A CSR ASSET PRICING MODEL

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Abstract. This study challenges widely used factor models (one, three, four and five factor models) in explaining stock returns in Europe and proposes an innovative corporate social responsibility (CSR) factor model. Our sample covers monthly returns on 18 European stock markets over thirteen years (June 2002 to May 2015). We examine the relationship between the return and the extra-financial notation of CSR in Europe. We observe that the less responsible firms have higher risk adjusted returns, on average, than the most responsible ones. We reveal a new risk premium associated to extra-financial notation priced by the market. We propose a parsimonious two-factor model including both the market and the CSR premia that outperforms existing asset pricing models in describing CSR rated firms' returns. Unlike previous models, our model is validated according to the GRS test.

Introduction

How informative is the extra-financial notation as a proxy for Corporate Social Responsibility (CSR) for financial markets? This paper explores this question by studying the Efficient Market Hypothesis (Fama, 1970 [28]) regarding the extra-financial notation. Our objective is to make a link between two well-documented fields in financial literature: asset pricing and corporate social performance (CSP). This study investigates thus an innovative issue related to the consideration of financial markets for extra-financial rating.

Developed in Europe only starting from the beginning of the 21st century, the European Commission (2001) defines corporate social responsibility as *"a concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with stakeholders on a voluntary basis"*. A firm's level of corporate social responsibility (CSR) may be measured by several dimensions, including good treatment of employees, reducing the level of environmental negative impact of production or philanthropic activities. While the number of academic studies in this area has also increased substantially in recent years, no clear consensus has yet emerged concerning whether investment in socially responsible stocks or funds is favorable or detrimental to returns. Holme and Watts (2000) [44] defines CSR as *"the commitment of*

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business to contribute to sustainable economic development, working with employees, their families, and the local community and society at large to improve their quality of life".

In the financial literature, most papers, when involving CSR, bring answers regarding the link between CSR involvement and the firms' financial performance. Indeed, Moskowitz (1972) [68] was one of the pioneers in this research area. He finds empirically that firms that have strong enough management to uphold their social responsibilities also have the skill and caliber to run a company with superior financial performance, making it attractive to investors, and rising thus the price of its stock up. Since then, the relationship between corporate social responsibility (CSR) and accounting-based indicators of financial performance has been extensively examined by researchers with mixed findings (Waddock and Graves, 1997 [80]; Allouche and Laroche, 2006 [2]; Nelling and Webb, 2009 [71], among others). In this paper, a new issue is considered relatively to the integration of the CSR information in stock prices. Consequently, our study contributes to the huge Efficient Market Hypothesis literature. By shedding light on a new non accounting-based risk factor (Bad minus good extra-financial notation factor that we note henceforth BMG), we find that extra-financial notation is integrated in stock prices which corroborates the EMH theory.

Since our concern lies with the identification of the appropriate asset pricing model for CSR involved firms, we challenge widely used factor models (one, three, four and five factor models) in explaining stock returns in Europe and we propose an innovative CSR factor model. Indeed, the linear relation between the expected rate of return of an asset and its risk dates from the fifties but remains one of the most fundamental assumptions made in finance. Following the seminal work of Markowitz (1952) [63], finance has known a substantial development since the outbreak of the first Capital Asset Pricing Model (Sharpe, 1964 [76]; Lintner, 1965 [58]; Mossin, 1966 [69] and Black, 1972 [11]). Despite this success, a large body of research criticizes the single factor model, unsatisfying to explain securities past returns as it relies on an unobservable market portfolio (Roll, 1977 [73]). Creating an asset pricing model fully describing stock returns will probably stay one of the hardest challenges in finance. The huge body of the empirical work on the CAPM remains usually inconclusive and fails to rationalize market anomalies not explained by the plain vanilla CAPM (since there are several versions, see for example Cochrane, 2005 [22]). In a series of papers, Fama and French (1993) [29] propose to consider the existence of additional risk factors as a consistent hypothesis. By adding the size and the book to market effects, they introduce the three factor model. Carhart (1997) [16] proposes a four factor model adding a portfolio of winners minus losers to the three factor model. Recently, Fama and French (2015) [33] suggest a five-factor asset pricing model which capture the size, value, operating profitability and investment patterns in average US stock returns.

In our study, we find that CSR extra-financial notation is indeed informative for financial markets and this should be taken into consideration while building the appropriate asset pricing model for CSR rated

firms. Our work brings two main contributions. First, we reveal a risk premium associated to extra-financial notation priced by the market. Second, we propose a parsimonious model including two risk factors that outperforms existing asset pricing models in describing CSR rated firms' returns. Adding CSR premium to the beta is sufficient to explain screened stocks by extra-financial agencies.

This paper proceeds as follows: Section I gives a theoretical background of asset pricing, corporate social responsibility and financial performance . Section II introduces the data sets used and the applied methodology. Section III summaries results of empirical tests and section IV presents conclusions.

1. Literature review

Once stated in 1970 by Fama [28] in his influential survey article, the Efficient Market Hypothesis (EMH) was widely accepted by academic financial researchers. It was generally believed that securities markets are efficient[1] in reflecting information about individual stocks and about the stock market as a whole. Since then, this hypothesis is widely challenged.

Actually, in financial markets, observing and understanding patterns in returns is and will always be an important issue. A large number of patterns that are claimed to be predictable are based on firm characteristics and different valuation parameters like firm size, value stocks or equity premium puzzle[2]. However, these patterns are not always robust and dependent on different markets and periods. Indeed, some of the patterns based on fundamental valuation measures of individual stocks may simply reflect better proxies for risk measurement.

Since the fifties, many economic models were introduced to specify the relationship between return and risk. Indeed, the Capital Asset Pricing Model CAPM (Sharpe, 1964 [76]; Lintner, 1965 [58]; Mossin, 1966 [69] and Black, 1972 [11]) is the most widely used model because of its simplicity. It assumes that investors respect the Markowitz mean-variance criterion in choosing their portfolios. The beta revolution had a significant impact on the academic and non-academic financial community. Other factor pricing models attempt to explain the cross-section of average asset returns as the Inter-temporal Capital Asset Pricing Model (Merton, 1973 [67]), the Arbitrage Pricing Model (Ross, 1976 [74]) and the inter-temporal capital asset pricing model based on consumption (Rubinstein, 1976 [75]; Lucas, 1978 [61]); Breeden, 1979 [14], Mehra and Prescott 1985 [66] among others).

However, the CAPM has been subject to criticism. Roll (1977) [73] argues that the model cannot be tested because it involves a joint hypothesis related to the model and the choice of market portfolio. Besides, many anomalies emerge from empirical studies, which are not explained by the CAPM. Basu (1977) [7] shows that expected returns and price to earnings ratio have a positive relation. Moreover, small capitalizations have

[1]Fama (1970) [28] specifies three levels of EMH : weak, semi-strong and strong forms.
[2]See for example Malkiel (2003) [62] for a summary of anomalies and predictable patterns.

higher expected returns than big ones (Banz 1981 [4]). As shown by Bhandari, 1988 [10]; Chan *et al.*, 1991 [17], there is also a positive relation between the level of debt and stock returns.

In view of these empirical results, Fama and French (1993) propose a three-factor model to capture the patterns in US average returns. They argue that stock returns may be explained by three-factors: market, book to market ratio and size. Their model draws upon earlier findings (Banz 1981 [4], Huberman and Kandel 1987 [47] Chan and Chen 1991 [17]). This model is, however, much debated. To compensate risk in a multi-factor version of Merton's (1973) [67] Inter-temporal Capital Asset Pricing Model (ICAPM) or Ross's (1976) [74] Arbitrage Pricing Theory (APT), factors must be related to state variables that justify a risk premium. Frazzini and Pedersen (2013) [35] propose a model that extends Black's (1972)[11] central insight by considering a broader set of constraints and deriving the dynamic time-series and cross-sectional properties arising from the equilibrium interaction between agents with different constraints. They add to the funding constraints of previous models, for example with leverage constraints and margin requirements. Frazzini and Pedersen (2013) [35] find empirically that portfolios of high-beta assets have lower alphas and Sharpe ratios than portfolios of low-beta assets. They show how this deviation from the standard CAPM can be captured by betting against beta factors, on which the return rivals those of all standard asset pricing factors.

The financial literature gives many explanations for size and value effects. Indeed, the premium of financial distress is irrational according to Lakonishok *et al.* (1994) [56] and Haugen (1995) [41]. We observe also low stock returns of firms in distressed financial situations, but not necessarily during a period of low returns on all stocks or of low Gross Domestic Product growth rate. However, some empirical studies have documented the disappearance of the size effect since the 1980s. For instance, Hirshleifer (2001) [43] claims that 1984 is the year when the size effect disappears.

To explain the premium of financial distress and validate the CAPM, some researchers put forward arguments related to the use of the data as survivor bias (Kothari *et al.* 1995 [53]). But even if the survivor bias criticism is valid, it does not necessarily support the CAPM (Kim 1997 [52], Barber and Lyon 1997 [5]). Data-snooping is another argument given by Black (1993a) and (1993b) and Lo and MacKinlay (1990) [59]. Extrapolation of data can lead to false conclusions, which is why out-of-sample tests are required. Fama and French (1996a) [31] and (1996b) [30] reject this bias. Moreover, the relation between stock returns and the book to market ratio is confirmed by Davis (1994) [25] on data over a long period, by Chan *et al.* (1991) [17] on Japanese data and by Barber and Lyon (1997) [5] for financial institutions, among others. Daniel and Titman (1997) [24] provide an alternative model to the three-factor one. They reject the assumption of risk factor in favor of the model of the firms' characteristics. A low book to market ratio, which is one of the characteristics of large firms, causes a low stock return that does not necessarily correspond to a risk. They

show the superiority of their model in comparison to Fama and French's three-factor model. However, Davis *et al.* (2000) [26] show that this interpretation is specific to the period of study, and they confirm the results of the three-factor model. Similarly, Lewellen (1999) [57] confirms the superiority of Fama and French model compared to the Daniel and Titman one. Lajili-Jarjir (2007) [55] finds the same result on the French stock market. Time series regressions results are consistent with the factor pricing model and inconsistent with the characteristic-based pricing model.

As an extension to the three-factor model and taking into account the momentum effect, Carhart (1997) [16] proposes a four-factor model, adding a portfolio of winners minus losers to the three-factor one. He adds a momentum factor to the Fama and French model so as to capture abnormal returns. Jegadeesh and Titman (1993) [48] show that in the US market, stock-buying strategies have performed well (winners) in the past, and selling stocks that have performed poorly (losers) in the past give positive returns. This momentum premium is also observed in international markets (Chui *et al.* 2010 [20]). More recently, Nasreddine and Lajili-Jarjir (2017) [70] find that the four-factor model explains better the common variation of stock returns in France and that asset pricing models are still reliable in times of distress.

On international markets, Griffin (2002) [40] finds that country-specific asset pricing models are more robust in explaining time-series variations compared to global ones. Domestic factors demonstrate more accurate pricing than foreign factors. Besides, Fama and French (2012) [32] explore size, value and momentum anomalies in a sample of international stock returns by comparing global and local models. They reject global models in explaining regional returns and find that local models give acceptable descriptions of local average returns. Asness *et al.* (2015) [3], Fama and French (2015) [33] suggest a five-factor asset pricing model that captures size, value, profitability and investment patterns for average US stock returns. They find that the list of anomalies shrinks in the five-factor model, partly because anomalous returns become less anomalous and partly because the returns associated with different anomaly variables share factor exposures that suggest they are largely the same phenomenon.

