DRIVERS OF THE COST OF CAPITAL: THE JOINT ROLE OF NON-FINANCIAL METRICS

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Conditionally accepted at the “International Journal of Research in Marketing”

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ABSTRACT: Recent studies in marketing suggest that non-financial metrics, such as customer satisfaction and brand equity, help explain the variation in the cost of equity and cost of debt. These studies usually focus on only one non-financial metric and one component of capital cost. In this study, we broaden the understanding of the relevance of non-financial metrics for the cost of capital. We investigate the joint role of customer satisfaction, brand equity, and corporate reputation for stock-market beta and credit ratings, which reflect the variation in equity and debt risk premiums across firms. In addition to the joint direct influence of these metrics on capital cost, we also study their interaction effects. We develop a conceptual model to explain the effects on capital cost and test the resulting hypotheses in a broad sample of 344 firms from diverse industries in the period 1991-2006.

Our results suggest that higher satisfaction ratings reduce both the cost of equity and cost of debt, whereas brand equity and corporate reputation only show a negative direct association with cost of debt. In addition, both measures moderate the impact of satisfaction on cost of debt. Brand equity attenuates the influence of satisfaction, while corporate reputation amplifies it.

Keywords: cost of capital; stock-market beta; credit spreads; brand equity; customer satisfaction; corporate reputation
1. Introduction

Weighted average cost of capital (WACC) is an important financial metric relevant to both constituents of the financial community such as institutional investors and the top management of a (publicly listed) firm. Given a stream of future cash flows, the lower the WACC the higher the present value of that stream. For management, a lower WACC means that hurdle rates for investment projects are lower because investors require a lower return from these capital expenditures.

WACC is composed of equity cost and debt cost. Both groups of providers of capital demand a return for their investment. The larger the risk they perceive to be associated with the investment the higher the required return. The most important measure for equity holder risk is systematic risk, while credit ratings are the best signal for debt holders for the default risk of a firm (Brealey, Myers, & Allen, 2007).

These risk components vary across companies and time. A natural interest is to understand the drivers of these risks. Extant accounting/finance literature has addressed this question (e.g., Beaver, Kettler, & Scholes, 1970; Blume, Lim, & MacKinlay, 1998). The focus of these studies is predominantly on ‘hard’ financial metrics such as operating margins, asset growth, leverage, earnings variability etc., which are commonly documented in financial reports or can be derived from corporate or analyst disclosures. Researchers found that several financial variables drive the costs of equity and debt. However, they also acknowledge that their models explain only a fraction of the observed variance in capital cost (e.g., Elton, Gruber, Agrawal, & Mann, 2001). Several authors believe that so called soft or intangible, non-financial metrics such as management capabilities, marketing metrics, etc. add to explain the residual variance (e.g., Blume et al., 1998; Pinches & Mingo, 1973).
An emerging research stream on the interface between accounting/finance and marketing provides evidence for the thesis that marketing metrics are indeed complementing the story on firm valuation. Particularly, recent efforts demonstrate that advertising expenditures, brand equity, customer satisfaction, and corporate social responsibility have the power to lower the cost of capital (for an overview see Srinivasan & Hanssens, 2009). However, all these studies investigate only one non-financial driver of capital cost. We believe that marketing-related non-financial metrics may offer different informational value for investors and creditors. As a result, they probably impact capital cost above and beyond each other. Measures such as customer satisfaction, brand equity, and corporate reputation reflect competitive advantage from different domains. Satisfaction focuses on the customer, brand equity focuses on the product, and corporate reputation emphasizes the firm. Therefore, they provide different signals about the financial health of a firm for investors that eventually influence the cost of debt and equity.

