

THE APERIO ADVANTAGE

## Measuring the Risk Impact of Social Screening

*“What you measure affects what you do. If you don’t measure the right thing, you don’t do the right thing.”*

- Joseph Stiglitz

Doing the “right” thing in ESG (Environmental, Social & Governance) screening in a public equities portfolio has been mostly left to a matter of emotion – does this feel right? In the rest of investing, academics and professionals have a set of metrics at their disposal to assess whether an investment is “right.” In this paper, we present a framework with associated metrics for assessing ESG integration in the portfolio with the same rigor and discipline used in all other fiduciary decisions. With this framework, there is no reason for ESG skeptics and proponents not to measure the impact and quantify what is right for the investor and their portfolio.

### **Author**

Patrick Geddes

Since the nineteenth century investors have incorporated social or ethical values into their portfolios, an approach described over time with such labels as SRI (Socially Responsible Investing), ESG (Environmental, Social, Governance) or MRI (Mission Related Investing). Among investment professionals a contentious debate rages on as to whether SRI is a well-intentioned effort doomed to suffer a performance penalty or a viable alternative with the potential for alpha due to screening, based on the assumption that firms that implement “good” practices will be rewarded in the market. This article will not address the performance debate already covered in other research, but instead will focus on the measurement of risk as introduced by SRI screening for public equities since that’s what can be most controlled. For simplicity, the term SRI will be used as the term for screened investing in general, with ESG used as a term for the specific screening issues.

Introducing more rigorous risk measurement may surprise both sides of this debate: the skeptics may learn with disappointment that in certain cases the impact of screening on risk and return is almost non-existent, while the more idealistic SRI advocates may learn with disappointment that intense screening can actually be quite costly in terms of the incremental risk introduced. In the future, this debate would be much improved if any arguments for or against SRI were to include the proper risk metrics.

Part of the problem inherent in this debate on SRI lies in the combining of two different goals: investors’ financial goals and whatever ethical, moral or religious goals they seek to achieve through their portfolios. In both the dismissive arguments made by skeptics and the passionate defense by SRI advocates, these two separate goals often aren’t properly synthesized or even reconciled at all. Like contentious political arguments, both sides selectively emphasize limited data, often without addressing the true impact of the trade-offs inherent in applying ESG screens. Although the best way to understand SRI lies in combining ESG issues with quantitative risk metrics, this article will begin by defining them separately, first with the process of how companies get screened and second with the process of measuring and managing incremental portfolio risk introduced by screening. After carefully defining both components, the two will be combined in an example to demonstrate the proper synthesis.

### **Investment vs. Expressive Utility**

SRI investors seek to satisfy two different types of utility—investment and expressive utility, as defined in Table 1. Investment utility reflects all of the trade-offs any investor faces between risk and return integral to modern portfolio theory, i.e. achieving the highest return at the lowest level of risk. Expressive utility, a term coined by behavioral finance researcher Meir Statman,<sup>i</sup> describes investors’ benefit from the expression of their ethical values. The challenge for investment professionals lies in successfully incorporating both utilities into a portfolio. Advisors, like their clients, may face conflicting goals in that they often must act in a fiduciary sense to optimize investment utility, while simultaneously making their SRI clients feel as though their values matter and can be

included in a portfolio as long as the effect on risk and return, if any, is well understood. Advisors have often felt squeezed between a rock and a hard place in that they may view all SRI investing as harmful tinkering with a portfolio. On the other hand, they can't tell their clients that it's silly to want to incorporate their values, or at least not if they want to keep them as clients.

**Table 1**

	<b>Goal</b>	<b>Metrics</b>	<b>Advisor's Concern</b>
<b>Investment Utility</b>	Maximize risk-adjusted return	Beta, alpha, Sharpe Ratio	Fiduciary risk: ensure investment is prudent
<b>Expressive Utility</b>	Align portfolio with ethical values	Objective data on corporate behavior	Relationship risk: ensure client's needs get served

Expressive utility may seem to be an emotions-driven exercise since the measurement of whether a portfolio “feels right” to a values-driven investor is so highly subjective. However, such an emotions-driven decision is effectively no different from the risk-return trade-off integral to creating optimal portfolios, i.e. investors are supposed to know when the level of risk “feels right” in terms of the loss they might face across different levels on a risk-return efficient frontier. To make the process of the risk-return trade-off work for investors, investment professionals use risk-adjusted return measurements such as the Sharpe ratio to determine if the incremental return offered in a portfolio justifies the additional risk borne. Later in this article we'll introduce the equivalent metrics for SRI.

### **ESG Screening**

While SRI can be incorporated into almost all asset classes, this article will focus exclusively on public equities, where investors can apply four different ways to align their portfolios to their values:

1. Negative screens, e.g. excluding tobacco producers,
2. Positive screens, such as over-weighting the companies with the best human rights records or emphasizing investments in environmentally sustainable practices or products, i.e. selecting the “best in breed,” or impact investing,
3. Proxy voting to ensure that shareholder resolutions reflect an investor's values,
4. Corporate activism to engage or lobby companies to influence them directly for positive change.