This large literature about asset pricing and anomalies on financial markets does not investigate the informative content of extra-financial notation. Only the relationship between corporate social responsibility and financial performance has been extensively examined with mixed findings. Waddock and Graves (1997) [80] document that lower implicit costs by socially irresponsible actions induce higher explicit costs for the firm. In addition, the potential benefits for the firm are higher than the costs of CSP. Furthermore, good management can be considered as an explanation for this positive relationship. Slack resources resulting from good financial performance can be used also to improve social performance. Hong *et al. (2012)* [45] document that firms do good only when they do well in the sense of having financial slack. Lastly, having both good management and slack resources can create a virtuous circle between CSP and financial performance. Holme

and Watts (2000) [44] found that CSR was not just relevant business sense, but also helped contribute to the long-term growth, success and survival of the company. Cox *et al.* (2004) [23] and Graves and Warddock (1994) [39] show that poor corporate social responsibility can lead to a decrease in the number of long-term institutional investors holding these stocks. Considering only the environmental dimension of the CSR, Feldman *et al.* (1997) [34] and Derwall *et al.* (2004) [27] find that the highest portfolios in terms of environmental score significantly outperforms the lower ranking portfolios in terms of stock returns.

Countless studies investigate the issue of firm characteristics, CSR and financial markets. Lourenço *et al.* (2012) [60] indicate that large profitable firms can be penalized by the market due to their low level of CSP. Otherwise, Godfrey *et al.* (2009) [38] introduce the risk management hypothesis to understand a possible relationship between firm characteristics and market reaction. Indeed, managers who decide to improve the CSR of their firms can create value for their shareholders. Furthermore, Oikonomou *et al.* (2012) [72] emphasize the importance of the market conditions in the determination of the nature and the strength of the CSP-risk relationship. They argue that there exist both a negative but weakly relation between CSR and systematic firm risk; and a positive and strong relationship between corporate social irresponsibility and financial risk. Lackmann *et al.* (2012) [54] conclude that reaction to an increase in the reliability of sustainability information is stronger for firms with high systematic investment risk, financial leverage, and levels of opportunistic management behavior. The relation between CSR and firm value can be explained based on the corporate governance theory. According to the stakeholder theory (Freeman, 1984 [36]; Clarskon, 1995 [21]), firms should use CSR as an extension of effective corporate governance mechanisms to resolve conflicts between managers and non-investing stakeholders. In this case, CSR is value enhancing. Firms develop intangible and valuable assets considered as source of competitive advantage (Hillman and Keim, 2001 [42]). Jo and Harjoto (2012) [50] show that corporate governance positively influences CSR, and CSR increases firm value. Their results support the conflict-resolution hypothesis, and therefore stakeholder theory, as opposed to overinvestment argument.

Contrary to stakeholder theory and according to the agency theory (Jensen and Meckling, 1976 [49]), insiders have an interest in overinvesting in CSR if doing so provides private benefits of reputation building as good social citizens, possibly at a cost to shareholders (Barnea and Rubin, 2010 [6]). Cheng *et al.* (2014) [19] find empirical evidence supporting the argument that managers of large US firms enjoy private benefits from investing in CSR. In this case, CSR is value destroying. Brammer *et al.* (2005) [13] find that the composite CSR score is significantly and negatively related to stock returns, but the poor financial reward offered by these firms is mainly attributable to their good performance with employment, and environmental measures. They conclude that empirical evidence provided by the authors suggests that there is a negative impact of socially responsible UK firms on their stock returns and link this finding to the increased costs

incurred from the additional measures they are required to fulfill. Indeed, the cost of socially responsible behavior can explain the negative sign of the relationship. This argument is consistent with the neoclassical theory. Brammer *et al.* (2005) [13] somehow confirmed the proposition of Vance (1975) [79] who find evidence to support the negative effect of CSR firm strategies on stock performance and link this finding to the competitive disadvantage induced by CSR expenses. This point of view was also confirmed by McWilliams and Siegel (2001) [65]. Based on Carhart (1997) [16] four factor model, Bauer *et al.* (2002) [8] show that both German and US ethical funds underperform their benchmark in terms of their risk-adjusted returns, although similar UK funds achieve slight outperformance. However, authors also noticed a learning effect that is at work thanks to an improvement of ethical fund managers over time.

A last point of view supposes that, under some assumptions concerning the markets and well-defined property rights, an equilibrium should develop overtime engaging in expenditure on CSR involved firms leading thus to indistinguishable returns to socially responsible and irresponsible firms of course for a given level of risk and other firm characteristics. This neutral relationship can be explained by the efficient market hypothesis, which assumes that publicly available information *is immediately incorporated into prices* (Shleifer, 2000 [77]). Becchetti *et al.* (2012) [9], using a large sample of US firm forecasts, find that CSR contributes to make financial markets efficient. Besides, because of the measurement problems related to the Corporate Social Performance (CSP), some authors (Ullman, 1985 [78]) believe that there is no link between social and financial performance. Rather than seeing CSR as a voluntary action, institutional theory suggests seeking to place CSR within a wider field of economic governance characterized by different modes, including the market, regulations, formal and informal rules, norms (Brammer *et al.*, 2012 [12]). Because firms are embedded in different national systems, they may face divergent internal and external pressures to engage in CSR activities (Aguilera *et al.* 2007 [1]; Campbell, 2007 [15]). Matten and Moon (2008) [64] suggest that unlike the voluntary and explicit forms of CSR found in liberal economies, CSR is likely to be more implicit within coordinated market economies.

So far, most empirical research on CSR has focused mainly on the relationship between CSP and firm's financial performance as well as the links between CSP and firm's characteristics. Our objective is to assess how investors price the quality of extra-financial information. Considering an European database gathering firms with available extra-financial notation, we shed light on the existence of a CSR premium. The latest is integrated in a two factor asset pricing model that seems to be suitable for the description of CSR rated firms' returns.

2. Data and variables

2.1. **Database.** We study monthly returns on the European market through 18 different countries from June 2002 to May 2015. We use *DATASTREAM* to extract and construct our data base. Financial firms and stocks with negative *book-to-market* ratio are eliminated from the sample comprising *in fine* 12,144 firms listed on Euronext Stock Exchange market. We retain firms listed at least for three years. We include delisting ones when available. Subsequently, we independently sort our sample to assign stocks to three groups regarding their Asset4 extra-financial notations [3] (*good, neutral* and *bad*) and to three *book-to-market* (Panel A), *operating profitability* (Panel B), and *investment* groups (Panel C)[4]. We label these portfolios with two letters. The first letter describes the *book-to-market* (*high* $[H]$, *neutral* $[N]$ and *low* $[L]$), *operating profitability* (*robust* $[R]$, *neutral* $[N]$ and *weak* $[W]$) and *investment* (*conservative* $[C]$, *neutral* $[N]$ and *aggressive* $[A]$). We form our variables at the end of June in year t by using information from fiscal year-end $t-1$ from DATASTREAM. The different strategies tested are monthly value-scaled. We consider a holding period return from the beginning of June of year t to July of year $t+1$. Allocation of portfolios is annually updated.

In our study, the main question is about the informative content of extra-financial rating. We do not discuss the methodology used by Asset4 which considers several indicators (approximately more than 750 data points in four pillars: Economic, Environmental, social and corporate governance)[5]. Moreover, our study supposes that Asset4 ESG ratings are known and available for all investors.

2.2. **Explanatory variables.** Seven independent variables are used in our time series regressions. *The Market Premium* $[R_M - R_f]$ is the excess return of the European market. *The Small Minus Big* portfolio $[SMB]$ corresponds to the difference between the average monthly stock returns of the three portfolios of small capitalizations (SL, SM and SH) and the three with big capitalizations (BL, BM and BH). *The High Minus Low* portfolio $[HML]$ corresponds to the difference between the average monthly stock returns of the two portfolios with the highest *book-to-market* ratios (SH and BH) and the two with the lowest ratios

[3] Asset4 is one of the bigger providers of ESG (environmental, social, governance) information.

[4] *Book-to-market* ratio is obtained by inverting *market-to-book* [MTBV]. Revenues minus cost of goods sold, minus selling, general, and administrative expenses [EBITDA: WC18198], minus interest expense [WC01251] all divided by book equity [WC05491] constitute our *operating profitability* ratio. Finally, *investment* is defined as the annual change in gross property, plant, and equipment added of the annual change in inventories [Total Asset: WC02999] between $t-2$ and $t-1$ all divided by the lagged book value of total assets of $t-2$.

[5] Thomson Reuters (August 2013) indicates about Asset4 notation that *"The ratings are designed to provide the most appropriate peer-to-peer comparisons. At the same time, we endeavor to avoid over-fitting so the relationships remain robust over time. To accomplish this, each ASSET4 pillar is handled and modelled differently. Environmental KPIs tend to be very global-industry-specific. Alternatively, corporate governance practices are best benchmarked by region. Our attempts at getting more granular by investigating region-specific models within each industry-specific environmental model led to preliminary results with little stability from year-to-year so this pursuit was abandoned. The same was true in trying to further break down the region-specific governance models to make them more industry specific. The social practices pillar was the most challenging of the three. Product-responsibility and health-and-safety practices were best benchmarked by industry sector but employment quality and community citizenship practices were most differentiated by region, and human rights issues are benchmarked universally. Each KPI is scored within each industrial, regional, or universal model between zero and one."*

(SL and BL). *The Winners Minus Losers* portfolio [WML] is the return of a long strategy on stocks with high past returns (winners) minus the return of a short strategy on firms with low past returns (losers). Every month t, stocks are sorted into 3 groups according to their cumulative returns between month $t-12$ and $t-2$. Then, the value-weighted returns of the winner and loser portfolios are computed. The WML factor is thus the spread. *The Robust Minus Weak* portfolio [RMW] corresponds to the difference between the average monthly stock returns of the two highest profitable portfolios (SR and BR) and the the two lowest (SW and BW). We retain the definition of the *operating profitability* ratio of Hou *et al.* (2015) [46] and Fama and French (2015) [33]. *The Conservative Minus Aggressive* portfolio [CMA] corresponds to the difference of the average monthly returns on portfolios with high asset growth rates, designated *agressive* (SA and BA) and portfolios with *conservative* firms (SC and BC). Like Chen and Zhang (2010) [18], Hou *et al.* (2015) [46] and Fama and French (2015) [33] the *investment* proxy is the annual change in gross property, plant, and equipment added of the annual change in inventories between $t-2$ and $t-1$ all divided by the lagged book value of total assets of $t-2$. Finally, *The Bad Minus Good* portfolio [BMG] corresponds to the difference between the average monthly stock returns of the two portfolios of stocks with the best extra-financial notations (the top 30%) and the worst one (the lower 30%). Portfolio allocations in the beginning of $t+1$ are based on the grades in the end of t. Those strategies are maintained one year and are then rebalanced[6]. The six portfolios data [$R_M - R_f$], [SMB],[HML] ,[WML] , [RMW] and [CMA] are extracted from French website [7] . Only the [BMG] portfolio returns are authors' calculation.

2.3. **Dependent variables.** Three sets of portfolios named 'panels' are used as dependent variables. At the end of each year, stocks are classified into three CSR groups regarding their extra-financial notation (*good, neutral* and *bad*). Stocks are subsequently allocated independently to three *book-to-market* groups (Panel A), three *investment* groups (Panel B), three *operating profitability* groups (Panel C). The intersections of the two sorts produce 9 value-weighted portfolios per panel corresponding to the left hand side variables.

2.4. **Summary statistics.** On average, firms with the highest monthly excess returns have bad CSR grades. Indeed, we report a 1.41% and a 1.42% average monthly return for firms with bad notation and respectively high and low B/M classification compared to a 0.65% and 0.94% for firms with good CSR grade (see table [1], panel A). This category is also found to be the riskiest since we record a 16.69% average monthly standard deviation for firms with bad notation and high B/M compared to firms with good notation and high B/M with a 7.55% average standard deviation. Also, firms with bad notation and low B/M have on average 7.83% monthly standard deviation compared to an average monthly standard deviation of 3.76% for firms with good

[6]As a robustness check, we construct the BMG portfolio with a breakpoint at 10% as Kempf and Osthoff (2007)[51]. Results are similar.
[7]http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/

notation and low B/M. Form descriptive statistics, there is no obvious relationship between average return and B/M classification. However, value stocks seem to be riskier than growth stocks on average. Besides, the higher average number of firms is recorded for companies classified to be neutral in terms of notation and B/M whereas the lowest average number of firms concerns companies with bad notation and high B/M. Also, firms with good CSR notation and low B/M seem to have higher average market capitalization.