This study attempts to provide several contributions. First, we investigate the joint role of the common non-financial measures customer satisfaction, brand equity, and corporate reputation for the cost of capital. We call these measures non-financial because they inform investors about the quality of marketing and management capabilities even though they may be measured in Euros (e.g., brand equity). Specifically, we consider the popular and publicly available American Customer Satisfaction Index ratings, the financial brand values by Interbrand, and Fortune’s corporate reputation scores. We develop a novel conceptual model of the informational value and signal contained in these metrics. From this model, we derive hypotheses about the incremental contribution of each metric to explaining the risk components of the cost of capital. We also derive hypotheses about the moderating impact of brand equity and corporate reputation on the role of satisfaction ratings.
Second, we test the hypotheses in a broad sample of 344 firms from diverse industries in the period 1991-2006. Results are generalizable and account for dynamics as well as the potential endogeneity of our focal non-financial metrics. Since we include all three metrics together in the empirical models of equity cost and debt cost, we are able to quantify the relative impact of each of the measures above and beyond the other measures. For managers and investors, it is important to know whether satisfaction ratings, brand equity, and corporate reputation scores provide additional distinct information. If not, investors and managers could simply substitute one non-financial metric for another to evaluate the risk potential.

Third, given that the focal metrics are measured at different scales it is hard to compare their relative importance in driving the cost of capital. For that reason, we transform estimated coefficients into elasticity estimates. This study is among the first to calculate elasticities for the impact of non-financial metrics on components of the cost of capital. These elasticities enable managers and investors to assess precisely how changes in non-financial metrics influence the cost of capital. In addition, the results facilitate conducting meta-analyses.

The paper is organized as follows. We briefly discuss the related literature in the next section. We then provide details about the conceptualization of our key variables, which is important to assess their informational value. In section 4, we derive our hypotheses. The following section includes the empirical study and the estimation results. We discuss these results in the last section and finish with conclusions and limitations of our study.

2. Literature background

In Table 1, we briefly review the related literature in accounting, finance, and marketing. From marketing, we include all studies that consider either systematic risk (equity cost) or default risk (debt cost) as dependent variable and non-financial metrics as independent variable.
2.1 Accounting and Finance Literature

Extant literature examines the effect of various factors on systematic risk and the cost of equity. Beaver et al. (1970) provide one of the first contributions to that literature. Their model relates systematic risk, measured by beta, to variables that describe the financial position of a firm. They find that greater systematic risk is related to lower dividend payout, higher growth, smaller asset size, and greater leverage. Following studies (e.g., Hill & Stone, 1980) considered similar variables and supported Beaver et al.'s (1970) results.

Horrigan's (1966) study is among the first to analyze drivers of credit ratings that reflect the terms of debt financing. He considers different financial variables (e.g., total assets) to predict corporate bond ratings. Kaplan and Urwitz (1979) use an ordered probit model to predict the bond rating. They find, as an example, that total assets, the long-term debt to total assets ratio, and the stock-market beta are relevant. Blume et al. (1998) extend the approach by analyzing a panel of firms in the period 1978-1995. They introduce new variables such as pretax interest coverage. We adopt the widely used models by Beaver et al. (1970) and Blume et al. (1998) as baseline specifications that we extend by our focal non-financial metrics.

2.2 Marketing Literature

Non-financial metrics provide current and forward-looking information above and beyond “hard” information contained in a firm’s financial statements. Five studies (see table 1 again) focus on the impact of customer satisfaction on one component of the cost of capital (stock-market beta or credit spreads). These studies provide strong evidence that customer satisfaction reduces the systematic risk (stock-market beta) and leads to better credit ratings.
Compared to customer satisfaction the impact of brand equity on capital cost components is ambiguous. Madden et al. (2006) find that a portfolio of firms with stronger-than-average brands has a lower systematic risk. Rego et al. (2009) report that stronger brands improve credit ratings and lower systematic risk, albeit the relationship is not as strong as for credit ratings. Quite in contrast, Bharadwaj et al. (2011) find that strong brand quality increases systematic risk. The results of Johansson, Dimofte, and Mazvancheryl (2012) are in contrast to Madden et al. (2006), but in line with Rego et al. (2009): Top brands measured by financial brand equity (Interbrand) did not show lower systematic risk than the market as a whole during the Fall 2008 stock market downturn. However, brands scoring the highest on a consumer-based brand equity measure (Eq-uiTrend) had lower systematic risk.

To the best of our knowledge, prior research on the impact of corporate reputation on capital cost is not available. There are studies that focus on corporate social responsibility as an important but not the only dimension of corporate reputation. Orlitzky and Benjamin (2001) suggest that higher corporate social responsibility is associated with lower financial risk. Agarwal and Berens (2009) support this observation and show that corporate social responsibility helps decrease the cost of capital in general.

