The Benefits of Socially Responsible Investing: *An Active Manager's Perspective*

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Socially responsible investing has been around since the early 1990s and has many names, the most common one being "ESG," for environment, social, and governance.[1] There has been a lot of research on the predictive power of ESG ratings, the relationship between ESG ratings and subsequent stock performance, and whether using ESG data in stock analysis and portfolio management is value-additive or value-detracting. This line of analysis has mainly been from the return perspective—whether higher ESG-rated stocks tend to have higher returns or whether ESG ratings are an alpha signal. The results in this area of research are mixed, and the results are often time specific, as some research indicates that the alpha-addition from ESG has been diluted in recent years.

De and Clayman [2010] found that ESG scores had predictive and positive association with subsequent total stock returns and financial performance measured by return on equity (ROE), although the impact on the returns weakened after about the year 2000, while the impact on ROE continued to remain strong. Huppe [2011] suggested that corporate social responsibility (CSR) alpha arose because investors historically overlooked the relevance of this information and would be surprised after earnings announcements. But investor attention to this CSR information has increased, and the stock market now more fully reflects the value of CSR information. Kurtz and DiBartolomeo [2011] suggested that investors may not get a performance advantage through the use of social or environmental factors because market valuations already correctly incorporate this information. Borgers et al. [2013] had a similar finding that shareholder information predicted risk-adjusted return until 2004, but increased attention to stakeholder issues since has reduced the errors in investors' expectations and eliminated the mispricing. ESG becoming a more commonly tracked datapoint is certainly borne out by the fact that the share of S&P 500 Index companies filing sustainability reports has increased from 20% in 2011 to 72% in 2013.[2]

Risk and return are the two paramount criteria in making investment decisions. Since the 2008 financial crisis, the world of investments has become more focused on risk. Hoepner [2010] developed a theoretical model that argued that inclusion of ESG criteria into investment processes could improve portfolio diversification through a reduction of the average stock's specific risk. Fulton, Kahn, and Sharples [2012] looked at more than 100 academic studies on sustainable investing and found that ESG factors are correlated with superior risk-adjusted returns at a securities level. Their findings were remarkable: 100% of the academic studies agreed that highly rated ESG companies had a lower cost of

capital (loan, bonds, and equities) because the market recognized them to have lower risk, 89% of the studies showed superior ESG companies exhibited market-based outperformance, and 85% of studies showed they exhibited accounting-based outperformance.

This article builds upon existing research to answer such questions as, Does ESG impact the risk or return profile of stocks? Do low ESG rated companies represent tail risk? Does restricting investment opportunities by deleting low ESG rated companies from the investible universe impose costs for the investor or does it lead to better portfolios? It is important to note that the exclusion of low ESG rated stocks is *not* the same as having exclusionary screens to screen out stocks with operations in areas deemed "sinful."[3] Excluding "sin" stocks has the effect of excluding all stocks with operation in certain industries. ESG ratings are based on a "best in class" among industry peers methodology, and excluding stocks based on ESG ratings is equivalent to excluding stocks with the worst ESG profile in a peer comparison and does not impose any sector bets.

Some investment managers, for idealistic convictions or to meet client guidelines or for risk-reduction, throw out low ESG rated companies from their potential investment pool. But the question arises whether restricting the investment pool in this way hurts or helps investment performance. Given the recent surge in investment funds incorporating ESG criteria in their decisions, this is a question with enormous implications for all investors and money managers. According to U.S. SIF (The Forum for Sustainable and Responsible Investment), the number of investment funds deemed sustainable and responsible grew from 260 in 2007 to 925 in 2014 (19.9% compound annual growth rate). The assets under management for such firms grew even faster, from $202 billion in 2007 to $4.3 trillion in 2014 (54.8% CAGR).[4] This article aims to answer that question in current market conditions by considering the financial crisis and the subsequent years.

Adler and Kritzman [2008] tried to answer the question in a purely mathematical way by restricting the investment pool by randomly deleting securities from the universe and simulating portfolios from the restricted and unrestricted universe, with their return distribution being a theoretical normal distribution generated through Monte Carlo simulation. They concluded that socially responsible investing imposes a cost to skilled investors. They also opined that investors owning good ESG companies because of higher expected return were not socially responsible investors but rather active managers. We argue that the results of Adler and Kritzman [2008] have nothing to do with ESG specifically and can be used to argue against any kind of exclusion. Kazner [2013] also pointed out that a random deletion of observations implicitly assumed that good ESG companies were no more or less likely to outperform bad ESG companies, and that random deletion cannot be a proxy for socially responsible investing (SRI).

We argue that being socially responsible and an active manager go hand in hand if better ESG companies improve the portfolio risk–return profile. An active manager would restrict the potential investment universe based on certain criteria only, and the criterion we explored was eliminating the lowest ESG rated companies. Our first hypothesis then was that ESG ratings have an association and/or have predictive power on the return and risk profile of stocks. And if so, then incorporating these factors into the investment process would improve the portfolio performance.

We found an ex post association between ESG ratings and stock returns, where higher return companies in aggregate had better ESG ratings. But the predictive power of ESG ratings on stock performance was really most meaningful for risk. We found a strongly negative relationship between ESG and volatility, with higher ESG ratings being correlated with lower volatility, and this relationship was stronger when market volatility was higher. There is much empirical literature about the low-volatility anomaly showing the outperformance of low-volatility stocks. Haugen and Baker [1991] showed that investors can build equity portfolios with significantly lower volatility and equal or greater return than capitalization-weighted portfolios. Jagannathan and Ma [2003] found that a minimum-variance portfolio had higher returns and lower risk than a cap-weighted benchmark. Ang et al. [2006] found that U.S. stocks with high volatility had abnormally low returns. Following up on the low-volatility anomaly, we detangled the ESG and volatility effects to answer whether positive ESG ratings lead to low volatility that helped in performance or whether ESG was a positive contributor in its own right. Chi-square frequency tests showed that high ESG stocks tend to be in the low-volatility group and low ESG stocks tend to be in the high-volatility group, in a statistically significant way in almost all time periods. Both (high) ESG and (low) volatility positively

impacted stock returns, but the ESG effect was independent of the low-volatility effect, and ESG was a positive contributor in its own right. We concluded that there was value added by using ESG ratings in investments.

An even more powerful argument (in favor of ESG-based investing) would be if restricting the investible universe by deleting the lower tail of ESG companies and then creating portfolios randomly does not detract from investment performance or, even better, improves the investment outcomes. Put another way: if the return distribution of portfolios created randomly from a universe restricted by deleting the lower tail of ESG companies exhibited equal or superior characteristics to those randomly generated from the complete universe of ESG rated stocks, then using ESG criterion is value additive. If a randomly generated portfolio from a restricted universe (where the restriction was based on the lowest ESG rated stocks) had a high probability of being equal or superior to a randomly generated portfolio from the entire universe, then active managers should consider incorporating an ESG profile in stock selection and portfolio construction. Our methodology was similar to the portfolio opportunity distributions (POD) introduced by Surz [1994], in which numerous random portfolios were generated based on the opportunity set and the risk and return of the simulated portfolios represented the possible investment outcomes given the opportunity set.

Our main conclusion is that deleting low-rated ESG companies as a tail risk did not necessarily impose opportunity costs and, in fact, tended to be value additive for investors. Restricting the investible universe through deletion of the worst ESG stocks tended to improve the probability distribution of returns with higher average and maximum portfolio returns. Using risk-adjusted returns in the random selection from the restricted and unrestricted universes led to similar conclusions. This implies that excluding the worst ESG stocks from the investible universe tends to improve (or keep the same) the return and risk-adjusted return distribution even through a process of random selection.

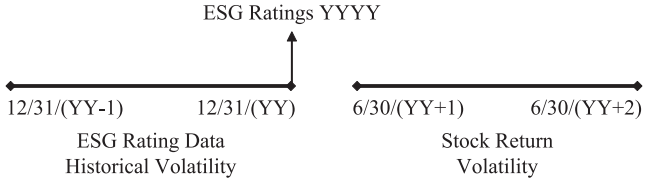
But active management is not a random process. We found higher return companies in aggregate had better ESG ratings and the highest return stocks were always from the better ESG rated group. We found a strong negative correlation between ESG ratings and stock volatility, and this relationship strengthened when market volatility was higher. The implication would be that asset managers could get diversification benefits through lower average stock-specific risk by choosing better ESG stocks, and this benefit would be greater when the need was greater due to higher market volatility. The correlation between ESG rating and risk-adjusted return turned significantly positive in recent years, and this positive correlation was strengthened by excluding the lowest ESG stocks. We also found that the ESG effect was independent of the low-volatility anomaly and the two indicators worked in different time periods, with ESG being more consistent, albeit less powerful, cumulatively.

We conclude that ESG investing does not impose an opportunity cost by way of restricting the investible pool and asset managers could actively enhance their stock-picking and portfolio construction ability by using the predictive ability of ESG on a stock's risk and risk-adjusted return.

DATA

We used Thomson Reuters Corporate Responsibility Data. The dataset had annual data files from 2007 through 2012. ESG data file YYYY referred to ratings created on 12/31/YY using data available during calendar YY. To ensure no look-ahead bias, we used annual stock returns with a six-month lag and stock volatility was measured using the standard deviation of these daily returns. So ESG data for calendar year YYYY (used for ratings as of 12/31/YY) were the independent variable matched with two dependent variables, stock returns and stock volatility, for the period (6/30/[YY+1] – 6/30/[YY+2]). The last return period analyzed was 6/30/13–3/31/14, because the analysis for this research study was started in April 2014.

We also detangled the effect of ESG and volatility (ESG and volatility being two independent variables) on stock returns (dependent variable). We did this using volatility for the ensuing 12 months and also historic volatility, which was measured using standard deviation of the daily stock returns for the same time period used for ESG ratings (calendar year YYYY). The following timeline representation illustrates the different variables.



We restricted the sample to the United States for two reasons. One was that this automatically controlled for the market effect, the biggest common factor in stock returns, and second, ESG standards and the market perception of the importance of these factors differed widely across countries.

METHODOLOGY AND STATISTICS

As a starting point, we analyzed the sample and its overlap with various indexes across the market capitalization and value–growth spectrum to identify any sample characteristics that could have affected our analysis. We did this using the count of companies in the overlap and analyzing the count overlap as a percentage of both the ESG database and the different Russell indexes. For the sample each year, we looked at the descriptive statistics for ESG rating, stock returns, and risk-adjusted returns (RAR).

Risk-adjusted returns = [Annual stock return/
Annualized (Standard deviation of monthly return)]

Given that our research was on stock returns after June 2008, a period of historically low and close-to-zero interest rates, we felt that the simplification by not deducting the risk-free rate in the numerator was immaterial.

We did exploratory analysis on the relationship between ESG ratings and subsequent stock return. We divided the dataset into the *bottom tail* and *rest of the sample* based on ESG ratings and analyzed the returns of both groups. We also divided the dataset into the *bottom tail* and *rest of the sample* based on returns and analyzed their prior ESG ratings. We did this analysis with the break point at the 10th and 5th percentiles. Thus, we divided the dataset into the bottom 10% (5%) and top 90% (95%) based on ratings and analyzed their returns and then divided the dataset into the bottom 10% (5%) and top 90% (95%) based on returns and analyzed their prior ESG ratings. We did t-tests for the difference in returns and ESG ratings.

We did a similar analysis using risk-adjusted returns (RAR). We divided the dataset into the bottom 10% and top 90% based on ESG ratings and analyzed the risk-adjusted returns of both groups and then divided the dataset into the bottom 10% and top 90% based on risk-adjusted returns and analyzed their prior ESG ratings.