Concerning portfolios sorted by investment and CSR notation, descriptive statistics in panel B of table [1] show that, firms with the highest average returns have bad notations. Moreover, firms that are considered to be aggressive have always higher average stock return than conservative ones. However, aggressive firms are less risky than conservative ones based on average standard deviation. Whereas, firms with bad notation display higher average monthly standard deviation than good graded firms. Also, the higher number of firms in average is for companies classified to be neutral in terms of notation and investment whereas the lowest average number of firms concerns aggressive companies with good notation. Also, aggressive firms with good CSR notation seem to have higher average market capitalization.

Turning this time to portfolios sorted by profitability and CSR notation, we also record a higher average monthly stock return for firms with bad CSR notation compared to companies with good notation. Indeed, we report a 1.28% and a 1.23% average monthly return for firms that are respectively robust and weak having bad notation compared to a 0.55% and 0.04% average monthly returns for firms with good notation while being robust and weak respectively in terms of profitability classification. Robust firms seem to have higher average return than weak ones. Moreover, the latest is riskier than robust firms since we record a higher monthly return standard deviation for weak firms compared to robust companies. Still, firms with bad CSR notation have on average a higher standard deviation compared to good graded companies. The higher number of firms in average is for robust companies classified to be neutral in terms of notation whereas the lowest average number of firms concerns weak companies that have good notation. Additional descriptive statistics are reported in table [1] panel C.

Tables [2], [3] and [4] report Pearson and Spearman correlation matrix of variables monthly excess returns. Strategies considered in table [2] panel A are built based on B/M and CSR grade independent classifications. Correlations appear to be low between the considered portfolios and the risk factors: market, SMB, HML, WML, RMW, CMA, and BMG. Especially, the constructed BMG appears to be positively correlated with market factor, SMB and HML whereas it is negatively linked to RMW, CMA and WML. These correlations are still low (0.28, 0.21, 0.19, -0.21, -0.05 and -0.14 respectively). We also notice that the market factor as well as HML and BMG have a generally positive correlation with the tested portfolios whereas the correlation appears to be generally negative between the latest and SMB, RMW, CMA and WML factors. The same results are found for portfolios constructed based on investment and CSR notation and for strategies built

based on profitability and CSR notation classifications. Correlations are reported in tables [3] and [4] respectively for panels B and C.

Table [5] reports summary statistics of factors monthly returns. For market factor, SMB and HML, we measure an average monthly return of 0.7%, 0.163% and 0.214% respectively. Moreover, RMW, CMA and WML factors record a 0.293%, 0.175 and 0.803 average monthly return. BMG factor presents the higher average monthly return (1.187%) but displays also the highest standard deviation among the tested risk factors (Market, SMB, HML, RMW, CMA and WML).

3. Empirical results

3.1. **Time series regressions results for B/M-CSR portfolios:** From Panel A of tables [6], [7], [8], [9] and [10], betas are positive and significant for all portfolios and for all asset pricing models tested. The latest is increased for portfolios with low B/M when adding additional risk factors to the one factor model. In table [7] (Panel A), SMB factor is negative and significant for firms with good CSR notation whereas it is positively and significantly linked to firms with bad notation (except for portfolios with high B/M ratio). Except bad graded firms, HML coefficients in table [7] are positive and significant for value portfolios and negative and significant for growth portfolios. Moreover, as shown in table [8] (Panel A), WML factor is almost always negative. It is significant for portfolios with high B/M and good notation and for portfolios with low B/M and bad CSR grade. The same finding for WML applies to RMW and CMA factors as shown in table [8] (Panel A). However, in table [10] (Panel A), BMG factor coefficient is positive and significant for portfolios of bad graded firms whereas it is negative but not always significant for portfolios of good graded firms. This finding shows that there is CSR premium for companies that are classified as bad graded in terms of CSR. Table [11] displays adjusted R squared for CAPM, 3FM, 4FM, 5FM and the proposed CSR pricing model. From Panel A, one can notice that adjusted R squared are improved particularly for portfolios of bad graded firms. For these portfolios, the highest adjusted R squared are given by the CSR model.

3.2. **Time series regressions results for investment-CSR portfolios:** From Panel B of tables [6], [7], [8], [9] and [10], betas are positive and significant for all portfolios and for all asset pricing models tested. Table [7] (Panel B) shows negative and significant SMB coefficients for firms with good CSR notation whereas it is positively and significantly linked to firms with bad notation (except for conservative firms). Except bad graded firms, HML coefficients in table [7] (Panel B) are positive and significant for conservative portfolios and negative but not significant for aggressive portfolios. Moreover, as shown in table [8] (Panel B), WML factor is negative and significant for portfolios that are classified as conservative in terms of investment. The same finding for WML applies to RMW and CMA factors (see table [9] Panel B). However, BMG factor coefficient is positive and significant for portfolios of bad graded firms whereas it is negative but not

always significant for portfolios of good graded firms (table [10] Panel B). From table [11] (Panel B), one can notice that adjusted R squared are improved for portfolios of bad graded firms especially for aggressive and conservative firms.

3.3. **Time series regressions results for profitability-CSR portfolios:** From Panel C of tables [6], [7], [8], [9] and [10], betas are positive and significant for all portfolios and for all asset pricing models tested. Except for weak profitability firms, SMB factor is negative and significant for firms with good CSR notation whereas it is positively and significantly linked to firms with bad notation. Moreover, HML coefficients in table [7] are positive and significant for robust portfolios. However, when introducing WML, CMA and RWM, the HML factor loses its significance (as shown in tables [8] and [9]). Moreover, as shown in table [8], WML factor is negative and significant for all strategies except for the portfolio of robust and good graded firms. The same finding for WML applies to RMW factor in table [9]. CMA factor is always negative and significant except for the firms that are robust in terms of profitability and at the same time bad graded in terms of CSR. However, BMG factor coefficient is positive and significant for portfolios of bad graded firms whereas it is negative and significant for portfolios of good graded firms. From table [11], one can notice that adjusted R squared are improved for portfolios of bad graded firms.

3.4. **Gibbons, Ross and Shanken (1989)**[37] **statistic results:** Table [12] displays GRS statistic values for 10 asset pricing models. Each model is a combination of the market premium factor and one or several other factors among SMB, HML, WML, RMW, CMA, and our constructed BMG model. Panel A, Panel B and Panel C of table [12] reports GRS statistic for portfolios classified by B/M-CSR notation, Investment-CSR notation and Operating profitability-CSR notation respectively. Models with the lowest GSR statistic all contain BMG factor. Moreover, on average, model 8 presents the lowest GRS test when considering together the three portfolio classifications. Indeed, GRS test statistics are below the critical value for respectively Panel A (1.984), Panel B (1.881) and Panel C (1.191). This result confirms that a parsimonious two-factor model including both the market and the CRS premia is sufficient to describe stock returns of firms screened by extra-financial agencies in Europe.

4. Conclusion

This paper shed light on the negative relationship between the return and the corporate social responsibility proxied by extra-financial notation in Europe from June 2002 to May 2015 (13 years). We cover a long period since the early 2000s development of extra-financial notation. To our best knowledge, our study is pioneer in exploring this field under the asset pricing dimension.

Since our concern lies with the identification of the appropriate asset pricing model for CSR involved firms, we challenge, among others, widely used factor models: one, three, four and five factor models. We propose a well specified two-factor model including a new risk premium related to corporate social responsibility succeeding easily the Gibbons, Ross and Shanken test. Considering 27 investment strategies based on CSR, book-to-market, investment and operating profitability, both market and CSR premia explain returns without size, value, momentum, operating profitability and investment factors. Both CSR funds and asset managers can use our local European two-factor model for performance measurements and expected return computation. Using this model allows also to integrate the corporate social responsibility dimension in corporate valuation. Most responsible firms will have lower discount factor increasing their market values.

For future research, our paper can be extended to different issues in finance. First, it is interesting to challenge our results with different extra-financial notation agencies. Second, we can investigate how financial market practitioners consider or not the existence of extra-financial notation in their pricing. Finally, since the US market remains the most documented in asset pricing field, testing a CSR model would be definitely an innovative issue.

References

[1] R. V. Aguilera, J. Ganapathi, D. E. Rupp, and C. A. Williams. Putting the s back in corporate social responsibility: A multilevel theory of social change in organizations. *Academy of Management Review*, 32(3):836–863, 2007.

[2] J. Allouche and P. Laroche. The relationship between corporate social responsibility and corporate financial performance: a survey. *Allouche, J. (Ed.), Corporate Social Responsibility: Performance and Stakeholders*, 2006.

[3] C. Asness, R. Frazzini, T. Israel, Moskowitz, and L. H. Pedersen. Size matters, if you control your junk. *Working Paper*, January 2015.

[4] R. Banz. The relationship between return and market value of common stocks. *Journal of Financial Economics*, (9):3–18, 1981.

[5] B. Barber and J. Lyon. Firm size, book-to-market ratio, and security returns : a holdout sample of financial firms. *Journal of Finance*, 52(2):875–83, June 1997.

[6] A. Barnea and A. Rubin. Corporate social responsibility as a conflict between shareholders. *Journal of Business Ethics*, 97:71–86, 2010.

[7] S. Basu. Investment performance of common stocks in relation to their price-earnings ratios: A test of the efficient market hypothesis. *Journal of Finance*, 32(3):663–82, June 1977.

[8] R. Bauer, K. Koedijk, and R. Otten. International evidence on ethical mutual fund performance and investment style mimeo. In *Limburg Institute of Financial Economics, Maastricht University*, 2002.

[9] L. Becchetti, R. Ciciretti, I. Hasan, and N. Kobeissi. Corporate social responsibility and shareholder's value. *Journal of Business Research*, 65(11):1628–1635, 2012.

[10] L. Bhandari. Debt/equity ratio and expected common stock returns: Empirical evidence. *Journal of Finance*, 43(2):507–28, June 1988.

[11] F. Black. Capital market equilibrium with restricted borrowing. *Journal of Business*, (45):444–55, 1972.

[12] S. Brammer, G. Jackson, and D. Matten. Corporate social responsibility and institutional theory: new perspectives on private governance. *Socio-Economic Review*, 10:3–28, 2012.

[13] S. Brammer and S. Pavelin. Corporate community contributions in the united kingdom and the united states. *Journal of Business Ethics*, 56:15–26, 2005.

[14] D. Breeden. An Intertemporal Asset Pricing Model with stochastic consumption and investment opportunities. *Journal of Financial Economics*, (7):265–96, 1979.

[15] J. Campbell. Why would corporations behave in socially responsible ways? an institutional theory of corporate social responsibility. *Academy of Management Review*, 32(3):946, 2007.

[16] M. Carhart. On persistence in mutual fund performance. *Journal of Finance*, 52(1):57–82, March 1997.

[17] K. Chan and N. Chen. Structural and return characteristics of small and large firms. *Journal of Finance*, 46(4):1467–84, september 1991.

[18] L. Chen and L. Zhang. A better three-factor model that explains more anomalies. *Journal of Finance*, 65(2):563–595, April 2010.

[19] I. H. Cheng, H. Hong, and K. Shue. Do managers do good with other people's money? *Chicago Booth Paper*, pages 12–47, 2014.

[20] A. Chui, S. Titman, and K. Wei. Individualism and momentum around the world. *Journal of Finance*, 65:361–392, 2010.

[21] M. Clarskon. A stakeholder framework for analyzing and evaluating corporate social performance. *Academy of Management Review*, 20:92–117, 1995.

[22] J. H. Cochrane. *Asset Pricing*. Princeton University Press, 2005.

[23] P. Cox, S. Brammer, and A. Millington. An empirical examination of institutional investor preferences for corporate social performance. *Journal of Business Ethics*, 52(1):27–43, 2004.