Collectively, prior studies provide stronger and clearer evidence for the role of customer satisfaction compared to brand equity and corporate social responsibility. Findings for the role of brands with respect to systematic risk are inconsistent. We are not aware of studies that investigate the relation between corporate reputation and the components of capital cost. As a consequence, we hope that our joint consideration of all three metrics contributes to shed light on their role for driving the cost of capital.
3. Conceptualization and measurement of key variables

Customer satisfaction, brand equity, and corporate reputation are multi-dimensional constructs that are not directly observable. Our hypotheses about their impact on capital cost are based on the distinct informational value these metrics provide for investors. Different approaches have been suggested how to measure these constructs. It is beyond the scope of this paper to discuss these approaches in detail. But it is important to understand the conceptual foundation of the specific measures we use in this study.

Following the idea of efficient capital markets, we selected measures that are publicly available, consistently measured over time, and widely appreciated by investors. Three measures fulfill these prerequisites: the American Customer Satisfaction Index (ACSI), Interbrand's brand value measure, and Fortune's corporate reputation index. Following the literature in finance, we use credit spreads and stock-market beta to measure the risk components of capital cost. These components are responsible for company-specific differences in the cost of debt and equity.

Credit Spread (default risk). For debt holders, the default risk of the firm is most relevant (Blume et al., 1998). Consistent with the literature (Brealey et al., 2007; Ederington, Yawitz, & Roberts, 1987), we measure this risk in terms of credit spreads that are closely related to credit ratings issued by rating agencies such as Standard & Poor’s (S&P). S&P defines credit ratings as follows: „[…] ratings express the agency’s opinion about the ability and willingness of an issuer … to meet its financial obligations in full and on time” (Standard & Poor’s, 2011a, 3). Typically, analysts obtain information from published reports and financial statements as well as from interviews with the issuer’s management. They use that information to assess the entity’s financial condition and risk potential. In detail, credit analysts use different rating criteria in the rating process. Two risk components lead to the final credit rating: First, credit analysts assess the financial risk of a firm by evaluating „hard“ financial metrics such as capital structure or profita-
bility. Second, they assess a firm’s business risk by considering the company’s market position, its cost efficiency, and management and marketing capabilities (Standard & Poor’s, 2011a). Relevant factors may be market share, reflecting the firm’s market position and the ability to sustain or increase share; strength of the brand; degree of operating efficiency; management’s track record of product innovation and brand building, including efficiency and effectiveness of marketing spend (Standard & Poor’s, 2011b). All these information are non financial by nature and relate to marketing capabilities.

Stock-market beta (systematic risk). Following the Capital Asset Pricing Model (e.g., Brealey et al., 2007), the covariance between firm i’s stock return, $r_i$, and the market return, $r_m$, relative to the variance of the market return, $\sigma_{r_m}^2$, measures systematic risk or stock-market beta, respectively. Using the identity $\text{Cov}(r_i, r_m) = \rho_{r_i, r_m} \sigma_{r_i} \sigma_{r_m}$, we can also write for beta:

$$
\text{Beta}_i = \frac{\rho_{r_i, r_m} \sigma_{r_i} \sigma_{r_m}}{\sigma_{r_m}^2} = \rho_{r_i, r_m} \frac{\sigma_{r_i}}{\sigma_{r_m}},
$$

(1)

where $\rho_{r_i, r_m}$ measures the correlation between returns and $\sigma_{r_i}$ and $\sigma_{r_m}$ are the associated standard deviations. The correlation coefficient measures how closely firm returns follow the overall market trend. For example, insurance companies and banks depend quite heavily on the business cycle, whereas pharmaceutical companies are not much affected by business trends. Hence, $\rho_{r_i, r_m}$ rather picks up differences across industries, but does not vary so much over time for a single firm. However, the ratio of the standard deviations of firm and market returns, $\sigma_{r_i}/\sigma_{r_m}$, captures firm-specific differences that also vary over time. It is this ratio we are concentrating on when developing our arguments for the associated hypotheses. Note that consistent with fair value theory, stock returns and earnings/cash flows are highly correlated (Brealey et al., 2007).
A major driver of the variation of cash flows is their growth rate. Fischer et al. (2010) provide a formal proof for this fundamental relation. Empirical capital markets research consistently found that growth stocks are indeed associated with higher beta (e.g., Fama & French, 1992). We will refer to expectations about firm growth rates relative to the market average for the development of our hypotheses later.