The first two of these can affect portfolio risk since they can change the composition of the universe of available stocks. The last two may be highly relevant in terms of incorporating ethical values but do not generally affect risk. Many committed SRI

investors believe that much of the value of ethical investing derives from proxy voting or activism, but those issues do not affect risk directly and will thus not be addressed here.

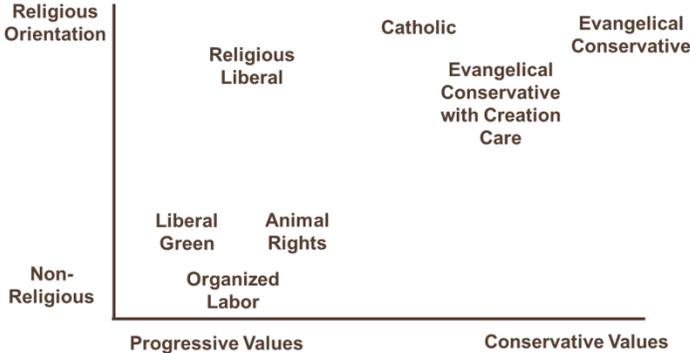
For well-diversified portfolios of public equities, screening requires some sort of ESG research across a wide range of companies. While there has been a great deal of ESG research available for many years, the breadth and sophistication of the research databases available has grown significantly in the past few years. A wide range of ESG issues are identified and catalogued by a number of research firms around the world such as MSCI (who acquired KLD in 2010), Bloomberg, IW Financial, Sustainalytics, EIRIS, or Asset4 from Thomson Reuters. Some of these simply aggregate data from governmental, company and other objective sources, while some provide interpretation and recommendation. These firms now offer the capability of rating U.S. and international companies according to a wide range of ethical belief systems, from environmental sustainability to conservative Christian values to animal rights.

These vendors offer in-depth statistics and data across a range of ESG issues germane to those belief systems, including environmental, human rights, corporate governance, labor practices, etc. In addition, data are available on companies in terms of their involvement in businesses such as tobacco, alcohol and weapons. Data values originate with governmental providers like the U.S. EPA or Department of Labor as well as directly from company filings with the SEC and other objective sources. These vendors provide databases that can be used to screen a large number of companies across many different ESG belief systems, which greatly reduces the time and cost of investment firms doing their own ESG research. These databases allow for all companies in broad benchmarks such as the Russell 3000 to be covered, which in turn allows for a broadly diversified investment strategy. Other areas of concern to issue-specific SRI investors may come directly from advocacy groups, such as the list of companies deemed unnecessarily cruel to animals as defined by PETA, the People for the Ethical Treatment of Animals. However, the broad databases allow for a wide range of values to be incorporated into portfolios efficiently, thus offering SRI investors flexibility and economies of scale beyond what was available in the recent past.

### Belief Systems and ESG Issues

SRI investors bring a bewildering variety of ESG passions and preferences to the investment process. Chart 1 shows the range of beliefs from both the progressive and conservative sides of the political spectrum that can be incorporated (shown on horizontal axis), as well as from both religious and non-religious viewpoints (shown on vertical axis).

Chart 1



Each of those belief systems focuses on a particular ESG issue or series of issues of particular concern, like contraceptive manufacturing for a portfolio screened for Catholic values. The list in Table 2 breaks down such screens into two general categories: issues that are typically addressed through negative screens and those that can be addressed through positive screens. The stocks that investors want to exclude through negative screens are generally more straightforward, as it's not complicated to determine whether or not a firm manufactures tobacco. The level of involvement of course can vary, like firms who may have a smaller sales component from adult entertainment, e.g. Marriott's revenue from pay-per-view pornography versus companies who are clearly in the pornography business and derive a significant revenue percentage from it, like Playboy Enterprises before it went private in 2011.

Positive screening can present a more nuanced challenge, since there can be so many different ways to score and rate companies on their records and policies. For example, environmental screening, one of the most popular issues (remember the "E" in ESG stands for Environmental), involves many different ways of rating firms in terms of their impact on the planet, from the idea of "best in class" scoring that might highlight for example the mining companies with the most sustainable practices. Alternatively, investors can implement a more absolute approach that expresses the sentiment, "There are no 'best in class' coal companies since the whole industry is disastrous for the