We consistently used the terminology of *BN_Variable* and *TN_Variable*, where;

BN = bottom *N* percentage group (*N* = 10% or 5%)
TN = top percentage group (*N* = 90% or 95%)
Variable = *ESG* (ratings), *Return* (stock return), or *RAR* (risk-adjusted return)

We looked at the correlation between ESG ratings and subsequent stock performance for the entire dataset and the dataset with the bottom 10% of ESG rated companies truncated. We next analyzed the correlation between ESG ratings and subsequent volatility of the stock. We measured the volatility using the standard deviation of daily returns for the same one-year period used in stock return analysis. The relationship between ESG ratings and stock volatility was compared with the market volatility to understand whether this relationship (or its strength) varied based on the level of market risk. We used two measures of market risk: 1) the daily average of the closing level of the CBOE Volatility Index (VIX) over the same subsequent one-year period used to measure stock return, and 2) the standard deviation of the S&P 500 daily returns for the same one-year period used in stock return analysis. We used the VIX because it is the most commonly used number to gauge the volatility or fear in the market, but it is a measure of implied volatility. We used measure 2 to have an apples-to-apples comparison with the measure of individual stock and market volatility. We followed up the analysis of the relationship between ESG rating and stock-specific risk with correlation between ESG ratings and risk-adjusted return for the entire dataset and the dataset truncated into the bottom 10% of ESG rated companies and the rest.

We found a strong negative correlation between ESG ratings and stock volatility. But the low-volatility effect is well documented in empirical research. We detangled the ESG and volatility effects to answer whether positive ESG ratings lead to low volatility, which was helpful to performance, or whether ESG was a positive contributor in its own right. For ESG data file for year (YY), we had the returns and volatility (standard deviation of daily returns) for the period (6/30/[YY+1] – 6/30/[YY+2]), except for the last year when the returns are through 3/31/14. We did the analysis year by year to see the consistency in the relationship. We classified every stock based on its value for ESG ratings and its subsequent stock volatility, with the median as the measure of central tendency. Stocks with ESG lower than the median were classified as ESG_L, otherwise

ESG_H. Stocks with volatility lower than the median were classified as Vol_L, otherwise Vol_H. We did a two-way frequency tabulation of stocks along their ESG and volatility groupings and chi-square tests to analyze the relationship between these two traits. Next, we tested the independent effect of both ESG and volatility on stock returns using t-tests. Last, we grouped the stocks into four groups based on their classification along both the ESG and volatility groups (the four groups being [*Vol_H, ESG_H*], [*Vol_H, ESG_L*], [*Vol_L, ESG_H*], [*Vol_L, ESG_L*]) and analyzed the average return of the four groups. We used the two-way analysis of variance (ANOVA) procedure with unbalanced design for the two independent variables of ESG and volatility and reported the Duncan test values at the 95% confidence level.

Because this analysis used volatility measured over the same period as stock returns (therefore, returns and volatility being contemporaneous), we did a robustness check by also using historic volatility. Historic volatility (*HVol*) was measured using standard deviation of the daily stock returns for the same time period as for ESG ratings (calendar year YYYY), and matched with returns for the period (6/30/[YY+1] – 6/30/[YY+2]), except for the last year when the returns are through 3/31/14. We used the median value to classify stocks as *HVol_L* or *HVol_H*.

The next part of our analysis was based on a probability estimation of the impact on portfolio construction by excluding the lower tail of ESG rated companies (stocks with the worst ESG profile). Using the entire dataset (*E*), we created 100 random portfolios P_{ei} (P_{e1}, P_{e2}, …, P_{e100}) of *N* stocks each. We choose a fixed value of $N = 40$, because 40 stocks denote a fairly concentrated portfolio indicative of active management. The stocks in each individual portfolio were selected randomly without replacement, so that one stock could only have 2.5% weight (1/40) in the portfolio. Once a portfolio was generated, all stocks were again available for the next random portfolio generation. For each randomly generated portfolio P_{ei}, we calculated the average portfolio return (M_{ei}). So we got 100 values of M_{ei} from the entire dataset (*E*), and named this distribution (E_1_*M*).

We next identified the 10th percentile value of ESG rating (B10), truncated the dataset (*E*) at the value of B10, and call this truncated dataset (S10). We repeated the same random sampling without replacement method as before and created 100 random portfolios P_{si} (P_{s1}, P_{s2},… ,P_{s100}) of $N = 40$ stocks each. For each randomly generated portfolio P_{si}, we calculated the average portfolio return (M_{si}). We got 100 values of M_{si} from the restricted dataset (*S10*) and named this distribution (*S10_M*). We generated the random samples using the SAS procedure for random sampling without replacement and used a seed number (125) so that the results could be duplicated. We compared the properties of the distributions E_1_M and S10_M.

Restricting the investment pool by truncating the lowest rated ESG stocks involved a judgment on how to define tail risk. Our initial analysis used the 10th percentile as the tail-risk cut off. As a cross-check, we also used a more extreme definition of tail risk by setting it at the 5th percentile. We again did the creation of 100 samples of 40 stocks each through random selection without replacement during each portfolio creation, from the entire dataset (*E*) and again by truncating the lower tail of ESG rated stocks. This time we truncated the dataset (*E*) at the 5th percentile value of ESG rating (*B5*) and call this restricted dataset S5. Following the same methodology, we calculated the average portfolio return of each of the 100 portfolio samples created from datasets *E* and *S5* and named these distributions E_2_*M* and S5_M. To create more randomness in the process, this time we used a different seed number (75). We compared the properties of the distributions E_2_*M* and *S5_M*.

As a further cross-check, we repeated our analysis with randomly generated portfolios using risk-adjusted return as the variable of interest. We did the random portfolio generation of 100 portfolios of 40 stocks each from the entire sample and from the sample with the bottom 10% ESG companies truncated, getting a distribution of the average risk-adjusted return of the 100 portfolios generated from the entire ESG sample and the restricted dataset (excluding the bottom 10% ESG stocks). We called the two distributions E_1_*M_RAR* and *S10_M_RAR* and compared their properties.

We did all the analyses on a year-wise basis, because we believed it showed important variations over time that would have been lost in a pooled analysis.

STATISTICAL ANALYSIS AND RESULTS

In order to understand our sample, we analyzed the overlap in terms of the number of companies common between the Thomson Reuters ESG database (restricted to U.S. companies) and the different Russell indexes (Russell 1000, 1000 Growth, Midcap, Midcap Growth, 2500, and 2000). We expressed the count overlap as a percentage of the count in ESG (U.S.) database in Panel

A of Exhibit 1 and as a percentage of the Russell index count in Panel B.

For example: In 2007, N = 655 companies was the count overlap between the ESG (U.S.) database and Russell 1000. This overlap number expressed as a percentage of the 680 companies in the ESG (U.S.) database is 96% and is reported in Panel A of Exhibit 1 in year 2007 under R1000. The overlap of 655 expressed as a percentage of the R1000 count is 66% and is reported in Panel B of Exhibit 1 in year 2007 under R1000.

The sample had a large-cap bias, with maximum overlap with the large-cap indexes and progressively less so down the market cap spectrum. On average, 93% of the sample belonged to the Russell 1000, 72% belonged to the Russell Midcap, 48% belonged to the Russell 2500, and only 6% belonged to the Russell 2000. Analyzing it in reverse, we found that around 85% of the Russell Large Cap and Midcap indexes had ESG rating coverage, and this ratio dropped dramatically to 18% for Russell 2500 and to a negligible 3% for the Russell 2000. The coverage extended more into the mid-cap companies in later time periods. There was also a bias toward growth companies.

See Exhibit 2 for summary statistics of the sample.

Relationship between ESG Ratings and Stock Return

In Exhibit 3, Panel A, the mean and median stock return for the *T90_ESG* group was higher than that of the *B10_ESG* group in only two of the six sample time periods, and the difference in means for these periods was not statistically significant. However, the volatility (standard deviation of returns) of the *T90_ESG* group was less in four out of six sample time periods, and the maximum return of the *T90_ESG* group was always higher. The fact that the highest return stocks were always in the non-lower-tail group had the important implication that the stocks every asset manager wants to identify would not be lost in the opportunity set by excluding the worst ESG rated stocks.

In Panel B of Exhibit 3, the mean and median stock returns for the *T95_ESG* group were higher than that of the *B5_ESG* group in three of the six sample time periods, with the superior returns being statistically significant in only one year. The volatility (standard deviation) of returns for the *T95_ESG* group was less in three out of six sample time periods. The maximum return of the *T95_ESG* group was higher in all sample time periods.

Panels A and B of Exhibit 3 lend support to the often-stated view that ESG ratings are not an alpha factor for stock returns. But they tend to reflect risk characteristics. Non-tail ESG companies had lower volatility 58% of the time (in 4/6 years when the lower tail was defined as 10% and in 3/6 time periods when the lower tail was defined as 5%). The maximum return stocks always had a better ESG profile. An asset manager, by excluding the worst ESG stocks, could reduce portfolio volatility and increase the probability of identifying the best-performing stocks.

In Panel C of Exhibit 3, in all six sample time periods, the mean and median ESG ratings of the *T90_Return* group were higher than that of the *B10_Return* group, and the difference in average rating was statistically significant in five of the six time periods.

In Panel D of Exhibit 3, in all six sample time periods, the mean and median ESG ratings of the *T95_Return* group were higher than that of the *B5_Return* group, and the difference in average rating was statistically significant in four of the six time periods. Panels C and D of Exhibit 3 show that the lowest return stocks always had ESG ratings, on average, lower than the non-tail population.

The results from Exhibit 3 (Panels A, B, C, and D) indicate a strong ex post association between ESG ratings and returns, where higher-return companies, on average, had higher ESG ratings. Truncating the bottom ESG rated companies lowered the standard deviation 58% of time, indicating that ESG ratings could reflect risk characteristics. The maximum return stock was always from

EXHIBIT 1
Overlap between ESG Rating Sample and Various Indexes

ESG Data	R1000	R1000 G	RMC	RMC G	R2500	R2000
Panel A: Percentage of the ESG dataset belonging to various indexes						
2007	96%	67%	68%	47%	33%	3%
2008	94%	60%	74%	45%	47%	4%
2009	93%	60%	74%	47%	52%	5%
2010	90%	58%	72%	45%	53%	8%
2011	92%	56%	73%	44%	52%	7%
2012	90%	51%	71%	40%	52%	9%
Average	93%	59%	72%	45%	48%	6%
Panel B: Percentage of the Russell Indexes covered in ESG dataset						
2007	66%	66%	58%	59%	9%	1%
2008	82%	81%	80%	77%	17%	2%
2009	93%	94%	92%	93%	20%	3%
2010	92%	92%	91%	91%	21%	4%
2011	92%	93%	91%	92%	21%	4%
2012	88%	87%	86%	84%	20%	4%
Average	86%	85%	83%	83%	18%	3%

EXHIBIT 2

ESG Rating, Return, Risk-Adjusted Return Characteristics: Complete Distribution

ESG Data Year	Variable	N	Mean	Median	Standard Deviation	Minimum	Maximum	Skew	Kurtosis
2007	Rating	680	51.1	49.2	10.0	31.3	83.5	0.7	0.1
	Return	652	–28.3	–27.5	27.3	–99.5	136.0	0.6	3.0
	RAR	652	–0.5	–0.5	0.4	–1.6	2.0	0.9	3.0
2008	Rating	860	50.9	48.8	10.4	26.0	80.4	0.6	–0.3
	Return	836	30.0	23.1	49.5	–97.0	635.0	5.5	57.0
	RAR	836	0.9	0.9	1.0	–1.4	5.2	0.6	0.9
2009	Rating	971	49.8	47.3	11.2	24.9	79.1	0.6	–0.5
	Return	930	37.0	33.4	34.9	–84.4	247.3	0.9	3.2
	RAR	930	1.5	1.4	1.2	–1.3	7.2	0.5	0.7
2010	Rating	996	50.9	48.4	10.7	28.2	81.4	0.6	–0.5
	Return	959	–3.1	–2.0	27.4	–97.7	111.1	–0.1	1.4
	RAR	959	0.1	–0.1	1.0	–2.8	6.8	1.5	5.1
2011	Rating	982	51.2	49.0	11.1	27.9	82.5	0.5	–0.7
	Return	958	27.6	22.3	41.7	–77.2	634.1	5.1	56.6
	RAR	958	1.3	1.2	1.2	–1.5	5.6	0.5	0.2
2012	Rating	972	51.3	49.0	11.2	28.0	82.6	0.5	–0.8
	Return	939	21.2	18.7	24.5	–82.1	181.6	1.1	4.9
	RAR	939	1.0	0.9	0.9	–1.6	5.5	0.6	1.3

Notes: Rating = ESG Rating, Return = 12-month stock return, RAR = Annual Risk-Adjusted Return. ESG Data Year (YY) is associated with return and risk-adjusted return in period mid-(YY+1) through mid-(YY+2). For ESG Data Year (2012), the returns and risk-adjusted return are mid-2013 through 1Q 2014, the latest available at time of the study. N = sample size. Some observations had ESG ratings but did not have return and RAR data.

the better ESG profile group, and an active manager could improve the probability of identifying the highest return stocks by eliminating the lower tail ESG stocks.