Customer satisfaction. An individual firm’s customer satisfaction represents its current customers’ overall evaluation of total purchase and consumption experience (Fornell et al., 1996). Thus, customer satisfaction is an indicator for the loyalty and the willingness-to-pay of current customers, i.e. it provides information related to revenues from the current customer base (Anderson, Fornell, & Lehmann, 1994).

We use customer satisfaction ratings (ACSI) from the National Quality Research Center at the University of Michigan. Fornell et al. (1996) provide details on how ACSI is measured.

Brand equity. Brand equity is defined as the value added to a product or service by its association with a brand name (e.g., Rego et al., 2009). Brand equity has been measured mainly in two ways in the marketing literature (Johansson et al., 2012): (1) as a consumer-based metric reflecting the consumers’ brand beliefs and attitudes that affect purchase behavior (e.g. Rego et al., 2009) or (2) as a dollar value reflecting the incremental discounted future cash flows accruing from a branded product compared with an identical but unbranded product (e.g., Madden et al., 2006).

We follow the second measurement approach and obtain brand equity data from the Interbrand Group. This approach provides a dollar figure for the brand asset that is consistent with the definition of incremental cash flows due to the brand (see www.Interbrand.com for a detailed description). One specific characteristic of the Interbrand approach is that it forecasts the current and future revenues specifically attributable to the branded products. The cost of doing business
(e.g., operating costs) and intangibles such as patents and management strength are subtracted to assess what portion of these earnings is due to the brand. A measure of how the brand influences customer demand at the point of purchase is applied to arrive at the branded earnings. Industry benchmark analysis for the role brands play in driving customer demands is derived from Interbrand’s database of more than 5,000 prior valuations conducted over the course of 20 years. Finally, the brand strength score is a benchmark of the brand’s ability to secure ongoing customer demand (e.g., loyalty, retention) and thus sustain future earnings, translating branded earnings into net present value. In general, the Interbrand measure is to reflect the revenue and profit growth potential of a firm as a result of brand strength.

*Corporate reputation.* Following Fombrun (1996, 72), we define corporate reputation as “a perceptual representation of a company’s past actions and future prospects that describe the firm’s overall appeal to all its key constituents when compared to other leading rivals”. Corporate reputation probably is the most complex metric among our focal metrics. In general, corporate reputation comprises the credibility and respect that an organization has among a broad set of constituents (e.g., employees, investors, regulators, customers). In this study, we follow Fortune's approach to measure corporate reputation (Fombrun & Shanley, 1990; Fortune, 2009). A firm’s overall reputation score is built from ratings of eight dimensions: financial soundness, innovation, long-term investment, ability to attract, develop, and keep talented people, product/services quality, quality of management, social responsibility, and wise use of corporate assets. The Fortune measure reflects the potential of a firm to increase its future revenues and operational efficiency.

4. **Hypotheses**

4.1 *Conceptual model*
Figure 1 shows the conceptual model that underlies our hypothesis system. Information about customer satisfaction, brand equity, and corporate reputation are assumed to impact the cost of capital via the risk components beta and credit spread. In this framework, we expect customer satisfaction to play a prominent role for both beta and credit spreads, which has been supported in prior research (e.g., Anderson & Mansi, 2009; Tuli & Bharadwaj, 2009). Compared to brand equity and corporate reputation, satisfaction informs directly about the quality of customers and thus the revenue base of a firm. Losing a customer obviously has a direct and immediate impact on firm revenue. Losing brand attractiveness or corporate reputation instead may not cause immediate customer defection but only in later periods. We therefore believe that satisfaction provides information to investors that are complemented and moderated by information signals from brand equity and corporate reputation (see Figure 1 again).