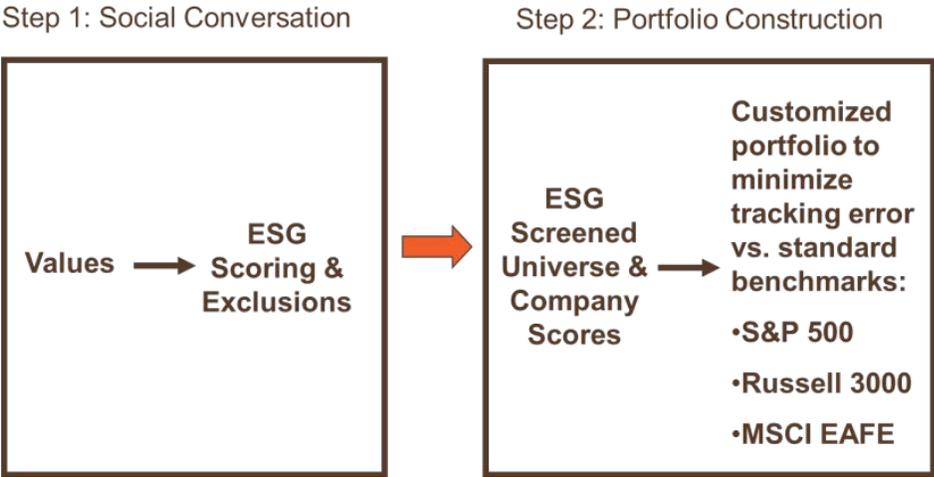
planet.” That value requires the negative screen of excluding all coal companies. Positive screening means simply that each company is scored on a sliding scale rather than negative screening, where each company is rated in a binary way as either included or excluded, with no middle ground. Technically any issue can be implemented as either a positive or negative screen. Table 2 shows some common investor preferences.

**Table 2**

<b>Common Exclusions (negative screens)</b>	<b>Common Scoring (positive screens)</b>
Adult Entertainment Alcohol Animal Testing Firearms and weapons Gambling Life/Choice & Stem Cell Research Nuclear Power Tobacco	Board Diversity/Employee Policies Environmental Impact Human Rights Labor Relations Corporate Governance

How do passionate investors identify clearly which of these issues they want reflected in their investments, and how do their advisors convert those preferences into portfolios? We’ll divide the process into two steps, with the first ascertaining which ESG issues matter to the investor (labeled as the “Social Conversation”) and then how to construct an optimal portfolio that incorporates those issues, as shown in Chart 2.

**Chart 2**



## The Social Conversation

Wealth managers and SRI money managers often use questionnaires of all the available issues like those in Table 2 to help investors articulate and clarify their preferences. Investors can identify which issues matter and how intensely they care, such as a mild preference for negative screening on tobacco and a strong preference for positive environmental screening. This “Social Conversation” allows an advisor in effect to convert a non-quantitative belief system to quantitative exclusions or scores. Many SRI investors may have a general sense of their preferences but remain unclear on exactly how to define them, e.g. “I want a more environmentally sound portfolio, but I’m not sure exactly how to implement such a goal.” The Social Conversation serves three purposes: first identifying the specific issues about which the investor is passionate, second setting the level of intensity for each and finally determining what data are available from ESG research providers or other sources.

These values questionnaires don’t necessarily provide all the answers regarding an investor’s preferences, but they can be helpful to investment advisors in determining goals. Values questionnaires function analogously to risk tolerance questionnaires that attempt to gauge an investor’s ability to withstand significant drops in a portfolio’s value. Skeptics of SRI investing may often point out that the definition of what’s socially or environmentally responsible can vary widely, which indeed reflects the reality of so many belief systems. However, the availability of a wide range of ESG data allows investors to define clearly their preferences, and later in the section on portfolio construction we’ll focus on how those values get incorporated into a customized portfolio.

Let’s examine an example of a simple scoring scheme for positive screening after a highly simplified “Social Conversation.” Assume that an investor studies all the screens in Table 2 and determines that the only two issues that matter are environmental impact and corporate governance. Based on data from IW Financial’s SRI screening database, we’ll look at how the process might score a company like DuPont based on our investor’s specific preferences. Scoring DuPont against other chemical companies, the firm scores

fairly poorly on its environmental record based on data from the EPA such as pollution emitted per million dollars of revenue. However, based on publicly available data like its shareholder protections, board voting and compensation, DuPont scores relatively well, again compared to other chemical companies. Finally, we'll assume that this particular SRI investor feels equal passion about a company's environmental policies as its corporate governance. Thus if we weight the two issues equally, we get an overall score that's middling, reflecting the offsetting effects of a good governance score with a bad environmental score as judged by our hypothetical investor.

**Table 3**

Issue	DuPont Score*
Environmental Score	9
Corporate Governance Score	80
Overall Score (50% weighting to each score)	45

\*Based on a 1 to 100 scale with 1 the worst and 100 the best. For example, the chemical company with the lowest quantity of pollutants per million dollars of revenue (among other statistics) would score 100, while DuPont scored only 9 on a scale of 1 to 100. Source: IW Financial.

This example presented in Table 3 provides a single score of 45 for DuPont, and the process would be applied in a similar fashion to all stocks in a universe, say the Russell 3000 for a U.S. stock portfolio. Thus the numeric output for Step 1 is a comprehensive list of scores for each company customized to the investor's values. Now that we've defined the process for Step 1, the ESG portion, we'll turn next to Step 2 and see how screening affects tracking error.

