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Which dimensions of social responsibility concern financial investors?

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February 2012



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Abstract

Social and environmental ratings provided by social rating agencies are multidimensional. Using the six sub-ratings provided by the Vigeo rating agency, we perform a principal component analysis and we highlight three main socially responsible (SR) dimensions related to (1) the direct non-financial stakeholders (employee, customers and suppliers), (2) the indirect stakeholders (environment and society) and (3) the financial stakeholders (stockholders and debt holders). We explore the link between stock returns and these three SR dimensions. Our main result is that, for each SR dimension, investors ask for an additional risk premium when they decide to hold non SR stocks. The cost of equity is thus lower for socially responsible firms. The average premium over the period 2003-2010 is larger for the components “direct non-financial stakeholders” and “financial stakeholders” than for the component “indirect stakeholders”. For this last component, the premium obviously exists only since the end of 2008. Environment and community involvement have only recently become a more important risk factor in investors’ minds. About the former risk premia (“direct non-financial stakeholders” and “financial stakeholders”), investors appear to penalize firms with the worst behavior in respect to their direct non-financial stakeholders and reward firms with good corporate governance practices

Keywords : socially responsible investment; social ratings; asset pricing; principal component analysis

JEL Classification: G1; G12; M14

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1. Introduction¹

Since the emergence of the issue of firm social responsibility (SR), the link between stock returns and socially responsible investment (SRI) has been studied in academic literature. Theoretically, this link can be positive or negative. It can be positive either because socially responsible firms are seen as more risky than other firms, or because there is a temporary efficiency anomaly. This anomaly can be explained either by increasing investor demand for social stocks, or by investor myopia preventing prices to fully reflect the SR benefits. Conversely, the return of socially responsible firms can be less than the return of non SR firms if SR firms are seen as less risky than others, or if investors are not motivated purely by financial returns and accept a financial sacrifice to “improve the world”.

The empirical results concerning the link between SRI and financial performance are mixed and depend on performance measures, countries, periods, assets or portfolios. The literature has recently moved towards examination of the main dimensions of SRI. The underlying intuition is that the relationship between SRI components² and stock returns is not necessarily uniform. We focus on this literature about sub-ratings and their link with financial performance and equity market value.

A first series of tests examine the relationship between social scores and equity returns. Galema et al. (2008) form portfolios based on individual KLD rating agency criteria. Most empirical tests use the ratings provided by KLD and are split into seven themes: community involvement, corporate governance, diversity, employee relations, environment, product, and human rights (the last one being considered since 2000). Adjusting for risk in a Carhart model, Galema et al. find no significant abnormal return difference between portfolios built

¹ We are grateful to the Vigeo social rating agency for their generosity in providing the ratings they produce.

² The SRI components are dimensions of social responsibility like, for instance, environment, firm relationships with clients and suppliers, or respect for human rights. These dimensions are estimated by rating agencies and give rise to “sub-ratings”. A global firm SR rating is a combination of its sub-ratings.

on each of the six dimensions, apart from the community involvement dimension (which shows positive abnormal returns for high scores). Using cross-sectional regressions on individual stocks, the authors carry out a regression of the stock excess returns on the six sub-ratings, the stock's beta and some control variables. The employee relations score is the only one to have a significant positive effect on excess returns. Statman and Glushkov (2009) show similar results. They build portfolios with increasing SR scores for the period 1992-2007 and obtain significantly positive returns for long short portfolios when the SR criterion is employee relations or community involvement. For employee relations, significant results only appear on the first sub-period (1992-1999). Conversely, the human rights score is not significant for the whole period but is significantly negative for the second sub period (2000-2007). With the same ratings and almost the same period (1992-2009) Gregory et al. (2010) see no significant link between stock returns and social ratings. Brammer et al. (2006), using scores provided by EIRIS (Ethical Investment Research Service) updated and available in July 2002, show that the UK companies with higher social performance scores tend to achieve lower returns. On disaggregate data, they observe that the environmental and community involvement indicators are negatively correlated with returns while the employment indicator is weakly positively related.

Nelling and Webb (2009) reexamine the “virtuous circle” between corporate social responsibility and financial performance using a fixed effects Granger causality approach. The question they address is the following. Does the social behavior of a firm have an impact on its stock returns or is it the contrary? Over the period 1993-2000, there is no evidence that corporate social responsibility (CSR) as measured by KLD scores affected firm financial performance. Higher stock returns led to higher employee relations scores. For other aspects of CSR, there is no evidence of causality between stock returns and CSR.

The link between social scores and financial returns has probably changed over the last several years. The point of interest for companies and investors in the future will be to forecast the cost of equity in relation with present social ratings. ElGhoul et al. (2011), on a sample of US firms, find that firms with higher CSR ratings exhibit significantly lower implied cost of equity capital. The implied cost of equity is an ex-ante measure coming from different discounted cash flow models, with data provided by IBES. Furthermore, they find that on the six dimensions of KLD social performance, only three are related to the cost of equity. Employee relations, environmental policies, and product strategy dimensions are negatively related to this cost. The results have to be cautiously interpreted, given that they rely on analysts' earnings forecasts.

Some papers are devoted to only one SR dimension, especially environment or employee relations. Edmans (2011) finds that firms with a high level of employee satisfaction (firms belonging to the 100 Best Companies to Work for in America) earned an annual abnormal return of 3.5% from 1984 to 2009. He interprets his findings as a market failure to fully incorporate intangible assets into stock valuations, even if, all things being equal, these firms exhibit greater market values (as measured by the market-to-book ratio, the price-to-earnings ratio and the ratio of aggregate value to EBITDA). The market is at least partially valuing the intangibles.

Instead of a dynamic analysis on stock returns, some articles try to find a link between the market value of equity and social scores. Does the value creation of a firm depend on its social scores? To answer this question, one first needs a good measure of value creation, and, second, to identify all other variables impacting value creation (sector, size, growth...). Bird et al. (2007) use the KLD ratings issued during the period from 1991 to 2003 for US companies and suggest the CSR activities valued by the market vary over time. It seems that returns and valuation multiples (market-to-book and price-to-earnings) are positively linked to

diversity and employee strengths. On the contrary, there is a conflict between community strengths and market valuation. The same thing is observed for firms with a high environmental strength score. Galema et al. (2008) investigate the impact of KLD scores on the book-to-market ratio, proxying for equity market value over the period 1992-2006. The link is negative, except for the governance score which has a significantly positive effect on book-to-market. Gregory et al. (2010) show that high levels of KLD sub-ratings during the years 1992-2009 are related to high stock values, in particular diversity, employee relations and environment. The market rewards CSR, indicating that these firms have a lower cost of capital and/or greater expected cash-flows than their counterparts.

Semenova et al. (2010) investigate the value relevance of environmental and social performance ratings for the market values of companies listed on the OMX Stockholm. They use the GES Investment Services risk rating for Swedish companies belonging to the SIX 300 Index for the period 2005-2008. The estimated dimensions are environmental and social components of SR. Three sub-dimensions are rated inside the social dimension: employees, community, and suppliers. The environmental index is positively related to the market value of equity. The relation between the global social index and the market value is significantly negative. Regarding the social sub-dimensions, the relation is negative with employees but positive with community and suppliers. Marsat and Williams (2011) use MSCI ESG ratings (formerly Innovest) over the period 2005-2009 and observe a negative impact of responsible behavior on corporate market value. They use Tobin's Q and price-to-book ratio to proxy equity valuation. The negative relation between the market value and the CSR score is observed both on the global rating and on the four sub-ratings (environment, human capital, strategic governance, stakeholder capital). Either the market considers SR firms bear more costs or the advantages to being SR are not yet fully reflected in stock prices.