[24] K. Daniel and S. Titman. Evidence on the characteristic of cross sectional variation in stock return. *Journal of Finance*, 52(1):1–33, March 1997.

[25] J. Davis. The coss-section of realized stock returns: the pre-compustat evidence. *Journal of Finance*, 49(5):1579–93, December 1994.

[26] J. Davis, E. Fama, and K. French. Characteristics, covariances, and average returns : 1929 to 1997. *Journal of Finance*, 55(1):389–406, February 2000.

[27] J. Derwall, N. Gunster, R. Bauer, and K. Koedijk. The eco-efficiency premium puzzle mimeo. *Rotterdam School of Management, Erasmus University*, 2004.

[28] E. Fama. Efficient capital markets: A review of theory and empirical work. *Journal of Finance*, 25(2):383–417, December 1970.

[29] E. F. Fama and K. R. French. Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics*, 33:3–56, 1993.

[30] E. F. Fama and K. R. French. The capm is wanted, dead or alive. *Journal of Finance*, 51(5):1947–58, December 1996.

[31] E. F. Fama and K. R. French. Multifactor explanations of asset pricing anomalies. *Journal of Finance*, 51(1):55–84, March 1996.

[32] E. F. Fama and K. R. French. Size, value, and momentum in international stock returns. *Journal of Financial Economics*, (105):457–472, 2012.

[33] E. F. Fama and K. R. French. A five-factor asset pricing model. *Journal of Financial Economics*, 116:1–22, 2015.

[34] S. J. Feldman, P. A. Soyka, and P. G. Ameer. Does improving a firsm's environmental management system and environmental performance result in a higher stock price? *Journal of Investing*, 6(4):87–97, 1997.

[35] A. Frazzini and L. H. Pedersen. Betting against beta. *Journal of Financial Economics*, 111:1–25, 2014.

[36] R. Freeman. Strategic management: A stakeholder approach. *Massachusetts: Pitman Publishing Inc.*, 1984.

[37] M. Gibbons, S. Ross, and J. Shanken. A test of the efficiency of a given portfolio. *Econometrica*, 57:1121–1152, 1989.

[38] P. C. Godfrey, C. B. Merrill, and J. M. Hansen. The relationship between corporate social responsibility and shareholder value: An empirical test of the risk management hypothesis. *Strategic Management Journal*, 30:425–445, 2009.

[39] S. B. Graves and S. A. Waddock. Institutional owners and corporate social performance. *The Academy of Management Journal*, 37(4):1034–1046, 1994.

[40] J. Griffin. Are the Fama and French factors global or country-specific? *Working Papers*, pages 1–37, September 2000.

[41] R. Haugen. *The new finance: the case against efficient markets*. Prentice-Hall, Englewood Cliffs, New Jersey, 1995.

[42] A. Hillman and G. D. Keim. Shareholder value, stakeholder management, and social issues: what's the bottom line? *Strategic Management Journal*, 22(2):125–139, 2001.

[43] D. Hirshleifer. Investor psychology and asset pricing. *Journal of Finance*, 56:1533–1597, 2001.

[44] R. Holme and P. Watts. Corporate social responsibility: Making good business sense. In *World Business Council for Sustainable Development, Geneva*, 2000.

[45] H. G. Hong, J. D. Kubik, and J. A. Scheinkman. Financial constraints on corporate goodness. *Working Paper. Available at SSRN: https://ssrn.com/abstract=1734164 or http://dx.doi.org/10.2139/ssrn.1734164*, February 2012.

[46] K. Hou, C. Xue, and L. Zhang. A comparison of new factor models. *Working papers*, 2015.

[47] G. Huberman and S. Kandel. Mean-variance spanning. *Journal of Finance*, 42(4):873–88, September 1987.

[48] N. Jegadeesh and S. Titman. Returns to buying winners and selling losers: implications for stock market efficiency. *Journal of Finance*, 48(1):65–91, March 1993.

[49] M. Jensen and W. Meckling. Theory of firm: Managerial behavior, agency costs, and capital structure. *Journal of Financial Economics*, 3:305–360, 1976.

[50] H. Jo and M. Harjoto. The causal effect of corporate governance on corporate social responsibility. *Journal of Business Ethics*, 106:53–72., 2012.

[51] A. Kempf and P. Osthoff. The effect of socially responsable investing on portfolio performance. *European Financial Management*, 13:908–922, 2007.

[52] D. Kim. The errors in the variables problem in the cross-section of expected stock returns. *Journal of Finance*, 50(5):1605–34, December 1995.

[53] S. Kothari, J. Shanken, and R. Sloan. Another look at the cross-section of expected stock returns. *Journal of Finance*, 50(1):185–224, March 1995.

[54] J. Lackmann, J. Ernstberger, and M. Stich. Market reactions to increased reliability of sustainability information. *Journal of Business Ethics*, 107:111–128, 2012.

[55] S. Lajili-Jarjir. Explaining the cross-section returns in france: Characteristics or risk factors? *The European Journal of Finance*, 13(2):145–158, February 2007.

[56] J. Lakonishok, A. Shleifer, and R. Vishny. Contrarian investment, extrapolation, and risk. *Journal of Finance*, 49(5):1541–78, December 1994.

[57] J. Lewellen. the time series relations among expected return, risk, and book to market. *Journal of Financial Economics*, 54:5–43, 1999.

[58] J. Lintner. The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets. *Review of Economics and Statistics*, (47):13–37, 1965.

[59] A. Lo and A. MacKinlay. Data-snooping biases in tests of financial asset pricing models. *Review of Financial Studies*, 3(3):431–67, 1990.

[60] I. Lourenço, M. Branco, J. D. Curto, and Eugenio. How does the market value corporate sustainability performance? *Journal of Business Ethics*, 108:417–428, 2012.

[61] R. Lucas. Asset prices in an exchange economy. *Econometrica*, 46(6):1429–45, November 1978.

[62] B. Malkiel. The efficient market hypothesis and its critics. *Journal of Economic Perspectives*, 17(1):59–82, 2003.

[63] H. Markowitz. Portfolio selection. *Journal of Finance*, (7):77–91, March 1952.

[64] D. Matten and J. Moon. 'implicit' and 'explicit' csr: A conceptual framework for a comparative understanding of corporate social responsibility. *Academy of Management Review*, 33:404–424, 2008.

[65] A. McWilliams and D. Siegel. Corporate social responsibility: A theory of the firm perspective. *The Academy of Management Review*, 26(1):117–127, January 2001.

[66] R. Mehra and E. Prescott. The equity premium: A puzzle. *Journal of Monetary Economics*, (15):145–161, 1985.

[67] R. Merton. An intertemporal capital asset pricing model. *Econometrica*, 41(5):867–87, September 1973.

[68] M. Moskowitz. Choosing socially responsible stocks. *Business and Society Review*, 1:71–75, 1972.

[69] J. Mossin. Equilibrium in a capital asset market. *Econometrica*, 34(4):768–83, October 1966.

[70] A. Nasreddine and S. Lajili-Jarjir. Scrutinizing portfolio strategies and asset pricing models: The french case. *Bankers, Markets & Investors*, (146):38–48, January-February 2017.

[71] E. Nelling and E. Webb. Corporate social responsibility and financial performance: the "virtuous circle" revisited. *Review of Quantitative Finance and Accounting*, 32:197–209, 2009.

[72] I. Oikonomou, C. Brooks, and s. Pavelin. The impact of corporate social performance on financial risk and utility: A longitudinal analysis. *Financial Management*, pages 483–515, 2012.

[73] R. Roll. A critique of the asset pricing theory's tests. *Journal of Financial Economics*, (4):129–76, 1977.

[74] S. Ross. The arbitrage theory of capital asset pricing. *Journal of Economic Theory*, (13):341–60, 1976.

[75] M. Rubinstein. The strong case for the generalized logarithmic utility model as the premier model of financial markets. *Journal of Finance*, 31(2):551–71, May 1976.

[76] W. Sharpe. Capital asset prices: A theory of market equilibrium under conditions of risk. *Journal of Finance*, 19(3):425–42, September 1964.

[77] A. Shleifer. Inefficient markets: An introduction to behavioural finance. *Oxford University Press UK*, 2000.

[78] A. Ullman. Data in search of a theory: A critical examination of the relationships among social performance, social disclosure, and economic performance of us firms. *Academy of Management Review*, 10:540–557, 1985.

[79] S. Vance. Are socially responsible corporations good investment risks? *Management Review*, 64(8):18–24, 1975.

[80] S. Waddock and S. Graves. Corporate social performance financial performance link. *Strategic Management Journal*, 18:303–319, 1997.

Table 1. **Summary statistics of returns of 27 portfolios constructed from independent sorts on book-to-market, investment, operating profitability and CSR extra-financial notations from June 2002 to May 2015**

Stocks are independently sorted into three Asset4 extra-financial notations (*good, neutral* and *bad*) and three *book-to-market* (Panel A), *operating profitability* (Panel B), and *investment* groups (Panel C). The table hereunder statistically describes monthly excess ;returns of the 27 value-weighted portfolios.

			Panel A				***Panel B***				***Panel C***		
			book-to-market				***Investment***				***Operating profitability***		
			Low	*Neutral*	*High*		*Aggress.*	*Neutral*	*Cons.*		*Weak*	*Neutral*	*Robust*
Mean	***CSR***	*Good*	0,65	0,56	0,94	*Good*	0,69	0,23	0,64	*Good*	0,04	0,29	0,55
		Neutral	1,22	0,54	0,07	*Neutral*	1,16	0,69	0,60	*Neutral*	-0,11	0,63	1,11
		Bad	1,41	1,20	1,42	*Bad*	1,61	1,58	0,64	*Bad*	1,23	1,13	1,28
Standard deviation	***CSR***	*Good*	3,76	4,78	7,55	*Good*	4,92	5,15	6,37	*Good*	10,54	5,13	3,88
		Neutral	4,61	6,25	8,37	*Neutral*	5,81	6,58	7,06	*Neutral*	7,36	5,40	6,69
		Bad	7,83	7,96	16,69	*Bad*	7,44	7,17	14,17	*Bad*	15,85	7,78	7,78
Sharpe ratio	***CSR***	*Good*	0,17	0,12	0,12	*Good*	0,14	0,04	0,10	*Good*	0,00	0,06	0,14
		Neutral	0,26	0,09	0,01	*Neutral*	0,20	0,10	0,09	*Neutral*	-0,02	0,12	0,17
		Bad	0,18	0,15	0,08	*Bad*	0,22	0,22	0,05	*Bad*	0,08	0,14	0,16
Average nb. of firms	***CSR***	*Good*	67,8	111,4	34,2	*Good*	44,5	127,1	44,7	*Good*	12,3	96,2	103,9
		Neutral	115,9	147,7	52,8	*Neutral*	82,7	164,8	74,2	*Neutral*	31,4	137,9	145,8
		Bad	78,5	103,5	52,2	*Bad*	74,7	106,3	59,0	*Bad*	39,3	108,0	85,7
Average market cap. (M€)	***CSR***	*Good*	698,6	428,9	449,7	*Good*	829,7	541,3	536,1	*Good*	1067,4	516,1	642,3
		Neutral	146,6	135,6	145,7	*Neutral*	198,7	163,7	110,7	*Neutral*	207,6	124,7	175,0
		Bad	81,9	59,0	44,9	*Bad*	75,4	45,0	72,1	*Bad*	82,8	49,8	73,5
Jarque Bera	***CSR***	*Good*	36,7	4,7	5,0	*Good*	6,1	390,0	26,3	*Good*	1235,6	5,3	12,0
		Neutral	6,2	72,0	24,0	*Neutral*	52,4	68,8	24,6	*Neutral*	72,6	24,1	112,7
		Bad	25,4	326,2	4801,8	*Bad*	104,9	59,7	2428,6	*Bad*	5444,4	335,5	171,1

TABLE 2. **Pearson and Spearman correlation matrix of monthly returns of the panel A: June 2002 to May 2015**

At the end of each year, stocks are classified into three *book-to-market* groups (*low, neutral* and *high*). Stocks are subsequently allocated independently to three CSR groups regarding the Asset4 extra-financial notation (*good, neutral* and *bad*) constituting the Panel A. The intersections of the two sorts produce 9 value-weighted portfolios. The *right hand side* variables are explanatory variables: $(R_M - Rf)$ is the market premium, the *size* factor (SMB), the *value* factor (HML), the *operating profitability* factor (RMW), the *investment* factor (CMA), the *momemtum* factor (WML) and the CSR risk factor (BMG). We use both the *Pearson* (black figures) and the *Spearman* (blue figures) correlations to study the relations between variables. The first letter corresponds to the *book-to-market* group (L, N or H). The second corresponds to the CSR grade (G, N or B). For instance, LG is a value-scaled portfolio comprising simultaneously the smallest 30% *book-to-market* firms and the highest 30% CSR firms stocks.