**Tracking Error**

Traditionally SRI investing has been measured by its returns or by its ethical values, and the key question has usually been, "What is the performance penalty faced by SRI investors for including their values in a portfolio?" In fact the research data on returns do not support either the existence of a penalty nor the existence of a benefit. Like most performance studies, the results often remain far less conclusive than we would prefer. For more detail, see the report published by the United Nations and Mercer, "Demystifying Responsible Investment Performance."<sup>ii</sup>

Instead of focusing on returns, we'll address instead the impact of screening on risk, which can be measured and predicted in advance more reliably than returns even though it's the latter that investors care about most. Given that the studies on SRI are not conclusive regarding a return penalty, the question becomes far more effective when rephrased, "What is the risk penalty for SRI screening?"

In order to isolate the impact of screening upon portfolio risk for a U.S. stock portfolio, we'll start with the Russell 3000, a standard U.S. market index as a benchmark for comparison. Then as we introduce screening, we'll measure how far from the benchmark Russell 3000 various SRI strategies deviate. To measure that difference, we'll use the Barra Aegis multi-factor model that measures stock risk across fundamental and industry factors. The model generates a forecast for tracking error, the statistical measurement of deviation from a target benchmark.<sup>iii</sup> Tracking error is analogous to the concept of darts thrown at a dartboard, where the bull's-eye is the benchmark return, and the dispersion of dart throws around the bull's-eye is measured by the tracking error. A portfolio with tight tracking error means the darts are tightly dispersed around the bulls eye, while a loose tracking error means the darts are all over the dartboard.

The Aegis model generates a forecast tracking error representing an estimate of standard deviation of a particular portfolio versus a benchmark. For the U.S. market, Aegis uses a total of sixty-eight factors to estimate the tracking error: thirteen fundamental factors like P/E, market capitalization, leverage and dividend yield as well as fifty-five industry factors. While the examples discussed in this section are all domestic benchmarks, the exact same methodology can be applied as well to foreign or global stock benchmarks like the MSCI EAFE or the MSCI All Country World.

Using multi-factor equity models and an optimizer to incorporate SRI screening has been explored in depth by both Jennings and Milevsky, who address the technical issues involved. Milevsky posits that statistical optimization allows SRI investors to achieve virtually the same level of diversification finding substitutes, showing that a portfolio “can maintain a statistically indistinguishable level of diversification while incorporating corporate social responsibility based screens and constraints on portfolio holdings.” Following a similar goal of minimizing tracking error and the impact on diversification, in this paper we use the Barra Aegis multi-factor model and optimizer to squeeze out all possible tracking error, thus assuring the optimal level of minimized unsystematic risk. In a similar vein, Jennings proposes using a multi-factor model to eliminate unnecessary tracking error, labeling such an approach as “Socially Enhanced Indexing.”

Optimizing an SRI portfolio in this fashion minimizes the tracking error to the lowest possible level given the SRI constraints as defined in the Social Conversation. This method allows for optimal risk because this type of model compensates for any factor tilts introduced by the SRI constraints. For example, traditionally progressive SRI portfolios like the KLD 400 (previously as tracked by the Domini Social Equity mutual fund) have often introduced growth tilts since they tend to overweight sectors like technology while underweighting value sectors like energy. Those tilts are unavoidable since any constraints will shift a portfolio off of its benchmark. However, with a multi-factor optimizer, the risk impact of the tilts can be minimized, leaving the investor with a portfolio that incorporates the desired values while at the same time introducing the smallest amount of risk possible.

Using a multi-factor model and an optimizer not only allows measurement but also management of the risk impact of screening. These tools can change the opinionated debate around SRI by grounding it in an objective metric straight from classic portfolio theory. Each particular set of beliefs or values brought to the investment process by an SRI investor can thus be “priced” in terms of the minimum incremental increase in risk due to tracking error. In other words, different value screens cause different levels of tracking error.

Table 4 shows the tracking error for a range of issues, including religious and non-religious as well as a variety of values that could be considered conservative and others progressive. After all, the definition of “socially responsible” varies widely and means different things to different investors, which is why measuring the risk impact of all those different kinds of screening is so critical.

**Table 4**

**Examples of Impact of Screening on Risk**

<b>Value Set</b>	<b>Screens</b>	<b>Tracking Error vs. Russell 3000</b>
<b>Animal Rights</b>	Avoid non-pharmaceutical testing, factory farming, fur production	0.59%
<b>Catholic</b>	Avoid companies associated with abortion, contraception, stem cell research, pornography, nuclear weapons, tobacco, alcohol, gambling	0.57%
<b>Environmental</b>	Positive screening	0.85%
<b>Tobacco</b>	Avoid tobacco manufacturers	0.50%
<b>Corporate Governance</b>	Positive screening	0.85%
<b>Nonviolence Pragmatic</b>	Avoid weapons manufacturers	0.41%
<b>Nonviolence Idealistic</b>	Avoid companies contracting with Department of Defense	2.84%

Sources: IW Financial for screening and Barra Aegis for risk forecasts

What can we conclude from these examples? For one thing, single-issue screens can often be quite inexpensive in terms of additional tracking error. However, the intensity of interpretation of values matters greatly, as can be seen in the last two examples, Nonviolence Pragmatic and Nonviolence Idealistic. Both reflect the same belief system, but the screening bar is set much higher for Nonviolence Idealistic. Thus it's both the nature and intensity of a set of values that drives the impact on risk. In the example of Nonviolence Idealistic, many companies get thrown out, e.g. Kraft since they sell things like cheese to the military.