Some articles focus on environmental impact on market value. Dowell et al. (2000) find that higher market value (as measured by Tobin's Q) is associated with the adoption of a single stringent environmental standard around the world. Several interpretations are proposed: low environmental quality creates a bad image and potential liabilities, adopting high environmental standards increases productivity thanks to latest technologies and may be an indicator of firm quality.

Guenster et al. (2011) examine the link between corporate eco-efficiency and either an accounting performance measure (return on assets) or a financial performance one (Tobin's Q). Eco-efficiency scores come from Innovest (monthly scores for the period 1996-2004) and reflect both past and future firm environmental behavior. Eco-efficiency is defined as "the ability to create more value while using fewer environmental resources, such as water, air, oil, coal and other limited natural endowments". The authors find a positive relation between eco-efficiency and return on assets as well as with market value. The valuation differential between the most eco-efficient firms and the least eco-efficient firms is time-varying and has increased over the period. This result favors an efficiency anomaly, environmental information being gradually incorporated into the stock price.

Fernando et al. (2009), using KLD environmental measures over the period 1996-2007, show that both green and toxic firms have lower Tobin's Q values than do environmentally neutral firms. They find no significant abnormal returns for firms in green and toxic industries.

The results about value and social responsibility do not converge. It could be due to the weak impact of social responsibility on market value as compared to the other determinants of value. Even with a meticulous methodology it is hard to isolate the social impact. Moreover, if the market is at equilibrium and shareholders and managers rationally have the same goal of maximizing the firm value, the market-to-book ratio must be identical for all companies in a given sector. The reason is that, in a given sector, costs are similar to reach the same social

commitment and, at equilibrium, no firm will take advantage of a change in its social status to become more or less socially responsible. As shown by Dupré et al. (2009), the lower cost of capital for SR firms (due to lower risk or stockholder altruism) will be compensated by the higher costs they incur and their lower expected cash-flows. It could be expected that, over long periods, empirical tests studying the relation between equity and social responsibility (especially when SR is valued by comparison between firms belonging to the same sector) will show only one thing: a lower return for socially responsible stocks.

Another group of articles adopt a totally different approach, focusing on stock returns over a few days around a CSR-related event. Drusch and Lioui (2010) present an event study on 148 CSR-related events for 31 firms on the French market between 2003 and 2009. At the aggregate level, CSR has a positive but not statistically significant impact on stock returns. Six dimensions are considered. Two yield a significant positive reaction (social integration and help for suburbs). The others show non-significantly negative or positive reactions (environmental protection, health care, sports, entry/exit from an index).

Our paper relies on the Vigeo ratings. Very few studies are available using this database as compared to the KLD one. Articles based on the Vigeo ratings mainly concern European firms. The rating methodologies are different. Vigeo values six dimensions: human resources, environment, corporate governance, community involvement, business behavior, and human rights (see Appendix 1). The score is relative inside a sector and for a date. The results may be different from that which was obtained on US firms using KLD scores. One previous study on Vigeo sub-scores is the Cellier et al. (2011) event study. They measure the impact of Vigeo score announcements on the European stock market over the period 2004-2009. They find that market reaction to the global score announcement is positive regardless the rating (good news or bad news). They make a regression of the cumulative abnormal returns around the announcement on the Vigeo rating or sub-ratings as well as on some control variables. It

appears that the aggregated score has no impact, the Human rights sub-score has a positive influence, and the Environment and Human resources have a negative one.

The goal of our paper is twofold. First, we want to identify the different dimensions of social responsibility. Before considering the link between the dimensions of SRI and financial returns, we carry out an exploratory analysis on the six Vigeo SR dimensions. A better understanding of these dimensions will help us interpret the nature of their relation with returns. Using the six sub-ratings provided by the Vigeo rating agency, we perform a principal component analysis and we highlight three main SR dimensions related to (1) the direct non-financial stakeholders (employee, customers and suppliers), (2) the indirect stakeholders (environment and society) and (3) the financial stakeholders (stockholders and debt holders). The second part of the paper is devoted to exploring the link between stock returns and SR dimensions. In this part, we use a Fama and French (1993) approach with risk premiums associated with each of the three new social dimensions we have put forward in our principal component analysis. The main results of this section are that being non-socially responsible in one or several of the three dimensions is compensated by significant risk premiums in the market. The average premiums over the period 2003-2010 are larger for the components “direct non-financial stakeholders” and “financial stakeholders” than for the component “indirect stakeholders”. For this last component, the premium obviously exists only since the end of 2008. Environment and community involvement have only recently become a more important risk factor in investors’ minds. About the former risk premia (“direct non-financial stakeholders” and “financial stakeholders”), investors appear to penalize firms with the worst behavior in respect to their direct non-financial stakeholders and reward firms with good corporate governance practices.

Our paper is structured as follows. Section 2 presents the data and our methodology for extracting three independent dimensions from the social performance. Section 3 is devoted to empirically studying the impact of social performance on financial performance. We first construct, along the same lines as Fama and French (1993), a risk premium linked to each of the three social dimensions put forward in Section 2. We then add these three social risk premia to the traditional market, size and book-to-market premia in a Fama and French (1993) setting, and we test this new empirical model. The last section contains our conclusions.

2. The Dimensions of Social Performance

2.1 Data

Our data set consists of the monthly social ratings of 816 firms followed by the Vigeo rating agency between December 2003 and November 2010. The SR valuation embed six different ratings concerning different aspects of social commitment: Human Resources (HR), Environment (ENV), Business Behavior (BB), Corporate Governance (CG), Community Involvement (CIN), and Human Rights (HRts). Each of these ratings ranges from 0 for less socially responsible firms to +4 for more socially responsible ones. The different criteria evaluated by Vigeo for establishing the social ratings, as well as our methodology for constructing a global rating based on these six sub-ratings are explained in Appendix 1.

Book-to-market ratios as well as market values, necessary for our Fama and French (1993) based empirical methodology come from Datastream.

We note that the number of rated stocks changes on a monthly basis over the period under consideration. For instance, data concerning each of the six social ratings is available for 43 firms in December 2003, 306 in December 2004, 525 in December 2005, 577 in December 2006, 631 in December 2007, 685 in December 2008, 787 in December 2009 and 816 in December 2010. This represents a total of 816 different firms rated over the period we

consider. Accounting and financial data is converted into Euros using the relevant exchange rate at the end of each financial year.

Table 1, Panel A presents some descriptive statistics on the six social sub-ratings produced by Vigeo as well as on the global rating summarizing the six sub-ratings (see Appendix 1). All sub-ratings present a same distribution with an average around 2, the middle of the scale, and with a high dispersion (standard deviation is near 1).

Table 1 Panel A
Descriptive Statistics on the Social Variables

This table presents some descriptive statistics (average, median, standard deviation, minimum and maximum) for the six social sub-ratings produced by Vigeo as well as on the global rating summarizing the six sub-ratings.

	Global Rating	HR rating	ENV rating	C&S rating	CG rating	CIN rating	HRts rating
Average	1.90	1.97	1.98	1.98	1.97	1.98	1.97
Median	1.93	2	2	2	2	2	2
Standard deviation	.71	.93	.96	.92	.95	.94	.95
Minimum	0.12	0	0	0	0	0	0
Maximum	3.82	4	4	4	4	4	4

Table 1 Panel B presents some descriptive statistics for the financial variables: the stocks excess returns on the risk free rate, the market risk premium, the stock market values, the stocks' book-to-market values.

Table 1 Panel B
Descriptive Statistics on the Financial Variables

This table presents some descriptive statistics (average, median, standard deviation, minimum and maximum) for the financial variables (the stock excess return over the risk-free rate, the market risk premium, the firm market value, the firm book-to-market value).

