2006] found no statistically significant differences between the returns of social responsibility stock indices, such as KLD 400 and Calvert, and the returns of the S&P 500 Index, which is a conventional

stock index. Comparisons of indices' performance are free of the confounding effects of managerial skills and expenses, but such comparisons do not provide full accounts, as overlap between the lists of stocks in socially responsible indices and lists of those in conventional indices understate differences. For example, the KLD 400 Index and the S&P 500 Index share 250 companies. Moreover, companies in both socially responsible and conventional indices vary in their levels of social responsibility, such that even an analysis that excludes shared companies fails to provide a full account of performance differences associated with social responsibility.

A comparison of an index or fund's performance by using the six-factor model versus using the four-factor model lets us differentiate performance that can be attributed to social responsibility betas from performance that can be attributed to other sources, such as high managerial skills or low expenses.

Exhibit 3 shows that the KLD 400 Index's annualized alpha is 0.75% when we apply the four-factor model and 0.30% when we apply the six-factor model, implying that some of the alpha under the four-factor model is converted into the TMB and AMS factors' betas. Similarly, the S&P 500 Index's annualized alpha is 0.44% when we apply the four-factor model and 0.24% when we use the six-factor model, implying that here,

too, some of the alpha by the four-factor model is converted into the TMB and AMS factors' betas. The results are qualitatively similar when we compare the four- and six-factor alphas of the Calvert Social Index and S&P 500 index. The comparison between the socially responsible indices and the S&P 500 index shows that the performance of stocks of socially responsible companies exceeds that of conventional companies, yet none of the alphas are statistically significant, consistent with findings in earlier studies that there are no statistically significant differences between the performance of the stocks of socially responsible and that of the stocks of conventional companies.

We gain better insight into performance differences associated with social responsibility by examining mutual funds' alphas derived from the four-factor model, as well as from the same funds' TMB and AMS betas derived from the six-factor model. This examination sets aside performance differences associated with expense ratios, managerial skills, and other fund characteristics.

Consider a sample of 5,786 active U.S. mutual funds, encompassing funds classified as either socially responsible or conventional. We examine their returns, available for a period of no fewer than 36 months from January 1992 through June 2012. We calculate each fund's alpha using the four-factor model and its TMB and AMS betas using

EXHIBIT 5

Classification of Selected Mutual Funds as Socially Responsible by Morningstar, U.S. SIF, Social Funds, and by Positive TMB and AMS Betas

X indicates that a fund is on the Morningstar, U.S. SIF, or Social Funds list, or that its TMB and AMS beta is positive.

Fund Name	Ticker	Date Range	Morningstar	U.S. SIF	Social Funds	TMB beta	AMS beta
Appleseed	APPLX	1/31/2007–06/30/2012	X	X	X		X
Winslow Green Growth Inv	WGGFX	5/31/2001–06/30/2012	X	X	X		
Domini Social Equity Inv	DSEFX	1/31/1992–06/30/2012	X	X	X	X	X
Thrivent Natural Resources I	TREIX	7/29/2005–06/30/2012	X			X	
CAMCO Investors	CAMCX	2/27/1998–06/30/2012	X				
VALIC Company II Socially Responsible	VCSRX	6/29/2007–06/30/2012	X			X	X
Dreyfus Third Century Z	DRTHX	1/31/1992–06/30/2012	X				X
Green Century Equity	GCEQX	10/31/1995–06/30/2012	X	X		X	X
Parnassus Workplace	PARWX	5/31/2005–06/30/2012	X	X		X	X
Ariel Investor	ARGFX	1/31/1992–06/30/2012	X	X			
Winslow Green Solutions	WGSIX	12/31/2007–31mar2010			X		
Calvert Mid Cap Value A	CMVAX	11/30/2004–29oct2010			X		
Praxis Value Index I	MVIIX	6/29/2001–06/30/2012	X	X			X
Parnassus Equity Income - Inv	PRBLX	10/30/1992–06/30/2012	X	X		X	
American Heritage Fund, Inc	AHERX	1/31/1992–06/30/2012				X	X
Kinetics Mutual Funds, Inc: Internet Fund; No Load Class	WWWFX	11/29/1996–06/30/2012				X	X
Rydex Series Funds: Technology Fund; Investor Class Shares	RYTIX	05/29/1998–06/30/2012				X	
Fidelity Select Portfolios: Retailing Portfolio	FSRPX	1/31/1992–06/30/2012					X
Vice Fund	VICEX	09/30/2002–06/30/2012					
Ave Maria Catholic Values	AVEMX	06/29/2001–06/30/2012	X				

the six-factor model. Next, we double-sort the funds by TMB into three groups with equal numbers of funds: high TMB, medium TMB, and low TMB. We sort similarly on AMS, for a total of nine groups.

Exhibit 6 shows mean differences between annualized four-factor alphas among TMB and AMS groups. Compare the group in which TMB is high to the group in which TMB is low. We keep AMS low in both groups. The 0.55% figure indicates that high TMB adds an average increment of 0.55% to alpha, relative to low TMB. Findings are similar when we compare the group in which TMB is high with the group in which TMB is low, keeping AMS either medium or high in both groups. This implies that social responsibility improves performance when it is in the form of high TMB, reflecting socially responsible investors' preference for stocks of companies with high ratings on indicators such as employee relations. The increment to alpha due to high TMB is generally statistically significant.

Now compare the group in which AMS is high with the group in which AMS is low. (We keep TMB low in both groups.) The negative -0.36% figure indicates that

high AMS subtracts an average increment of -0.36% from alpha, relative to low AMS. Findings are similar when we compare the group in which AMS is high with the group in which AMS is low, keeping TMB either medium or high in both groups. This implies that social responsibility detracts from performance when it is in the form of high AMS, reflecting socially responsible investors' preference against shunned companies' stock, such as that of firms associated with tobacco. The increment to alpha due to low AMS is not statistically significant.