== Insert Figure 1 about here ==

4.2 Information content of satisfaction, brand equity, and corporate reputation

The three non-financial metrics contain information signals that help investors assess future risk. There are overlaps in the information contents of the three metrics, but each metric also provides unique information. It is because of that unique information why we believe that each metric has incremental value for investors in evaluating the potential risk of an investment in a specific company. Table 2 summarizes these differences in information value of the metrics. Generally speaking, differences result from the fact that satisfaction focuses on the customer, brand equity focuses on the product, and corporate reputation focuses on the firm.

== Insert Table 2 about here ==

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1 We thank the AE for stimulating the following discussion.
Customer satisfaction is a signal for the loyalty and the willingness-to-pay of existing customers (e.g., Anderson et al., 1994). Hence, investors make inferences about revenues and cash flows that come from existing customers in the future.

Brand equity informs about the strength of a brand. This strength emanates to a great extent from the innovativeness and the potential to grow with existing and new products in existing and new markets (e.g., Barth et al., 1998; Leone et al., 2006). In addition, brand equity signals how familiar investors are with the firm (e.g., Rego et al., 2009).

Corporate reputation provides additional non-market based information that reflects within-firm characteristics (Fombrun & Shanley, 1990). Six out of eight dimensions of Fortune’s reputation metric focus on internal firm processes. Financial soundness and the wise use of corporate assets provide signals about corporate cost management and the operational efficiency (Fombrun, 1996). In addition, the metric informs about the quality of management and employees.

4.3 Hypotheses on credit spreads

We start discussing the potential influence of customer satisfaction, brand equity, and corporate reputation on credit spreads followed by a discussion of the effects on beta.

Research in finance has shown that firms are less able to service its debt obligations if they suffer from a higher equity risk as measured by stock-market beta (e.g., Blume et al., 1998). A higher beta reflects more vulnerable and volatile cash flows relative to the market average. That increases the default risk of a firm and consequently the risk premium or credit spreads, respectively, for corporate bonds. Our empirical model to explain variation in credit spreads includes beta as an important predictor. In the following, we focus on developing hypotheses for the direct influence of satisfaction, brand equity, and reputation on credit spread that is above and beyond the mediated influence via beta, which we discuss subsequently.
Customer satisfaction. Customer satisfaction positively influences the willingness to pay of customers, while it also reduces behaviors with negative economic consequences for the firm, such as complaints (e.g., Anderson & Mansi, 2009). Satisfied customers are more likely to buy more of the same product, to buy additional products, and to make recommendations to other customers (e.g., Anderson et al., 2004). Customer satisfaction ratings impact the credit rating process through its information about the behavior of current customers that determine the size of profits for the firm (Anderson & Mansi, 2009). Firms that have a higher level of expected cash flows ensure payment and are viewed as less risky borrowers. Thus,

**H1. Customer satisfaction is negatively associated with credit spreads.**

Brand Equity. Strong brands are a signal for excellent marketing, which credit rating agencies consider an important criterion in their rating process (Standard & Poor’s, 2011b). In addition to customer satisfaction, brand equity offers potential to grow the customer base by acquiring new customers. These growth opportunities signal that the firm is capable of generating additional sales in the future that help fulfilling its liabilities. Moreover, it is well known that a significant proportion of a firm’s market value lies in intangible, off-balance sheet assets such as brands (e.g., Badir, Bharadwaj, & Srivastava, 2008). Brands may serve as an elementary security for debt holders in case of a firm’s financial distress or even bankruptcy. Finally, brands facilitate the access to fresh capital from equity investors, which again reduces the likelihood of financial distress. Investor funds from Abu Dhabi and Qatar, as an example, provided fresh equity capital to Daimler and Porsche in 2009 when the cash holdings were tight due to the deep financial crisis. Both investor funds mentioned the strength of the premium car brands among the reasons for their investment decisions. Hence, we hypothesize

**H2. Brand equity is negatively associated with credit spreads.**
Corporate reputation. Corporate reputation leads to greater familiarity of debt holders and credit rating agencies with the firm (e.g., Fombrun, 1996). Note that corporate reputation offers unique information signals with regard to operational efficiency and the quality of the management. Naturally, the operational efficiency is an important driver for the profitability of the firm and thus its ability to fulfill future liabilities (e.g., Singh et al., 2005). The quality of the management and employees is also a positive signal for credit rating agencies because it reduces the likelihood of a firm to get into a situation of financial distress (e.g., Blume et al., 1998). Well-known companies are generally more successful in attracting and keeping better employees who are in turn more productive (Luo & Bhattacharya, 2006). Thus, corporate reputation provides positive signals to credit rating agencies that assess the credit worthiness of a firm. Standard & Poor’s (2011b) mentions the degree of operating efficiency and the management’s track record of product innovation among their top factors for the credit rating. Therefore, we hypothesize

H3. Corporate reputation is negatively associated with credit spreads.

