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BAD-REPUTATION FIRMS VS GOOD-REPUTATION FIRMS; AN ANALYSIS OF REPUTATION-RELATED RISK ON CORPORATE PERFORMANCE

par

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Préambule

La gestion financière responsable vise la maximisation de la richesse relative au risque dans le respect du bien commun des diverses parties prenantes, actuelles et futures, tant de l'entreprise que de l'économie en général. Bien que ce concept ne soit pas en contradiction avec la définition de la théorie financière moderne, les applications qui en découlent exigent un comportement à la fois financièrement et socialement responsable. La gestion responsable des risques financiers, le cadre réglementaire et les mécanismes de saine gouvernance doivent pallier aux lacunes d'un système parfois trop permissif et naïf à l'égard des actions des intervenants de la libre entreprise.

Or, certaines pratiques de l'industrie de la finance et de dirigeants d'entreprises ont été sévèrement critiquées depuis le début des années 2000. De la bulle technologique (2000) jusqu'à la mise en lumière de crimes financiers [Enron (2001) et Worldcom (2002)], en passant par la mauvaise évaluation des titres toxiques lors de la crise des subprimes (2007), la fragilité du secteur financier américain (2008) et le lourd endettement de certains pays souverains, la dernière décennie a été marquée par plusieurs événements qui font ressortir plusieurs éléments inadéquats de la gestion financière. Une gestion de risque plus responsable, une meilleure compréhension des comportements des gestionnaires, des modèles d'évaluation plus performants et complets intégrant des critères extra-financiers, l'établissement d'un cadre réglementaire axé sur la pérennité du bien commun d'une société constituent autant de pistes de solution auxquels doivent s'intéresser tant les académiciens que les professionnels de l'industrie. C'est en mettant à contribution tant le savoir scientifique et pratique que nous pourrons faire passer la finance responsable d'un positionnement en périphérie de la finance fondamentale à une place plus centrale. Le développement des connaissances en finance responsable est au cœur de la mission et des intérêts de recherche des membres du Groupe de Recherche en Finance Appliquée (GReFA) de l'Université de Sherbrooke.

Les modèles d'évaluation des actifs financiers sont au cœur de la théorie financière. Ce cahier de recherche propose d'étudier différents facteurs de risque en lien avec la réputation ESG. Nos résultats supportent la présence de ces facteurs pour la période 2004 à 2014, même en tenant en compte les cinq facteurs du modèle de Fama et French (2015).

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Abstract

We analyze the effect of reputation-related risk on the performance of U.S. firms. We use a conditional empirical approach in order to explain the daily returns of five types of portfolios. Different specifications of reputation-related risk factors are considered based on aggregate, dimensional or dynamic combinations. Our results support the presence of a reputation effect for the U.S. market between 2004 and 2014. This is expressed by a superior performance by conditional financial asset valuation models that include reputational risk factors.

JEL Classifications: G17 ; G32 ; M14

Key words: Corporate social responsibility, extra-financial performance, ESG risk, extra-financial ratings, reputation risk,

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1. INTRODUCTION

The value creation potential of a healthy corporate reputation is of growing interest in both the professional and scientific communities. The designation of reputation as the most important strategic asset of an organization (see, for e.g., Flanagan and O'Shaughnessy, 2005 or Fombrun, 1996) is an indication of its many benefits. Specifically, the consideration by stakeholders, from which reputation mainly comes from, generates a power of attraction, trust, a sense of attachment and self-esteem (Fombrun et al., 2015). From these stems a multitude of benefits such as increased customer loyalty (Bartikowski and Walsh, 2011; Fombrun, 1996), increased employee motivation and productivity (Fombrun, 1996; Tymon and al., 2010), greater income stability (Fombrun, 1996) and a continued higher profitability (Roberts and Dowling, 2002). In addition, reputation influences the buying process through its quality certification role (Shapiro, 1983; Rogerson, 1983; Rindova and al., 2005) and the unique competitive advantage it provides (see, for e.g., Fombrun, 1996; Hall, 1992).

On the other hand, many firms cannot take advantage of these benefits, for instance if their reputation is too new, deteriorating or simply bad. Some firms are also predisposed to have a bad reputation because of the nature of their activity. This is the case for so-called sin stocks, namely companies that operate in sectors that are considered to be unethical or immoral such as tobacco, alcohol, lottery, the sex industry, weapons and defense. In addition, their weak social acceptability hinders their growth potential through increased control by the authorities and negative coverage in the media, for example.

In this context, the performance or the level of risk of good-reputation firms should be better than that of bad-reputation firms. However, in order to obtain the true impact of reputation on performance, we must also consider the costs and restrictions associated with building and/or maintaining a good reputation, since the above-mentioned benefits of reputation are typically the result of investments in terms of resources and controls. To determine whether costs or benefits dominate and to assess whether markets effectively integrates this information, several studies have examined firms' risk-adjusted financial performance conditional on their reputational performance. To this end, various results are observed in the literature depending on the study's methodology, measure of reputation and time period. For example, Anginer and Statman (2010) argue that the performance of reputable firms is similar to that of less reputable firms. In contrast, Filbeck et al.

(2013) observe an abnormal positive performance for reputable companies. Some studies have also focused on the effect of reputation on risk. In this regard, the above-mentioned benefits suggest a negative relationship between risk and reputation. Nevertheless, from an empirical point of view, results are often contradictory because of methodological differences, especially if we include studies on corporate social responsibility (CSR). Studies such as that of Oikonomou et al. (2012) support a positive relationship between systematic risk and bad reputation.

In this perspective, the main contribution of our study is to clarify the relationship between corporate reputation and risk by using an empirical approach that is based on the methodology of Fama and French (1993; 2015a) and Ferson and Schadt (1996). Specifically, we examine whether there is a reputation-related effect that can explain the daily returns of U.S. firms between 2004 and 2014. We measure reputation-related performance by constructing variables based on CSR ratings by considering the different aspects and dimensions that compose of reputation. We use these reputation-related performance measures to build seven reputation-related risk factors. These "bad-reputation minus good-reputation" (BMG) factors are then tested in a number of setting to evaluate their performance. Our sample of 2,860 firms (on average) to build replicating portfolios is a relatively large sample compared to previous studies such as, among others, Mănescu (2011) and Girerd-Potin et al. (2014) who suggest a CSR-related risk factor.

Our results support the presence of a reputational effect in the U.S. market between 2004 and 2014. Specifically, asset pricing models (conditional and unconditional) that incorporate reputation-related risk factors can better explain financial returns than benchmark models. The performance of the BMG factor is sensitive to the choice of reputation-related performance estimator.

The rest of the paper is divided as follows. Section 2 presents a review of the literature as well as the theoretical framework for our analysis. Section 3 explains the methodology as well as the data. Section 4 analyzed the results and section 5 concludes the paper.

2. LITERATURE REVIEW AND RESEARCH HYPOTHESES

2.1 Reputation and reputation risk

Reputation can be defined as the current aggregate of past, present, and expected representations of firm-specific stakeholders on specific dimensions (Fombrun, 1996; Walker 2010). From this definition, two observations emerge. Firstly, reputation is subject to the perceptions of stakeholders (employees, customers, communities, etc.) according to their experiences, interests and expectations. Taken collectively, the characteristics that are peculiar to the individuals diminish toward a common idea regarding the firm's reputation. Secondly, reputation is a multidimensional concept. Schwaiger (2004) distinguishes two components of reputation: i) a rational component that combines the dimensions related to performance, quality and social responsibility and ii) an emotional component that is related to attraction. Fombrun et al. (2000b) suggest adding admiration, trust, respect and esteem to the emotional component.

Given their link, it is important to clearly distinguish the concepts of reputation and CSR. We define CSR as the integration of environmental, social and governance (ESG) factors by the firm. The relationship between reputation and CSR is one of antecedence. Specifically, while CSR is perceived as a momentary image induced by context, reputation feeds on CSR for its development (Quevedo-Puente et al., 2007). Reputation and CSR also differ in terms of dimensions. As such, CSR is generally seen as an important but insufficient determinant of reputation which also includes an emotional component. Further, quality- and performance-related dimensions are evaluated differently for the two concepts.

In finance, reputation is often related to risk. Fombrun et al. (2000a) consider reputation capital as the firm's market value less its net asset value and intellectual capital. This value is subject to variations attributable to reputation. Reputational risk can therefore be defined as the potential loss or gain of reputation capital that results from a change in the perception of one or more stakeholder towards the company. In this regard, the change in value is the result of a change in the company's ability to improve, maintain or establish new relationships. Potential sources of reputational risk are multiple and include the risk related to a firm's competitive or legislative environment, risk by association, ethical risk, managerial risk, operational risk, environmental risk and social risk[1]. In other words, reputational risk can be seen as a complementary risk that evolves parallel to related risks.