Relationship between ESG Ratings and Risk-Adjusted Stock Return

The results shown in Exhibit 4 with risk-adjusted returns were broadly in line with that of returns. Panel A of Exhibit 4 shows that the stock with maximum risk-adjusted return was always in the non-lower-tail ESG group, implying that excluding the lowest tail ESG stocks would have increased the probability of identifying good stocks. In Panel B, in five out of six time periods, the higher risk-adjusted return stocks (*T90_RAR*) had higher average and median ESG ratings than the lowest risk-adjusted return stocks (*B10_RAR*), indicating an ex post association between ESG ratings and risk-adjusted return. The superior average ESG rating of the *T90_RAR* group was statistically significant in two years.

Correlation: ESG Rating and Return, Risk, and Risk-Adjusted Return

Panel A of Exhibit 5 shows a statistically significant positive correlation between ESG ratings and stocks returns only during the financial crisis (mid 2008–mid 2009), and this was driven by the non-lower-tail ESG group. This could indicate a market preference for better ESG stocks during times of financial stress. In the sharp stock market recovery period (mid 2009–mid 2010), there was actually a significantly negative correlation between ESG and returns, which was much stronger in the lower tail of ESG stocks. This confirms the market belief that the early stage of a strong rally is often led by low-quality stocks. In the other years, there was no statistically significant correlation between ESG rating and stock return. The results in Exhibit 5, Panel A, are in line with Exhibit 3, which indicated that ESG ratings usually did not have predictive ability on subsequent stock returns, only an ex post association that higher return companies had prior high ESG ratings.

EXHIBIT 3

Relationship between ESG Ratings and Stock Return

Panel A: Distributions truncated by ESG ratings (tail risk bottom 10%)
- **Bottom 10% of ESG companies (B10_ESG)**
- **Top 90% of ESG companies (T90_ESG)**

ESG Data Year	Distribution	Variable	N	Mean	Median	Std Dev	Min	Max	Skew	Kurtosis	Mean Return of [T90_ESG > B10_ESG]
2007	*B10_ESG*	Rating	69	37.2	37.8	2.2	31.3	39.8	–0.9	0.1	
	B10_ESG	Return	67	–32.1	–33.2	28.2	–99.5	60.7	0.3	0.8	
	T90_ESG	Rating	611	52.7	50.4	9.3	39.9	83.5	0.9	0.2	
	T90_ESG	Return	585	–27.9	–26.3	27.2	–98.9	136.0	0.6	3.3	Y
2008	*B10_ESG*	Rating	88	36.6	36.9	2.3	26.0	39.4	–1.6	4.3	
	B10_ESG	Return	84	37.3	31.6	34.7	–33.1	141.7	1.1	1.7	
	T90_ESG	Rating	772	52.6	50.1	9.6	39.6	80.4	0.8	–0.3	
	T90_ESG	Return	752	29.1	21.8	50.8	–97.0	635.0	5.6	57.3	N *
2009	*B10_ESG*	Rating	99	34.6	35.2	2.3	24.9	37.2	–1.7	4.1	
	B10_ESG	Return	93	35.3	28.5	40.5	–84.4	196.5	0.9	3.1	
	T90_ESG	Rating	872	51.5	48.7	10.5	37.3	79.1	0.7	–0.6	
	T90_ESG	Return	837	37.2	34.0	34.3	–79.5	247.3	0.9	3.3	Y
2010	*B10_ESG*	Rating	103	36.3	36.9	2.4	28.2	38.9	–1.4	1.8	
	B10_ESG	Return	101	–1.5	–1.3	26.9	–73.9	78.0	–0.2	1.1	
	T90_ESG	Rating	893	52.5	50.0	10.0	39.0	81.4	0.6	–0.6	
	T90_ESG	Return	858	–3.3	–2.2	27.4	–97.7	111.1	–0.0	1.4	N
2011	*B10_ESG*	Rating	101	36.1	36.6	2.2	27.9	38.4	–1.3	2.0	
	B10_ESG	Return	98	34.8	26.6	46.0	–31.8	346.0	3.9	22.6	
	T90_ESG	Rating	881	52.9	50.7	10.4	38.5	82.5	0.5	–0.8	
	T90_ESG	Return	860	26.8	22.1	41.1	–77.2	634.1	5.3	62.9	N *
2012	*B10_ESG*	Rating	101	36.1	36.8	2.2	28.0	38.4	–1.3	1.8	
	B10_ESG	Return	97	21.9	19.0	25.1	–31.1	125.1	1.3	4.2	
	T90_ ESG	Rating	871	53.1	51.1	10.5	38.5	82.6	0.5	–0.8	
	T90_ESG	Return	842	21.1	18.7	24.4	–82.1	181.6	1.1	5.0	N

*Notes: Rating = ESG Rating, Return = 12-month stock return. ESG Data Year (YY) is associated with return and risk-adjusted return in period mid-(YY+1) through mid-(YY+2). For ESG Data Year (2012), the returns and risk-adjusted return are mid-2013 through 1Q 2014, the latest available at time of the study. N = sample size. Some observations had ESG ratings but did not have return data. Null Hypothesis: Average returns of B10_ESG and T90_ESG are equal. The two-tailed probability for unequal variances is reported if the probability from the F-test is less than 0.05. *** = 99% confidence, ** = 95% confidence, * = 90% confidence.*

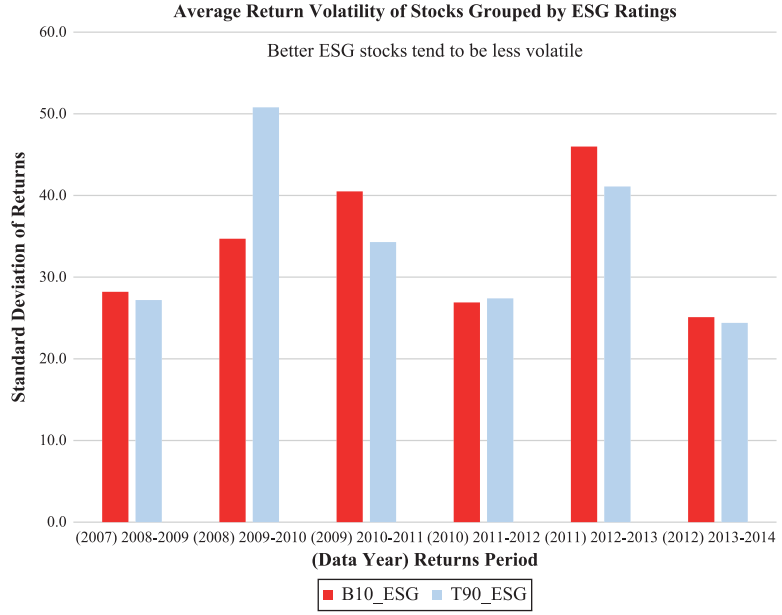


EXHIBIT 3 (*Continued*)

Panel B: Distributions truncated by ESG ratings (tail risk bottom 5%)
- **Bottom 5% of ESG Companies (B5_ESG)**
- **Top 95% of ESG Companies (T95_ESG)**

ESG Data Year	Distribution	Variable	N	Mean	Median	Std Dev	Min	Max	Skew	Kurtosis	Mean Return of [T95_ESG> B5_ESG]
2007	*B5_ESG*	Rating	37	35.6	35.8	1.8	31.3	37.8	–0.8	–0.1	
	B5_ESG	Return	36	–33.0	–34.1	27.1	–86.8	15.4	–0.1	–0.7	
	T95_ESG	Rating	643	52.0	49.9	9.5	37.9	83.5	0.8	0.1	
	T95_ESG	Return	616	–28.1	–27.1	27.3	–99.5	136.0	0.6	3.2	Y
2008	*B5_ESG*	Rating	44	34.8	35.5	2.0	26.0	36.7	–2.6	8.8	
	B5_ESG	Return	41	41.3	36.9	33.0	–12.8	141.7	1.3	2.8	
	T95_ESG	Rating	816	51.8	49.5	9.9	37.0	80.4	0.7	–0.3	
	T95_ESG	Return	795	29.4	22.4	50.1	–97.0	635.0	5.6	57.2	N **
2009	*B5_ESG*	Rating	51	33.1	33.5	2.2	24.9	35.2	–1.9	4.4	
	B5_ESG	Return	47	27.6	23.7	33.2	–84.4	99.7	–0.6	2.3	
	T95_ESG	Rating	920	50.7	47.8	10.8	35.3	79.1	0.7	–0.5	
	T95_ESG	Return	883	37.5	33.9	34.9	–79.5	247.3	1.0	3.2	Y *
2010	*B5_ESG*	Rating	50	34.5	35.2	2.1	28.2	36.7	–1.4	1.3	
	B5_ESG	Return	48	–6.1	–3.1	28.9	–73.9	78.0	–0.2	1.3	
	T95_ESG	Rating	946	51.7	49.3	10.3	36.8	81.4	0.6	–0.6	
	T95_ESG	Return	911	–3.0	–1.9	27.3	–97.7	111.1	–0.1	1.4	Y
2011	*B5_ESG*	Rating	51	34.4	35.2	1.9	27.9	36.6	–1.5	2.3	
	B5_ESG	Return	48	45.8	35.7	57.6	–17.3	346.0	3.6	16.4	
	T95_ESG	Rating	931	52.1	50.1	10.7	36.7	82.5	0.5	–0.8	
	T95_ESG	Return	910	26.7	21.9	40.5	–77.2	634.1	5.2	63.3	N **
2012	*B5_ESG*	Rating	49	34.4	34.9	1.9	28.0	36.6	–1.4	2.0	
	B5_ESG	Return	45	25.2	21.6	26.3	–30.0	119.2	1.1	2.9	
	T95_ ESG	Rating	923	52.2	50.0	10.8	36.8	82.6	0.5	–0.8	
	T95_ESG	Return	894	21.0	18.6	24.4	–82.1	181.6	1.1	5.1	N

*Notes: Rating = ESG Rating, Return = 12-month stock return. ESG Data Year (YY) is associated with return and risk-adjusted return in period mid-(YY+1) through mid-(YY+2). For ESG Data Year (2012), the returns and risk-adjusted return are mid-2013 through 1Q 2014, the latest available at time of the study. N = sample size. Some observations had ESG ratings but did not have return data. Null Hypothesis: Average returns of B5_ESG and T95_ESG are equal. The two-tailed probability for unequal variances is reported if the probability from the F-test is less than 0.05. *** = 99% confidence, ** = 95% confidence, * = 90% confidence.*

Panel C: Distributions truncated by stock return (tail risk bottom 10%)
- **Bottom 10% of stock return companies (B10_Return)**
- **Top 90% of stock return companies (T90_Return)**