Relative strength of effects. All three non-financial metrics offer unique information value for the credit rating process. Therefore, we expect that each of them impacts credit spreads. However, considering their different information signals, we assume that they do so with different strength. Corporate reputation is measured across eight dimensions, emphasizing the financial soundness and operational efficiency. Compared to brand equity and customer satisfaction ratings, it may be harder to advance along this scale, as it requires improvements across several dimensions at once. We therefore believe that the relative responsiveness (elasticity) of credit spreads is higher for corporate reputation than for brand equity and customer satisfaction. Thus,

H4. Compared to brand equity and customer satisfaction corporate reputation will have the strongest negative impact on credit spreads
Consistent with our conceptual model in Figure 1, we believe that both brand equity and corporate reputation also moderate the role of customer satisfaction ratings in the credit rating process.

*Moderating effect of brand equity.* The signal that customer satisfaction ratings provide may be less informative for firms who have strong brands. The reason is that customer satisfaction ratings reflect past customer transactions, whereas brand equity informs about the potential to grow the business with revenues from new customers. Hence, it informs about a second source of future revenues that is not fully reflected in satisfaction ratings from current customers. In addition, future growth from new customers has a side effect as it increases uncertainty about the exact level of future cash flows, which is important to evaluate a firm’s potential to service its debt obligations. That uncertainty also makes the information signal from customer satisfaction less powerful. Thus,

**H5. Brand equity attenuates the negative effect of customer satisfaction on credit spreads.**

*Moderating effect of corporate reputation.* The perceived quality of a product or service is a main driver of customer satisfaction (Fornell et al., 1996). As a result, companies invest heavily in implementing systems for customer relationship management or total quality management to increase customer satisfaction (Anderson et al., 1994; Mithas, Krishnan, & Fornell, 2005). Naturally, firms differ with regard to the efficiency of such investments (e.g., Anderson et al., 1994). Corporate reputation particularly provides information about the financial soundness and the operational efficiency of a firm. Thus, the information signal from a firm’s customer satisfaction rating becomes more valuable to credit rating agencies if the firm is known for its operational efficiency and financial soundness (Standard & Poor’s, 2011b). That implies such a firm generates its revenues from satisfied customers at lower costs. Therefore, credit rating agencies may evaluate the
same customer satisfaction for firms differently depending on their reputation for operational efficiency. Thus,

**H6. Corporate reputation amplifies the negative impact of customer satisfaction on credit spreads.**

### 4.4 Hypotheses on stock-market beta

**Customer satisfaction.** Several studies have shown that customer satisfaction enhances customer retention and therefore contributes to reducing the volatility and vulnerability of future cash flows (e.g., Gruca & Rego, 2005). Customers are more committed to the firm and less likely to switch to other firms. In periods of a cyclical downturn, cash flows are cushioned from the downward trend. In upswing periods, the firm probably does not grow as fast as other companies that lost customers and expand with the market. As a result, systematic risk for firms with more satisfied customer is lower. Since prior research (e.g., Fornell, Mithas, Morgeson, & Krishnan, 2006; Tuli & Bharadwaj, 2009) provides strong support for this relationship we do not repeat the arguments in detail here.