2.2 The impact of reputation on performance and risk

Empirical studies provide evidence of the impact of reputation on firm performance and risk. To examine how investors react to reputation-related information, most authors rely on event

[1] Larkin, J., « *Strategic reputation risk management* », 2013, Palgrave MacMillan.

studies and test for the presence of abnormal returns. Results regarding the relationship between abnormal performance and the components of reputation differ according to the study (see, for e.g. Edmans, 2011; Bedchuk et al., 2013; Borgers et al., 2013). Results regarding the relationship between performance and aggregate reputation also show contradictory results (Anginer and Statman, 2010; Filbeck et al., 2013). The difficulty in accurately evaluating the impact of intangible assets can partially explain these conflicting results. Economic conditions can help explain the different results. For instance, Nofsinger and Varma (2014) find that responsible funds underperform traditional funds during favorable economic environments but outperform during periods of economic turmoil.

In terms of its impact on risk, results are clearer, and many studies find that a better reputation can reduce specific corporate risk through a decrease in potential conflicts (McGuire et al., 1988), a decrease of information asymmetries (see, for e.g., Cao et al., 2012; Cao et al., 2013) or a lower uncertainty regarding future reputational performance (following Shapiro's 1983 model). Event studies also demonstrate the importance of reputational risk in explaining other types of risk (see, for e.g., Karpoff et al., 2008; Murphy et al., 2009 and Gillet et al., 2009). Further, Srivastava et al. (1997) and Delgado-Garcia et al. (2013) observe a positive relationship between reputation and systematic risk.

In contrast, Luo and Bhattacharya (2009) find a negative relationship between CSR and systematic risk, which can be explained by the authors' measurement of CSR with an aggregate measure. Oikonomou et al. (2012) use a fragmented measure of CSR and find that the relationship between CSR and risk depends on the CSR dimension. The authors conclude that there is a positive (negative) relationship between CSR and systematic risk when CSR is measured with concerns (strengths). Similar findings are obtained for idiosyncratic risk.

2.3 Reputational risk factor

To our knowledge, no study explicitly addresses the subject of reputational risk factors. However, some studies explore the inclusion of a related risk, namely CSR-related or ESG-related risk. For instance, Mănescu (2011) analyzes the relevance of a CSR factor to explain the performance of firms in the S&P500 and the Domini Social 400 indices. The author measures CSR performance both on an aggregate level and for specific CSR dimensions and finds that only the traditional B/M and momentum factors are relevant over the 1992-2008 sample period. However, the Community dimension of CSR can help explain corporate returns when a 90% confidence level is considered. Nevertheless, results do not justify the addition of a new risk factor.

Girerd-Potin et al. (2014) categorize CSR dimensions according to their relevant stakeholders, which allows them to combine concerns and common interests and thereby simplify the evaluation of the determinants. The authors use Vigeo ratings to measure CSR for a sample of European firms between 2003 and 2010 and find that the addition of a CSR factor increases the explanatory power by about 2.20%. In addition, the authors argue that a firm's sensitivity to a CSR factor is strongly influenced by its size, which affects investors' perceptions regarding its CSR performance. In the same vein, Jin (2018) uses a fund-based approach to analyze the relevance of a CSR factor created from the RobeccoSam database. The author examines the return of 1,425 U.S. funds over the 2009-2016 period and concludes that CSR risk is a market-compensated systematic risk. The author attributes this result to the protection against the risk of loss of a fund with good CSR performance. Other studies have focused on the relevance of a CSR-related risk factor and their conclusions vary according to the CSR measure (see, for e.g., Halbritter and Dorfleitner, 2015), among other things.

2.4. Research hypothesis

Based on the literature cited above, it appears that corporate reputation-related performance is related to risk. Given this link, the obvious leap is to add a reputation-related risk factor in asset pricing models. We argue that a reputation-related risk factor is relevant for three main reasons. Firstly, a good reputation is the result of the company's already-proclaimed willingness to take responsibility and take into account (at least some) stakeholders' concerns. This willingness diminishes the potential for conflicts as well as their magnitude, thereby giving the firm greater stability. In this perspective, reputation-related performance plays an insurance role against reputation risk and its related risks. This reputation risk factor is similar to the CSR-related risk factor described by Mănescu (2011) and Girerd Potin et al. (2014) and to an idiosyncratic risk factor (see, for e.g., Goyal and Santa Clara, 2003 or Fu, 2009).

Secondly, the information asymmetry environment in which a firm evolves is value-destructing (Merton, 1987). Reputation, as a source of information that is based on a company's track record, can help reduce agency costs by reducing information asymmetries. Further, we argue that more reputable firm have lower information asymmetries since they are generally more transparent (Bebbington et al., 2008; Cao et al., 2012; Cao et al., 2013) and since financial analysts are more likely to follow them, which enhances information about both the firm and its industry (Durand et al., 2013; Hong and Kacperczyk, 2009). These elements reduce the cost of information and reduce the uncertainty surrounding the firm, which should result in a lower cost of capital (Merton 1987; Epstein and Schneider 2008).

Thirdly, the risk premium depends, among other things, on investors' preferences, on their willingness to overweight stocks of firms that are deemed more responsible, local or "green" (Fama and French, 2007). Also, a firm's risk premium can also be affected if the firm is neglected (because of aversion), which leads to inefficiencies in terms of risk sharing among shareholders. Sin stocks are a good example of this effect (Hong and Kacperczyk, 2009; Durand et al., 2013; Fauver and McDonald IV, 2014). The growth of responsible investment is perhaps the main reason behind this aversion by encouraging good corporate citizens and penalizing (through avoidance) negligence and irresponsible behavior.

Our main research hypothesis is thus the following: *Adding a reputation-related risk factor can improve the performance of asset pricing models.*

3. METHODOLOGY

To test our research hypothesis, we add different specifications of a reputation-related risk factor to a benchmark conditional asset pricing model and we test the performance of the factor(s) in different settings.

3.1 Reputation-related performance measures

To build our reputation-related risk factor, we must first create valid reputation-related performance measures. To do so, we rely on CSR ratings provided by MSCI-KLD, an extra-financial rating agency. Our choice is motivated by the popularity of the database (Waddock, 2003), the magnitude of its coverage and the long historical data availability. In addition, the information is presented in a very fragmented manner, which allows for a granular analysis. Specifically, ratings are available for the following seven components of CSR: environment, community, diversity, employee relations, human rights, products and governance. For each component, ratings are available for strengths and weaknesses (or concerns).

As discussed in section 2, there is a strong link between corporate reputation and CSR. However, because the two concepts are not equal, we modify CSR ratings to more adequately reflect the theoretically accepted definition of reputation and to construct robust reputation-related risk factors. We account for two dimensions of reputation: i) quality (which combines the environment, community, diversity and human rights ratings) and ii) social responsibility (which combines the employee, products and governance ratings).[2] Our two dimensions of reputation are based on Schwaiger's (2004) definition of reputation as well as on Girerd-Potin et al.' (2014) and Murphy et al.' (2009) stakeholder approach.[3] Since CSR ratings are available for strengths and weaknesses separately, each of our two dimensions of reputation can be categorized into strengths (S) and weaknesses (W). We therefore estimate four measures of reputation-related performance, two for each of the dimensions: *QUALITY_S*, *QUALITY_W*, *SOCIAL_S* and *SOCIAL_W*. The four reputation-related performance measures are estimated by taking, for each firm, an (arithmetic) average of the annual CSR ratings for the different components included in the reputation dimension.[4]

Overall measures of reputation strengths and weaknesses for firm *i* during year *t*, REP_S_{it} and REP_W_{it}, are also estimated by taking the average of the two respective dimensional measures:

$$REP\_S_{it} = \frac{1}{2} \times (SOCIAL\_S_{it} + QUALITY\_S_{it}) \quad (1)$$

$$REP\_W_{it} = \frac{1}{2} \times (SOCIAL\_W_{it} + QUALITY\_W_{it}) \quad (2)$$

Finally, an overall aggregate reputation measure, *REP_Global*, is estimated by subtracting the overall measure of strengths from the overall measure of weaknesses:

$$REP\_Global_{it} = REP\_S_{it} - REP\_W_{it} \quad (3)$$

[2] Our decision to include governance in the quality dimension is mainly based on our perspective of evaluating the quality of managers. It can also be explained by an interested stakeholders' approach. In this regard, investors would be the stakeholders that are the most affected by governance.

[3] We argue that CSR ratings are good estimators for two of the three dimensions of the rational component of reputation as defined by Schwaiger (2004), namely the social responsibility and the quality dimensions. We therefore do not consider the performance dimension of reputation. However, we argue that its impact is probably negligible given that it's probably already captured by traditional risk factors in asset pricing models. Regarding the emotional component of reputation, factual indicators cannot estimate perceptions. This constitute a weakness of our reputation-related performance measures.

[4] As an example, *QUALITY_S* is the average of the firm's environment, community, diversity and human rights *strengths* ratings, while *QUALITY_W is* the average for the same four components' *weaknesses* ratings.