ESG Data Year	Distribution	Variable	N	Mean	Median	Std Dev	Min	Max	Skew	Kurtosis	Mean ESG of [T90_Return> B10_Return]
2007	*B10_Return*	Rating	94	48.4	46.8	8.6	31.7	72.7	0.9	0.6	
	B10_Return	Return	66	–75.7	–76.5	10.4	–99.5	–61.2	–0.6	–0.4	
	T90_Return	Rating	586	51.5	49.6	10.1	31.3	83.5	0.6	0.0	Y ***
	T90_Return	Return	586	–23.0	–24.1	23.2	–61.2	136.0	1.4	5.7	
2008	*B10_Return*	Rating	106	49.8	46.7	9.7	26.0	75.1	0.7	–0.1	
	B10_Return	Return	82	–24.1	–20.3	14.3	–97.0	–10.6	–2.3	7.9	
	T90_Return	Rating	754	51.1	49.1	10.4	29.6	80.4	0.6	–0.3	Y
	T90_Return	Return	754	35.8	26.4	48.4	–10.0	635.0	6.3	66.5	

EXHIBIT 3 (*Continued*)

ESG Data Year	Distribution	Variable	N	Mean	Median	Std Dev	Min	Max	Skew	Kurtosis	Mean ESG of [T90_Return> B10_Return]
2009	*B10_Return*	Rating	134	47.5	45.0	11.1	24.9	78.9	1.0	0.7	Y **
	B10_Return	Return	93	–17.4	–13.6	15.9	–84.4	–0.1	–1.9	4.9	
	T90_Return	Rating	837	50.2	47.5	11.2	26.3	79.1	0.5	–0.6	
	T90_Return	Return	837	43.1	37.3	31.0	–0.0	247.3	1.7	4.8	
2010	*B10_Return*	Rating	133	49.2	46.7	10.1	29.8	77.4	0.7	–0.3	Y *
	B10_Return	Return	96	–54.1	–49.3	15.3	–97.7	–36.6	–0.9	0.1	
	T90_Return	Rating	863	51.1	48.9	10.8	28.2	81.4	0.5	–0.6	
	T90_Return	Return	863	2.5	1.3	22.0	–36.5	111.1	0.9	2.0	
2011	*B10_Return*	Rating	120	49.2	47.1	10.9	33.9	78.7	1.0	0.4	Y **
	B10_Return	Return	96	–24.4	–18.1	18.0	–77.2	–5.6	–1.2	0.7	
	T90_Return	Rating	862	51.4	49.4	11.1	27.9	82.5	0.4	–0.8	
	T90_Return	Return	862	33.4	25.9	39.5	–5.5	634.1	6.5	74.7	
2012	*B10_Return*	Rating	127	49.7	46.7	11.5	31.8	77.6	0.7	–0.4	Y *
	B10_Return	Return	94	–15.6	–11.3	13.9	–82.1	–3.7	–2.3	6.8	
	T90_Return	Rating	845	51.6	49.7	11.2	28.0	82.6	0.4	–0.8	
	T90_Return	Return	845	25.3	21.0	21.8	–3.5	181.6	1.9	6.9	

*Notes: Rating = ESG Rating, Return = 12-month stock return. ESG Data Year (YY) is associated with return and risk-adjusted return in period mid-(YY+1) through mid-(YY+2). For ESG Data Year (2012), the returns and risk-adjusted return are mid-2013 through 1Q 2014, the latest available at time of the study. N = sample size. Some observations had ESG ratings but did not have return data. Null Hypothesis: Average ratings of B10_Return and T90_Return are equal. The two-tailed probability for unequal variances is reported if the probability from the F-test is less than 0.05. *** = 99% confidence, ** = 95% confidence, * = 90% confidence.*

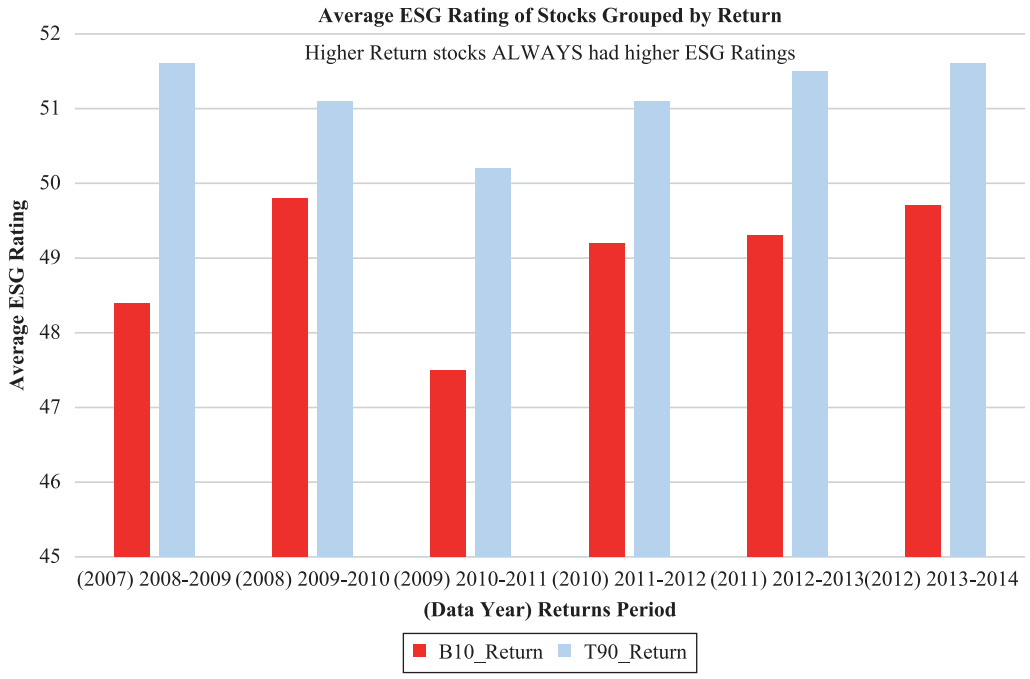


EXHIBIT 3 (*Continued*)

Panel D: Distributions truncated by stock return (tail risk bottom 5%)
- **Bottom 5% of stock return companies (B5_Return)**
- **Top 95% of stock return companies (T95_Return)**

ESG Data Year	Distribution	Variable	N	Mean	Median	Std Dev	Min	Max	Skew	Kurtosis	Mean ESG of [T95_Return> B5_Return]
2007	*B5_Return*	Rating	61	49.0	48.1	8.7	35.1	72.7	1.0	0.7	
	B5_Return	Return	33	–84.1	–80.2	7.4	–99.5	–76.5	–1.0	–0.5	
	T95_Return	Rating	619	51.3	49.2	10.1	31.3	83.5	0.7	0.0	Y *
	T95_Return	Return	619	–25.3	–25.5	24.7	–76.5	136.0	1.1	4.4	
2008	*B5_Return*	Rating	66	48.8	46.2	9.6	26.0	75.1	0.8	0.6	
	B5_Return	Return	42	–33.4	–29.5	14.7	–97.0	–20.1	–2.4	7.8	
	T95_Return	Rating	794	51.1	49.1	10.4	29.6	80.4	0.6	–0.3	Y *
	T95_Return	Return	794	33.3	24.8	48.4	–19.7	635.0	6.1	64.1	
2009	*B5_Return*	Rating	88	47.0	45.6	10.5	24.9	78.7	0.9	1.0	
	B5_Return	Return	47	–28.4	–23.2	15.6	–84.4	–13.6	–2.1	4.7	
	T95_Return	Rating	883	50.1	47.5	11.3	26.3	79.1	0.6	–0.6	Y **
	T95_Return	Return	883	40.5	35.7	32.1	–13.6	247.3	1.5	4.2	
2010	*B5_Return*	Rating	85	49.0	47.3	9.2	29.8	70.6	0.7	–0.0	
	B5_Return	Return	48	–66.2	–64.8	12.5	–97.7	–49.8	–0.7	–0.1	
	T95_Return	Rating	911	51.0	48.6	10.8	28.2	81.4	0.5	–0.6	Y *
	T95_Return	Return	911	0.2	–0.4	23.7	–48.8	111.1	0.6	1.4	
2011	*B5_Return*	Rating	72	49.1	47.2	10.3	33.9	77.8	1.1	0.8	
	B5_Return	Return	48	–38.1	–33.4	16.2	–77.2	–18.5	–0.9	–0.1	
	T95_Return	Rating	910	51.3	49.2	11.2	27.9	82.5	0.4	–0.8	Y
	T95_Return	Return	910	31.1	24.4	39.7	–17.7	634.1	6.2	70.6	
2012	*B5_Return*	Rating	80	49.8	46.7	11.3	31.8	77.4	0.7	–0.5	
	B5_Return	Return	47	–24.4	–19.7	15.0	–82.1	–11.4	–2.0	4.6	
	T95_Return	Rating	892	51.5	49.3	11.2	28.0	82.6	0.4	–0.8	Y
	T95_Return	Return	892	23.6	20.1	22.4	–11.2	181.6	1.8	6.1	

*Notes: Rating = ESG Rating, Return = 12-month stock return. ESG Data Year (YY) is associated with return and risk-adjusted return in period mid-(YY+1) through mid-(YY+2). For ESG Data Year (2012), the returns and risk-adjusted return are mid-2013 through 1Q 2014, the latest available at time of the study. N = sample size. Some observations had ESG ratings but did not have return data. Null Hypothesis: Average ratings of B5_Return and T95_Return are equal. The two-tailed probability for unequal variances is reported if the probability from the F-test is less than 0.05. *** = 99% confidence, ** = 95% confidence, * = 90% confidence.*

Panel B of Exhibit 5 showed a very statistically strong negative correlation between ESG ratings and stock volatility. Higher ESG rated stocks had lower stock volatility. What is also important is that the strength of the negative correlation between ESG rating and stock volatility varied based on the level of market risk. The higher the market volatility or fear in the market, the greater the benefit of investing in higher ESG rated stocks as a way to reduce individual stock volatility (individual stock volatility being one of the three components of portfolio volatility). This relationship was true whether we used the implied volatility (VIX) or the actual market volatility. This suggests that the portfolio diversification impact of lowering average stock-risk by selecting higher ESG stocks was highest when the portfolio manager needed it the most.

The correlation between ESG rating and risk-adjusted return turned positive and then significantly positive in the years following the financial crisis. The correlation between ESG rating and risk-adjusted return was much more strongly positive and statistically significant in recent years, after excluding the bottom 10% of ESG rated companies. The implication of this would again be that excluding the bottom 10% ESG companies

EXHIBIT 4
Relationship between ESG Ratings and Risk-Adjusted Stock Return

Panel A: Distributions truncated by ESG ratings (tail risk bottom 10%)
- **Bottom 10% of ESG companies (B10_ESG)**
- **Top 90% of ESG companies (T90_ESG)**

ESG Data Year	Distribution	Variable	Mean	Median	Std Dev	Min	Max	Skew	Kurtosis	Mean RAR of [T90_ESG > B10_ESG]
2007	*B10_ESG (69,67)*	RAR	–0.43	–0.48	0.39	–1.35	1.11	0.91	2.84	
	T90_ESG (611,585)	RAR	–0.48	–0.49	0.44	–1.63	2.01	0.95	3.06	N
2008	*B10_ESG (86,82)*	RAR	1.13	1.09	0.84	–0.80	3.10	0.10	–0.41	
	T90_ESG (774,754)	RAR	0.84	0.82	0.98	–1.40	5.23	0.60	1.05	N
2009	*B10_ESG (99,93)*	RAR	1.37	1.18	1.21	–1.25	4.11	0.40	–0.09	
	T90_ESG (872,837)	RAR	1.48	1.39	1.20	–1.09	7.24	0.53	0.83	Y
2010	*B10_ESG (103,101)*	RAR	0.09	–0.04	0.86	–2.79	2.83	0.56	2.19	
	T90_ESG (893,858)	RAR	0.12	–0.09	0.98	–2.35	6.78	1.56	5.26	Y
2011	*B10_ESG (101,98)*	RAR	1.44	1.25	1.28	–0.70	5.21	0.78	0.73	
	T90_ESG (881,860)	RAR	1.28	1.17	1.20	–1.49	5.59	0.43	0.15	N
2012	*B10_ESG (101,97)*	RAR	0.93	0.95	0.86	–0.74	3.19	0.26	–0.05	
	T90_ESG (871,842)	RAR	0.98	0.91	0.94	–1.55	5.53	0.65	1.35	Y

Notes: ESG Data Year (YY) is associated with risk-adjusted return in period mid-(YY+1) through mid-(YY+2). For ESG Data Year (2012), the risk-adjusted return is mid-2013 through 1Q 2014, the latest available at time of the study. Sample size reported in parentheses. First number = number of companies in that ESG grouping; second number = number of companies with data available for the dependent variable RAR. RAR data were not available for some companies. Jobson and Korkie [1981] demonstrated hypothesis testing with the Sharpe ratio, but it is mathematically messy and not commonly used, and we did not conduct that test.