Some issues just don't affect tracking error much, like the exclusion of tobacco manufacturers since there are so few publicly traded firms in that industry. Skeptics enjoy pointing out that excluding certain tobacco manufacturers has harmed returns over certain periods, taking that as proof that screening is just a tax on investing. However, cherry-picking the data with one example against SRI is as indefensible as picking a short period when certain screened portfolios have outperformed as proof that SRI can create alpha. Instead, emphasizing tracking error as estimated by a multi-factor model allows investors to understand both 1) the magnitude of the factor bets or style tilts inherent in SRI screening and 2) which factor bets are created by the screening process, e.g. a growth tilt or underweighting a particular industry.

### **What Does Additional Tracking Error Cost the Investor?**

If investors are to decide whether a tracking error of 0.41% to exclude weapons manufacturers is reasonable or excessive, they will require some context of what that number implies. First, it has an expected value of zero, meaning that in a passive management framework, a portfolio's return is just as likely to be above the benchmark as below. Second, the average expected tracking error for institutional active management is 5.0% according to a survey of large U.S. pension funds,<sup>iv</sup> which means that investors already bear comparatively significant tracking error with their active managers. Third, the standard deviation estimate of tracking error is not additive to overall portfolio risk, as shown in Table 5. In other words, if the total market's risk is 21.67%,<sup>v</sup> then the portfolio risk does not rise by another 0.41% to 22.08%. Instead, the impact of screening on absolute portfolio risk must be calculated by using variance terms, from which standard deviations are derived. Unlike standard deviations, variance terms are additive and can thus be combined.

As Table 5 shows, adding 0.41% of tracking error increases absolute portfolio risk by only 0.0039%, or less than half of one hundredth of a percent. In other words, the portfolio does become riskier, but only by such a trivial amount that it's basically an irrelevant impact on risk. However, investors are technically bearing additional risk for which they are not compensated. (An SRI investor may believe in the alpha potential from screening, but overall the research on returns does not support the existence of positive alpha any more than negative alpha due to SRI screening.)

**Table 5**

**SRI Portfolio with Low Tracking Error, e.g. Nonviolence Pragmatic**

	<b>Standard Deviation</b>	<b>Variance = (Std. Dev.)<sup>2</sup></b>	<b>Theoretical Return Penalty*</b>
<b>Market Risk (Russell 3000)</b>	21.6700%	4.6959%	
<b>Tracking Error</b>	0.4100%	0.0017%	
<b>Combined (SRI) Portfolio</b>	21.6739%	4.6976%	
<b>Incremental Risk</b>	0.0039%		0.0013%

Note: Terms may not sum exactly due to rounding.

\*We can convert the uncompensated risk to a theoretical return penalty by using a simplified historical risk premium. Based on S&P 500 returns and risk (as a proxy for the market) from January 1926 to June 2011,<sup>vi</sup> we find a total market annual return of 9.88% versus T-bills over the same period of 3.60% for an excess return of 6.29%. From the same data set, the S&P 500 has had an annualized standard deviation of 19.14%, giving a simplified market Sharpe Ratio of 0.33, calculated as follows: Market Sharpe Ratio =  $(\text{Return on market} - \text{risk-free rate}) / \text{risk}$ , where  $\text{Return on market}$  is return on market,  $\text{risk-free rate}$  is risk-free rate and  $\text{risk}$  is the risk of the market as measured by standard deviation. The simplified historical Market Sharpe Ratio is calculated as follows:  $(9.88\% - 3.60\%) / 19.14\% = 0.33$ . The theoretical return penalty in the table above is calculated as follows:  $0.0039\% \text{ incremental standard deviation} \times \text{Sharpe Ratio of } 0.33 = 0.0013\%$ , or slightly more than a tenth of a basis point in theoretical foregone return. In other words, the impact on return, according to standard portfolio theory, is virtually non-existent.

Now let's turn to an example of a more idealistic SRI screen, Nonviolence Idealistic, which requires no investment in firms doing business with the U.S. Department of Defense. As described in Table 4, the tracking error versus the Russell 3000 for that screening is 2.84%, which introduces significantly more risk penalty to the screening than in Table 5's example of the Nonviolence Pragmatic portfolio. Table 6 shows that the more strict screening means an investor faces 0.1853% extra risk, which equates to about six basis points in theoretical lost return.