3.2 Reputation-related risk factor

To construct our reputation-related risk factor, we use a methodology similar to Fama and French (1993; 2015a) and create a "bad-reputation minus good-reputation" or BMG factor from replicating portfolio returns that are built yearly on the last day of June of each year. To do so, firms are first divided into three groups according to their reputation-related performance during the previous year (based on the 30th and 70th percentiles) to obtain a group of good-reputation, neutral and bad-reputation firms.[5] Good-reputation (bad-reputation) firms are defined as firms with a reputation-related performance ranking that is in 30^{th} (70^{th}) percentile. The choice of the 30^{th} and 70^{th} percentile is inspired by Girerd-Potin et al. (2014). It allows for a better distinction between good- and bad-reputation firms by considering a third group composed of difficult-to-discriminate firms.[6] Because of the high correlation between our BMG and the traditional Fama & French's SMB factors, we control for size by further dividing our firms into small-capitalization and large-capitalization firms based on the NYSE median (as available on Kenneth R. French's website).[7] Market capitalization is used to determine the firm's weight within the portfolio. The general equation for our reputation-related risk factor is the following:

$$BMG_t = \tfrac{1}{2}\,(R\_Small\_Bad_t + R\_Big\_Bad_t) - \tfrac{1}{2}\,(R\_Small\_Good_t + R\_Big\_Good_t) \qquad (4)$$

where *R_Small_badt* is the return for the portfolio of small and bad-reputation firms on day t, *R_Big_badt* is the return for the portfolio of large and bad-reputation firms on day t, *R_Small_Goodt* is the return for the portfolio of small and good-reputation firms on day t and *R_Big_Goodt* is the return for the portfolio of large and good-reputation firms on day t. Replicating portfolios are constructed from a total sample of 4,900 public U.S. firms.[8]

We test different specifications of the general BMG factor defined in equation (4) in order to determine the most relevant. Overall, seven specifications of BMG are tested: i) a *BMG_Global*

[5] The higher (lower) the performance for strengths' (weaknesses') ratings, the more favorable the reputation-related performance of the firm for that component.
[6] We observe similar reputation-related performances among many firms in our sample, especially for the *SOCIAL_S, QUALITY_S* and *QUALITY_W* measures. In the cases for which the values at the 30th and 70th percentiles are the same, we take the value at the next discriminating percentile.
[7] Before controlling for size, the average correlation between BMG and SMB is 0.524. Controlling for size also reduces the correlation between BMG and other risk factors such as RMW and HML since size is the most important source of correlation.
[8] On average, 2,860 firms are analyzed annually. To be included in a replicating portfolio at time t, a firm must i) have a CSR rating from MSCI-KLD in the previous year and ii) have daily financial data regarding its return and market capitalization.

factor based on the overall aggregate reputation-related performance measure, ii) two BMG factors, *BMG_S* and *BMG_W*, based on overall measures of reputation strengths and weaknesses, respectively, and iii) four BMG factors, *BMG_QUALITY_S*, *BMG_SOCIAL_S*, *BMG_QUALITY_W* and *BMG_SOCIAL_W*, based on the four measures of reputation by dimension.[9] In each case, the risk factor is created from replicating portfolios composed of firms in the 30th and 70th percentile based on the corresponding reputation-related performance measure from section 3.1. For instance, *BMG_S* is obtained by creating replicating portfolios of good- and bad-reputation firms based on our *REP_S* measure of reputation-related performance. Similarly, *BMG_SOCIAL_W* is obtained by creating replicating portfolios of good- and bad-reputation firms based on *SOCIAL_W*.

The first specification based on our overall aggregate measure of reputational performance, *BMG_Global*, is chosen to reflect the common usage of aggregate estimators in the CSR literature. In addition, it allows for the consideration of potential offsetting effects (from different CSR components) that may influence stakeholder perceptions. The two specifications based on strengths and weaknesses, *BMG_S* and *BMG_W*, are chosen because of their potentially different or asymmetrical impact on firm risk (see, for e.g., Oikonomou et al., 2012). For example, studies on sin stocks reveal that variables based on concerns (i.e. weaknesses) have a greater explanatory power for stock returns than variables based on strengths (see, for e.g. Hong and Karperczyk, 2009 or Durand et al., 2013). Our four specifications based on the two dimensions of reputation, *BMG_QUALITY_S*, *BMG_QUALITY_W*, *BMG_SOCIAL_S* and *BMG_SOCIAL_W*, are also chosen because of their potentially different impact on stock returns (see, for e.g., Oikonomou et al., 2012 or Bouslah et al., 2013), which can be explained by the findings of Murphy et al. (2009) that repercussions are determined by the proximity of the stakeholder.

Finally, we also test two-factor combinations in order to consider the dynamics between our reputation-related risk factors. Overall, we test fifteen combinations of BMG factors that are deemed complementary in their risk-related information.[10]

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[9] When looking at measures based on weaknesses (i.e. *BMG_W*, *BMG_QUALITY_W* and *BMG_SOCIAL_W*), good-reputation firms are those from the 70th percentile or above in terms of reputation-related performances, while bad-reputation firms are those from the 30th percentile and below. In other words, bad-reputation firms are those with the highest ratings in terms of weaknesses while good-reputation firms are those with the lowest ratings when looking at weaknesses.

[10] Two-factor combinations that are excluded because of their similar nature are the following: *BMG_Global-BMG_S*, *BMG_Global-BMG_W*, *BMG_S-BMG_QUALITY_S*, *BMG_S-BMG_SOCIAL_S*, *BMG_W-BMG_QUALITY_W* and *BMG_W-BMG_SOCIAL_W*.

3.3 Conditional asset pricing model

To test the significance of our BMG factors, we add them (sequentially) to a conditional asset pricing model, following a methodology similar to Fama and French (1993; 2015a) and Ferson and Schadt (1996). Our benchmark model is the commonly-used Fama and French (2015a) five-factor model extended with the momentum factor, hereafter the FF6 model. We therefore add one or two BMG factor to the FF6 model to obtain the following general form:

$$\begin{aligned} Ret_{i,t} - Rf_t = {} & a_i(Z_{t-1}) + b_i(Z_{t-1})MKT_t + b_i^- MKT_{t-1} + s_i SMB_t^{FF5} + s_i^- SMB_{t-1}^{FF5} \\ & + h_i HML_t + h_i^- HML_{t-1} + r_i RMW_t + r_i^- RMW_{t-1} + c_i CMA_t \\ & + c_i^- CMA_{t-1} + w_i WML_t + w_i^- WML_{t-1} + o_{1,i} BMG_{1,t} \\ & + o_{1,i}^- BMG_{1,t-1} + o_{2,i} BMG2, t + o_{2,i}^- BMG_{2,t-1} + e_{i,t} \end{aligned} \qquad (2)$$

$$a_i(Z_{t-1}) = a_{i,0} + A_i^- Z_{t-1}$$
$$\text{and} \quad b_i(Z_{t-1}) = b_{i,0} + B_i^- Z_{t-1}$$

where $Ret_{i,t}$ - Rf_t is the excess daily return of portfolio *i* on day *t* and $Ret_{i,t}$ and Rf_t respectively designate the return for portfolio *i* and the risk-free rate (i.e. the daily yield on a 1-month T-bill) on day *t*. $BMG_{1,t}$ and $BMG_{2,t}$ represent two specifications of our BMG factor defined in section 3.2, while $BMG_{1,t-1}$ and $BMG_{2,t-1}$ represent the lagged BMG factors.

a_i is the regression intercept (alpha) and $e_{i,t}$ is the error term for portfolio *i* and is normally distributed, N(0,σ). Risk factors MKT_t, SMB_t, HML_t, RMW_t, CMA_t and WML_t respectively represent the systematic risk effect, the size effect, the book-to-market ratio effect, the profitability effect, the investment effect and the momentum effect. Coefficients b_i, s_i, h_i, w_i, r_i, and c_i measure portfolio *i*'s sensitivity to the respective risk factor. MKT_{t-1}, SMB_{t-1}, HML_{t-1}, RMW_{t-1} and CMA_{t-1} and WML_{t-1} are the same risk factors taken with a 1-day lag to consider non-synchronous transaction problems associated with the use of daily returns, following the suggestion of Scholes and Williams (1977) and Dimson (1979).

Vector Z_{t-1} includes four standardized macroeconomic information variables that condition the model alpha and beta and are inspired by Ferson and Schadt (1996): i) the 1-month T-Bill daily yield ($LEVEL_{t-1}$), ii) the NYSE dividend rate (DIV_{t-1}), iii) the slope of the term structure of interest rates defined as the difference between the 10-year and 3-month T-bond rates ($SLOPE_{t-1}$), and iv) the credit spread measured by the rate difference between BBA- and AAA-rated bonds ($SPREAD_{t-1}$).[11]

All specifications of model (4) are estimated between July 1, 2004 and June 30, 2014 on the returns for five types of portfolios (based on B/M, momentum, profitability, investment and industry). Portfolios *i* and their respective returns are taken directly from the Kenneth French's website.[12] Stocks in the portfolios are weighted by their market capitalizations. We estimate *t*-stats for the models using the heteroskedasticity-consistent estimation techniques of Newey and West (1987).[13] T-bill returns, market returns, portfolio returns (used as dependent variables in model (4)) as well as risk premiums for the six traditional risk factors (MKT_t, SMB_t, HML_t, RMW_t, CMA_t and WML_t) are taken from Kenneth R. French's web site. Instrumental variables as well as financial data to create BMG factors are taken from Bloomberg.