Panel B: Distributions truncated by stock RAR (tail risk bottom 10%)
- **Bottom 10% of stock risk-adjusted return companies (B10_RAR)**
- **Top 90% of stock risk-adjusted return companies (T90_RAR)**

ESG Data Year	Distribution	Variable	Mean	Median	Std Dev	Min	Max	Skew	Kurtosis	Mean ESG of [T90_RAR> B10_RAR]
2007	*B10_RAR*(68,96)	Rating	51.39	49.90	8.72	35.10	75.50	0.53	–0.12	
	T90_RAR(584,584)	Rating	51.07	49.10	10.19	31.30	83.50	0.71	0.07	N
2008	*B10_RAR*(85,109)	Rating	49.67	46.80	9.56	26.00	75.10	0.72	0.01	
	T90_RAR(751,751)	Rating	51.11	49.10	10.46	29.60	80.40	0.60	–0.33	Y
2009	*B10_RAR*(95,136)	Rating	47.75	45.25	11.22	24.90	78.90	0.94	0.52	
	T90_RAR(835,835)	Rating	50.15	47.50	11.20	26.30	79.10	0.55	–0.61	Y **
2010	*B10_RAR*(96,133)	Rating	49.87	47.50	9.80	29.80	81.30	0.64	–0.04	
	T90_RAR(863,863)	Rating	51.02	48.60	10.83	28.20	81.40	0.54	–0.60	Y
2011	*B10_RAR*(96,120)	Rating	49.29	47.05	10.77	33.90	78.70	1.05	0.40	
	T90_RAR(862,862)	Rating	51.44	49.35	11.14	27.90	82.50	0.40	–0.83	Y **
2012	*B10_RAR*(94,127)	Rating	50.52	47.00	11.69	31.80	77.60	0.64	–0.62	
	T90_RAR(845,845)	Rating	51.46	49.50	11.13	28.00	82.60	0.44	–0.76	Y

*Notes: ESG Data Year (YY) is associated with risk-adjusted return in period mid-(YY+1) through mid-(YY+2). For ESG Data Year (2012), the risk-adjusted return is mid-2013 through 1Q 2014, the latest available at time of the study. Sample size reported in parentheses. First number = number of companies in that RAR grouping; second number = number of companies with data available for the dependent variable ESG Rating. Observations with missing RAR but having ESG ratings were grouped in the B10_RAR. Null Hypothesis: Average ratings of B10_RAR and T90_RAR are equal. *** = 99% confidence, ** = 95% confidence, * = 90% confidence.*

EXHIBIT 5

Correlation: ESG Rating and Return, Risk, and Risk-Adjusted Return

Panel A: Correlation between ratings and return

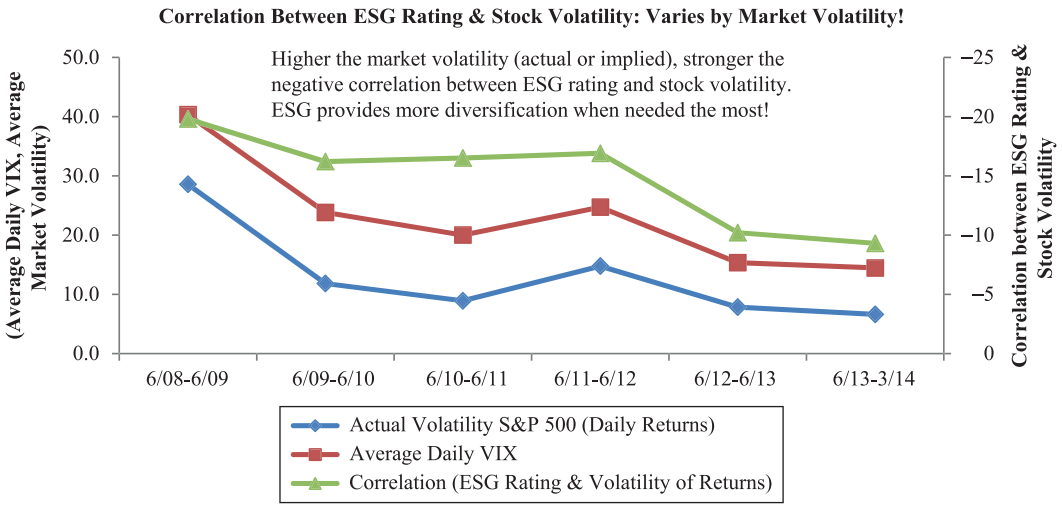
ESG Data Year	Returns Period	Entire Distribution	B10_ESG	T90_ESG
2007	Mid 2008–Mid 2009	+10.3% ***	+ 5.7%	+ 9.6% **
2008	Mid 2009–Mid 2010	– 7.6% **	– 13.0%	– 5.9%
2009	Mid 2010–Mid 2011	– 2.5%	+13.9%	– 4.2%
2010	Mid 2011–Mid 2012	+ 0.5%	+10.6%	+ 1.5%
2011	Mid 2012–Mid 2013	+ 0.1%	–23.5%**	+ 4.0%
2012	Mid 2013–Q1/ 2014	+ 2.9%	– 6.1%	+ 4.1%

*Notes: B10_ESG = Bottom 10% ESG companies. T90_ESG = Distribution excluding bottom 10% ESG companies. ***, **, * indicate statistical significance at the 99%, 95%, and 90% confidence levels, respectively.*

Panel B: Correlation between ESG ratings and stock risk: Does it vary based on market risk?

ESG Data Year	Returns & Market VIX Period	Entire Distribution	VIX	Actual Market Volatility
2007	Mid 2008–Mid 2009	–19.8% ***	40.3	2.86
2008	Mid 2009–Mid 2010	–16.2% ***	23.8	1.18
2009	Mid 2010–Mid 2011	–16.5% ***	20.0	0.89
2010	Mid 2011–Mid 2012	–16.9% ***	24.7	1.48
2011	Mid 2012–Mid 2013	–10.2% ***	15.3	0.78
2012	Mid 2013–Q1/ 2014	–9.3% ***	14.4	0.66

*Notes: The actual market volatility was the standard deviation of the daily returns of S&P 500. ***, **, * indicate statistical significance at the 99%, 95%, and 90% confidence levels, respectively.*



Note: The actual volatility (standard deviation of the daily returns of S&P 500) was multiplied by 10 in order to graph it on the same axis as VIX.

EXHIBIT 5 (*Continued*)

Panel C: Correlation between ratings and risk-adjusted return

ESG Data Year	Returns Period	Entire Distribution	B10_ESG	T90_ESG
2007	Mid 2008–Mid 2009	– 1.5%	+ 2.9%	+ 0.3%
2008	Mid 2009–Mid 2010	– 4.4%	–10.2%	– 0.2%
2009	Mid 2010–Mid 2011	+ 4.0%	+10.4%	+ 3.0%
2010	Mid 2011–Mid 2012	+ 6.3% *	+ 8.0%	+ 6.8% **
2011	Mid 2012–Mid 2013	+ 3.6%	–13.4%	+ 6.9% **
2012	Mid 2013–Q1/ 2014	+11.4% ***	–14.2%	+ 12.9% ***

*Notes: B10_ESG = Bottom 10% ESG companies. T90_ESG = Distribution excluding bottom 10% ESG companies. ***, **, * indicate statistical significance at the 99%, 95%, and 90% confidence levels, respectively.*

as a tail risk enhanced the value of using ESG ratings in picking stocks with superior risk-return profile.

The results in Exhibit 5 indicate that except in times of extreme distress, there was no statistically significant correlation between ESG and stock return. Excluding the lowest ESG stocks either did not change or actually improved the relationship. But there was a consistent and significantly strong negative correlation between ESG ratings and stock volatility, and this relationship implying diversification opportunities (through reduction of average stock-specific risk) was stronger when market volatility was higher. Combining the risk and return through risk-adjusted returns, we see that the correlation between ESG rating and risk-adjusted return turned significantly positive in the recent years. It is important to note that the positive correlation between ESG rating and risk-adjusted return strengthened by excluding the lowest ESG stocks. The implication is that an asset manager can use ESG information as a portfolio risk control strategy and further enhance the value of actively using ESG in stock picking by excluding the worst ESG stocks.

Detangling the ESG and Volatility Effects

We found a negative relationship between ESG and volatility, with higher ESG ratings being correlated with lower volatility. But there is a lot of empirical literature about the low-volatility anomaly, showing the outperformance of low-volatility stocks. We detangled the ESG and volatility effects to answer whether positive ESG ratings lead to low volatility, which helped performance, or whether ESG was a positive contributor in its own right. We used volatility measured over the same time period as stock returns (*Vol*) and also measured over the same time period as ESG ratings (*HVol*).

For ESG data file (YYYY), we have the returns and volatility (standard deviation of daily returns) for the period (6/30/[YY+1] – 6/30/[YY+2]), except for the last year when the returns are through 3/31/14. For each ESG data file (YYYY), we also had the volatility measured over the year (YYYY) and called it *HVol*.

We classified every stock based on its value for ESG ratings and volatility and used the median as the measure of central tendency. Stocks with ESG lower than the median were classified as *ESG_L*, otherwise *ESG_H*. Stocks with volatility lower than the median were classified as *Vol_L*, and otherwise *Vol_H*. Stocks with historic volatility lower than the median were classified as *HVol_L*, otherwise *HVol_H*. Because multiple stocks had the median ESG value, the number of stocks in the *ESG_H* group was slightly higher than in *ESG_L*. The same was true for volatility, although to a lesser degree. We did a two-way tabulation of stocks along their ESG and volatility groupings and the chi-square test to analyze the relationship between these two traits. Because the sample size kept increasing each year, we report the percentage of stocks in Exhibit 6.

The data in Panels A and B of Exhibit 6 show a clear relationship between ESG ratings and volatility. High ESG stocks tended to be in the low-volatility group, and low ESG stocks tended to be in the high-volatility group. This relationship held true in all sample time periods and was statistically significant in five of the six time periods (83% of time) using volatility and in all time periods (100% of time) when using historic volatility.

We next tested the effect of volatility and ESG on stock returns independently with t-tests for difference in means. We analyzed stock returns of (*ESG_L* and *ESG_H*), (*Vol_L* and *Vol_H*), and (*HVol_L* and *HVol_H*) and used the two-tailed *p*-values. We annualized the returns of all the groups to gauge the cumulative effect.

The results from the t-tests showed that higher ESG stocks had higher returns in four of the six years (67% of the time), the same in one year (17% of time), and lower in one year (17% of time). The returns of higher ESG stocks were significantly higher in two years (33% of the time), and significantly lower in one year (17% of the time).