	Excess Return	Market Risk Premium	Market Value in K€	Book-to- Market
Average	.0034	-.0006	11,221.75	.6129
Median	.0009	.0073	4,523.84	.4808
Standard deviation	.1026	.0524	18,809.03	.9381
Minimum	-.99	-.16	3.06	-25.00
Maximum	2.29	.15	207,385.03	33.33

2.2 The three main dimensions of social responsibility

Social responsibility is an extensive concept which can be measured by a lot of criteria. In the Vigeo methodology, six sub-criteria are retained. Each one is supposed to characterize a specific dimension of social responsibility according to the stakeholder approach: debt- and stockholders, employees, clients and suppliers, environment, society, and humanity. We can ask if these dimensions are all relevant for the financial market. Before answering this question, it might be useful to analyze the information given by each sub-criterion. Are the six dimensions necessary to describe the complexity of social responsibility? Are some of them redundant? Is it possible to synthesize all of them in a reduced number of components?

The correlation matrix presented in Table 2 reveals that sub-ratings are not mutually independent. Correlation reaches a maximum of 0.647 between Human Rights and Human Resources; Environment exhibits a strong link with Human Resources and Community Involvement. Conversely, correlation is weaker between Corporate Governance and the other sub-criteria. Corporate Governance is also the sub-rating which is the least linked to the global social rating.

Table 2
Correlation matrix of the six sub-ratings and the global rating

This table presents the Pearson correlation coefficients of the six sub-ratings and the global rating. *, **, *** respectively indicate that the coefficient is significantly different from zero at the 10%, 5% and 1% level.

Rating	Global Rating	Human Resources	Environment	Clients & Suppliers	Corporate Governance	Community Involvement	Human Rights
Global Rating	1						
Human Resources	.771***	1					
Environment	.796***	.567***	1				
Clients & Suppliers	.789***	.557***	.562***	1			
Corporate Governance	.553***	.205***	.324***	.319***	1		
Community Involvement	.753***	.485***	.563***	.517***	.302***	1	
Human Rights	.792***	.647***	.541***	.589***	.297***	.511***	1

According to the previous analysis, the high correlation between each sub-criterion and the global rating suggests that the information can be summarized in fewer dimensions. A

principal components analysis (PCA, hereafter) can be applied to extract the relevant and independent dimensions.

The PCA is run on the whole sample during the entire period. Noting $XJ_{i,t}$ the criterion J score for the firm i at time t, the data matrix for the analysis is organized as follows:

$$\begin{pmatrix} \dots & X1_{i,t} & \dots \\ \dots & X2_{i,t} & \dots \\ \dots & \dots & \dots \\ \dots & \dots & \dots \\ \dots & X6_{i,t} & \dots \end{pmatrix}$$

In Table 3, we show that the first component has an Eigen value of 3.4 and accounts for about 57% of the total variance. It's clearly the main factor. The second and third components respectively explain 14% and 9% of the total variance and can possibly be retained to improve the representation of the SR diversity. Together, these three components explain 80% of the total variance. The other components can be neglected.

Table 3
Eigen values of the Principal Component Analysis
 This table presents the Eigen values of each component of the PCA as well as the percentage of the total variance which is accounted for by each component.

Component	Initial Eigen values	% Variance	Cumulated Variance
1	3.431	57.186	57.186
2	.851	14.183	71.369
3	.542	9.035	80.405
4	.428	7.128	87.533
5	.419	6.987	94.520
6	.329	5.480	100.000

All the sub-ratings contribute highly and equally to the first Component except the Corporate Governance one which is concentrated in the second component (see Appendix 2 for a detailed analysis of those factors). As it explains 9% of the total variance, we decide to also retain the third component in the next development. To facilitate the factor interpretation, we apply a Varimax rotation on the retained components. Table 4, Panel A presents the

correlations between the rotated components (noted C1, C2 and C3), and the initial sub-ratings. Regarding those correlations, we can associate C1 with Human Resources, Business Behavior and Human Rights sub-ratings and we can refer (for this component) to the “direct non financial stakeholders”. Employees, clients and suppliers can be called “direct stakeholders” because they are linked to the firm by a contract. Human Rights are logically associated with the direct stakeholders because it refers to the way a firm is concerned by human rights in its relation with its employees³. The association of the direct non financial stakeholders in a same component suggests that the way a firm behaves towards its partners is the same regardless of the counterpart: when a firm is concerned for its employees, it tends to consider its clients and suppliers in the same way. As this component explains 57% of the variance, we can state that firms differ mainly in the way they deal with their non financial stakeholders. The second component, which is the most highly correlated with the Environment and Community Involvement sub-ratings, can be interpreted as social responsibility towards society, what we call “indirect stakeholders”. The relationship between a firm and the environment or the community is not regulated by a specific and explicit contract but by general law and implicit social pressure. Finally, the third component is most highly correlated with the Corporate Governance sub-rating and reflects social responsibility to financial stakeholders. This confirms our intuition that Corporate Governance is a specific and independent dimension of social responsibility⁴. Those results seem to indicate that firms distinguish three main and independent targets in their SR policy: the direct non financial

³ As mentioned by Vigeo, the human rights rating deals with respect for freedom of association, the right to collective bargaining, non-discrimination and promotion of equality, elimination of illegal working practices such as child or forced labor, prevention of inhumane or degrading treatment such as sexual harassment, protection of privacy and personal data.

⁴ We also run the Varimax rotation only on C1 and C2. The first rotated component aggregates the 5 non financial sub-ratings and the second one reflects only the Corporate Governance dimension. Comparing both rotations, we can observe that increasing the number of components allows splitting the first “non financial stakeholders” component into two parts: the main one which considers only the direct non financial stakeholders and a second one which considers the indirect stakeholders.

stakeholders (employees, clients and suppliers), the indirect ones (environment and society) and the financial ones (debt holders and stockholders).

**Table 4 Panel A
Rotated Component Matrix**

This table presents the correlations between the rotated components (noted C1, C2 and C3), and the initial sub-ratings. The higher correlations are identified by bold characters.

Rating	Components		
	C1	C2	C3
HR rating	.846	.278	.001
ENV rating	.497	.650	.190
BB rating	.681	.392	.227
CG rating	.135	.159	.971
CIN rating	.266	.897	.124
HRts rating	.839	.221	.165
<i>Explained Variance</i>	<i>57.18%</i>	<i>14.18%</i>	<i>9.04%</i>
Concern	Direct non financial stakeholders: Employees, Clients and Suppliers	Indirect stakeholders: Environment and Society	Financial stakeholders: Stockholders and Debt holders

We present in Table 4, Panel B the component score coefficients used to compute the value of our three new components C1, C2 and C3. For each component, the sign of the coefficient is such that more responsible a firm is, the higher its score. According to the correlation analysis, when a sub-rating can be associated to a component, its coefficient is positive; inversely, if it cannot, its coefficient is negative. To test the validity of the score functions, the PCA is run again on two equal sub-periods (cf. columns 2 and 3). The results are similar and prove the robustness of the analysis: each coefficient keeps a same sign and has a close level. Finally, Table 4, Panel C presents some descriptive statistics for the three components which will be considered in the next section dealing with financial performance. The components seem to have a same distribution: we can thus compare the score calculated on each component. As the sum of function coefficients is inferior to 1, the average score is under the median score of each sub-rating (around 1.5 instead of 2).

Table 4 Panel B
Component Rating Coefficient Matrix

This table presents the component score coefficients used to compute the value of our three new components C1, C2 and C3. For each component, we present the rating coefficients from the analysis applied on the whole period (column 2), then on two equal sub-periods (columns 3 and 4). In the last column we also present the difference between the coefficients obtained for each sub-period.