**Table 6**

**SRI Portfolio with High Tracking Error, e.g. Nonviolence Idealistic**

	<b>Standard Deviation</b>	<b>Variance = (Std. Dev.)<sup>2</sup></b>	<b>Theoretical return Penalty</b>
<b>Market Risk (Russell 3000)</b>	21.6700%	4.6959%	
<b>Tracking Error</b>	2.8400%	0.0807%	
<b>Combined (SRI) Portfolio</b>	21.8553%	4.7765%	
<b>Incremental Risk</b>	0.1853%		0.0609%

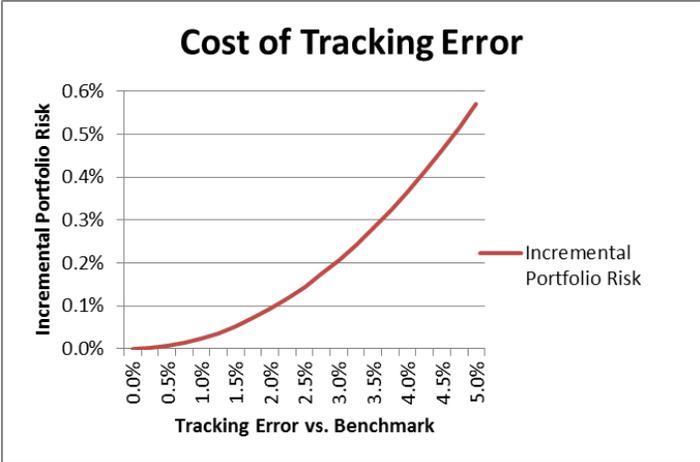
Note: Terms may not sum exactly due to rounding.

While those amounts of risk and return penalty can no longer be deemed trivial from an investment perspective, it may still be viewed as a small but acceptable price for an idealistic investor strongly opposed to firms doing business with the Defense Department. The point for investors and their advisors is not whether it's appropriate or inappropriate to engage such a screen but rather to measure the impact on risk and foregone theoretical return. Only by such rigorous metrics can the debate on SRI move beyond preconceived notions both pro and con as well as inconclusive data on return histories. An SRI skeptic can still claim that Nonviolence Pragmatic is a foolish investment choice, but the math shows it to be an almost irrelevant negative impact on both risk and theoretical return penalty. However, that same skeptic can argue more forcefully that Nonviolence Idealistic does introduce significant risk and should be implemented by only the most passionate SRI investor who, for example, might eschew stocks altogether if it means owning companies who work with the Defense Department. Anyone weighing in on the SRI debate should look first to quantify the risk impact and theoretical return penalty before opining on how screening should be judged as either harmful or beneficial.

Can we determine any general guidelines on how much incremental risk a prudent investor should bear? Chart 3 shows the incremental absolute portfolio risk for a range of tracking errors up to 5%. At tracking errors of 2% or less, the incremental risk and

associated theoretical return penalty remain quite small, with incremental risk of about 0.10% or less and commensurate theoretical return penalty of 0.03% or less. At higher levels of tracking error the incremental risk rises to become more significant, with an exponentially increasing negative impact on both risk and return. To repeat the survey statistic mentioned earlier, as a comparison for forecasted tracking error, the average active manager will take 5% tracking error in an effort to generate alpha.<sup>vii</sup>

Chart 3



**Necessary and Unnecessary Tracking Error**

We’ve already established that incorporating SRI screens increases tracking error, but some SRI managers may incur more tracking error than caused by just the screening. In his research, Jennings found that many SRI mutual funds incur more tracking error than indicated by just the social screens. Results shown below in Table 7 confirm similar findings to those of Jennings, whereby for each mutual fund portfolio, the same universe is optimized to track a standard all-capitalization index, the Russell 3000 in this case. For each portfolio, the same stocks are optimized against the benchmark to obtain the minimum tracking error, defined as Optimal Tracking Error in Table 7.

Table 7

	FTSE KLD 400 Social Index	iShares MSCI USA ESG Select Index	Domini Social Equity	Calvert Social Equity	Vanguard FTSE Index	TIAA-CREF Social Equity
Standard Deviation	19.98%	20.86%	19.84%	19.67%	20.33%	20.97%
Forecast Tracking Error, %	3.06%	2.36%	2.59%	4.55%	3.35%	2.88%
Optimal Tracking Error, %	1.91%	1.34%	2.26%	2.98%	1.98%	1.06%
Unnecessary TE, %	1.15%	1.02%	0.33%	1.57%	1.37%	1.82%

Source: Holdings from Morningstar Principia, June 30, 2011. Risk data from Barra Aegis.

While these fund managers could with validity dispute the choice of benchmark or the time lag of holdings, the basic concept remains true, that SRI funds do bear unnecessary tracking error, i.e. tracking error that could be diversified away. After all, the Capital Asset Pricing Model, CAPM, posits that an investor will not be compensated for unsystematic risk (the source of tracking error) since it can be diversified away. Of course active SRI managers incur tracking error from two completely different sources, alpha-seeking security selection and SRI screening. Unfortunately it can be difficult for an investor to determine how much of the tracking error derives from which source. For rules-based SRI managers not seeking alpha, however, there's theoretically no justification for bearing unnecessary tracking error versus a standard benchmark like the Russell 3000.