Lower-volatility stocks had statistically significant higher returns in two of the six years (33% of the time) and statistically significant lower returns in the balance of four years (67% of the time). The results were directionally the same using volatility and historic volatility, although the extent of the differences each year led to different conclusions cumulatively over the entire period. Because volatility can be measured much more instantaneously, we used the results from volatility (instead of historic volatility measured six months prior to return data) to conclude that cumulatively both low-volatility stocks and high ESG stocks had outperformed over the entire period.

The cumulative difference in returns of the (theoretically) superior group was greater using volatility (3.8% points annualized for the low-volatility effect compared with 0.9% annualized for the high ESG effect). This was despite the fact that the low-volatility effect failed in a statistically significant manner in four of the six years (67% of the time) while the ESG effect worked in most years (although not always in a statistically significant manner). This implies that the low-volatility effect itself was a volatile indicator: it worked strongly in a minority of years, but the outperformance in those years cumulatively overshadowed the ESG effect for the entire period. The ESG effect, in contrast, had better consistency as an indicator. This side-by-side time series analysis also indicates that the ESG and low-volatility

EXHIBIT 6
Detangling the ESG and Volatility Effects

Panel A: Two-way classification along ESG and volatility: Percentage of stocks

Data Year/ Returns Period			Chi-Square Statistics
2007/ 08-09	Vol_H	Vol_L	
ESG_H	22.7%	27.5%	
ESG_L	26.6%	23.2%	4.6 **
2008/ 09-10	Vol_H	Vol_L	
ESG_H	22.8%	27.2%	
ESG_L	26.8%	23.2%	5.5 **
2009/ 10-11	Vol_H	Vol_L	
ESG_H	23.4%	26.9%	
ESG_L	26.0%	23.8%	3.1 *
2010/ 11-12	Vol_H	Vol_L	
ESG_H	24.0%	26.1%	
ESG_L	25.3%	24.6%	0.8
2011/ 12-13	Vol_H	Vol_L	
ESG_H	22.0%	28.0%	
ESG_L	27.6%	22.4%	12.3 ***
2012/ 13-14	Vol_H	Vol_L	
ESG_H	21.7%	28.7%	
ESG_L	27.5%	22.1%	14.8 ***

Panel B: Two-way classification along ESG and historic volatility: Percentage of stocks

Data Year/ Returns Period			Chi-Square Statistics
2007/ 08-09	*HVol_H*	*HVol_L*	
ESG_H	20.4%	29.7%	
ESG_L	29.0%	20.9%	20.5 ***
2008/ 09-10	*HVol_H*	*HVol_L*	
ESG_H	20.2%	29.9%	
ESG_L	29.2%	20.7%	28.6 ***
2009/ 10-11	*HVol_H*	*HVol_L*	
ESG_H	21.3%	28.9%	
ESG_L	28.1%	21.6%	19.3 ***
2010/ 11-12	*HVol_H*	*HVol_L*	
ESG_H	22.2	27.9	
ESG_L	27.3	22.6	10.9 ***
2011/ 12-13	*HVol_H*	*HVol_L*	
ESG_H	22.8	27.2	
ESG_L	26.9	23.1	6.5 **
2012/ 13-14	*HVol_H*	*HVol_L*	
ESG_H	22.7	27.7	
ESG_L	27.0	22.6	8.3 ***

*Note: ***, **, * indicate statistical significance at the 99%, 95%, and 90% confidence levels, respectively.*

EXHIBIT 6 (*Continued*)

Panel C: *t*-Test for difference in returns: ESG high and ESG low

Data File/Return year	*ESG_H*	*ESG_L*	(Returns *ESG_H*) – (Returns *ESG_L*)
2007/ 08–09	–26.6	–30.1	3.5 *
2008/ 09–10	26.3	33.8	–7.5 **
2009/ 10–11	37.0	37.0	0.0
2010/ 11–12	–2.7	–3.6	0.9
2011/ 12–13	28.8	26.5	2.3
2012/ 13–14	22.7	19.7	3.0 *
Annualized return (5.75 Years)	12.4	11.5	0.9

*Notes: Null Hypothesis: Returns of ESG_H and ESG_L are equal. Two-tailed probability for unequal variances if the probability from the F-test is less than 0.05. ***, **, * indicate statistical significance at the 99%, 95%, and 90% confidence levels, respectively.*

Panel D: *t*–Test for difference in returns: Volatility high and volatility low

Data File/Return year	Vol_H	Vol_L	(Returns Vol_L) – (Returns Vol_H)
2007/ 08–09	–39.3	–17.2	22.0 ***
2008/ 09–10	40.6	19.4	–21.2 ***
2009/ 10–11	41.8	32.4	–9.4 ***
2010/ 11–12	–14.1	7.8	21.9 ***
2011/ 12–13	31.1	24.2	–6.9 **
2012/ 13–14	24.4	18.0	–6.5 ***
Annualized return (5.75 Years)	9.6	13.5	3.8

*Notes: Null Hypothesis: Returns of Vol_H and Vol_L are equal. Two-tailed probability for unequal variances if the probability from the F-Test is less than 0.05. ***, **, * indicate statistical significance at the 99%, 95%, and 90% confidence levels, respectively.*

Panel E: *t*-Test for difference in returns: Historic volatility high and historic volatility low

Data File/Return year	*HVol_H*	*HVol_L*	(Returns *HVol_L*) – (Returns *HVOL_H*)
2007/ 08–09	–32.7	–23.9	8.8 ***
2008/ 09–10	38.4	21.5	–16.9 ***
2009/ 10–11	40.3	33.7	–6.6 ***
2010/ 11–12	–11.5	5.2	16.6 ***
2011/ 12–13	33.2	22.1	–11.0 ***
2012/ 13–14	24.1	18.4	–5.7 ***
Annualized return (5.75 Years)	11.9	11.6	–0.3

*Notes: Null Hypothesis: Returns of HVol_H and HVol_L are equal. Two-tailed probability for unequal variances if the probability from the F-test is less than 0.05. ***, **, * indicate statistical significance at the 99%, 95%, and 90% confidence levels, respectively.*

Panel F: Two-way ANOVA test, unbalanced, Duncan values at 95% confidence level: Volatility

Data File/ Return year	Vol_H, ESG_H	Vol_L, ESG_H	Vol_H, ESG_L	Vol_L, ESG_L	Stronger Effect
2007/ 08–09	**–38.2** $_{B}$	–17.0 $_{A}$	–40.2 $_{B}$	**–17.5** $_{A}$	Volatility
2008/ 09–10	**35.5** $_{B}$	18.5 $_{C}$	45.1 $_{A}$	**20.5** $_{C}$	ESG
2009/ 10–11	**42.8** $_{A}$	32.0 $_{B}$	40.8 $_{A}$	**32.9** $_{B}$	ESG
2010/ 11–12	**–14.3** $_{B}$	8.1 $_{A}$	–13.9 $_{B}$	**7.4** $_{A}$	Volatility
2011/ 12–13	**34.1** $_{A}$	24.5 $_{B}$	28.6 $_{A, B}$	**23.8** $_{B}$	ESG
2012/ 13–14	**27.2** $_{A}$	19.2 $_{B,C}$	22.3 $_{B}$	**16.3** $_{C}$	ESG
Annualized return (5.75 Years)	**10.2**	13.6	9.2	**13.3**	Volatility

Notes: The results for the two groups of greatest interest [Vol_H, ESG_H] and [Vol_L, ESG_L] have been indicated in bold. Groups whose mean returns are not statistically different from each other will have the same letter.

EXHIBIT 6 (*Continued*)

Panel G: Two-way ANOVA test, unbalanced, Duncan values at 95% confidence level: Historic volatility

Data File/ Return year	HVol_H, ESG_H	HVol_L, ESG_H	HVol_H, ESG_L	HVol_L, ESG_L	Stronger Effect
2007/ 08–09	**–35.1** $_{C}$	–20.8 $_{A}$	–31.1 $_{B,C}$	**–28.6** $_{B}$	Volatility
2008/ 09–10	**30.9** $_{B}$	23.0 $_{B, C}$	43.7 $_{A}$	**19.2** $_{C}$	ESG
2009/ 10–11	**41.7** $_{A}$	33.6 $_{B}$	39.3 $_{A,B}$	**34.0** $_{B}$	ESG
2010/ 11–12	**–14.0** $_{B}$	6.2 $_{A}$	–9.5 $_{B}$	**3.9** $_{A}$	Volatility
2011/ 12–13	**35.7** $_{A}$	22.9 $_{B}$	30.9 $_{A}$	**21.3** $_{B}$	ESG
2012/ 13–14	**27.3** $_{A}$	19.1 $_{B}$	21.5 $_{B}$	**17.5** $_{B}$	ESG
Annualized return (5.75 Years)	**10.6**	13.0	12.7	**9.5**	ESG

Notes: The results for the two groups of greatest interest [HVol_H, ESG_H] and [HVol_L, ESG_L] have been indicated in bold. Groups whose mean returns are not statistically different from each other will have the same letter.

effect did not work or failed in identical time periods. We therefore conclude that ESG and volatility are independent effects.

We next grouped the stocks into four groups based on their classification along both the ESG and volatility groups. The four groups of stocks were (*Vol_H, ESG_H*), (*Vol_H, ESG_L*), (*Vol_L, ESG_H*), and (*Vol_L, ESG_L*).

The two groups of greatest interest are (*Vol_H, ESG_H*) and (*Vol_L, ESG_L*), in which the opposing effects of ESG and volatility came into play. (*Vol_H, ESG_H*) would have lower returns expected because of high volatility and high returns expected because of high ESG. The opposite is true for (*Vol_L, ESG_L*). Therefore, a comparison of the actual returns of these two groups would indicate which effect was stronger. (*Vol_H, ESG_H*) out-performing (*Vol_L, ESG_L*) would indicate that the ESG effect was stronger. (*Vol_L, ESG_L*) outperforming (*Vol_H, ESG_H*) would indicate that the low volatility effect was stronger. We used the two-way ANOVA procedure with unbalanced design and report the Duncan test values at a 95% confidence level. The tests were done year-wise, and the annualized returns were calculated to evaluate the cumulative effect, but without the significance numbers.

The Duncan test shows that the returns of (*Vol_H, ESG_H*) and (*Vol_L, ESG_L*) were statistically different (at the 95% confidence level) in all six time periods. (*Vol_H, ESG_H*) outperformed in four of the six time periods, and (*Vol_L, ESG_L*) outperformed in two time periods. Thus, the ESG effect dominated in four of the six time periods (67% of the time), and the low-volatility effect dominated in two of the six time periods (33% of the time). Cumulatively, the volatility effect was stronger. We repeated the analysis using historic volatility.

The results with historic volatility are directionally similar to that with volatility. The returns of (*HVol_H, ESG_H*) and (*HVol_L, ESG_L*) were statistically different (at the 95% confidence level) in all six time periods. The two effects thus appear to be different with the ESG effect being more consistently effective. However, using historic volatility, the ESG effect was cumulatively stronger.

Based on the results in Panels F and G of Exhibit 6, we conclude there was value-addition in using ESG in investments and that ESG was a positive contributor in its own right.

Return Distribution of Randomly Generated Portfolios

We did a probability estimation of the impact on portfolio construction by excluding the worst ESG companies. From the entire dataset (E), we created 100 random portfolios P_{ei} (P_{e1}, P_{e2}, …, P_{e100}) of 40 stocks each. We choose 40 because this represents a fairly concentrated portfolio indicative of active management. The stocks in each individual portfolio were selected

randomly without replacement, so that one stock could have only a 2.5% weight in the portfolio. Once a portfolio was generated, all stocks were again available for the next random portfolio generation. For each randomly generated portfolio P_{ei}, we calculated the average portfolio return (M_{ei}). So, we got 100 values of M_{ei} from the entire dataset (*E*) and named this distribution (E_1_M).