Sub-rating	Whole period	First sub-period December 2003- May 2007	Second sub-period June 2007- November 2010	Difference between sub-periods
Component C1				
Human Resources	.547	.647	.493	.0055
Environment	-.033	-.186	.005	-.191
Clients & Suppliers	.298	.231	.324	-.093
Corporate Governance	-.108	-.121	-.098	-.023
Community Involvement	-.395	-.367	-.389	.022
Human Rights	.561	.590	.562	.028
Component C2				
Human Resources	-.213	-.299	-.141	-.158
Environment	.461	.586	.43	.156
Clients & Suppliers	-.013	.105	-.063	.168
Corporate Governance	-.154	-.168	-.143	-.025
Community Involvement	.961	.840	.972	-.132
Human Rights	-.329	-.285	-.359	.074
Component C3				
Human Resources	-.178	-.123	-.214	.091
Environment	-.027	-.034	-.027	-.007
Clients & Suppliers	.064	.004	.094	-.09
Corporate Governance	1.034	1.068	1.012	.056
Community Involvement	-.142	-.152	-.128	-.024
Human Rights	.023	-.011	.042	-.053

Table 4 Panel C
Descriptive Statistics on the three components of Social Performance

This table presents some descriptive statistics (average, median, standard deviation, minimum and maximum) for the value of the three components (C1, C2, C3).

	C1	C2	C3
Average	1.7170	1.4194	1.5295
Median	1.7402	1.3681	1.5189
Standard Deviation	.9418	.9499	.9578
Minimum	-1.03	-1.39	-1.05
Maximum	4.74	4.60	3.99

3. Social Performance Impact on Financial returns

In this section, we study the impact of each one of the three dimensions of social performance on financial performance. Firms that do not consider ethical and socially responsible investments are seen as more risky⁵. Investors should thus ask for an additional risk premium when they decide to hold non SR stocks. Hereafter, we precisely test the existence of this risk premium and ask the following question. Are all three dimensions of social responsibility put forward in the previous section associated with a risk premium?

We first construct, in the same vein as Fama and French (1993), a “non social” risk premium factor, called NMR (the return of non-socially responsible firms minus the return of socially responsible firms), for each of the three dimensions of social performance put forward in section 2.2. These NMR1, NMR2 and NMR3 factors are orthogonalized against the size and book-to-market dimensions, following the Fama and French (1993) methodology.

More precisely, we use the following steps to construct portfolios based on size, book to market and social responsibility.

- 1- Each month, the stocks in our sample are split into two groups according to their size. The stocks with a size smaller than the median are in the small (S) group. The stocks with a size larger than the median are in the big (B) group.
- 2- Independent of size classification, we split the stocks in our sample into three groups based on their book-to-market ratio. Stocks with a book-to-market ratio amongst the 30% lowest book-to-market ratios will form the L (Low book-to-market) group. Stocks with a book-to-market ratio falling in the group with the 30% highest book-to-market ratios will form the H (High book-to-market) group. The other stocks make up the M (Median book-to-market) group.

⁵ Investors are aware that society at large produces socially responsible rules which can affect the firms' returns. Increasing individuals sensitivity to social responsibility makes it more difficult for non-socially responsible firms to avoid vindictive actions such as boycotts, for instance.

3- Stocks are then classified according to their social performance. SR performance is appraised successively by the value of the first social component (C1), the second social component (C2), and the third social component (C3). Stocks with a social performance belonging to the lowest 30% will form the N (Non-socially responsible) group. Stocks with a social performance belonging to the highest 30% will form the R (socially Responsible) group. The other stocks will form the I (In-between) group. We then obtain 18 portfolios for each of the three social dimensions, thus a total of 54 portfolios. Each portfolio includes all the firms belonging to the same size, book-to-market and social responsibility levels. Below is a table explaining the splitting for each criterion.

Criteria	Size	Book-to-Market	Social Responsibility (appraised with the first, second or third SR dimension)
1 st group	S (Small size firms – 50% of the firms)	H (High book-to-market firms – 30% of the firms)	N (Non-socially responsible firms – 30% of the firms)
2 nd group		M (Median book-to-market firms – 40% of the firms)	I (In-between firms – 40% of the firms)
3 rd group	B (Big size firms – 50% of the firms)	L (Low book-to-market firms – 30% of the firms)	R (socially Responsible firms – 30% of the firms)

The monthly return of each portfolio is computed as a weighted average of the return of the stocks belonging to this portfolio during the considered month. The weights are the market values at the beginning of the month. This methodology allows us to construct three risk premia: NMR1, NMR2 and NMR3.

NMR1 (resp. NMR2, NMR3) corresponds to the return of the less SR firms' portfolio minus the return of the more SR firms' portfolio, social commitment being measured by the first (respectively second, third) component of social performance, C1 (respectively C2, C3).

NMR1, NMR2, and NMR3 are computed as follows.

$$\begin{aligned}
 NMR1_t &= \left\{ \frac{1}{6} \left(\bar{R}_{SHN1_t} + \bar{R}_{SMN1_t} + \dots + \bar{R}_{BLN1_t} \right) \right\} - \left\{ \frac{1}{6} \left(\bar{R}_{SHR1_t} + \bar{R}_{SMR1_t} + \dots + \bar{R}_{BLR1_t} \right) \right\} \\
 NMR2_t &= \left\{ \frac{1}{6} \left(\bar{R}_{SHN2_t} + \bar{R}_{SMN2_t} + \dots + \bar{R}_{BLN2_t} \right) \right\} - \left\{ \frac{1}{6} \left(\bar{R}_{SHR2_t} + \bar{R}_{SMR2_t} + \dots + \bar{R}_{BLR2_t} \right) \right\} \\
 NMR3_t &= \left\{ \frac{1}{6} \left(\bar{R}_{SHN3_t} + \bar{R}_{SMN3_t} + \dots + \bar{R}_{BLN3_t} \right) \right\} - \left\{ \frac{1}{6} \left(\bar{R}_{SHR3_t} + \bar{R}_{SMR3_t} + \dots + \bar{R}_{BLR3_t} \right) \right\}
 \end{aligned}$$

Where \bar{R}_{SHN1_t} is the return weighted average of the stocks belonging to the Small/High book-to-market/Non-socially responsible group, social responsibility being measured with the first component C1. The same definition applies to the 53 other average returns involved in the three equations above.

We propose a deep study of the Non-social risk premia NMR1, NMR2 and NMR3, in section 3.1 below. In section 3.2 we then analyze the impact of these risk premia on the return of the 54 portfolios presented above, based on size, book-to-market and social responsibility.