Pearson correlation matrix		*Spearman correlation*															
		LG	LN	LB	NG	NN	NB	HG	HN	HB	$R_M - R_f$	SMB	HML	RMW	CMA	WML	BMG
	LG		0,67	0,47	0,75	0,63	0,41	0,43	0,49	0,45	0,66	-0,30	0,13	-0,16	-0,23	-0,20	-0,04
	LN	0,70		0,56	0,78	0,77	0,59	0,51	0,53	0,62	0,74	-0,11	0,30	-0,30	-0,13	-0,22	0,18
	LB	0,47	0,51		0,62	0,62	0,51	0,44	0,47	0,56	0,60	0,10	0,29	-0,40	-0,06	-0,21	0,56
	NG	0,76	0,76	0,57		0,79	0,52	0,61	0,60	0,61	0,79	-0,20	0,44	-0,38	-0,09	-0,33	0,13
	NN	0,69	0,73	0,61	0,77		0,61	0,51	0,65	0,69	0,74	0,01	0,43	-0,38	-0,08	-0,29	0,25
	NB	0,40	0,58	0,48	0,47	0,62		0,41	0,46	0,58	0,57	0,17	0,30	-0,27	-0,12	-0,23	0,57
	HG	0,47	0,52	0,50	0,67	0,53	0,43		0,58	0,53	0,58	-0,18	0,45	-0,48	0,04	-0,35	0,13
	HN	0,54	0,59	0,50	0,63	0,65	0,47	0,65		0,63	0,61	-0,05	0,51	-0,48	0,04	-0,39	0,18
	HB	0,38	0,44	0,40	0,48	0,49	0,45	0,47	0,47		0,64	0,04	0,43	-0,42	0,04	-0,26	0,44
	$R_M - R_f$	0,72	0,75	0,61	0,80	0,80	0,59	0,61	0,67	0,53		-0,09	0,49	-0,45	-0,02	-0,32	0,21
	SMB	-0,28	-0,09	0,09	-0,27	0,03	0,23	-0,17	-0,04	-0,06	-0,10		0,02	0,02	-0,05	0,16	0,32
	HML	0,14	0,26	0,31	0,41	0,43	0,35	0,54	0,48	0,31	0,50	0,00		-0,63	0,32	-0,29	0,25
	RMW	-0,21	-0,36	-0,46	-0,46	-0,41	-0,37	-0,61	-0,53	-0,30	-0,49	0,06	-0,66		-0,29	0,33	-0,25
	CMA	-0,37	-0,22	-0,23	-0,19	-0,34	-0,18	-0,07	-0,16	-0,15	-0,22	-0,11	0,26	-0,21		-0,01	0,04
	WML	-0,36	-0,32	-0,46	-0,48	-0,48	-0,39	-0,51	-0,54	-0,36	-0,48	0,12	-0,37	0,50	0,21		-0,09
	BMG	0,02	0,22	0,56	0,12	0,23	0,53	0,16	0,21	0,66	0,28	0,21	0,19	-0,21	-0,05	-0,14	

TABLE 3. **Pearson and Spearman correlation matrix of monthly returns of the panel B: June 2002 to May 2015**

At the end of each year, stocks are classified into three *investment* groups (*low, neutral* and *high*). Stocks are subsequently allocated independently to three CSR groups regarding the Asset4 extra-financial notation (*good, neutral* and *bad*) constituting the Panel A. The intersections of the two sorts produce 9 value-weighted portfolios. The *right hand side* variables are explanatory variables: $(R_M - Rf)$ is the market premium, the *size* factor (SMB), the *value* factor (HML), the *operating profitability* factor (RMW), the *investment* factor (CMA), the *momemtum* factor (WML) and the CSR risk factor (BMG). We use both the *Pearson* (black figures) and the *Spearman* (blue figures) correlations to study the relations between variables. The first letter corresponds to the *investment* group (C, N or A). The second corresponds to the CSR grade (G, N or B). For instance, CG is a value-scaled portfolio comprising simultaneously the 30% most conservative firms and the highest 30% CSR firms stocks (*good*).

Pearson correlation matrix / *Spearman correlation*

	AG	AN	AB	NG	NN	NB	CG	CN	CB	$R_M - R_f$	SMB	HML	RMW	CMA	WML	BMG
AG		0,71	0,55	0,76	0,68	0,60	0,56	0,69	0,46	0,69	-0,18	0,34	-0,33	-0,11	-0,26	0,08
AN	0,75		0,61	0,71	0,66	0,60	0,52	0,69	0,47	0,68	-0,01	0,32	-0,26	-0,17	-0,22	0,21
AB	0,52	0,63		0,52	0,53	0,56	0,39	0,59	0,54	0,58	0,22	0,28	-0,32	-0,14	-0,11	0,61
NG	0,79	0,76	0,48		0,72	0,62	0,65	0,69	0,52	0,74	-0,22	0,34	-0,34	-0,19	-0,33	0,05
NN	0,69	0,68	0,53	0,75		0,69	0,61	0,73	0,55	0,75	-0,09	0,44	-0,44	-0,11	-0,32	0,19
NB	0,63	0,63	0,56	0,70	0,74		0,54	0,71	0,61	0,66	0,07	0,36	-0,40	-0,01	-0,37	0,44
CG	0,57	0,43	0,34	0,59	0,59	0,55		0,63	0,51	0,65	-0,19	0,41	-0,45	0,06	-0,34	0,06
CN	0,61	0,60	0,51	0,63	0,73	0,65	0,56		0,61	0,74	-0,06	0,45	-0,43	0,03	-0,42	0,27
CB	0,45	0,44	0,48	0,51	0,51	0,56	0,47	0,50		0,58	-0,01	0,39	-0,47	-0,03	-0,33	0,56
$R_M - R_f$	0,76	0,75	0,60	0,80	0,78	0,71	0,62	0,68	0,55		-0,09	0,49	-0,45	-0,02	-0,32	0,21
SMB	-0,18	0,06	0,26	-0,20	-0,06	0,05	-0,19	-0,05	-0,05	-0,10		0,02	0,02	-0,05	0,16	0,32
HML	0,37	0,30	0,30	0,33	0,39	0,39	0,49	0,44	0,33	0,50	0,00		-0,63	0,32	-0,29	0,25
RMW	-0,39	-0,30	-0,38	-0,39	-0,52	-0,50	-0,50	-0,47	-0,41	-0,49	0,06	-0,66		-0,29	0,33	-0,25
CMA	-0,18	-0,36	-0,17	-0,36	-0,28	-0,17	-0,10	-0,14	-0,19	-0,22	-0,11	0,26	-0,21		-0,01	0,04
WML	-0,36	-0,32	-0,27	-0,48	-0,60	-0,57	-0,60	-0,58	-0,48	-0,48	0,12	-0,37	0,50	0,21		-0,09
BMG	0,15	0,23	0,56	0,13	0,21	0,41	0,05	0,25	0,75	0,28	0,21	0,19	-0,21	-0,05	-0,14	

TABLE 4. **Pearson and Spearman correlation matrix of monthly returns of the panel C: June 2002 to May 2015**

At the end of each year, stocks are classified into three *investment* groups (*low, neutral* and *high*). Stocks are subsequently allocated independently to three CSR groups regarding the Asset4 extra-financial notation (*good, neutral* and *bad*) constituting the Panel A. The intersections of the two sorts produce 9 value-weighted portfolios. The *right hand side* variables are explanatory variables: $(R_M - Rf)$ is the market premium, the *size* factor (*SMB*), the *value* factor (*HML*), the *operating profitability* factor (*RMW*), the *investment* factor (*CMA*), the *momemtum* factor (WML) and the CSR risk factor (*BMG*). We use both the *Pearson* (black figures) and the *Spearman* (blue figures) correlations to study the relations between variables. The first letter corresponds to the *operating profitability* group (W, N or R). The second corresponds to the CSR grade (G, N or B). For instance, WG is a value-scaled portfolio comprising simultaneously the 30% less profitable firms (*weak*) and the highest 30% CSR stocks (*good*).

Pearson correlation matrix						*Spearman correlation*											
	WG	WN	WB	NG	NN	NB	RG	RN	RB	$R_M - R_f$	SMB	HML	RMW	CMA	WML	BMG
WG		0,51	0,40	0,55	0,53	0,32	0,50	0,53	0,48	0,57	-0,11	0,36	-0,32	0,05	-0,29	0,02
WN	0,55		0,52	0,66	0,65	0,47	0,49	0,54	0,58	0,65	0,03	0,57	-0,49	0,02	-0,45	0,26
WB	0,32	0,47		0,57	0,53	0,41	0,48	0,50	0,48	0,57	0,12	0,34	-0,42	0,00	-0,32	0,42
NG	0,54	0,72	0,52		0,80	0,57	0,76	0,72	0,61	0,73	-0,19	0,46	-0,49	-0,10	-0,36	0,13
NN	0,58	0,66	0,46	0,79		0,53	0,72	0,77	0,65	0,71	-0,13	0,40	-0,38	-0,10	-0,33	0,18
NB	0,40	0,55	0,47	0,63	0,63		0,45	0,56	0,60	0,52	0,11	0,32	-0,34	-0,10	-0,17	0,59
RG	0,51	0,52	0,45	0,73	0,77	0,50		0,67	0,51	0,73	-0,25	0,20	-0,20	-0,20	-0,21	0,00
RN	0,61	0,52	0,41	0,64	0,76	0,58	0,67		0,63	0,72	-0,05	0,32	-0,31	-0,16	-0,23	0,18
RB	0,46	0,55	0,28	0,53	0,61	0,59	0,43	0,57		0,65	0,15	0,45	-0,42	0,01	-0,26	0,54
$R_M - R_f$	0,65	0,68	0,51	0,73	0,79	0,61	0,76	0,75	0,61		-0,09	0,49	-0,45	-0,02	-0,32	0,21
SMB	-0,07	0,01	-0,01	-0,19	-0,10	0,18	-0,26	-0,03	0,17	-0,10		0,02	0,02	-0,05	0,16	0,32
HML	0,37	0,61	0,28	0,53	0,36	0,40	0,23	0,28	0,46	0,50	0,00		-0,63	0,32	-0,29	0,25
RMW	-0,42	-0,52	-0,36	-0,54	-0,41	-0,40	-0,25	-0,45	-0,48	-0,49	0,06	-0,66		-0,29	0,33	-0,25
CMA	-0,22	-0,11	-0,19	-0,18	-0,29	-0,25	-0,32	-0,29	-0,02	-0,22	-0,11	0,26	-0,21		-0,01	0,04
WML	-0,44	-0,54	-0,40	-0,62	-0,55	-0,43	-0,37	-0,47	-0,39	-0,48	0,12	-0,37	0,50	0,21		-0,09
BMG	0,05	0,26	0,70	0,14	0,21	0,54	0,07	0,21	0,46	0,28	0,21	0,19	-0,21	-0,05	-0,14	

TABLE 5. **Summary statistics for monthly factor returns: June 2002 to May 2015**

The table hereunder describes statistically our independent variables. $R_M - R_f$ is the European *market premium*. Stocks are independently classified to three *book-to-market*, *operating profitability*, *investment*, *momentum* and *CSR notation* groups, by using their 30th and 70th percentiles as respective breakpoints. *HML*, utilizes value-weighted portfolios formed from the intersection of the *size* and *book-to-market* sorts ($2 \times 3 = 6$ portfolios). This mechanic is similar for *operating profitability*, *momentum*, *investment* and *CSR* giving respectively *RMW*, *WML*, *AMC* and *BMG*.