Table 1 presents the descriptive statistics for the risk factors as well as the instrumental variables. Positive average returns for all the reputation-related risk factors (Panel A) indicate a higher (lower) average return for bad-reputation (good-reputation) firms, which is as expected since bad-reputation firms are typically riskier. Also, BMG factors based on strengths are associated with higher expected returns than their based-on-weaknesses counterparts. Finally, we observe that the volatility of reputation-related risk factors is generally lower than that of the benchmark FF6 model in Panel B. Girerd-Potin et al. (2014) find a similar result for their CSR-related risk factors.

[**Insert table 1 here**]

Table 2 presents the correlation coefficients between the risk factors. If we look at the correlation between BMG risk factors, we observe that *BMG_SOCIAL_S* is relatively highly correlated with *BMG_SOCIAL_W* (0.349), *BMG_QUALITY_S* (0.454) and *BMG_QUALITY_W* (-0.437). In terms of the correlation between our BMG factors and FF6 factors, *BMG_QUALITY_W* and *BMG_W* have the highest correlation coefficients with the six traditional risk factors, while *BMG_Global* is associated with the lowest correlation coefficients.

[11] All instrumental variables are centralized with their previous 6-month average.
[12] The fact that these portfolio returns are not based on the BMG factors (unlike the six traditional risk factors) biases our results *against* BMG factors.
[13] The number of lags (L) is estimated following Newey et West's (1994) procedure: $L = 1{,}1447 \times T^{1/3}$ where T is the number of days observed.

[**Insert table 2 here**]

3.4 Model performance indicators

The relevance of our reputation-related risk factors is evaluated according to their statistical significance while the quality of each model specification is evaluated according to two criteria: its universality and its precision. The first criterium is considered by using five types of portfolios (based on B/M, momentum, profitability, investment and industry) to test different model specifications, as described in section 3.3.[14] The second criterium is evaluated with the five performance indicators inspired by Fama and French (2015b). These five indicators are grouped into three types: i) one indicator related to the significance of the alphas which includes the number of significant alphas at the 5% level of significance as well as Gibbons et al.'s (1989) GRS test which assesses whether the set of alphas is jointly equal to zero for the different financial assets, ii) one indicator related to the dispersion of the alphas which includes the ratios $A|a_i|/A|\bar{R}_i|$ and $Aa_i^2/A\bar{R}_i^2$ and iii) an indicator related to the general explanatory power of the model measured by the average of the adjusted determination coefficients $A(R^2)$.[15] To facilitate the comparison of the models, we also use a global performance index defined as the weighted sum of the model rank for all five indicators. In addition, we use the variance inflation factor (VIF) to identify multicollinearity issues.

4. ANALYSIS OF THE RESULTS

4.1 Model performance

Table 3 presents the results regarding the performance of different model specifications. Specifically, we estimate 15 eight-factor models (that combine two BMG factors), 7 seven-factor models (that include one BMG factor) and the benchmark FF6 model. We observe that the best-performing models (ranks 1 to 7) are eight-factor models that include two reputation-related risk factors. This supports our choice of adding two complementary BMG factors to capture different aspects of reputation risk. The model with both the *BMG_S* and *BMG_SOCIAL_W* factors (hereafter called the R8 model) obtains the best performance for four out of five performance

[14] All the portfolios are taken directly from the Kenneth French's website. Stocks in the portfolios are weighted by their market capitalizations.

[15] A represents the average while $\bar{R}_i$ represents daily excess return for portfolio *i*, measured by the difference between portfolio return *i* ($Ret_{i,t}$) and market return (Rm_t).

indicators. Model specifications with *BMG_SOCIAL_W* and *BMG_SOCIAL_S* or with *BMG_SOCIAL_W* and *BMG_Global* come in second places.

[**Insert table 3 here**]

In terms of seven-factor models that include one reputation-related risk factor, the model with the factor based on overall strengths, *BMG_S*, is the best-performing model, ranking 8th overall. Interestingly, the seven-factor model based on weaknesses, *BMG_W*, performs much worst for four of the five performance indicators and ranks 21st overall. Reputation strengths, as opposed to reputation weaknesses, therefore seem to provide the most information regarding reputation risk or corporate risk in general. In terms of reputational dimensions, the similar global performance of models that account for either *BMG_SOCIAL_S* (13th) or *BMG_QUALITY_S* (14th) makes it difficult to compare the relevance of the two measures. Nevertheless, the fact that models that include either *BMG_SOCIAL_S* or *BMG_SOCIAL_W* are generally better ranked, and the fact that the model that includes *QUALITY_W* is our worst-performing model overall (23rd), may indicate that the social responsibility dimension of reputation provides better information regarding reputation risk than the quality dimension. Further, our best-performing model, the R8 model, is the one that combines *BMG_SOCIAL_W* and *BMG_S*.[16] Therefore, with some reservations, our results tend to favor the social responsibility dimension of reputation as opposed to the quality dimension. Finally, our seven-factor model that includes our overall aggregate measure of reputation, *BMG_Global*, performs rather poorly overall, although it still over-performs (slightly) the standard FF6 benchmark model.

Overall, models that include reputation-related risk factors, either through seven- or eight-factor models, generally perform better than the benchmark six-factor model (FF6), supporting the relevance of including a reputation-related risk factor in asset pricing models.

4.2 Risk factor redundancy

Because our models have six, seven or eight risk factors, it's important to examine the redundancy of each factor as well as their incremental informativeness. To do so, we use step-wise regressions in order to successively remove risk factors from our previously-identified best-

[16] VIF is relatively high form all the models. Multicollinearity issues in explanatory variables mainly come from the instrument variable *SPREAD*. As an example, if *SPREAD* is removed from the benchmark FF6 model, VIF drops from 7.498 to 3.780.

performing eight-factor model, R8. Model rankings are based on their global performance index for which we only consider models that have $A(R^2)$ > 90%[17].

Table 4 presents the results for the five best-performing models in each category. Overall, we observe that removing one or more risk factors from R8 does not improve its global performance. Further, since the two BMG factors in R8, *BMG_S* and *BMG_SOCIAL_W*, are not the de facto removed risk factors, we can consider them to be complementary to traditional five-factor models. Traditional risk factors remain the preferred choices if we wish to use a five-factor model. Overall, a weakness of our R8 model appears to be its overall explanatory power, $A(R^2)$, which only slightly diminishes when BMG factors are removed. However, this result may be partly attributable to the types of portfolios used as dependent variables which are based directly on the traditional five factors.

[**Insert table 4 here**]

In terms of traditional risk factors, CMA, WML and HML are those with the lowest incremental informational value.[18] Interestingly, the redundancy of the HML factor, noted by Fama and French (2015a), is not entirely demonstrated by our results. Untabulated results show that, not surprisingly, the market premium, MKT, is the most important risk factor and the one that affects the global performance of the model the most if removed.

4.3 The informational content of risk factors

As a complement to the redundancy analysis in the previous sector, we also test the informational content of each risk factor by regressing it on the other factors. The estimated alpha indicates the risk sensitivity that is not captured by the other risk factors. Table 5 presents the results of the regressions. Our *BMG_S* factor is significantly informational but only in Panel B. However, the fact that only *MKT* and *RMW* are associated with significant alphas (at the 95% level of confidence) despite their importance in the literature is intriguing and warrants further investigation. The results may be partly attributable to our sample period.

[**Insert table 5 here**]

[17] A value < 90% is generally observable when MKT and SMB factors and removed.

[18] WML is not included in the five-factor model by Fama and French (2015a et 2015b). According to the authors, the WML factor is only relevant if momentum-based portfolios are considered.

4.4 Model performance by portfolio type

In order to identify weaknesses in our models, table 6 presents the results according to portfolio types. Consistent with our earlier results, our R8 model has a better global performance than benchmark model FF6 for every type of portfolios, except for the industry portfolios in Panel E. Our R8 model also dominates the FF6 model on all performance indicators for 3 of the 5 types of portfolios.

[**Insert table 6 here**]

Model performance, for both R8 and FF6, is highest for portfolios based on profitability. As a matter of fact, results in Panel C show that it's the only case for which the GRS test is supported at the 95% confidence level. Slightly lower performances are observed for portfolios based on investment (Panel D), B/M ratio (Panel A) and momentum (Panel B), for which $A(R^2)$ is greater than 0.95. Overall, industry portfolio returns are the hardest to explain for both the R8 and FF6 models, with $A(R^2)$ below 80% in both cases. It's also the only case for which the FF6 model outperforms the R8 model. These difficulties to explain industry portfolio returns have been noted by Fama and French (1997). Some of the industry portfolios may not be well diversified since not enough firms belong to that industry. Panel F shows the results for the subsample of 19 portfolios for which industries have at least 50 firms. We observe slightly better model performances for both R8 and FF6, and R8 now outperforms FF6. Nevertheless, $A(R^2)$ remains lower than for the other portfolios.