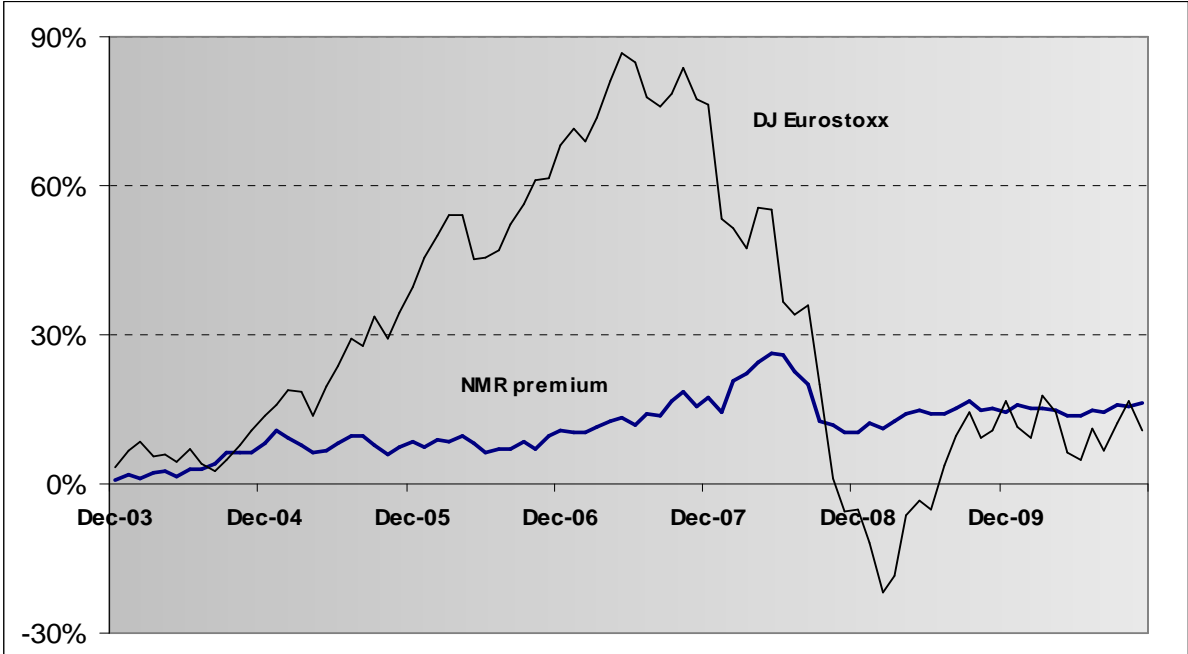
3.1 The “Non Social” Risk Premia

In this section, we analyze the level and the evolution of the social responsibility premium we previously proposed following Fama and French (1993). This premium measures the rate of return difference between two portfolios, the first being composed of non-socially responsible firms and the second consisting of socially responsible firms. This premium is hereafter called the “Non social” risk premium. Indeed, it measures the rate of return sacrificed by an investor to protect its portfolio against the risk faced by non SR firms.

Figure 1, Panel A shows the evolution of the cumulative non social risk premium when it is calculated by referring to the global rating⁶. While the Dow-Jones index is particularly erratic during the period under study, the cumulative non-social risk premium increases regularly. At the end of the seven year period, the non-socially responsible portfolio out-performs the socially responsible one by 15%. Exceptionally, during 2008, the non social risk premium fell by 10% but easily withstood the crash.

Figure 1 Panel A
Evolution of the NMR premium for the global rating

This graph presents the cumulative monthly return of the NMR premium calculated following the Fama-French (1993) model extended to the SR global rating. For comparison purposes, the Dow Jones Eurostoxx index cumulated return is also presented.



We run the Fama-French Model extended to the SR-rating defined by components C1, C2 and C3 of the previous analysis. Results are reported in Table 5. The three SR average risk premia are significantly positive. They are higher for the components C1 (non financial stakeholders) and C3 (financial stakeholders) than for C2 (indirect stakeholders).

⁶ The same methodology as that presented at the beginning of section 3 was carried out to construct a NMR risk premium based on the global rating, instead of on C1, C2 or C3 components (Appendix 1 presents the global rating computation).

Simultaneously, the average SMB and HML risk premia are paradoxically negative on our European dataset⁷. SMB and HML risk premium also appear to be negative when these premia are constructed without considering social responsibility issues (i.e. we consider the six portfolios only based on size and book-to-market dimensions). One explanation could be that the SR criterion is partially correlated with size and book-to-market.

Table 5
Descriptive Statistics on the Extended Fama-French monthly risk premia

The Fama-French methodology is employed for the three alternative specifications of the social rating. Each specification is based on a component (C1, C2 or C3) of the principal components analysis. Market risk premium (column 2) is the same regardless of SR specification. The NMR, SMB and HML risk premia in the following columns are reported for each specification. SMB and HML are slightly different because of the portfolio construction. All average premia differ significantly from 0 at the 0.1% level.

SR Component	Market	C1			C2			C3		
Monthly premia	$r_m - r_f$	NMR	SMB	HML	NMR	SMB	HML	NMR	SMB	HML
Average	..03%	..35%	-.68%	-1.75%	..20%	-.74%	-1.68%	..35%	-.75%	-1.82%
Median	..85%	..24%	-.56%	-1.09%	..12%	-.65%	-1.08%	..08%	-.66%	-1.18%
Standard Deviation	5.03%	1.43%	2.28%	4.55%	1.35%	2.27%	4.49%	1.95%	2.27%	4.56%
Minimum	-16.30%	-3.19%	-8.34%	-19.24%	-4.08%	-6.70%	-19.63%	-3.24%	-1.28%	-19.71%
Maximum	14.84%	5.31%	7.64%	18.03%	3.41%	7.56%	17.10%	9.34%	7.06%	17.18%

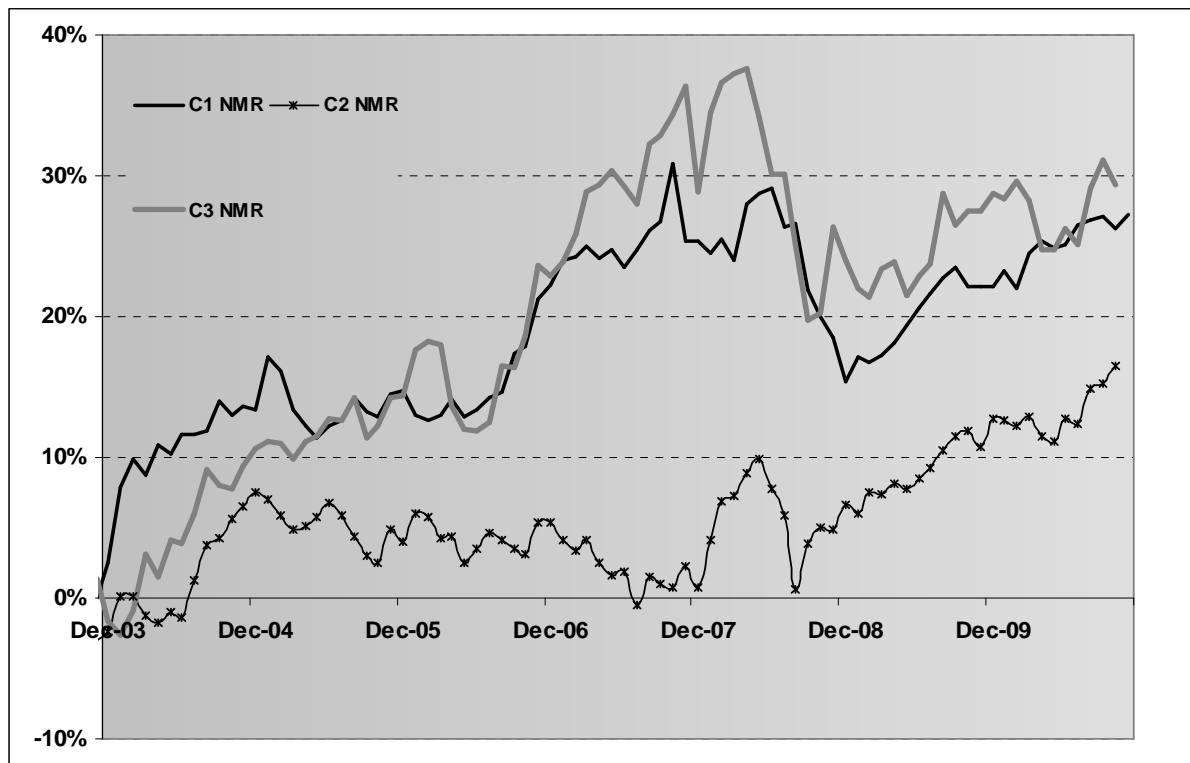
Figure 1, Panel B shows the evolution of the SR risk premium (NMR) based on each component. The NMR risk premia based on C1 and C3 increase regularly from the beginning of the period, while the increase of C2 is obvious only from the end of 2008⁸. SR concerns of financial investors initially only dealt with the way firms manage their relationship with their direct stakeholders. Environmental and community involvement have only recently become a risk factor in investors' minds.