We next identified the 10th percentile value of ESG rating (*B10*) and truncated the dataset (*E*) at the value of B10 and called this truncated dataset (*S10*). We repeated the same random sampling without replacement method as before to create 100 random portfolios P_{si} (P_{s1}, P_{s2}, …, P_{s100}) of 40 stocks each. For each randomly generated portfolio P_{si}, we calculated the average portfolio return (M_{si}). We got 100 values of M_{si} from the restricted dataset (*S10*) and named this distribution (*S10_M*). We compared the properties of the distributions E_1_M and *S10_M*. See Panel A of Exhibit 7.

The shaded cells in Exhibit 7 indicate when the return distribution of the portfolios created after truncating the bottom 10% ESG rated companies exhibited a more favorable outcome—higher mean, median, minimum or maximum return, or lower volatility.

In five of the six sample years (83% of time), the return distribution for randomly selected portfolios from the restricted stock universe had the same or higher average, although the difference was not statistically significant. We got a higher median and higher maximum in four of the six sample years (67%). The entire distribution for E_1_M and *S10_M* in each year with both the normal and kernel density are shown in the Appendix.

We repeated our analysis with a more extreme definition of tail risk. We created 100 samples of 40 stocks each through random selection without replacement during each portfolio creation, from the entire dataset (*E*) and from a restricted dataset (*S5*) by truncating the lower tail of ESG rated stocks at the 5th percentile ESG value (*B5*). To create more randomness in the process, we used a different seed number (75). The distribution of the average return of each of the 100 portfolios created from datasets (*E*) and (*S5*) were named E_2_M and *S5_M*.

Panel B of Exhibit 7 shows that we got almost the same or better average return in four of the six sample years (67%) for portfolios created from the restricted stocks pool although the difference was statistically significant in only one year. In five of the six years (83%), we got higher maximum return in the distribution from the restricted pool.

In Exhibit 7 (Panels A and B), in 75% of cases, the return distribution for portfolios created from a restricted universe (excluding lower-tail ESG stocks) had the same or higher average, although the difference was not statistically significant in most cases.[5] In 75% of cases, the return distribution for active portfolios created from a restricted sample had a higher maximum.[6] So, we concluded that restricting the investible universe through deletion of the worst ESG stocks *tended* to improve the probability distribution of returns with a higher average and maximum portfolio return. Excluding the worst ESG stocks from the investible universe did not impose any opportunity cost and actually tended to improve the probability distribution of investment outcomes and improved the probability of identifying the highest return stock.

Risk-Adjusted Return Distribution of Randomly Generated Portfolios

As a further cross-check, we repeated our analysis with 100 randomly generated 40-stock portfolios using risk-adjusted return as the variable of interest, from the entire sample and from the sample with bottom 10% ESG companies truncated. The distribution of the average risk-adjusted return of the 100 portfolios generated from the entire sample and restricted dataset were termed $E_1\_M\_RAR$ and *S10_M_RAR*.

The results in Exhibit 8 were in-line with those in Exhibit 7 (Panels A and B). In three out of six years (50%), we got the same or better risk-adjusted return distribution for active portfolios created through random selection from the restricted stocks pool. And in the 2007 ESG data sample, the average from the restricted sample was almost the same (–0.48 versus –0.47 from the unrestricted sample). In five of the six years (83%), we got higher maximum risk-adjusted return in the distribution from the restricted pool. A random portfolio selection process from the restricted universe (excluding the worst ESG companies) tended to lead to a distribution of risk-adjusted returns in line or superior in terms of the mean and maximum.

EXHIBIT 7
Return Distribution of Randomly Generated Portfolios

ESG Data Year	Distribution	Mean	Median	Std Dev	Min	Max	Skew	Kurtosis	Means Statistically Significantly Different?
Panel A: Return Distribution of E_1_M and S10_M: Effect of truncating the bottom 10% ESG rated companies (seed value for random sampling = 125)									
2007	*E_1_M*	–27.8	–27.9	3.7	–35.2	–17.2	0.1	–0.3	
	S10_M	–27.6	–27.6	3.6	–36.9	–19.3	0.1	–0.3	No
2008	*E_1_M*	30.3	28.7	7.8	13.7	51.3	0.6	–0.1	
	S10_M	30.7	29.7	9.8	15.3	64.5	1.2	1.8	No
2009	*E_1_M*	36.9	37.0	5.4	23.0	49.7	0.0	0.2	
	S10_M	36.9	36.8	5.3	24.1	51.2	0.2	–0.2	No
2010	*E_1_M*	–2.9	–2.8	4.2	–12.1	7.1	0.0	–0.3	
	S10_M	–2.5	–2.7	4.6	–11.2	7.7	0.1	–0.6	No
2011	*E_1_M*	27.6	26.7	6.1	18.0	50.0	1.2	2.3	
	S10_M	27.2	26.9	6.9	12.6	46.4	0.6	0.4	No
2012	*E_1_M*	21.4	21.6	3.7	12.0	30.0	0.1	–0.4	
	S10_M	21.7	21.4	3.8	9.6	32.0	0.2	0.7	No
	S10_M same or superior in >= half the years	Yes (5/6 years)	Yes (4/6) years		Yes (3/6) years	Yes (4/6) years			
Panel B: Return distribution of E_2_M and S5_M: Effect of truncating the bottom 5% ESG rated companies (seed value for random sampling = 75)									
2007	*E_2_M*	–28.0	–28.3	4.3	–39.4	–19.3	–0.0	–0.1	
	S5_M	–28.3	–28.5	4.3	–40.6	–17.8	0.2	0.3	No
2008	*E_2_M*	29.4	28.9	7.9	17.1	53.2	1.1	1.4	
	S5_M	29.4	28.1	8.4	13.1	63.0	1.3	2.8	No
2009	*E_2_M*	35.9	36.1	5.8	22.4	53.9	0.4	0.6	
	S5_M	37.9	38.1	5.7	24.6	57.7	0.1	0.6	Yes **
2010	*E_2_M*	–3.4	–3.1	4.2	–13.1	5.8	–0.1	–0.4	
	S5_M	–3.2	–4.0	4.3	–13.8	8.3	0.2	–0.5	No
2011	*E_2_M*	27.5	26.6	6.6	13.9	48.0	0.7	0.6	
	S5_M	26.9	26.3	5.5	13.0	40.9	0.2	–0.1	No
2012	*E_2_M*	20.8	20.6	3.6	12.7	29.5	0.3	–0.1	
	S5_M	20.8	20.8	4.0	11.5	32.5	0.3	0.3	No
	S5_M same or superior in >= half the years	Yes (4/6 years)		Yes (3/6 years)		Yes (5/6 years)			

*Note: ** indicates statistical significance at the 95% confidence level.*

EXHIBIT 8

Risk-Adjusted Return Distribution of E_1_M_RAR and S10_M_RAR: Effect of Truncating the Bottom 10% ESG Rated Companies (seed value for random sampling = 125)

ESG Data Year	Distribution	Mean	Median	Std Dev	Min	Max	Skew	Kurtosis
2007	E_1_M_RAR	–0.47	–0.47	0.06	–0.61	–0.34	–0.10	–0.49
	S10_M_RAR	–0.48	–0.48	0.07	–0.64	–0.30	–0.02	0.04
2008	E_1_M_RAR	0.88	0.87	0.15	0.48	1.32	0.10	0.37
	S10_M_RAR	0.84	0.85	0.14	0.54	1.18	–0.01	–0.67
2009	E_1_M_RAR	1.48	1.48	0.18	0.99	1.91	–0.09	0.11
	S10_M_RAR	1.50	1.47	0.21	0.94	2.15	0.49	0.89
2010	E_1_M_RAR	0.12	0.10	0.16	–0.20	0.50	0.24	–0.36
	S10_M_RAR	0.15	0.13	0.16	–0.19	0.69	0.38	0.14
2011	E_1_M_RAR	1.30	1.31	0.17	0.92	1.75	0.30	0.12
	S10_M_RAR	1.26	1.24	0.20	0.78	1.79	0.29	–0.19
2012	E_1_M_RAR	0.98	0.99	0.15	0.60	1.27	–0.14	–0.54
	S10_M_RAR	0.98	0.97	0.13	0.65	1.32	0.26	0.20
	S10_M_RAR same or superior in >= half the years	Yes (3/6 years)		Yes (3/6 years)	Yes (3/6 years)	Yes (5/6 years)		

Note: Jobson and Korkie [1981] demonstrated hypothesis testing with the Sharpe ratio, but it is mathematically messy and not commonly used, and we did not conduct that test.

CONCLUSIONS

ESG factors might indicate risk and return characteristics that otherwise could be overlooked in portfolio construction. We found a strong ex post association between ESG ratings and stock return whereby higher-return companies had higher prior ESG ratings on average. The highest return stocks always had better ESG profiles, which implied that an active manager seeking the outperforming stocks could improve the probability of doing so by eliminating the lower-tail ESG stocks. Eliminating the lower-tail ESG companies tended to reduce portfolio volatility. The results were similar when we used risk-adjusted returns (instead of simple returns). Higher risk-adjusted return stocks almost always had higher average ESG rating, and stocks with maximum risk-adjusted return were always from the non-lower-tail (ESG) group.

We did not find a statistically significant positive correlation between ESG and stock return except during the peak financial crisis period. However, there was a significantly strong negative correlation between ESG ratings and stock volatility, and this relationship, implying portfolio diversification opportunities through reduction of the average stock-specific risk, was stronger when market volatility was higher. So, ESG ratings, while not predictive of alpha, did predict the stock risk. Combining the risk and return through using risk-adjusted returns, we saw the correlation between ESG rating and risk-adjusted return turn significantly positive in recent years. It is also important to note that the positive correlation between ESG rating and risk-adjusted return strengthened by excluding the lowest ESG stocks. Asset managers can enhance their stock-picking ability by using ESG information and, even more so, by excluding the bottom ESG stocks.

We explored our finding of a negative relationship between ESG and volatility in greater depth, given the existing empirical literature about the low-volatility anomaly showing the outperformance of low-volatility stocks. We detangled the ESG and volatility effects to answer whether positive ESG led to low volatility, which was helpful in performance, or whether ESG was a positive contributor in its own right. Chi-square frequency tests showed that high ESG stocks tended to be in the low-volatility group and low ESG stocks tended to be in

the high-volatility group in a statistically significant way in almost all time periods. Both (high) ESG and (low) volatility led to higher stock returns, but the ESG effect was independent of the low-volatility effect, and ESG was a positive contributor in its own right. We concluded that there was value addition in using ESG in investments

Some prior research had indicated that excluding any set of stocks from the investible universe imposed a cost. But we found that low ESG ratings were a risk indicator and using this information in stock picking and excluding the worst ESG stocks improved the risk–return profile of stocks. Logically, it followed that excluding a group of stocks representing tail risk could have a beneficial impact on portfolio construction. We created a powerful mathematical test by restricting the investible universe through deletion of the lowest ESG companies and then created portfolios randomly, once from the complete universe and again from the restricted universe. We compared the distribution of average portfolio returns for portfolios created from the unrestricted universe and the restricted universe. We found that deleting lower-rated ESG companies as a tail risk did not necessarily impose opportunity costs and, in fact, tended to be value additive for investors in terms of higher average and maximum portfolio return. In 75% of cases, we got the same or better return distribution for active portfolios created from a restricted universe in terms of the average return. In 75% of cases, the return distribution for active portfolios created from a restricted sample had a higher maximum return. Using risk-adjusted returns as the variable of interest (instead of returns) in the random selection from the unrestricted and restricted universe led to similar conclusions. Randomly created portfolios from the ESG restricted universe tended to have similar average risk-adjusted returns but the maximum was almost always higher.