		$R_M - R_f$	SMB	HML	RMW	CMA	WML	BMG
Descriptive Statistics	*Mean* (%)	0,710	0,163	0,214	0,293	0,175	0,803	1,187
	Median (%)	0,995	0,225	0,250	0,370	0,170	1,180	0,400
	Variance	0,322	0,039	0,047	0,024	0,020	0,186	0,723
	Standard deviation (%)	5,676	1,963	2,161	1,553	1,407	4,315	8,502
	Annualized St. Dev. (%)	19,664	6,801	7,486	5,379	4,874	14,948	29,450
	Minimum (%)	-22,170	-6,850	-4,600	-5,250	-3,660	-26,150	-17,132
	25th percentile (%)	-2,313	-1,085	-1,010	-0,503	-0,595	-0,385	-3,438
	75th percentile (%)	4,398	1,543	1,423	1,190	0,850	2,520	4,221
	Maximum (%)	13,860	4,990	8,310	6,000	5,540	13,700	60,610
	Kurtosis	1,602	0,641	0,859	1,811	2,399	10,628	16,361
	Skewness	-0,668	-0,335	0,319	-0,279	0,710	-1,794	2,689
	Sharpe ratio	0,125	0,083	0,099	0,188	0,125	0,186	0,140

TABLE 6. **Time series regressions of monthly excess returns of Panels A, B and C with the Sharpe-Lintner-Black CAPM: June 2002 to May 2015**

At the end of each year, stocks are classified into three CSR groups regarding their extra-financial notation (*good, neutral and bad*). Stocks are subsequently allocated independently to three *book-to-market* groups (*low to high*), three *investment* groups (*conservative to aggressive*), three *operating profitability* groups (*low to high*). The intersections of the two sorts produce 9 value-weighted portfolios corresponding to the LHS (left hand side) variables of the panel A, B and C. Those dependent variables are then regressed with the Sharpe-Lintner-Black CAPM (1964). The table hereunder presents, for each portfolio, its slopes (bold figures) with their *Student t test* also illustrated with stars ($^{*}p < 0.1; ^{**}p < 0.05; ^{***}p < 0.01$).

Sharpe-Lintner-Black CAPM (1964)

Panel A ***Panel B*** ***Panel C***

Intercept

		Book-to-market			*Investment*			*Operating Profitability*		
		Low	Neutral	High	Aggress.	Neutral	Cons.	Weak	Neutral	Robust
CSR Notation	Good	**0,003**	**0,001**	**0,004**	**0,003**	**-0,002**	**0,000**	**-0,007**	**-0,002**	**0,002**
		1,45	0,31	0,75	1,05	-1,06	0,05	-1,25	-0,74	0,88
	Neutral	**0,008** ***	**-0,001**	**-0,006**	**0,006** **	**0,001**	**-0,001**	**-0,008** *	**0,001**	**0,005**
		3,18	-0,28	-1,24	2,00	0,17	-0,11	-1,69	0,35	1,44
	Bad	**0,007**	**0,006**	**0,004**	**0,011** **	**0,010** **	**-0,004**	**0,002**	**0,005**	**0,007**
		1,31	1,16	0,38	2,20	2,42	-0,41	0,17	1,10	1,27

Market Premium

		Book-to-market			*Investment*			*Operating Profitability*		
		Low	Neutral	High	Aggress.	Neutral	Cons.	Weak	Neutral	Robust
CSR Notation	Good	**0,476** ***	**0,686** ***	**0,811** ***	**0,618** ***	**0,658** ***	**0,872** ***	**1,030** ***	**0,747** ***	**0,520** ***
		12,78	16,37	9,54	14,55	16,83	9,71	10,62	13,18	14,64
	Neutral	**0,606** ***	**0,882** ***	**0,987** ***	**0,762** ***	**0,890** ***	**0,923** ***	**0,911** ***	**0,754** ***	**0,862** ***
		13,89	16,61	11,18	13,92	15,29	11,52	11,52	16,02	14,27
	Bad	**0,939** ***	**0,833** ***	**1,427** ***	**0,784** ***	**0,867** ***	**1,516** ***	**1,455** ***	**0,821** ***	**0,879** ***
		9,45	9,02	7,74	9,35	12,38	8,08	7,42	9,45	9,67

TABLE 7. **Time series regressions of monthly excess returns of Panels A, B and C with the Fama-French three-factor model: June 2002 to May 2015**

At the end of each year, stocks are classified into three CSR groups regarding their extra-financial notation (*good, neutral and bad*). Stocks are subsequently allocated independently to three *book-to-market* groups (*low to high*), three *investment* groups (*conservative to aggressive*), three *operating profitability* groups (*low to high*). The intersections of the two sorts produce 9 value-weighted portfolios corresponding to the LHS (left hand side) variables of the panel A, B and C. Those dependent variables are then regressed with the Fama-French three-factor model (1993). The table hereunder presents, for each portfolio, its slopes (bold figures) with their *Student t test* also illustrated with stars ($^{*}p < 0.1$;$^{**}p < 0.05$;$^{***}p < 0.01$).

Fama-French three-factor model (1993)

Panel A | ***Panel B*** | ***Panel C***

Intercept

		Book-to-market					*Investment*					*Operating Profitability*				
		Low		Neutral		High	Aggress.		Neutral		Cons.	Weak		Neutral		Robust
CSR Notation	Good	**0,004**	**	**0,002**		**0,004**	**0,003**		**-0,002**		**0,001**	**-0,007**		**-0,002**		**0,003**
		2,18		0,70		0,81	1,23		-0,78		0,11	-1,26		-0,70		1,43
	Neutral	**0,008**	***	**-0,002**		**-0,007**	**0,006**	*	**0,000**		**-0,001**	**-0,009**	**	**0,001**		**0,005**
		3,32		-0,54		-1,41	1,85		0,13		-0,21	-2,21		0,40		1,44
	Bad	**0,006**		**0,004**		**0,004**	**0,008**	*	**0,009**	**	**-0,005**	**0,001**		**0,003**		**0,004**
		1,10		0,75		0,36	1,87		2,20		-0,44	0,10		0,72		0,87

Market Premium

		Book-to-market					*Investment*					*Operating Profitability*				
		Low		Neutral		High	Aggress.		Neutral		Cons.	Weak		Neutral		Robust
CSR Notation	Good	**0,556**	***	**0,654**	***	**0,584**	**0,610**	***	**0,682**	***	**0,673**	**0,977**	***	**0,616**	***	**0,573**
		14,40		14,14		6,34	12,45		15,36		6,78	8,65		9,89		14,95
	Neutral	**0,664**	***	**0,873**	***	**0,843**	**0,826**	***	**0,889**	***	**0,834**	**0,683**	***	**0,771**	***	**0,941**
		13,29		14,36		8,41	13,29		13,07		9,03	8,21		14,05		13,56
	Bad	**0,964**	***	**0,832**	***	**1,339**	**0,840**	***	**0,857**	***	**1,410**	**1,422**	***	**0,777**	***	**0,777**
		8,46		8,29		6,23	9,41		10,64		6,45	6,22		8,09		7,85

Small Minus Big

		Book-to-market					*Investment*					*Operating Profitability*				
		Low		Neutral		High	Aggress.		Neutral		Cons.	Weak		Neutral		Robust
CSR Notation	Good	**-0,375**	***	**-0,493**	***	**-0,492**	**-0,241**	*	**-0,271**	**	**-0,569**	**-0,045**		**-0,391**	**	**-0,342**
		-3,87		-4,25		-2,13	-1,96		-2,43		-2,29	-0,16		-2,50		-3,56
	Neutral	**-0,030**		**0,353**	**	**0,064**	**0,400**	**	**0,054**		**0,032**	**0,253**		**-0,044**		**0,163**
		-0,24		2,31		0,25	2,56		0,31		0,14	1,21		-0,32		0,94
	Bad	**0,689**	**	**1,186**	***	**-0,053**	**1,236**	***	**0,415**	**	**-0,010**	**0,307**		**0,913**	***	**0,938**
		2,41		4,71		-0,10	5,52		2,05		-0,02	0,54		3,79		3,78

High Minus Low

		Book-to-market					*Investment*					*Operating Profitability*				
		Low		Neutral		High	Aggress.		Neutral		Cons.	Weak		Neutral		Robust
CSR Notation	Good	**-0,492**	***	**0,080**		**1,111**	**-0,002**		**-0,177**		**0,947**	**0,275**		**0,623**	***	**-0,343**
		-4,87		0,66		4,61	-0,02		-1,52		3,65	0,93		3,83		-3,43
	Neutral	**-0,313**	**	**0,111**		**0,770**	**-0,264**		**0,017**		**0,473**	**1,249**	***	**-0,097**		**-0,387**
		-2,39		0,70		2,94	-1,62		0,10		1,96	5,74		-0,68		-2,13
	Bad	**-0,010**		**0,216**		**0,456**	**-0,075**		**0,129**		**0,559**	**0,229**		**0,395**		**0,709**
		-0,03		0,82		0,81	-0,32		0,61		0,98	0,38		1,57		2,74

TABLE 8. **Time series regressions of monthly excess returns of Panels A, B and C with the Fama-French-Carhart four-factor model: June 2002 to May 2015**

At the end of each year, stocks are classified into three CSR groups regarding their extra-financial notation (*good, neutral and bad*). Stocks are subsequently allocated independently to three *book-to-market* groups (*low to high*), three *investment* groups (*conservative to aggressive*), three *operating profitability* groups (*low to high*). The intersections of the two sorts produce 9 value-weighted portfolios corresponding to the LHS (left hand side) variables of the panel A, B and C. Those dependent variables are then regressed with the Fama-French-Carhart four-factor model (1997). The table hereunder presents, for each portfolio, its slopes (bold figures) with their *Student t test* also illustrated with stars ($^{*}p < 0.1; ^{**}p < 0.05; ^{***}p < 0.01$).