Table 7 gives a list of « inexplicable » portfolios, which we define as those with a significant alpha (5% level) for either the FF6 or R8 model. Compared to the benchmark FF6 model, our R8 model has the lowest number of significant alphas, which indicates a better performance and a higher capacity to explain returns. This overperformance is notably observed for momentum and profitability portfolios for which the confidence level goes from 95% to 90% for nine of the cases with the inclusion of the two BMG factors. Overall, portfolios that have significant alphas are associated with either the B/M ratio or momentum, although momentum-based portfolios that are inexplicable are usually composed of very and small capitalization stocks (1^{st} and 2^{nd} quartiles).

[**Insert table 7 here**]

4.5 Sensitivity of risk premiums to percentiles

Our bad- and good-reputation portfolios are based on the performance of firms in the 30th and 70th percentiles. As a robustness test, we examine the sensitivity of our risk premiums to the choice of cut-off percentiles by building our portfolios based on the 50th percentile instead. Table 8 presents the results. We observe that three model performance indicators are slightly better with this new cut-off, namely those associated with alpha dispersion and GRS test. This impact is mainly attributable to the *BMG_S* factor. Overall, the fairly similar performances for different cut-offs suggest that when a firm simply engages into social-responsibility-related and quality-related activities the signal is strong enough to influence its risk.

[**Insert table 8 here**]

4.6 Frazzini's suggestions

A number of suggestions have been made in the literature to improve the performance of asset pricing models. We explore three of these suggestions and examine whether they have an impact on our model performance. Firstly, we add the « Betting against beta » (*BAB*) factor, which is constructed from a long position in the low-beta portfolio and a short position in the high-beta portfolio (Frazzini and Pedersen, 2014). Secondly, we add the *HML-DEVIL* factor which is based on contemporaneous data to build the replicating portfolios (Asness and Frazzini, 2013). Thirdly, we add the « Quality minus Junk » (*QMJ*) factor, which is inspired by Gordon's model to evaluate the quality of a firm based on four elements: profitability, growth, safety and distribution rate (Asness et al., 2013). We observe a high correlation of 0.635 between *QMJ* and the traditional RMW factor, which is consistent with the literature (see, for e.g., Harvey et Liu, 2015). We therefore examine the relevance of *QMJ* either by adding it or by substituting it for RMW.

Table 9 presents the results of these tests and shows that only the addition of the QMJ factor can improve model performance, based on the global index. However, the already-high VIF may hide multicollinearity issues.[19]

[**Insert table 9 here**]

[19] Additional tests based on the unconditional versions of the models show a significant increase of the VIF following the inclusion of each of the three suggested factors.

4.7 Instrumental variables

The importance of conditioning alpha and beta in asset pricing models is well established. In this section, we test the inclusion of additional instrumental (conditioning) variables based on model performance. To do so, we use step-wise regressions to add investor-confidence-related instrumental variables to the four macroeconomic instrumental variables suggested by Ferson and Schadt (1996) and defined in section 3. We test the following six variables associated with investor confidence : i) the *Conference Board Consumer Confidence Index* (*CONFIDENCE*), ii) the *University of Michigan Consumer Sentiment Index* (*SENTIMENT*), iii) the three componants of the *Investors Intelligence Survey* from the American Association of Individual Investors which represent indicual investor perception regarding the stock market in 6 months, namely bullish (*BULL*), neutral (*NEUTRAL*) and bearish (*BEAR*), and iv) Baker and Wurgler's (2006) orthogonalized confidence index.[20] We also test the following two variables related to the financial market environment : i) a binary variable related to the 2007-2009 financial crisis and ii) a binary variable that equals one when the VIX volatility index is greater than 25 (*VIX25*).[21] The choice of the best instrumental variables is based on the global index.[22]

Tableau 10 presents the results for the inclusion of instrumental variables to our R8 model. Panel B shows the resulting three best-performing models when one instrumental variable is added. We observe that adding *VIX25* improves the performance of the R8 model, notably from an improvement in $A|a_i|/A|\overline{R}_i|$ as well as from the significance of alphas. The *R8+SENTIMENT* model also dominates the initial R8 model for all performance indicators. Panel C presents the resulting three best-performing models when two instrumental variables are added.[23] We observe that *VIX25* is present for 4 of the 5 best models (untabulated) and the combination of *VIX25* and *SENTIMENT* generates the best model according to the global index. However, if we individually

[20] All the instrumental variables are centered at zero according to their last-6-months average following the methodology by Ferson and Qian (2004), as well as lagged according to their reporting frequency (1 week or 1 month accordingly). Variables related to investor confidence are considered both as a differential continuous variable and as a binary variable that equals one if the value is greater than 1 standard deviation from the mean (positive or negative).

[21] Our VIX variable is adjusted to be uniformed across a given period. Consequently, if the value for VIX is both preceded and followed by an opposite value, we adjust it to reflect the state of the market.

[22] Models that have a VIF greater than 10 are excluded. We also exclude combinations of two similar instrumental variables.

[23] To reduce the number of possible specifications, we build on the three best-performing models in Panel B. Likewise, specifications in Panel D are based on the three best-performing models in Panel C.

analyze the indicators, we conclude that *R8+SENTIMENT+BEAR* is the best-performing. The *R8+SENTIMENT+BEAR* also dominates the best model in Panel B. Panel D presents the results when three instrumental variables are added. Adding *VIX25*, *SENTIMENT* and *BULL* generates the best-performing model for all indicators except $A(R^2)$. It's also the best-performing model among those in table 10 according to the significance of alphas. Overall, we can conclude that our R8 model can be optimized by adding instrumental variables that are related to the investment environment. To that effect, *VIX25* and *SENTIMENT* are an obvious choice as well as *BEAR* and/or *BULL*.

[**Insert table 10 here**]

5. CONCLUSION

We study the inclusion of reputation-related risk factors in asset pricing models. We follow an empirical approach similar to that of Fama and French (1993; 2015a) and Ferson and Schadt (1996) to explain the daily returns of five types of stock portfolios. Our results support the integration of reputation-related risk factors in asset pricing models. A risk premium based on reputational strengths, *BMG_S*, yields the best results if only one BMG factor is added.

We also find that an eight-factor model that include two reputation-related factors, *BMG_S* and *BMG_SOCIAL_W*, yields the best performance overall. The second BMG factor, *BMG_SOCIAL_W* is one that is related to the social responsibility dimension of reputation. Our best-performing model, called the R8 model, performs well under a variety of circumstances and is robust to a number of robustness tests. We therefore conclude that a reputation-related effect can help explain the return of financial assets in the U.S. between 2004 and 2014.

Although the period length of our study is relatively short (10 years), it's clear that the still-growing investors and individuals' concerns regarding organizations' responsibilities support, and should continue to support, a return difference between bad-reputation and good-reputation firms, thereby justifying the presence of reputation-related risk factors. Investors who don't include them in their analysis could become exposed to market-compensated risk that can affect their performance.

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Table 1 – Descriptive variables for the risk factors

This table the descriptive statistics for the risk factor daily returns as well as for instrumental variables used in the estimation of model (4) for the period between July 1st 2004 and June 30th 2014, representing 2,517 observations. Panel A presents the statistics for the reputation-related BMG factors defined in section 3.2. Panel B presents the statistics for the six traditional risk factors present in the FF6 model and defined in section 3.3. Panel C presents the statistics for the four instrumental variables used to condition alpha and beta from model (4) and defined in section 3.3.

Risk factors	Avg. (%)	Median (%)	Min. (%)	Max. (%)	Std. dev. (%)	Asymm.	Kurtosis	Jacque-Bera	p-value
Panel A - Reputation-related risk factors (BMG)									
BMG_Global	0.010	0.011	-2.120	1.602	0.263	-0.392	10.007	5213.42	0.000
BMG_S	0.008	0.017	-1.921	2.368	0.275	-0.259	10.868	6519.77	0.000
BMG_W	0.001	0.002	-3.937	2.710	0.337	-0.850	19.125	27572.57	0.000
BMG_SOCIAL_S	0.009	0.016	-2.293	2.293	0.284	-0.508	10.577	6130.06	0.000
BMG_SOCIAL_W	0.003	0.004	-1.206	1.624	0.215	0.115	7.359	1997.83	0.000
BMG_QUALITY_S	0.003	0.002	-0.960	1.362	0.187	0.067	7.221	1870.40	0.000
BMG_QUALITY_W	0.002	0.005	-3.366	2.716	0.322	-0.754	16.572	19555.86	0.000
Panel B - FF6 risk factors									
MKT	0.034	0.090	-8.950	11.350	1.288	-0.136	12.931	10350.96	0.000
SMB	0.009	0.010	-3.420	4.530	0.578	0.111	7.126	1790.59	0.000
HML	0.007	0.000	-4.220	4.800	0.677	0.640	14.512	14069.82	0.000
WML	0.004	0.060	-8.220	7.050	1.008	-0.874	14.448	14064.78	0.000
RMW	0.014	0.000	-2.360	1.990	0.368	-0.098	6.211	1085.05	0.000
CMA	0.003	-0.010	-1.670	1.250	0.279	0.069	5.763	802.76	0.000
Panel C - Instrumental variables									
LEVEL	0.006	0.001	0.000	0.022	0.007	0.861	2.170	383.31	0.000
DIV	2.637	2.502	2.014	5.630	0.583	2.357	9.081	6209.25	0.000
SLOPE	1.894	2.080	-0.640	3.830	1.178	-0.488	2.188	168.89	0.000
SPREAD	1.139	0.950	0.530	3.500	0.543	2.504	9.351	6861.69	0.000

Table 2 – Correlation coefficients between risk factors

This table presents the Pearson correlation coefficients between risk factors and instrumental variables used in the estimation of model (4) between 2004 and 2014. All variables are defined in section 3. Coefficients in bold indicate significance at the 95% level of confidence.