⁷ In the USA Market (CRSP data), SMB and HML monthly risk premia are positive during the same period (they are however negative in more recent periods). The average level of those premia, during our analysis period, calculated with Kenneth French data (see http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html), are 0.16% for SMB and 0.26% for HML.

⁸ The evolutions of the NMR premia based on each one of the 6 sub-ratings proposed by Vigeo are presented in Appendix 2.

Figure 1 Panel B
Evolution of NMR premia for the three SR components

This graph presents the cumulative monthly return of the calculated NMR factor based on the Fama-French methodology extended to SR components C1, C2 or C3. .



In Table 5, the SR risk premia are less volatile (their standard deviation is around 1.5%) than the Market risk (5%), SMB (2.3%) and HML (4.5%) factors. Two conclusions can be inferred from this result. First, the evidence is stronger for the SR risk premium than for the other ones: the SR criterion is more relevant for defining risk. Second, the SR premium is relatively unaffected by market fluctuations or changes in investor expectations. The correlation analysis between the different risk premia (see Table 6) reveals that the SR risk premia based on C1 and C2 are counter-cyclical, while the other risk premium tends to follow the market conjuncture. When the market is bullish, the C1 and C2 based NMR risk premia decrease: investors thus appear to be more concerned about social responsibility when the market is bearish.

Table 6
Pearson correlation matrix of the risk premia

This table presents the Pearson correlation coefficients of the Market risk premium as well as the Fama and French based risk premia. *, **, *** respectively indicate that the coefficient is significantly different from zero at the 10%, 5% and 1% level.

	r_{m-r_f}	NMR1	SMB1	HML1	NMR2	SMB2	HML2	NMR3	SMB3	HML3
r_{m-r_f}	1.00***	-.24***	.43***	.80***	-.13***	.39***	.80***	.13***	.32***	.77***
NMR1	-.24***	1.00***	-.03	-.28***	.27***	.02	-.28***	-.18***	.00	-.35***
SMB1	.43***	-.03	1.00***	.50***	.02	.95***	.50***	-.21***	.96***	.48***
HML1	.80***	-.28***	.50***	1.00***	-.21***	.44***	.99***	-.02	.40***	.98***
NMR2	-.13***	.27***	.02	-.21***	1.00***	-.16***	-.21***	.27***	.02	-.24***
SMB2	.39***	.02	.95***	.44***	-.16***	1.00	.44***	-.24***	.95***	.43***
HML2	.80***	-.28***	.50***	.99***	-.21***	.44***	1.00***	-.02	.39***	.98***
NMR3	.13***	-.18***	-.21***	-.02	.27***	-.24***	-.02	1.00***	-.27***	-.02
SMB3	.32***	.00	.96***	.40***	.02	.95***	.39***	-.27***	1.00***	.41***
HML3	.77***	-.35***	.48***	.98***	-.24***	.43***	.98***	-.02	.41***	1.00***

3.2 SR-augmented Fama and French regressions

In this subsection we carry out an empirical analysis that aims at considering additional risk premia in the Fama and French (1993) model. Our objective is to analyze the impact of the three SR risk premia on financial performance.

We run the following empirical model, inspired by Fama and French (1993) for the 54 portfolios constructed previously (see the beginning of this section).

$$R_{p,t} - r_{f,t} = \alpha_p + \beta_{p,t} (R_{M,t} - r_{f,t}) + s_p \text{SMB}_t + h_p \text{HML}_t + e_p \text{NMR1}_t + f_p \text{NMR2}_t + g_p \text{NMR3}_t$$

Where $R_{P,t}$ is the return of portfolio P (one of the 54 constructed portfolios) on month t , $R_{M,t}$ is the return of the market portfolio on month t , SMB_t is the return of the “Small Minus Big size” Fama and French portfolio, HML_t is the return of the “High Minus Low BTM” Fama and French portfolio, and NMR1, NMR2, NMR3 are the three SR-based portfolios constructed at the beginning of Section 3.

3.2.1 Regression results

Table 7 presents the results for the 18 portfolios based on the first component (C1) of social performance (see Panel A), the 18 portfolios based on the second component (C2) of social performance (see Panel B), and the 18 portfolios based on the third component (C3) of social performance (see Panel C).

Adding the NMR1, NMR2 and NMR3 risk premia to the traditional Fama and French (1993) specification (only based on the market, SMB and HML risk premia) allows increasing the adjusted R^2 by approximately 2.48%. The average adjusted R^2 of the SR-augmented Fama and French (1993) regression (i.e. the regression including the NMR1, NMR2 and NMR3 risk premia) is about 84.54%.

When we analyze the coefficient significance at the 10% level, we note that the NMR1 coefficient is significant for 8 portfolios out of 18, the NMR2 coefficient is significant for 12 portfolios out of 18, and the NMR3 coefficient is significant for 13 out of 18 portfolios.

Table 7 Panel A

Results for the 18 portfolios based on the first component of social performance

This table presents the NMR1 coefficient as well as the adjusted R^2 and its variation when adding the NMR1, NMR2 and NMR3 risk premia in a traditional Fama and French (1993) specification (based only on market, SMB and HML risk premia).

portfolio based on C1	NMR1 coefficient	Standard Deviation	Student t	P-value	Adjusted R^2	R^2 variation
SLN	1.100	.179	6.146	.000	93.85%	3.93%
SLI	.245	.235	1.042	.301	85.31%	0.17%
SLE	-.555	.205	-2.708	.008	93.16%	1.44%
SMN	.623	.160	3.882	.000	85.06%	2.69%

SMI	.037	.136	.275	.784	91.56%	-0.24%
SME	-.699	.172	-4.072	.000	86.26%	2.80%
SHN	.789	.122	6.495	.000	91.75%	7.19%
SHI	.268	.178	1.508	.136	77.36%	0.83%
SHE	-.232	.175	-1.329	.188	75.14%	0.88%
BHN	.793	.209	3.784	.000	80.75%	4.17%
BHI	-.186	.175	-1.058	.293	93.34%	0.99%
BHE	.052	.127	.407	.685	96.52%	0.51%
BMN	.446	.216	2.066	.042	72.13%	1.69%
BMI	.031	.166	.188	.851	82.88%	2.05%
BME	-.028	.127	-.218	.828	87.28%	0.16%
BLN	.513	.170	3.025	.003	64.27%	7.49%
BLI	-.016	.159	-.101	.920	64.88%	1.78%
BLE	-.001	.131	-.010	.992	74.94%	0.81%

Table 7 Panel B
Results for the 18 portfolios based on the second component of social performance

This table presents the NMR2 coefficient as well as the adjusted R² and its variation when adding the NMR1, NMR2 and NMR3 risk premia in a traditional Fama and French (1993) specification (based only on market, SMB and HML risk premia).

portfolio based on C2	NMR2 coefficient	Standard Deviation	Student t	P-value	Adjusted R ²	R ² variation
SLN	.455	.213	2.135	.036	90.71%	0.61%
SLI	.610	.138	4.408	.000	95.60%	1.75%
SLE	-.809	.191	-4.238	.000	95.30%	1.68%
SMN	.503	.137	3.664	.000	91.63%	1.33%
SMI	.161	.158	1.019	.311	87.94%	-0.16%
SME	-.180	.223	-.808	.422	82.29%	0.02%
SHN	.623	.149	4.170	.000	86.12%	5.73%
SHI	.554	.143	3.869	.000	88.15%	4.87%
SHE	-.549	.189	-2.900	.005	77.89%	2.54%
BHN	.578	.186	3.101	.003	90.86%	1.53%
BHI	.516	.155	3.333	.001	93.02%	0.75%
BHE	-.430	.155	-2.771	.007	94.29%	1.85%
BMN	.659	.203	3.250	.002	78.91%	4.82%
BMI	-.004	.129	-.034	.973	90.62%	0.09%
BME	.024	.177	.138	.890	78.77%	-0.48%
BLN	.669	.190	3.522	.001	74.75%	5.94%
BLI	-.230	.142	-1.619	.110	67.26%	2.39%
BLE	-.089	.156	-.568	.572	70.71%	4.25%