Fama-French-Carhart four-factor model (1997)

Panel A | ***Panel B*** | ***Panel C***

Intercept

		Book-to-market					*Investment*					*Operating Profitability*				
		Low		Neutral		High	Aggress.		Neutral		Cons.	Weak		Neutral		Robust
CSR Notation	Good	**0,005**	**	**0,003**		**0,008**	* **0,003**		**0,000**		**0,007**	**-0,004**		**0,002**		**0,003**	
		2,35		1,24		1,73	1,10		-0,13		1,59	-0,62		0,81		1,45	
	Neutral	**0,008**	***	**0,000**		**-0,002**	**0,005**	*	**0,005**	*	**0,005**	**-0,005**		**0,004**		**0,008**	**
		3,06		0,14		-0,36	1,71		1,67		1,13	-1,15		1,55		2,22	
	Bad	**0,011**	**	**0,007**		**0,008**	**0,008**	*	**0,014**	***	**0,006**	**0,009**		**0,007**		**0,007**	
		1,99		1,35		0,77	1,84		3,70		0,55	0,80		1,44		1,29	

Market Premium

		Book-to-market					*Investment*					*Operating Profitability*				
		Low		Neutral		High	Aggress.		Neutral		Cons.	Weak		Neutral		Robust
CSR Notation	Good	**0,543**	***	**0,618**	***	**0,468**	*** **0,616**	***	**0,643**	***	**0,484**	*** **0,880**	***	**0,492**	***	**0,569**	***
		13,11		12,61		4,91	11,70		13,72		4,96	7,37		8,11		13,81	
	Neutral	**0,674**	***	**0,817**	***	**0,699**	*** **0,832**	***	**0,755**	***	**0,671**	*** **0,562**	***	**0,687**	***	**0,865**	***
		12,56		12,75		6,81	12,46		11,37		7,29	6,61		12,32		11,92	
	Bad	**0,823**	***	**0,747**	***	**1,210**	*** **0,835**	***	**0,709**	***	**1,115**	*** **1,200**	***	**0,679**	***	**0,714**	***
		6,97		7,04		5,28	8,70		8,89		4,96	5,00		6,74		6,78	

Small Minus Big

		Book-to-market					*Investment*					*Operating Profitability*				
		Low		Neutral		High	Aggress.		Neutral		Cons.	Weak		Neutral		Robust
CSR Notation	Good	**-0,367**	***	**-0,471**	***	**-0,423**	* **-0,244**	**	**-0,248**	**	**-0,456**	** **0,013**		**-0,316**	**	**-0,339**	***
		-3,77		-4,09		-1,89	-1,97		-2,25		-1,99	0,05		-2,22		-3,50	
	Neutral	**-0,035**		**0,386**	**	**0,150**	**0,396**	**	**0,133**		**0,130**	**0,325**		**0,007**		**0,209**	
		-0,28		2,56		0,62	2,52		0,85		0,60	1,62		0,05		1,23	
	Bad	**0,773**	***	**1,237**	***	**0,024**	**1,239**	***	**0,503**	***	**0,166**	**0,440**		**0,971**	***	**0,976**	***
		2,78		4,96		0,05	5,49		2,68		0,31	0,78		4,10		3,94	

High Minus Low

		Book-to-market					*Investment*					*Operating Profitability*				
		Low		Neutral		High	Aggress.		Neutral		Cons.	Weak		Neutral		Robust
CSR Notation	Good	**-0,509**	***	**0,036**		**0,968**	*** **0,005**		**-0,225**	*	**0,715**	*** **0,156**		**0,470**	***	**-0,349**	***
		-4,95		0,29		4,09	0,04		-1,94		2,95	0,53		3,13		-3,41	
	Neutral	**-0,301**	**	**0,042**		**0,593**	** **-0,256**		**-0,147**		**0,272**	**1,101**	***	**-0,201**		**-0,481**	***
		-2,26		0,26		2,33	-1,55		-0,90		1,19	5,22		-1,45		-2,67	
	Bad	**-0,183**		**0,110**		**0,298**	**-0,081**		**-0,053**		**0,196**	**-0,044**		**0,274**		**0,632**	**
		-0,62		0,42		0,52	-0,34		-0,27		0,35	-0,07		1,10		2,42	

Winners Minus Losers

		Book-to-market					*Investment*					*Operating Profitability*				
		Low		Neutral		High	Aggress.		Neutral		Cons.	Weak		Neutral		Robust
CSR Notation	Good	**-0,047**		**-0,124**	**	**-0,399**	*** **0,019**		**-0,135**	**	**-0,649**	*** **-0,333**	**	**-0,427**	***	**-0,015**	
		-0,92		-2,06		-3,40	0,29		-2,34		-5,40	-2,27		-5,72		-0,29	
	Neutral	**0,033**		**-0,192**	**	**-0,496**	*** **0,021**		**-0,460**	***	**-0,561**	*** **-0,415**	***	**-0,290**	***	**-0,263**	***
		0,50		-2,44		-3,93	0,26		-5,63		-4,96	-3,97		-4,22		-2,94	
	Bad	**-0,484**	***	**-0,295**	**	**-0,443**	**-0,017**		**-0,508**	***	**-1,014**	*** **-0,763**	***	**-0,337**	***	**-0,217**	*
		-3,33		-2,26		-1,57	-0,15		-5,18		-3,67	-2,58		-2,71		-1,67	

TABLE 9. **Time series regressions of monthly excess returns of Panels A, B and C with the Fama-French five-factor model: June 2002 to May 2015**

At the end of each year, stocks are classified into three CSR groups regarding their extra-financial notation (*good, neutral and bad*). Stocks are subsequently allocated independently to three *book-to-market* groups (*low to high*), three *investment* groups (*conservative to aggressive*), three *operating profitability* groups (*low to high*). The intersections of the two sorts produce 9 value-weighted portfolios corresponding to the LHS (left hand side) variables of the panel A, B and C. Those dependent variables are then regressed with the Fama-French five-factor model (2015). The table hereunder presents, for each portfolio, its slopes (bold figures) with their *Student t test* also illustrated with stars ($^{*}p < 0.1; ^{**}p < 0.05; ^{***}p < 0.01$).

Fama-French five-factor model (2015)

Panel A | ***Panel B*** | ***Panel C***

Intercept

CSR Notation	*Book-to-market* Low		*Book-to-market* Neutral		*Book-to-market* High		*Investment* Aggress.		*Investment* Neutral		*Investment* Cons.		*Operating Profitability* Weak		*Operating Profitability* Neutral		*Operating Profitability* Robust	
Good	**0,005**	**	**0,004**		**0,012**	***	**0,004**		**0,001**		**0,006**		**-0,001**		**0,003**		**0,003**	
	2,48		1,51		2,67		1,45		0,53		1,21		-0,12		0,80		1,39	
Neutral	**0,010**	***	**0,001**		**0,000**		**0,007**	**	**0,007**	**	**0,003**		**-0,006**		**0,004**		**0,011**	***
	3,61		0,43		0,08		2,19		2,15		0,68		-1,34		1,32		3,14	
Bad	**0,016**	***	**0,007**		**0,008**		**0,012**	**	**0,014**	***	**0,009**		**0,013**		**0,009**	*	**0,007**	
	2,82		1,36		0,65		2,53		3,42		0,77		1,09		1,71		1,40	

Market Premium

CSR Notation	*Book-to-market* Low		*Book-to-market* Neutral		*Book-to-market* High		*Investment* Aggress.		*Investment* Neutral		*Investment* Cons.		*Operating Profitability* Weak		*Operating Profitability* Neutral		*Operating Profitability* Robust	
Good	**0,501**	***	**0,596**	***	**0,397**	***	**0,586**	***	**0,571**	***	**0,527**	***	**0,797**	***	**0,479**	***	**0,539**	***
	11,46		11,21		3,95		10,25		11,76		4,66		6,20		6,93		12,30	
Neutral	**0,637**	***	**0,740**	***	**0,666**	***	**0,734**	***	**0,719**	***	**0,741**	***	**0,583**	***	**0,680**	***	**0,801**	***
	10,98		11,03		5,92		10,46		9,80		6,97		6,08		10,89		10,48	
Bad	**0,740**	***	**0,751**	***	**1,204**	***	**0,787**	***	**0,755**	***	**1,059**	***	**1,111**	***	**0,612**	***	**0,777**	***
	5,91		6,46		4,81		7,69		8,35		4,27		4,25		5,61		6,89	

Small Minus Big

CSR Notation	*Book-to-market* Low		*Book-to-market* Neutral		*Book-to-market* High		*Investment* Aggress.		*Investment* Neutral		*Investment* Cons.		*Operating Profitability* Weak		*Operating Profitability* Neutral		*Operating Profitability* Robust	
Good	**-0,428**	***	**-0,516**	***	**-0,518**	**	**-0,252**	**	**-0,346**	***	**-0,616**	**	**-0,122**		**-0,452**	***	**-0,386**	***
	-4,46		-4,42		-2,35		-2,01		-3,25		-2,48		-0,43		-2,98		-4,01	
Neutral	**-0,028**		**0,248**	*	**0,016**		**0,312**	**	**0,002**		**0,018**		**0,198**		**-0,096**		**0,134**	
	-0,22		1,69		0,07		2,03		0,01		0,08		0,94		-0,70		0,80	
Bad	**0,652**	**	**1,168**	***	**-0,138**		**1,264**	***	**0,423**	**	**-0,130**		**0,199**		**0,825**	***	**1,020**	***
	2,38		4,58		-0,25		5,62		2,13		-0,24		0,35		3,45		4,12	

High Minus Low

CSR Notation	*Book-to-market* Low		*Book-to-market* Neutral		*Book-to-market* High		*Investment* Aggress.		*Investment* Neutral		*Investment* Cons.		*Operating Profitability* Weak		*Operating Profitability* Neutral		*Operating Profitability* Robust	
Good	**-0,329**	***	**0,037**		**0,650**	**	**-0,010**		**-0,052**		**0,769**	**	**0,185**		**0,573**	***	**-0,168**	
	-2,63		0,24		2,27		-0,06		-0,37		2,38		0,50		2,90		-1,35	
Neutral	**-0,420**	**	**0,357**	*	**0,487**		**0,010**		**-0,217**		**0,251**		**1,278**	***	**-0,056**		**-0,665**	***
	-2,54		1,87		1,52		0,05		-1,04		0,83		4,67		-0,31		-3,05	
Bad	**-0,524**		**0,054**		**0,569**		**-0,439**		**-0,274**		**0,164**		**-0,108**		**0,417**		**0,163**	
	-1,47		0,16		0,80		-1,50		-1,06		0,23		-0,14		1,34		0,51	

Robust Minus Weak

CSR Notation	*Book-to-market* Low		*Book-to-market* Neutral		*Book-to-market* High		*Investment* Aggress.		*Investment* Neutral		*Investment* Cons.		*Operating Profitability* Weak		*Operating Profitability* Neutral		*Operating Profitability* Robust	
Good	**0,027**		**-0,358**	*	**-1,735**	***	**-0,133**		**-0,313**	*	**-1,027**	**	**-1,028**	**	**-0,748**	***	**0,148**	
	0,16		-1,77		-4,54		-0,61		-1,69		-2,38		-2,10		-2,84		0,89	
Neutral	**-0,326**		**-0,200**		**-1,368**	***	**0,050**		**-1,243**	***	**-0,849**	**	**-0,433**		**-0,365**		**-1,181**	***
	-1,48	**	-0,78		-3,19		0,19		-4,45		-2,10	**	-1,18	**	-1,53		-4,06	
Bad	**-2,009**	***	**-0,687**		**-0,451**		**-0,909**	**	**-1,215**	***	**-2,408**	**	**-2,113**	**	**-0,759**	*	**-0,983**	**
	-4,22		-1,55		-0,47		-2,33		-3,53		-2,55		-2,12		-1,83		-2,29	

Conservative Minus Aggressive

CSR Notation	*Book-to-market* Low		*Book-to-market* Neutral		*Book-to-market* High		*Investment* Aggress.		*Investment* Neutral		*Investment* Cons.		*Operating Profitability* Weak		*Operating Profitability* Neutral		*Operating Profitability* Robust	
Good	**-0,470**	***	**-0,311**	*	**-0,735**	**	**-0,140**		**-0,774**	***	**-0,728**	*	**-0,999**	**	**-0,776**	***	**-0,355**	**
	-3,05		-1,66		-2,08		-0,70		-4,53		-1,83		-2,21		-3,19		-2,30	
Neutral	**-0,074**		**-1,008**	***	**-0,827**	**	**-0,780**	***	**-0,822**	***	**-0,372**		**-0,625**	*	**-0,581**	***	**-0,610**	**
	-0,36		-4,27		-2,09		-3,16		-3,19		-1,00	*	-1,85		-2,65		-2,27	
Bad	**-0,913**	**	**-0,355**		**-0,909**		**-0,007**		**-0,268**		**-1,776**	**	**-1,587**	*	**-1,010**	***	**0,462**	
	-2,07		-0,87		-1,03		-0,02		-0,84		-2,04		-1,72		-2,63		1,16	

TABLE 10. **Time series regressions of monthly excess returns of the Panels A, B and C with the Lajili-Nasreddine-Desban two-factor model: June 2002 to May 2015**

At the end of each year, stocks are classified into three CSR groups regarding their extra-financial notation (*good, neutral and bad*). Stocks are subsequently allocated independently to three *book-to-market* groups (*low to high*), three *investment* groups (*conservative to aggressive*), three *operating profitability* groups (*low to high*). The intersections of the two sorts produce 9 value-weighted portfolios corresponding to the LHS (left hand side) variables of the panel A, B and C. Those dependent variables are then regressed with the Lajili-Nasreddine-Desban two-factor model (2017). The table hereunder presents, for each portfolio, its slopes (bold figures) with their *Student t test* also illustrated with stars ($^{*}p < 0.1$;$^{**}p < 0.05$;$^{***}p < 0.01$).