								BMG_										
		MKT	***SMB***	***HML***	***WML***	***RMW***	***CMA***	***SOCIAL_S***	***SOCIAL_W***	***QUALITY_S***	***QUALITY_W***	***S***	***W***	***Global***	***LEVEL***	***DIV***	***SLOPE***	***SPREAD***
	MKT	1.000	**0.308**	**0.418**	**-0.385**	**-0.403**	**-0.131**	**0.326**	**0.049**	**0.239**	**-0.389**	**0.298**	**-0.339**	**0.235**	-0.015	0.034	0.003	0.002
	SMB	**0.308**	1.000	**0.115**	**-0.046**	**-0.317**	0.007	**0.347**	**-0.235**	**0.363**	**-0.383**	**0.357**	**-0.379**	-0.015	-0.015	0.012	0.011	0.012
	HML	**0.418**	**0.115**	1.000	**-0.576**	**-0.449**	**0.118**	**-0.106**	**-0.119**	**0.121**	**-0.349**	**-0.092**	**-0.390**	**-0.050**	0.006	-0.002	0.001	-0.022
	WML	**-0.385**	**-0.046**	**-0.576**	1.000	**0.336**	**0.109**	**0.091**	**0.157**	**-0.138**	**0.351**	0.013	**0.395**	**0.097**	0.022	**-0.093**	-0.022	**-0.084**
	RMW	**-0.403**	**-0.317**	**-0.449**	**0.336**	1.000	**-0.071**	**-0.072**	**0.300**	**-0.226**	**0.253**	**-0.115**	**0.305**	**0.104**	0.001	0.001	0.022	0.015
	CMA	**-0.131**	0.007	**0.118**	**0.109**	**-0.071**	1.000	**-0.375**	**-0.155**	**-0.148**	**0.329**	**-0.330**	**0.218**	**-0.194**	-0.016	0.006	0.001	-0.002
	SOCIAL_S	**0.326**	**0.347**	**-0.106**	**0.091**	**-0.072**	**-0.375**	1.000	**0.349**	**0.454**	**-0.437**	**0.886**	**-0.223**	**0.550**	0.010	-0.005	-0.015	0.005
	SOCIAL_W	**0.049**	**-0.235**	**-0.119**	**0.157**	**0.300**	**-0.155**	**0.349**	1.000	**-0.161**	**0.179**	**0.203**	**0.431**	**0.662**	0.030	-0.015	-0.020	0.004
	QUALITY_S	**0.239**	**0.363**	**0.121**	**-0.138**	**-0.226**	**-0.148**	**0.454**	**-0.161**	1.000	**-0.367**	**0.709**	**-0.315**	**0.324**	0.002	0.005	-0.008	0.012
BMG_	***QUALITY_W***	**-0.389**	**-0.383**	**-0.349**	**0.351**	**0.253**	**0.329**	**-0.437**	**0.179**	**-0.367**	1.000	**-0.403**	**0.920**	**0.143**	0.006	-0.005	-0.012	0.017
	S	**0.298**	**0.357**	**-0.092**	0.013	**-0.115**	**-0.330**	**0.886**	**0.203**	**0.709**	**-0.403**	1.000	**-0.231**	**0.554**	-0.001	-0.001	-0.008	0.013
	W	**-0.339**	**-0.379**	**-0.390**	**0.395**	**0.305**	**0.218**	**-0.223**	**0.431**	**-0.315**	**0.920**	**-0.231**	1.000	**0.344**	0.010	-0.009	-0.011	0.018
	Global	**0.235**	-0.015	**-0.050**	**0.097**	**0.104**	**-0.194**	**0.550**	**0.662**	**0.324**	**0.143**	**0.554**	**0.344**	1.000	0.006	0.002	-0.010	0.026
	LEVEL	-0.015	-0.015	0.006	0.022	0.001	-0.016	0.010	0.030	0.002	0.006	-0.001	0.010	0.006	1.000	**-0.430**	**-0.866**	**-0.260**
	DIV	0.034	0.012	-0.002	**-0.093**	0.001	0.006	-0.005	-0.015	0.005	-0.005	-0.001	-0.009	0.002	**-0.430**	1.000	**0.398**	**0.930**
	SLOPE	0.003	0.011	0.001	-0.022	0.022	0.001	-0.015	-0.020	-0.008	-0.012	-0.008	-0.011	-0.010	**-0.866**	**0.398**	1.000	**0.257**
	SPREAD	0.002	0.012	-0.022	**-0.084**	0.015	-0.002	0.005	0.004	0.012	0.017	0.013	0.018	0.026	**-0.260**	**0.930**	**0.257**	1.000

Table 3 – Model performance according to specification

This table presents the results for the estimation of model (4). The table presents the performance indicators for the 15 eight-factor model specifications, 7 seven-factor model specifications and the benchmark FF6 model. The time series regressions are estimated on daily excess returns between 2004 and 2014, representing 2,517 observations. Model specification rankings are based on the global index. Model performance indicators are the following : number of significant alphas [# of alphas (5%)], the result for the GRS test [GRS] and the associated p-value [p-value], the average of absolute-value alphas divided par the average of the absolute-value excess market returns for portfolios *i* [$A|a_i|/A|\bar{R}_i|$], the squared average of the alphas divided by squared average of excess market returns for portfolios *i* [$Aa_i^2/A\bar{R}_i^2$], the average of the determination coefficients [$A(R^2)$], the global index [Global index] and the maximum VIF for all the coefficients. All the variables and model performance indicators are defined in section 3.

			Model performance indicators							
Rank	**Model**	**# of BMG factors**	**# of alpha (5%)**	**GRS**	**p-value**	$\frac{A\lvert a_i\rvert}{A\lvert\bar{R}_i\rvert}$	$\frac{Aa_i^2}{A\bar{R}_i^2}$	$A(R^2)$	**Global index**	**Max VIF**
1	*FF6 + BMG_S + BMG_SOCIAL_W* **(hereafter R8)**	2	16	1.425	0.001	0.602	0.517	0.924	4.167	7.517
2 (=)	*FF6 + BMG_SOCIAL_W + BMG_SOCIAL_S*	2	18	1.425	0.001	0.625	0.585	0.924	8.833	7.518
2 (=)	*FF6 + BMG_SOCIAL_W + BMG_Global*	2	24	1.445	0.001	0.613	0.490	0.923	8.833	7.510
4	*FF6 + BMG_W + BMG_S*	2	20	1.416	0.002	0.607	0.525	0.922	9.167	7.514
5	*FF6 + BMG_QUALITY_S + BMG_SOCIAL_W*	2	25	1.456	0.001	0.616	0.473	0.922	12.583	7.515
6	*FF6 + BMG_SOCIAL_S + BMG_W*	2	22	1.423	0.002	0.648	0.643	0.923	12.833	7.519
7	*FF6 + BMG_QUALITY_W + BMG_S*	2	22	1.418	0.002	0.616	0.552	0.921	13.500	7.520
8	*FF6 + BMG_S*	1	21	1.421	0.002	0.615	0.551	0.921	14.000	7.514
9	*FF6 + BMG_SOCIAL_S + BMG_Global*	2	23	1.430	0.001	0.652	0.663	0.923	14.667	7.527
10	*FF6 + BMG_SOCIAL_S + BMG_QUALITY_S*	2	24	1.444	0.001	0.658	0.687	0.923	15.500	7.535
11	*FF6 + BMG_QUALITY_S + BMG_W*	2	26	1.449	0.001	0.616	0.465	0.919	16.833	7.514
12	*FF6 + BMG_QUALITY_S + BMG_Global*	2	25	1.466	0.001	0.624	0.519	0.922	16.917	7.512
13	*FF6 + BMG_SOCIAL_S*	1	22	1.427	0.001	0.656	0.681	0.922	17.167	7.518
14	*FF6 + BMG_QUALITY_S*	1	25	1.452	0.001	0.615	0.466	0.918	17.750	7.512
15	*FF6 + BMG_Global*	1	24	1.447	0.001	0.633	0.530	0.921	18.667	7.502
16	*FF6 + BMG_SOCIAL_S + BMG_QUALITY_W*	2	25	1.429	0.001	0.667	0.706	0.922	18.917	7.521
17	*FF6 + BMG_QUALITY_S + BMG_QUALITY_W*	2	26	1.453	0.001	0.618	0.466	0.919	19.333	7.522
18	*FF6 + BMG_QUALITY_W + BMG_Global*	2	26	1.452	0.001	0.639	0.538	0.922	20.167	7.513
19 (=)	*FF6 + BMG_SOCIAL_W + BMG_QUALITY_W*	2	28	1.469	0.001	0.645	0.493	0.922	21.833	7.515
19 (=)	*FF6 + BMG_SOCIAL_W*	1	28	1.462	0.001	0.636	0.488	0.921	21.833	7.502
21	*FF6 + BMG_W*	1	28	1.455	0.001	0.638	0.484	0.918	23.833	7.499
22	*FF6*	0	28	1.457	0.001	0.635	0.485	0.917	24.667	7.498
23	*FF6 + BMG_QUALITY_W*	1	28	1.462	0.001	0.643	0.488	0.918	25.833	7.507