Table 7 Panel C**Results for the 18 portfolios based on the third component of social performance**

This table presents the NMR3 coefficient as well as the adjusted R² and its variation when adding the NMR1, NMR2 and NMR3 risk premia in a traditional Fama and French (1993) specification (based only on market, SMB and HML risk premia).

portfolio based on C3	NMR3 coefficient	Standard Deviation	Student t	P-value	Adjusted R ²	R ² variation
SLN	.476	.195	2.437	.017	84.59%	1.76%
SLI	-.087	.167	-.523	.602	91.58%	0.67%
SLE	-.781	.124	-6.293	.000	94.34%	4.77%
SMN	.158	.112	1.407	.163	89.59%	0.17%
SMI	.199	.105	1.899	.061	90.54%	0.21%
SME	-.575	.180	-3.187	.002	78.03%	2.07%
SHN	.359	.123	2.927	.004	85.13%	1.60%
SHI	-.050	.109	-.461	.646	85.81%	1.39%
SHE	-.814	.111	-7.344	.000	86.88%	12.09%
BHN	.354	.099	3.568	.001	94.01%	1.94%
BHI	-.204	.103	-1.990	.050	95.59%	0.20%
BHE	-.775	.121	-6.382	.000	94.36%	3.55%
BMN	.357	.121	2.956	.004	84.09%	1.55%
BMI	-.011	.096	-.116	.908	87.66%	-0.09%
BME	-.482	.141	-3.425	.001	79.61%	3.31%
BLN	.340	.141	2.417	.018	69.72%	2.66%
BLI	-.166	.106	-1.564	.122	67.00%	2.96%
BLE	-.669	.112	-5.979	.000	75.61%	14.42%

3.2.2 Link between portfolio SR ratings and their NMR sensitivity

Table 8 presents the average factor loadings of the NMR1, NMR2 and NMR3 risk premium in the SR-augmented Fama-French regression. The factor loadings are aggregated depending on the SR commitment of the portfolios. The first column of Table 8 presents the average factor loadings for the portfolios based on the first component of SR performance (C1). The first (and respectively second and third) row concern the average factor loadings for the six less (respectively in-between, and more) SR portfolios. The second column of Table 8 presents the average factor loadings for the portfolios based on the second component of SR

performance. Finally, the third column of Table 8 presents the average factor loadings for the portfolios based on the third component of SR performance.

As expected, we observe that the non-SR portfolios are positively linked to the NMR risk premia. The average factor loading decreases when the portfolios' SR commitment increases. Finally, the SR portfolios show a negative sensitivity to the NMR risk premia.

Table 8
Average factor loadings for the portfolios based on the three components of SR performance

The first column of this table presents the average factor loadings for the portfolios based on the first component of SR performance (C1). The first (respectively second, and third) row concern the average factor loadings for the six less (respectively in-between, most) SR portfolios. The second (respectively third) column presents the average factor loadings for the portfolios based on the second (respectively third) component of SR performance.

	NMR1	NMR2	NMR3
Non SR	.711	.581	.341
In-between	.063	.268	-.053
SR	-.244	-.339	-.683

Table 8 presents *average* factor loadings. To see whether *for each portfolio* based on size and book-to-market groups, the coefficient of the Non-SR portfolio is higher than the coefficient of the SR corresponding portfolio, we propose illustrating these coefficients in Figure 2.

Figure 2, Panel A (respectively Panel B and C) graphs the sensitivity to the NMR1 (respectively NMR2 and NMR3) risk premium of the 6 non-SR portfolios, the 6 In-between portfolios, and the 6 SR portfolios. We clearly see that the blue line is always above the green line and that the two lines never cross. This indicates that, for each portfolio based on size and book-to-market deciles, the sensitivity of the non-SR portfolio (to the NMR risk premium) is higher than the sensitivity of the corresponding SR portfolio.

Figure 2 Panel A

This Figure illustrates the sensitivity to the NMR1 risk premium of the 6 non-SR portfolios, the 6 In-between portfolios, and the 6 SR portfolios based on the first SR component (C1).

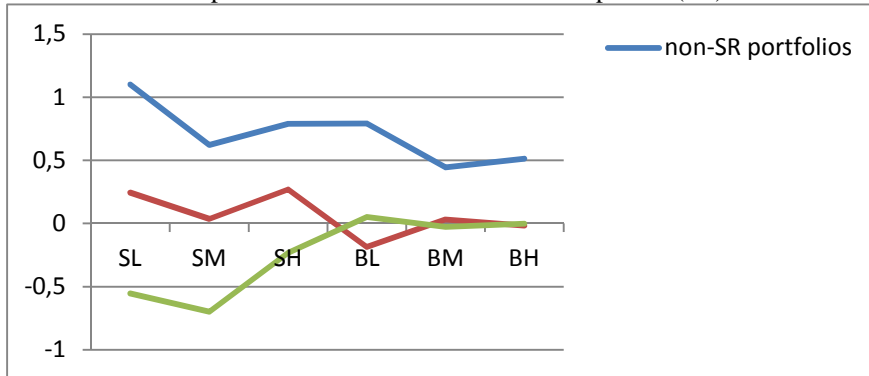


Figure 2 Panel B

This Figure illustrates the sensitivity to the NMR2 risk premium of the 6 non-SR portfolios, the 6 In-between portfolios, and the 6 SR portfolios based on the second SR component (C2).

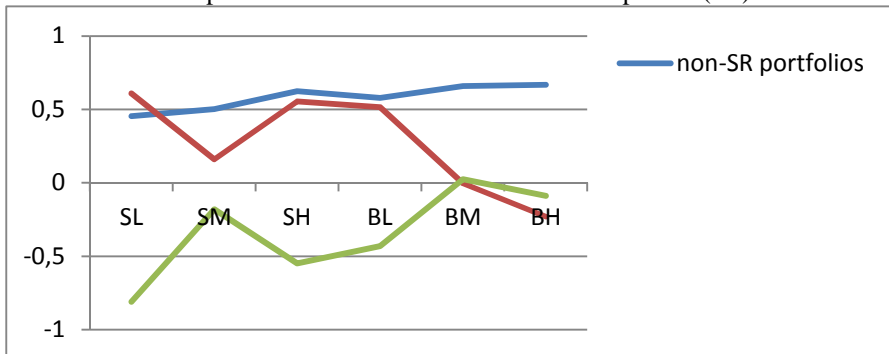
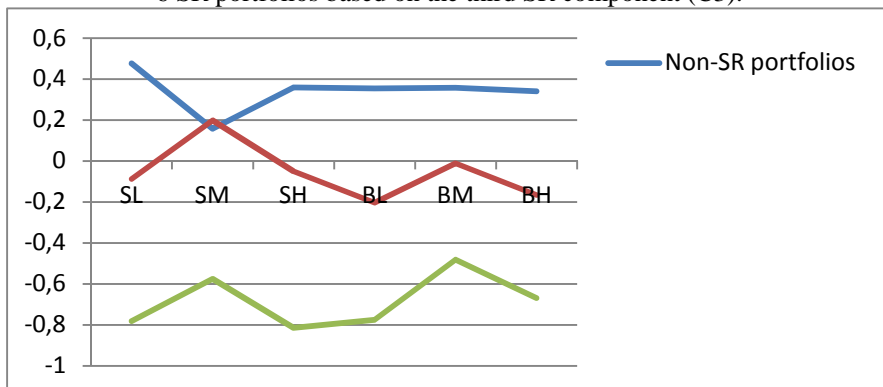


Figure 2 Panel C

This Figure illustrates the sensitivity to the NMR3 risk premium of the 6 non-SR portfolios, the 6 In-between portfolios, and the 6 SR portfolios based on the third SR component (C3).