The concept of unnecessary tracking error applies as well to many SRI benchmarks like the KLD 400 or the FTSE4Good, which bring indexing methodology to SRI investors. However, funds that track these benchmarks may bear unnecessary tracking error, as seen in the mutual funds in Table 7. These SRI indices may have provided screened universes in an accessible way, but since they are typically not fully optimized against a capitalization-weighted benchmark, they carry the burden of unnecessary risk. Whether these SRI benchmarks make for good portfolios depends on the investor's goals in the context of overall asset allocation. If an investor seeks a well-diversified representation of U.S. equities, for example, then the higher tracking error may be problematic. If an investor has a small portion of total U.S. equity exposure in SRI, then higher tracking error may matter significantly less.

### **Synthesizing Screening and Risk: The Socially Responsible Efficient Frontier**

Having defined and measured tracking error, both necessary and unnecessary, we turn now to synthesizing the two components discussed so far, screening and risk measurement. These can be combined into a series of choices for individual or institutional investors in a way that allows maximization of their utility and highlights the trade-offs between investment and expressive goals. To illustrate these trade-offs, we'll use an example of positive SRI screening on environmental issues.

With high levels of concern about the global environment, many investors express an interest in incorporating environmental sustainability and innovation into their portfolios. Among more idealistic SRI investors, the term "impact investing" is often applied to selecting the companies whose businesses will change how the economy operates while maintaining some expectation of return. Again we'll not address the return component, but instead focus on the trade-offs between the expressive utility of impact and portfolio

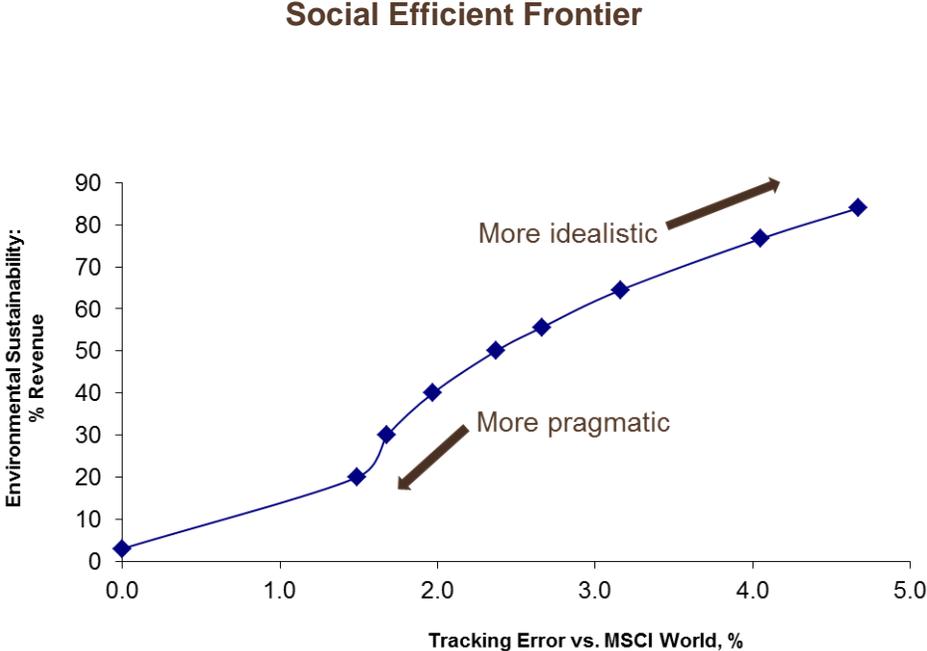
risk. In this case the expressive utility of impact investing will be measured by the amount of revenue generated from publicly traded companies in environmentally sustainable industries. While there exist many different definitions of which publicly-traded companies embrace environmental sustainability, ESG data researcher MSCI has defined five specific industries or services:

- Alternative energy
- Clean technology
- Green building materials
- Pollution prevention
- Sustainable water

For each of these, MSCI collects data on companies worldwide that offer products and services in these areas, determining what percentage of revenue is derived from such environmentally sustainable endeavors. An environmentally-oriented SRI investor could view the percentage of revenue from sustainable businesses as a good metric for companies that may change the world from an environmental perspective, i.e. as a way to represent expressive utility. For such a values-based investor, a higher percentage of revenue means a more responsible company and higher expressive utility. However, for a diversified global portfolio in this example, a higher level of required sustainable revenue means a higher tracking error, or lower investment utility. In other words, more stringent levels of ESG restrictions or scoring cause more unsystematic risk in the portfolio.

In order to measure the range of trade-offs facing an SRI investor keen to own companies with a positive environmental impact, we construct a series of portfolios using the Barra Aegis model to optimize to the lowest possible tracking error for varying levels of percentage of revenue from the five sustainable businesses. Chart 3 shows the tracking error versus the MSCI World index, a commonly used global benchmark that includes all developed economies worldwide. Like the earlier examples of tracking error versus the Russell 3000, here the portfolios are compared to a standard broad diversified benchmark, not a specialized SRI benchmark.