Table 4 – Model performance following risk factor redundancy tests

This table presents the results for the redundancy tests of the risk factors. The table presents the performance indicators for estimation of the R8 model (composed of the FF6 model + *BMG_S* + *BMG_SOCIAL_W*) to which one or more risk factor is removed through step-wise regressions. Panel A presents the results for the R8 model. Panel B presents the five (out of 6) best-performing model specifications when one risk factor is removed from R8. Panel C presents the five (out of 15) best-performing model specifications when two risk factors are removed from R8. Panel D presents the five (out of 20) best-performing model specifications when three risk factors are removed from R8. The time series regressions are estimated on daily excess returns between 2004 and 2014, representing 2,517 observations. Model specification rankings are based on the global index. Model performance indicators are the following : number of significant alphas [# of alphas (5%)], the result for the GRS test [GRS] and the associated p-value [p-value], the average of absolute-value alphas divided par the average of the absolute-value excess market returns for portfolios *i* [$A|a_i|/A|\bar{R}_i|$], the squared average of the alphas divided by squared average of excess market returns for portfolios *i* [$Aa_i^2/A\bar{R}_i^2$], the average of the determination coefficients [$A(R^2)$], the global index [Global index] and the maximum VIF for all the coefficients. All the variables and model performance indicators are defined in section 3.

			Model performance indicators							
Rank	**Model**	**# of BMG factors**	**# of alpha (5%)**	**GRS**	**p-value**	$\frac{A\|a_i\|}{A\|\bar{R}_i\|}$	$\frac{Aa_i^2}{A\bar{R}_i^2}$	$A(R^2)$	**Global index**	**Max VIF**
Panel A - R8 model										
	R8	2	16	1.425	0.001	0.602	0.517	0.924	-	7.517
Panel B - Seven-factor models										
1	*R8 minus WML*	2	14	1.412	0.002	0.605	0.517	0.917	2.200	7.460
2	*R8 minus BMG_SOCIAL_W*	1	21	1.421	0.002	0.615	0.551	0.921	3.100	7.514
3	*R8 minus CMA*	2	21	1.434	0.001	0.637	0.569	0.922	3.300	7.501
4 (=)	*R8 minus HML*	2	22	1.442	0.001	0.614	0.525	0.919	3.600	7.496
4 (=)	*R8 minus BMG_S*	1	28	1.462	0.001	0.636	0.488	0.921	3.600	7.502
Panel C - Six-factor models										
1	*R8 minus HML and BMG_SOCIAL_W*	1	21	1.436	0.001	0.620	0.542	0.916	4.800	7.491
2	*R8 minus WML and BMG_SOCIAL_W*	1	19	1.409	0.002	0.620	0.556	0.914	5.000	7.460
3	*R8 minus WML and CMA*	2	17	1.419	0.002	0.637	0.571	0.915	5.200	7.442
4	*FF6*	0	28	1.457	0.001	0.635	0.485	0.917	5.400	7.498
5	*R8 minus CMA and BMG_SOCIAL_W*	1	23	1.430	0.001	0.652	0.619	0.919	6.000	7.497
Panel D - Five-factor models										
1	*R8 minus WML, BMG_S and BMG_SOCIAL_W*	0	23	1.446	0.001	0.636	0.484	0.910	5.200	7.439
2	*R8 minus WML, CMA and BMG_S*	1	25	1.444	0.001	0.649	0.515	0.912	5.600	7.432
3 (=)	*R8 minus CMA, BMG_S and BMG_SOCIAL_W*	0	29	1.453	0.001	0.650	0.515	0.914	6.400	7.489
3 (=)	*R8 minus WML, CMA and BMG_SOCIAL_W*	1	18	1.416	0.002	0.653	0.620	0.912	6.400	7.441
5	*R8 minus HML, CMA and BMG_SOCIAL_W*	1	27	1.466	0.001	0.641	0.497	0.912	6.900	7.470

Table 5 – Informational content of the risk factors

This table presents the results for the regression of each risk factor or the remaining 5 or 7 risk factors. The table presents the value for alpha as well as the adjusted-R^2. The time series regressions are estimated on daily excess returns between 2004 and 2014, representing 2,517 observations, and include Newey-West's (1987) correction. 90%, 95% and 99% levels of confidence are represented, respectively, by *,** and ***.

	FF6		**R8**	
Risk factor	**Alpha (%)**	**R^2**	**Alpha (%)**	**R^2**
MKT	0.0348 **	0.575	0.0321 **	0.590
SMB	0.0096	0.223	0.002	0.364
HML	0.0103	0.469	0.0117	0.484
WML	0.0006	0.448	-0.0026	0.471
RMW	0.0197 ***	0.352	0.0196 ***	0.404
CMA	0.0049	0.114	0.0067 *	0.188
BMG_S	0.0072 *	0.352	0.007 **	0.398
BMG_SOCIAL_W	0.0004	0.213	-0.0013	0.265

Table 6 – Model performance by portfolio types

This table presents the results for the estimation of model (4) according to portfolio type. The time series regressions are estimated on daily excess returns between 2004 and 2014, representing 2,517 observations. Model performance indicators are the following : number of significant alphas [# of alphas (5%)], the result for the GRS test [GRS] and the associated p-value [p-value], the average of absolute-value alphas divided par the average of the absolute-value excess market returns for portfolios *i* [$A|a_i|/A|\bar{R}_i|$], the squared average of the alphas divided by squared average of excess market returns for portfolios *i* [$Aa_i^2/A\bar{R}_i^2$], the average of the determination coefficients [$A(R^2)$], the global index [Global index] and the maximum VIF for all the coefficients. All the variables and model performance indicators are defined in section 3.

			Model performance indicators					
Models	**# of alpha (%)**	**GRS**	**p-value**	$\frac{A\|a_i\|}{A\|\bar{R}_i\|}$	$\frac{Aa_i^2}{A\bar{R}_i^2}$	$A(R^2)$	**Global index**	**Max VIF**
Panel A - B/M portfolios (25)								
R8	7	2.123	0.001	0.596	0.410	0.964	1.167	7.517
FF6	9	2.115	0.001	0.650	0.437	0.962	1.833	7.498
Panel B - Momentum portfolios (25)								
R8	5	1.401	0.089	0.555	0.311	0.959	1.000	7.517
FF6	12	1.530	0.045	0.620	0.428	0.957	2.000	7.498
Panel C - Profitability portfolios (25)								
R8	0	0.969	0.506	0.353	0.123	0.965	1.000	7.517
FF6	2	1.047	0.399	0.457	0.213	0.962	2.000	7.498
Panel D - Investment portfolios (25)								
R8	1	1.543	0.042	0.445	0.228	0.965	1.000	7.517
FF6	3	1.626	0.026	0.523	0.301	0.963	2.000	7.498
Panel E - Industry portfolios (30)								
R8	3	1.811	0.005	0.929	1.073	0.793	1.667	7.517
FF6	2	1.787	0.005	0.840	0.784	0.772	1.333	7.498
Panel F - Industry portfolios (19) (> 50 firms on average)								
R8	1	1.519	0.069	0.776	0.725	0.838	1.333	7.517
FF6	0	1.554	0.059	0.876	0.683	0.823	1.667	7.498

Table 7 – Inexplicable portfolios

This table presents the list of portfolios for which alpha is significant at the 95% level of confidence for either the FF6 or R8 model. The time series regressions are estimated on daily excess returns between 2004 and 2014, representing 2,517 observations, and include Newey-West's (1987) correction. Model performance indicators are the following : number of significant alphas [# of alphas (5%)], the result for the GRS test [GRS] and the associated p-value [p-value], the average of absolute-value alphas divided par the average of the absolute-value excess market returns for portfolios *i* [$A|a_i|/A|\bar{R}_i|$], the squared average of the alphas divided by squared average of excess market returns for portfolios *i* [$Aa_i^2/A\bar{R}_i^2$], the average of the determination coefficients [$A(R^2)$], the global index [Global index] and the maximum VIF for all the coefficients. All the variables and model performance indicators are defined in section 3.