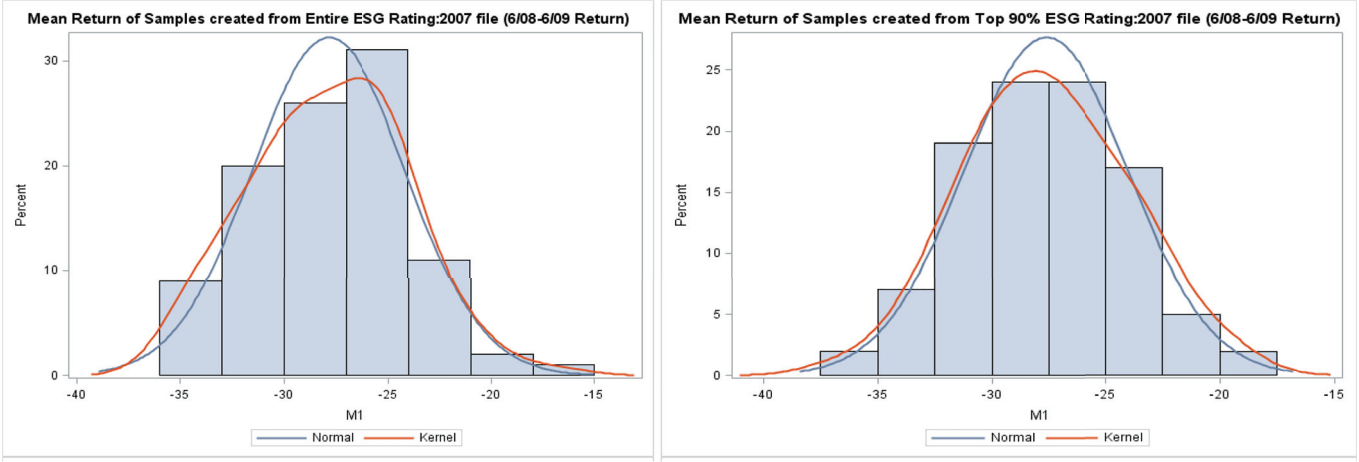
Excluding the worst ESG stocks from the investible universe imposed no opportunity cost and actually tended to improve the return and risk-adjusted return distribution, even through a process of random portfolio creation. But active management is not a random process. Higher return and risk-adjusted return stocks almost always had higher average ESG rating, and stocks with the maximum return and risk-adjusted return that active managers try to identify were always from the non-lower-tail (ESG) group. There was a strong negative correlation between ESG ratings and stock volatility, and this relationship was stronger when market volatility was higher. The correlation between ESG rating and risk-adjusted return turned significantly positive in recent years and strengthened further upon excluding the lowest ESG stocks. This implies that asset managers can enhance their stock-picking and portfolio construction ability by using ESG information and even more so by excluding the worst ESG stocks.

APPENDIX

COMPLETE RETURN DISTRIBUTION OF E_1_M AND $S10$_M (NORMAL AND KERNEL)

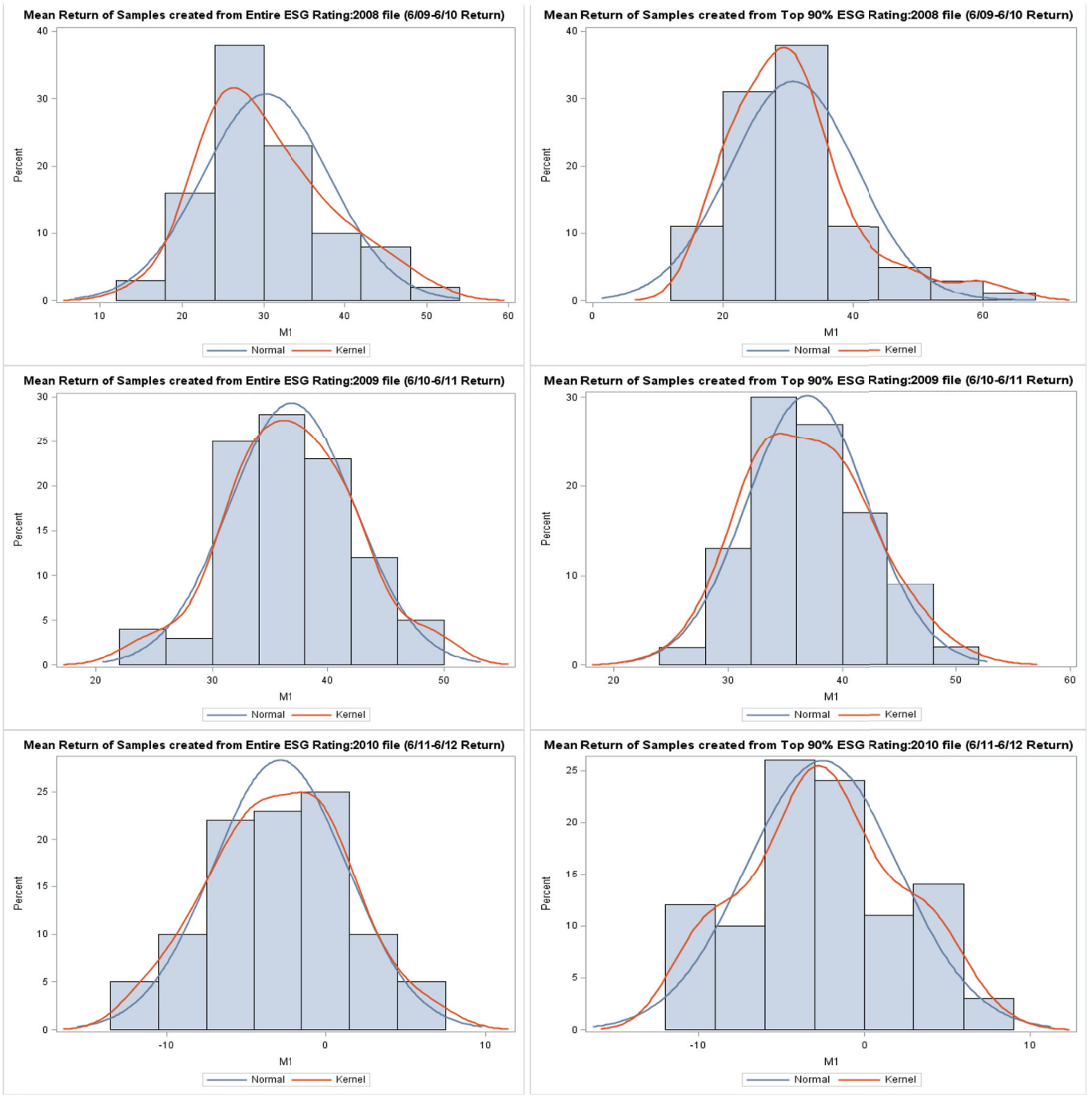
E_1_M = Mean return of samples created from *entire* ESG rating

$S10$_M = Mean return of samples created from *top 90%* ESG rating (excluding the bottom 10% ESG)



Note: For a color version of this exhibit, please visit The Journal of Investing *website at www.iijournals.com/joi.*

APPENDIX (*Continued*)



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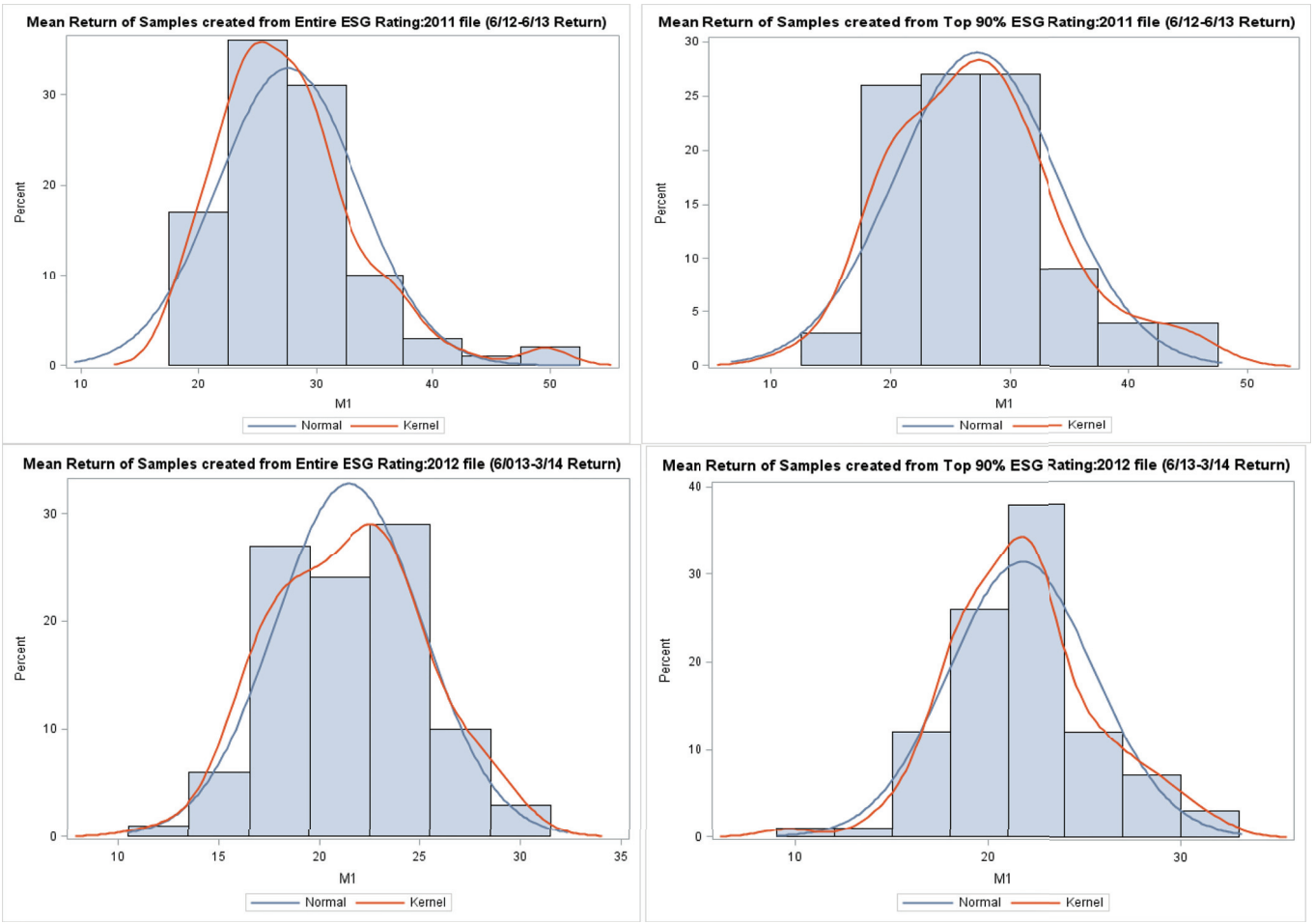
APPENDIX (*Continued*)



Note: For a color version of this exhibit, please visit The Journal of Investing *website at www.iijournals.com/joi.*

ENDNOTES

We would like to thank Thomson Reuters for giving us access to the ESG Ratings data, Daniel Buslik for his research assistance, and Nat Paull for helpful comments.

[1]There are different nomenclatures for environmental, social, and governance (ESG) based investing. Other commonly used terms are socially responsible investing (SRI), green investing, impact investing, and corporate social responsibility (CSR).

[2]2014 Report by Governance and Accountability Institute (see E. Chasen, "Sustainability Reports Gain Traction," *Wall Street Journal*, June 10, 2014).

[3]"Sin" stocks are defined as stocks operating in industries that an investor deems to have morally objectionable traits and typically include such industries as tobacco, military, contraceptives, alcohol, etc.

[4]See "2014 Report on Sustainable and Responsible Investing Trends," Annual report, U.S. SIF Foundation.

[5]75% is the average of 83% (improved average in Exhibit 7, Panel A) and 67% (same to improved average in Exhibit 7, Panel B).

[6]75% is the average of 67% (improved maximum in Exhibit 7, Panel A) and 83% (improved maximum in Exhibit 7, Panel B).

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