Lajili-Nasreddine-Desban two-factor model (2017)

		Panel A						***Panel B***						***Panel C***					
Intercept																			
		Book-to-market						*Investment*						*Operating Profitability*					
		Low		Neutral		High		Aggress.		Neutral		Cons.		Weak		Neutral		Robust	
CSR Notation	Good	**0,004**	*	**0,001**		**0,004**		**0,003**		**-0,002**		**0,001**		**-0,006**		**-0,002**		**0,002**	
		1,87		0,54		0,77		1,18		-0,86		0,27		-1,01		-0,62		1,20	
	Neutral	**0,008**	***	**-0,001**		**-0,006**		**0,006**	*	**0,001**		**-0,001**		**-0,008**	*	**0,001**		**0,005**	
		3,13		-0,30		-1,27		1,93		0,18		-0,23		-1,81		0,37		1,43	
	Bad	**0,004**		**0,003**		**-0,005**		**0,007**	*	**0,008**	**	**-0,015**	**	**-0,008**		**0,002**		**0,004**	
		0,72		0,60		-0,58		1,74		2,08		-2,11		-1,00		0,50		0,81	
Market Premium																			
		Book-to-market						*Investment*						*Operating Profitability*					
		Low		Neutral		High		Aggress.		Neutral		Cons.		Weak		Neutral		Robust	
CSR Notation	Good	**0,512**	***	**0,711**	***	**0,816**	***	**0,633**	***	**0,680**	***	**0,925**	***	**1,094**	***	**0,765**	***	**0,548**	***
		13,69		16,47		9,18		14,35		16,86		10,00		11,00		12,98		15,16	
	Neutral	**0,604**	***	**0,879**	***	**0,977**	***	**0,755**	***	**0,892**	***	**0,896**	***	**0,884**	***	**0,758**	***	**0,863**	***
		13,26		15,86		10,60		13,22		14,66		10,76		10,76		15,41		13,68	
	Bad	**0,755**	***	**0,679**	***	**1,015**	***	**0,629**	***	**0,788**	***	**1,015**	***	**0,979**	***	**0,670**	***	**0,756**	***
		8,50		7,96		6,75		8,39		11,36		7,79		6,52		8,45		8,61	
Bad Minus Good																			
		Book-to-market						*Investment*						*Operating Profitability*					
		Low		Neutral		High		Aggress.		Neutral		Cons.		Weak		Neutral		Robust	
CSR Notation	Good	**-0,088**	***	**-0,060**	**	**-0,011**		**-0,037**		**-0,052**	*	**-0,128**	**	**-0,155**	**	**-0,044**		**-0,068**	***
		-3,50		-2,07		-0,18		-1,25		-1,95		-2,07		-2,33		-1,11		-2,81	
	Neutral	**0,005**		**0,008**		**0,023**		**0,017**		**-0,003**		**0,064**		**0,065**		**-0,008**		**-0,002**	
		0,18		0,21		0,38		0,45		-0,09		1,15		1,18		-0,24		-0,05	
	Bad	**0,442**	***	**0,372**	***	**0,994**	***	**0,373**	***	**0,191**	***	**1,209**	***	**1,148**	***	**0,365**	***	**0,296**	***
		7,45		6,54		9,91		7,46		4,13		13,90		11,45		6,90		5,05	

TABLE 11. **Adjusted coefficient of determination related to the time series regressions of Panel A, B and C with the five asset pricing models: June 2002 to May 2015**

An adjusted R^2 is used to indicate how well terms fit a line and creates an adjustment depending on the number of factors in a model. Adding useless variables makes it decrease contrary to the classic R^2.

		Panel A			***Panel B***			***Panel C***		
Sharpe-Lintner-Black CAPM (1964)										
$R_{i_t} - R_{f_t} = \alpha_i + \beta_i(R_{M_t} - R_{f_t}) + \epsilon_{i_t}$										
		Book-to-market			*Investment*			*Operating Profitability*		
		Low	Neutral	High	Aggress.	Neutral	Cons.	Weak	Neutral	Robust
CSR	Good	0,511	0,633	0,367	0,576	0,646	0,376	0,419	0,527	0,579
	Neutral	0,553	0,640	0,444	0,554	0,600	0,459	0,460	0,622	0,566
	Bad	0,363	0,342	0,275	0,358	0,496	0,293	0,259	0,363	0,374
Fama-French three-factor model (1993)										
$R_{i_t} - R_{f_t} = \alpha_i + \beta_i(R_{M_t} - R_{f_t}) + s_i(R_{SMB_t}) + h_i(R_{HML_t}) + \epsilon_{i_t}$										
		Book-to-market			*Investment*			*Operating Profitability*		
		Low	Neutral	High	Aggress.	Neutral	Cons.	Weak	Neutral	Robust
CSR	Good	0,610	0,668	0,449	0,581	0,660	0,434	0,415	0,576	0,635
	Neutral	0,564	0,649	0,468	0,573	0,595	0,466	0,556	0,619	0,575
	Bad	0,378	0,422	0,269	0,458	0,504	0,288	0,251	0,421	0,449
Fama-French-Carhart four-factor model (1997)										
$R_{i_t} - R_{f_t} = \alpha_i + \beta_i(R_{M_t} - R_{f_t}) + s_i(R_{SMB_t}) + h_i(R_{HML_t}) + r_i(R_{WML_t}) + \epsilon_{i_t}$										
		Book-to-market			*Investment*			*Operating Profitability*		
		Low	Neutral	High	Aggress.	Neutral	Cons.	Weak	Neutral	Robust
CSR	Good	0,609	0,675	0,485	0,578	0,670	0,522	0,430	0,650	0,633
	Neutral	0,562	0,660	0,514	0,571	0,663	0,538	0,595	0,657	0,596
	Bad	0,417	0,437	0,276	0,455	0,576	0,342	0,278	0,444	0,455
Fama-French five-factor model (2015)										
$R_{i_t} - R_{f_t} = \alpha_i + \beta_i(R_{M_t} - R_{f_t}) + s_i(R_{SMB_t}) + h_i(R_{HML_t}) + r_i(R_{RMW_t}) + c_i(R_{CMA_t}) + \epsilon_{i_t}$										
		Book-to-market			*Investment*			*Operating Profitability*		
		Low	Neutral	High	Aggress.	Neutral	Cons.	Weak	Neutral	Robust
CSR	Good	0,629	0,674	0,514	0,578	0,699	0,454	0,437	0,611	0,647
	Neutral	0,565	0,683	0,503	0,596	0,650	0,476	0,562	0,634	0,618
	Bad	0,443	0,425	0,265	0,471	0,536	0,320	0,273	0,446	0,469
Lajili-Nasreddine-Desban two-factor model (2017)										
$R_{i_t} - R_{f_t} = \alpha_i + \beta_i(R_{M_t} - R_{f_t}) + b_i(R_{BMG_t}) + \epsilon_{i_t}$										
		Book-to-market			*Investment*			*Operating Profitability*		
		Low	Neutral	High	Aggress.	Neutral	Cons.	Weak	Neutral	Robust
CSR	Good	0,551	0,645	0,371	0,578	0,652	0,389	0,443	0,534	0,603
	Neutral	0,556	0,642	0,448	0,552	0,598	0,461	0,468	0,625	0,569
	Bad	0,535	0,489	0,561	0,526	0,543	0,686	0,603	0,517	0,467

TABLE 12. **GRS test Statistics results for Panels A, B and C : June 2002 to May 2015**

The regressions use among other the Sharpe-Lintner-Black (1964) [CAPM], the Fama-French three-factor (1993) [FF3F], the Fama-French-Carhart four-factor (1997) [FFC4F], the Fama-French five-factor (2015) [FF5F] and the Lajili-Nasreddine-Desban (2017) [CSR2F] models on a large mix on factors on the three panels (A, B and C). The GRS statistic tests whether the intercepts in a set of 9 (3x3) regressions are jointly equal to zero ; $\frac{1}{N}\sum_{i=1}^{N}|\alpha_i|$ is the average absolute intercept for a set of regressions ; $\frac{1}{N}\sum_{i=1}^{N}\bar{R}_i^2$ is the average adjusted R^2. We put $\frac{1}{N}\sum_{i=1}^{N}s_{\alpha_i}$ as the average standard error of the intercepts. Finally, with 9 portfolios and 156 monthly returns, the critical values of the GRS statistic for the tested models are: $\mathcal{F}_{90\%}(v1,v2)=1.41;\mathcal{F}_{95\%}(v1,v2)=1.56;\mathcal{F}_{97.5\%}(v1,v2)=1.69;\mathcal{F}_{99\%}(v1,v2)=1.86;\mathcal{F}_{99.9\%}(v1,v2)=2.25$. The GRS statistic is computed as follows:

$$GRS=\tfrac{T-N-K}{N}\times\left(1+\widehat{\mu}^{\top}\widehat{\Omega}^{-1}\widehat{\mu}\right)^{-1}\times\left(\widehat{\alpha}^{\top}\widehat{\Sigma}^{-1}\widehat{\alpha}\right)\sim\mathcal{F}_{N,T-N-K}$$

Where $\widehat{\mu}$ is the mean of excess returns of the explanatory variables computed as follows: $\widehat{\mu}_i=\frac{1}{T}\sum_{t=1}^{t=T}(R_{i_t}-R_{f_t})$ and $\widehat{\mu}^{\top}=[\widehat{\mu}_1\cdots\widehat{\mu}_N]$. Ω^{-1} is the inverse of their covariance matrix, $\Omega=\frac{1}{T}\sum_{t=1}^{t=T}(R_i-\mu_i)(R_i-\mu_i)^{\top}$ and N is the number of assets. The parameter Σ^{-1} is the inverse of the covariance matrix of the regression residuals ϵ_i, $\Sigma=\frac{1}{T}\sum_{t=1}^{t=T}\epsilon_i\epsilon_i^{\top}$. Finally, $\widehat{\alpha_i}$ denotes the vector of the intercept of the regression i, $\widehat{\alpha}^{\top}=[\widehat{\alpha}_1\cdots\widehat{\alpha}_N]$
The properties of minimum-variance frontier of Markowitz are used to apply the test in the case of a single factor model:

$$GRS=\left(\tfrac{T-N-1}{N}\right)\times\left(\frac{\left[\widehat{\mu}_{\xi}/\widehat{\sigma}_{\xi}\right]^2-\left[\widehat{\mu}_M/\widehat{\sigma}_M\right]^2}{1+\left[\widehat{\mu}_M/\widehat{\sigma}_M\right]^2}\right)$$

		Tested Models									
		1	2	3	4	5	6	7	8	9	10
		CAPM	FF3F	FFC4F	FF5F				LND2F		
Independent var.	*Market Premium*, R_M-R_f	x	x	x	x	x	x	x	x	x	x
	Size, SMB		x	x	x	x	x	x			
	Value, HML		x	x	x						x
	Momentum, WML			x			x			x	x
	Op. profitability, RMW				x	x					
	Investment, CMA				x	x		x			
	CSR Notation, BMG						x	x	x	x	x
		Gibbons, Ross and Shanken test statistics [GRS]									
	Panel A: CSR + Book-to-market	2,091	2,656	2,124	2,99	2,542	1,628	2,439	1,984	1,559	1,886
	Panel B: CSR + Investment	1,986	1,824	2,256	2,199	2,108	2,189	1,624	1,881	2,176	2,072
	Panel C: CSR + Op. profitability	1,391	1,64	1,839	2,058	1,67	1,596	1,695	1,191	1,621	1,844