				Alpha (%)	
Portfolio	**Portfolio type**	**Size quintile**	**Performance quintile**	**FF6**	**R8**
BE/ME_01_01	BE/ME	1	1	-0.0131 **	-0.0131 **
BE/ME_02_02	BE/ME	2	2	0.0091 **	0.0088 **
BE/ME_02_03	BE/ME	2	3	0.0099 **	0.0102 **
BE/ME_02_05	BE/ME	2	5	-0.0102 **	-0.009 *
BE/ME_03_02	BE/ME	3	2	0.0128 ***	0.0106 **
BE/ME_04_01	BE/ME	4	1	0.0115 **	0.008 *
BE/ME_04_03	BE/ME	4	3	-0.0141 **	-0.0197 ***
BE/ME_05_04	BE/ME	5	4	-0.0119 **	-0.0122 **
BE/ME_05_05	BE/ME	5	5	0.0154 **	0.0161 **
MOM_01_04	MOM	1	4	0.0103 **	0.0111 **
MOM_01_05	MOM	1	5	0.0123 **	0.011 *
MOM_02_01	MOM	2	1	0.0173 **	0.0157 **
MOM_02_02	MOM	2	2	0.0122 **	0.0114 **
MOM_02_03	MOM	2	3	0.0122 ***	0.0122 ***
MOM_03_01	MOM	3	1	0.0169 **	0.0124 *
MOM_03_02	MOM	3	2	0.0165 ***	0.0124 **
MOM_03_03	MOM	3	3	0.0102 **	0.0071 *
MOM_03_04	MOM	3	4	0.0088 **	0.007 *
MOM_04_02	MOM	4	2	0.0135 **	0.0093 *
MOM_04_03	MOM	4	3	0.011 **	0.0072 *
MOM_04_04	MOM	4	4	0.0106 **	0.0072 *
PRO_03_03	PRO	3	3	0.0076 **	0.0058 *
PRO_03_05	PRO	3	5	0.0133 **	0.0091 *
INV_01_05	INV	1	5	-0.0139 ***	-0.0135 **
INV_03_03	INV	3	3	0.0108 **	0.0087 *
INV_03_04	INV	3	4	0.0085 **	0.0054
IND_Smoke	IND	-	-	0.035 **	0.0362 **
IND_Books	IND	-	-	-0.0359 ***	-0.0392 ***
IND_Cnstr	IND	-	-	-0.0172	-0.0248 **

Table 8 – Model performance with 50% percentile cut-off

This table presents the results for the estimation of the R8 model for which the reputation-related risk factors are built with a 50% cut-off. The time series regressions are estimated on daily excess returns between 2004 and 2014, representing 2,517 observations, and include Newey-West's (1987) correction. Model performance indicators are the following : number of significant alphas [# of alphas (5%)], the result for the GRS test [GRS] and the associated p-value [p-value], the average of absolute-value alphas divided par the average of the absolute-value excess market returns for portfolios *i* [$A|a_i|/A|\bar{R}_i|$], the squared average of the alphas divided by squared average of excess market returns for portfolios *i* [$Aa_i^2/A\bar{R}_i^2$], the average of the determination coefficients [$A(R^2)$], the global index [Global index] and the maximum VIF for all the coefficients. All the variables and model performance indicators are defined in section 3.

		Model performance indicators							
Rank	**Model**	**# of alpha (5%)**	**GRS**	**p-value**	$\frac{A\|a_i\|}{A\|\bar{R}_i\|}$	$\frac{Aa_i^2}{A\bar{R}_i^2}$	$A(R^2)$	**Global index**	**Max VIF**
1	R8 with 50% cut-off	16	1.419	0.002	0.593	0.477	0.922	1.300	7.519
2	R8 with 30-70% cut-offs	16	1.425	0.001	0.602	0.517	0.924	1.700	7.517

Table 9 – Model performance with added risk factors

This table presents the results for the estimation of the FF6 and R8 models to which additional risk factors are added. The time series regressions are estimated on daily excess returns between 2004 and 2014, representing 2,517 observations, and include Newey-West's (1987) correction. Model performance indicators are the following : number of significant alphas [# of alphas (5%)], the result for the GRS test [GRS] and the associated p-value [p-value], the average of absolute-value alphas divided par the average of the absolute-value excess market returns for portfolios *i* [$A|a_i|/A|\bar{R}_i|$], the squared average of the alphas divided by squared average of excess market returns for portfolios *i* [$Aa_i^2/A\bar{R}_i^2$], the average of the determination coefficients [$A(R^2)$], the global index [Global index] and the maximum VIF for all the coefficients. All the variables and model performance indicators are defined in section 3.

	Model performance indicators							
Model	**# of alpha (5%)**	**GRS**	**p-value**	$\frac{A\|a_i\|}{A\|\bar{R}_i\|}$	$\frac{Aa_i^2}{A\bar{R}_i^2}$	$A(R^2)$	**Global index**	**Max VIF**
Panel A - Based on benchmark FF6 model								
FF6 + BAB	34	1.434	0.001	0.670	0.500	0.918	2.500	7.552
FF6 + QMJ	30	1.451	0.001	0.671	0.502	0.920	2.333	7.574
FF6 (QMJ)	32	1.492	0.000	0.741	0.649	0.917	4.167	7.553
FF6 (HML-DEVIL	25	1.462	0.001	0.643	0.519	0.916	3.500	7.486
FF6	28	1.457	0.001	0.635	0.485	0.917	2.500	7.498
Panel B - Based on R8 model								
R8 + BAB	21	1.405	0.002	0.605	0.471	0.925	3.000	7.579
R8 + QMJ	16	1.399	0.002	0.577	0.463	0.925	1.083	7.637
R8 (QMJ)	19	1.426	0.001	0.598	0.470	0.923	3.333	7.601
R8 (HML-DEVIL)	18	1.433	0.001	0.616	0.554	0.922	4.667	7.509
R8	16	1.425	0.001	0.602	0.517	0.924	2.917	7.517

Table 10 – Model performance with additional instrumental variables

This table presents the results for the estimation of R8 according to different choices of instrumental variables. The time series regressions are estimated on daily excess returns between 2004 and 2014, representing 2,517 observations, and include Newey-West's (1987) correction. Model performance indicators are the following : number of significant alphas [# of alphas (5%)], the result for the GRS test [GRS] and the associated p-value [p-value], the average of absolute-value alphas divided par the average of the absolute-value excess market returns for portfolios *i* [$A|a_i|/A|\bar{R}_i|$], the squared average of the alphas divided by squared average of excess market returns for portfolios *i* [$Aa_i^2/A\bar{R}_i^2$], the average of the determination coefficients [$A(R^2)$], the global index [Global index] and the maximum VIF for all the coefficients. All the variables and model performance indicators are defined in section 3.

Rank	Model	# of alpha (5%)	GRS	p-value	$\frac{A\|a_i\|}{A\|\bar{R}_i\|}$	$\frac{Aa_i^2}{A\bar{R}_i^2}$	$A(R^2)$	Global index	Max VIF
		Model performance indicators							
Panel A - Initial models									
1	R8	16	1.425	0.001	0.602	0.517	0.924	1.000	7.517
2	Unconditional R8	25	1.505	0.000	0.631	0.563	0.923	2.000	1.928
Panel B - Conditional models with 1 instrumental variable									
1	*R8 + VIX25*	16	1.022	0.417	0.585	0.515	0.923	4.000	3.740
2	*R8 + SENTIMENT*	15	1.028	0.399	0.600	0.466	0.923	5.400	2.113
3	*R8 + CONFIDENCE*	15	1.134	0.149	0.596	0.559	0.923	9.200	2.103
Panel C - Conditional models with 2 instrumental variables									
1	*R8 + VIX25 + SENTIMENT*	9	0.854	0.879	0.575	0.454	0.923	10.000	3.889
2	*R8 + VIX25 + BEAR*	8	0.906	0.766	0.580	0.487	0.923	14.900	3.851
3	*R8 + SENTIMENT + BEAR*	8	0.774	0.971	0.549	0.425	0.923	15.100	2.755
Panel D - Conditional models with 3 instrumental variables									
1	*R8 + VIX25 + SENTIMENT + BULL*	7	0.718	0.993	0.525	0.358	0.923	15.500	4.127
2	*R8 + VIX25 + SENTIMENT + BEAR*	8	0.719	0.992	0.531	0.407	0.923	17.200	4.224
3	*R8 + BEAR + SENTIMENT + SLOPE*	9	0.788	0.962	0.549	0.425	0.923	22.000	2.800