Chart 4



Source: MSCI for ESG revenue data and Barra Aegis for forecasted tracking error.

As can be seen in Chart 4, a more idealistic investor pays the price of increased tracking error in order to achieve greater impact and expressive utility. The shape of the efficient frontier appears quite similar to the traditional mean-variance efficient frontier, where in that case the vertical axis represents a portfolio’s expected return and the horizontal axis absolute risk. For the Social Efficient Frontier shown on Chart 4, the ESG value is now on the vertical axis, which in this case shows the portfolio’s weighted average percentage of revenue from sustainable businesses. The horizontal axis still represents risk, but here it’s the comparative risk measure of tracking error versus the benchmark, the MSCI World index. As with the conventional risk-return efficient frontier, reaching for extra benefit bears a cost in risk.

Though Chart 4 shows the expressive utility for one particular value set, it could be adopted to include any set of values conservative or progressive, e.g. Christian evangelical or pro-labor. Combining the basic tools of ESG databases with a multi-factor optimizer allows for any variation of custom portfolios to reflect any SRI issue for which data are widely available. SRI investors can now invest in ways that match their specific values while also measuring the negative impact of the incremental risk of different levels of strictness in how those values are applied to a portfolio.

## Summary

SRI investing in public equities encompasses two distinct components, screening and its impact on investment risk. Screening can incorporate a wide variety of issues across a wide variety of belief systems, but all require ESG research on many companies in order to build a diversified portfolio. The degree of diversification can best be measured by tracking error, the deviation from a target benchmark. Only in measuring the tracking error impact of screening can its true effect on investment performance be understood. Both skeptics and advocates of screened investing can benefit from using tracking error to gauge the trade-offs between screening and risk.

The debate on SRI will no doubt continue into the future, but the dialogue should reflect the capability of measuring the extra risk cost of screening. As the economist Joseph Stiglitz said, “What you measure affects what you do. If you don’t measure the right thing, you don’t do the right thing.”<sup>viii</sup>

## Bibliography

Asset Management Working Group of the United Nations Environment Programme Finance Initiative and Mercer, “Demystifying Responsible Investment Performance,” report published by UNEP Finance Initiative and Mercer, October 2007, [http://www.unepfi.org/fileadmin/documents/Demystifying\\_Responsible\\_Investment\\_Performance\\_01.pdf](http://www.unepfi.org/fileadmin/documents/Demystifying_Responsible_Investment_Performance_01.pdf)

Jennings, William W. and Gregory W. Martin, “Socially Enhance Indexing: Applying Enhanced Indexing Techniques to Socially Responsible Investment,” *The Journal of Investing*, Summer 2007, Vol. 16, No. 2: pp. 18–31

Milevsky, Moshe and Andrew Aziz, Al Goss, Jane Thompson and David Wheeler, “Cleaning a Passive Index,” *The Journal of Portfolio Management*, Spring 2006, Vol. 32, No. 3: pp. 110-118

## Endnotes

---

<sup>i</sup> “Why Stocks Are Like Socks...and Cars, and Wine...,” *Fortune* magazine web site, November 12, 2007, [http://money.cnn.com/magazines/fortune/fortune\\_archive/2007/11/12/101008311/index.htm](http://money.cnn.com/magazines/fortune/fortune_archive/2007/11/12/101008311/index.htm)

<sup>ii</sup> Asset Management Working Group, UNEP and Mercer

<sup>iii</sup> The forecast tracking error is the expected standard deviation of the variation between a portfolio and its benchmark. It can also be calculated historically, and is in fact the denominator of the information ratio, widely used by institutional investors and their advisors. The information ratio is alpha divided by tracking error.

<sup>iv</sup> Survey from GMO from 2008 of Callan Associates, Inc., Mercer Investment Consulting and Watson Wyatt Worldwide

<sup>v</sup> Forecast standard deviation for Russell 3000 as of 07-31-2011 from Barra Aegis model.

<sup>vi</sup> Source: Dimensional Fund Advisors

<sup>vii</sup> Survey from GMO from 2008 of Callan Associates, Inc., Mercer Investment Consulting and Watson Wyatt Worldwide

<sup>viii</sup> Quoted in the *New York Times*, September 22, 2009, in “Emphasis on Growth Is Called Misguided” by Peter S. Goodman, <http://www.nytimes.com/2009/09/23/business/economy/23gdp.html>

The information contained within this presentation was carefully compiled from sources Aperio believes to be reliable, but we cannot guarantee accuracy. We provide this information with the understanding that we are not engaged in rendering legal, accounting, or tax services. In particular, none of the examples should be considered advice tailored to the needs of any specific investor. We recommend that all investors seek out the services of competent professionals in any of the aforementioned areas.

With respect to the description of any investment strategies, simulations, or investment recommendations, we cannot provide any assurances that they will perform as expected and as described in our materials. Past performance is not indicative of future results. Every investment program has the potential for loss as well as gain.