The difference in alpha is most pronounced when we compare funds with high TMB and low AMS betas with funds with low TMB and high AMS beta. The first group has high alpha and the second has low alpha. The difference in annualized alphas is a statistically significant 0.91%.

These findings indicate that the lack of statistically significant differences between the performances of socially responsible and conventional mutual funds is likely the outcome of socially responsible investors' preference for stocks of companies with high TMB and high AMS. The first preference adds to their performance, whereas the second detracts from it, such that the sum of the two is small. A proper analysis of socially responsible mutual funds' performance requires separate accounting for the effects of TMB and AMS on performance.

EXHIBIT 6

Fund Performance Associated with TMB and AMS Factors, January 1992–June 2012

		TMB			High–Low
		Low	Medium	High	
AMS	Low	-1.06%	-0.99%	-0.51%	$0.55\%^*$ (1.93)
	Medium	-1.07%	-0.84%	-0.66%	$0.41\%^{***}$ (2.36)
	High	-1.42%	-1.19%	-0.80%	$0.62\%^{***}$
	High–Low	-0.36% (1.59)	-0.19% (1.12)	-0.29% (1.00)	(2.70)

Notes: The exhibit shows average four-factor annualized alphas within nine groups of funds categorized on the basis of their TMB and AMS betas, estimated using the entire January 1992–June 2012 sample period with at least 36 months of valid return history for a given fund. We calculate each fund's alpha using the four-factor model and its TMB and AMS betas using the six-factor model. Next, we independently double-sort the funds by TMB and AMS betas into nine groups (three groups by TMB and three groups by AMS). The "High–Low" column contains average differences between annualized four-factor alphas of mutual funds between high and low TMB groups, keeping AMS beta fixed. The "High–Low" row shows the average differences between annualized four-factor alphas between High and Low AMS funds, keeping TMB beta fixed. The sample includes 5,786 active U.S. mutual funds, encompassing funds that Morningstar classifies as socially responsible and conventional. ***, ** and * indicate 1%, 5%, and 10% levels of significance, respectively. *t*-Statistics are in parentheses.

CONCLUSION

We construct a factor model that extends the common four-factor asset-pricing model into a six-factor model by adding two social responsibility factors. We offer the model as a tool for classifying mutual funds as socially responsible mutual funds and measuring their performance.

We explore two particular social responsibility factors. The TMB factor reflects criteria such as good employee relation, whereas the AMS factor reflects criteria such as exclusion of tobacco companies. Criteria might well be broader than these, reflecting different values and notions of social responsibility. For example, one fund reflects Catholic values in part by excluding companies that produce contraceptives but not excluding companies that produce tobacco or alcohol. Similarly, another fund reflects Islamic values in part by excluding companies that pay or receive interest, such as banks, and companies that produce alcohol but not excluding companies that produce tobacco. We can construct factors that reflect either Catholic or Islamic values.

ENDNOTES

¹We diverge from Sharpe's method by using factor returns calculated as differences in returns between two indices, such as value and growth, rather than index returns.

²Morningstar uses the term "socially conscious" interchangeably with the term "socially responsible."

³The database was formerly known as KLD after KLD Research & Analytics, Inc. which became a part of MSCI following its acquisition of RiskMetrics in November 2009.

⁴See more at <http://www.msci.com/products/esg/stats/>.

⁵MSCI-ESG has provided unique company ID since 2007. There are cases where ticker and CUSIP information is stale as of the end of the calendar year, because of gaps between the time when MSCI-ESG receives information and when it is published in MSCI-ESG STATS. We correct these cases manually to ensure appropriate linking with CRSP.

⁶In some cases, MSCI-ESG's CUSIP data are inaccurate (e.g., Transocean Ltd has an erroneous CUSIP of 2821287 instead of G9007810 from 2002 to 2005). We rely on ticker-date match, supplemented by an inspection of historical company names, to ensure accurate historical correspondence between MSCI-ESG and CRSP.

⁷MSCI-ESG is the first to provide social responsibility ratings, so its data extend further into the past than do data from other providers, such as Asset4, Trucost, SiRi, EIRIS, and Oekom.

⁸MSCI-ESG ceased providing KLD 400 index returns in September 2007 as a part of an academic subscription to the KLD database. We use gross returns (net returns plus expense ratio) of iShares KLD 400 ETF (ticker DSI) to proxy for KLD 400 index returns after September 2007. Vanguard FTSE Social Index fund (VFTSX) proxies for the returns of FTSE-4-Good index from January 2006. Vanguard announced a switch from the Calvert index to the FTSE-4-Good index in October 2005. See <http://www.indexuniverse.com/sections/news/455.html>.

⁹We apply 20 industry classification used in Grinblatt and Moskowitz [1999].

¹⁰Shunned stocks are stocks of companies that KLD flags as having at least one concern in tobacco, gambling, alcohol, firearms, military, or nuclear operations in a given year. We also classify companies as shunned if their SIC code belongs to one of the following shunned categories: tobacco products, tobacco stores and stands (2100-2199, 5194, 5993), alcohol-related businesses (2082-2085, 5180-5182, 5920-5929), gambling (7993, 7999), explosives, small-arms ammunition, ammunition, and small arms (2892, 3482, 3483, 3484), guided missiles, space vehicles, tanks, and tank components (3761, 3795). See <http://www.osha.gov/pls/imis/sicsearch.html> for details.

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