We observe in Table 8 and Figure 2 that the sensitivity to the first factor (direct non financial stakeholders), NMR1, is larger for non SR portfolios. The R^2 variation and the student t associated with the SR factor loading are greater for these portfolios. As far as direct non financial stakeholders are concerned, it seems that investors claim a penalty for the least socially responsible firms rather than rewarding the more SR firms. The risk is concentrated on the worst non SR firm behaviors regarding employees, customers and suppliers. On the contrary, for the third factor linked to corporate governance, NMR3, the distinctive behavior is for the most SR firms. SR portfolios appear different from others, with negative sensitivities. SR firms benefit from a discount thanks to their good practices in maintaining links with their financial stakeholders: investors are more confident in their relationship with these firms and this is reflected in the required rate of return.

To deepen our understanding of the link between each portfolio's NMR coefficient and its SR level, we carry out a regression analysis. More precisely, we perform the following regression of the portfolios' NMR coefficient on the SR level, size level, and book-to-market level of portfolios:

$$\beta_{NMR} = \alpha_0 + \alpha_1 Size_level + \alpha_2 BTM_level + \alpha_3 SR_level$$

Where β_{NMR} is the portfolios' NMR coefficient. $Size_level$ takes the value of -1 for small size levels and the value of 1 for large size levels. BTM_level takes the value of -1 for low book-to-market levels, 0 for in-between levels and 1 for high book-to-market levels. Finally, SR_level takes the value of -1 for low levels of social responsibility, 0 for in-between levels and 1 for high levels of social responsibility.

Performing this regression for our 54 values of β_{NMR} gives the results presented in Table 9. As expected, we find that β_{NMR} is significantly and negatively linked to the SR level of portfolios.

Table 9
Link between portfolio NMR coefficients and their SR level

This table presents the results of the following regression:

$$\beta_{NMR} = \alpha_0 + \alpha_1 Size_level + \alpha_2 BTM_level + \alpha_3 SR_level$$

β_{NMR} is the NMR coefficient of the portfolios. *Size_level* can take the value of -1 for small size levels and the value of 1 for large size levels. *BTM_level* can take the value of -1 for low book-to-market levels, 0 for in-between levels and 1 for high book-to-market levels. *SR_level* can take the value of -1 for low levels of social responsibility, 0 for in-between levels and 1 for high levels of social responsibility.

variable	coefficient	Standard Deviation	Student t	P-value	Adjusted R ²
(Constant)	,011	,025	,461	,645	
<i>Size_level</i>	,000	,025	-,008	,993	14,6%
<i>BTM_level</i>	,000	,030	,017	,987	
<i>SR_level</i>	-,166	,030	-5,533	,000	

Conclusion

Social and environmental ratings provided by social rating agencies are multidimensional. While the first papers exploring the link between social scores and financial performance mainly used a unique, global score, recent studies try to highlight the relations between stock returns - or equity market values - and sub-ratings. The literature is mixed and provides no certainty about these links. In a previous article based on Vigeo global social scores, Dupré et al., 2006 showed that highly rated European firms used to experience a lower cost of equity. Vigeo rates firms on six dimensions, providing six sub-ratings. We contribute to a better understanding of the relation between the different dimensions of social responsibility thanks to an exploratory analysis of the sub-ratings. A principal component analysis of the six dimensions shows that firms distinguish three independent targets in their SR policy: direct non financial stakeholders (employees, customers and suppliers), indirect stakeholders (environment and society) and financial stakeholders (stockholders and debt holders). Consequently, each firm can be represented by three orthogonal sub-scores. If we rank separately the firms according to each of these scores, it appears that the difference between risk-adjusted returns on portfolios with low and high-rated firms is positive, regardless the sub-score. This difference

constitutes a risk premium required for non SR firms. The three average SR risk premia are significantly positive. They are higher for the first and third components (“direct non financial stakeholders” and “financial stakeholders”) than for the second component (“indirect stakeholders”). The SR component risk premia for the first two components increase regularly from the beginning of the period, while the increase of the third is obvious only from the end of 2008. Financial investors first focused their SR concern on the way firms manage their relationship with direct stakeholders. More recently, environmental and community involvement have become risk factors in investors’ minds. When adding the non-socially responsible risk premia to a Fama and French three factor model, sensitivity to the social factor of portfolios with different levels of social commitment exhibits the expected pattern. We show sensitivity decreases with social score. Regarding employees, customers and suppliers, we also show that risk is concentrated on the worst non SR firms. On the contrary, for the third factor linked to corporate governance, the gap is between SR portfolios and others: SR firms benefit from a discount thanks to their good practices in corporate governance.

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Appendix 1: Vigeo’s Social Rating Methodology

Vigeo evaluates social responsibility and not ethics. This agency evaluates a firm’s managerial engagement to take into account and report the rights and interests of all the firms’ stakeholders. The ratings are established following criteria and fields of social responsibility based on a reference framework. This framework is based on the *best practices* recommended by international organizations such as the UN, ILO and OECD. More precisely, Vigeo rates six criteria for social responsibility: “*Human Resources*”, “*Environment*”, “*Corporate Governance*”, “*Community Involvement*”, “*Business Behavior*”, and “*Human Rights*”.

Vigeo defines the six considered criteria as follows (see Vigeo website):

1. Human Resources: Continuous improvement of professional relations, labor relations and working conditions.

2. Environment: Protection, safeguarding, prevention of damage to the environment, implementation of an adequate management strategy, eco-design, protection of biodiversity and co-ordinated management of environmental impacts on the entire lifecycle of products or services.
3. Corporate Governance: Effectiveness and integrity, guarantee of independence and efficiency of the Board of Directors, effectiveness and efficiency of auditing and control mechanisms, in particular the inclusion of social responsibility risks, respect for the rights of shareholders, particularly minority shareholders, transparency and rationale for the remuneration of directors.
4. Community Involvement: Effectiveness, managerial commitment to community involvement, contribution to the economic and social development of territories / societies within which the company operates, positive commitment to manage the social impact linked to products or services and overt contribution and participation in causes of public or general interest.
5. Business Behavior: Consideration of the rights and interests of clients, integration of social and environmental standards in the selection of suppliers and on the entire supply chain, effective prevention of corruption and respect for competitive practices.
6. Human Rights in the Workplace: Respect for freedom of association, the right to collective bargaining, non-discrimination and promotion of equality, elimination of illegal working practices such as child or forced labor, prevention of inhumane or degrading treatment such as sexual harassment, protection of privacy and personal data.

A more precise definition of these criteria is available on Vigeo's website: <http://www.vigeo.fr/>.

Our Methodology for constructing a single rating based on the six Vigeo ratings.

The six ratings n^{HR} (“*Human Resources*”), n^{ENV} (“*Environment*”), n^{CG} (“*Corporate Governance*”), n^{CIN} (“*Community Involvement*”), n^{BB} (“*Business Behavior*”), and n^{HRts} (“*Human Rights*”), given to a company by Vigeo are integers between 0 and 4.

Based on these six integers, we follow the same methodology as that used for constructing the ASPI index. We create a global rating n such that:

$$n = \left(\sqrt[6]{(1+n^{HR})(1+n^{ENV})(1+n^{CG})(1+n^{CIN})(1+n^{BB})(1+n^{HRts})} - 1 \right)$$

Appendix 2: Evolution of the NMR premium for each sub-rating

We present the Figures representing the evolution of the NMR risk premia for each sub-rating produced by Vigeo. The six figures plot the NMR value, i.e. the difference between the cumulative return of the least ethical firms and of the most ethical ones.