**H7. Customer satisfaction is negatively associated with systematic risk (stock-market beta).**

**Brand equity.** A strong brand acts as a barrier to competition and increases the probability of a customer continuing to purchase the brand (McAlister et al., 2007). The perceived value of a brand prevents customers from brand switching even if it requires paying a price premium (Rego et al., 2009). Higher brand equity results from higher awareness, which in turn reduces consumer search costs and facilitates repeat purchases (Johansson et al., 2012). These forces strengthen the cash flow basis. Compared with average performers, this basis is less likely to erode for strong brands during an economic downturn when demand is shrinking. However, it may also been argued in the opposite direction. According to Bharadwaj et al. (2011), consumers view high brand quality
as a signal for high prices. As consumers become more price-conscious in a downturn, strong brands may lose market share faster than weaker but less-expensive brands. As a result, cash flows and thus stock returns decline faster than the market average.

During an economic upswing, strong brand equity signals faster growth. It is an indicator for the firm’s cross-selling potential and consumers of strong brands are more likely to increase purchases in the future (Rego et al., 2009). These benefits imply that, in an upswing situation, firms with higher brand equity may outperform the market average. While faster growth in cash flows is positive, it has as a side effect that it involves a higher variance of cash flows (Fischer, Leeflang, & Verhoef, 2010), i.e. beta rises (see Equation 1). Consequently, there are arguments favoring both a positive and a negative relationship between brand equity and beta. We leave this question to be solved by the empirical analysis.

**Corporate Reputation.** Corporate reputation sheds light on the operational efficiency of a firm and the quality of its management and employees (see Table 2). During a market downturn, a more efficient company is more flexible to manage costs compared to less efficient peers (e.g., Soteriou & Zenios, 1999). Firms with a high-quality management enjoy stable relationships with their stakeholders such as employees and suppliers (Srivastava et al., 1998). Thus, in economic hard times, these firms can expect these stakeholders being more willing to cooperate for lowering costs (e.g., by reducing input prices or wages). All these benefits contribute to stabilizing revenues and costs during market downturns. Thus, the variance of firm return is lower compared to the market average, leading to a lower beta.

While an excellent reputation may insulate a firm’s stock from market downturns, it may also contribute to outperforming competitors during market upswings. Because of the superior management capabilities and operational efficiency, new markets are entered faster and more easily
(Fombrun, 1996). In addition, a good reputation increases the acceptance of new product introductions among consumers and channel partners (Kaufman, Jayachandran, & Rose, 2006). Higher operational efficiency also implies that firms can increase their revenues at a lower cost compared to competitors. Thus, such companies offer a larger growth potential. But faster growth also leads to greater variance of returns relative to the market average, which in turn increases beta. Thus, there are arguments for both a positive and a negative relationship between corporate reputation and beta, which leads again to an empirical question.

Table 3 summarizes the hypotheses for our main and interactions effects of the focal variables on credit spreads and beta. We test these hypotheses subsequently.

== Insert Table 3 about here ==

5. **Empirical Study**

5.1 *Data and Measures*

Since the database and the data alignment, respectively, influence model specification, we start with this discussion before presenting the empirical model. We collected data from various databases, including the Center for Research in Security Prices (CRSP), Standard & Poor's COMPUSTAT database, Bloomberg, Interbrand, Financial World, Fortune, and the National Quality Research Center at the University of Michigan. This data covers the period 1989-2006. However, we have not been observing all variables since 1989.

*Credit spread (default risk).* Credit ratings are obtained from COMPUSTAT’s databases. COMPUSTAT offers Standard & Poor’s long-term domestic issuer credit rating, which measures a firm’s capacity to meet its long-term financial commitments. The ratings range from AAA (highest credit standing) to D (firm is in default) on an ordinal scale. The credit spread for a rating class is calculated as the difference between the average yield (10-year maturity) of a bond
portfolio including only bonds of that rating class and the yield of a risk-free bond (10-year US-Treasury Bond). This data is provided by Bloomberg’s database.

*Stock-market beta (systematic risk).* We follow the standard market-model approach (see for example McAlister et al., 2007) to estimate firm-specific betas. We use daily stock returns for each firm and the market return of the Center for Research in Security Prices (CRSP) Value-Weighted-Return Index of all trading days of the specific year to obtain the estimates.

*Customer satisfaction.* ACSI produces a single overall customer satisfaction score for each organization that ranges from 0-100. ACSI collects and releases data on an annual basis. We obtained the customer satisfaction scores from the fourth quarter of 1994 to the fourth quarter of 2006.

*Brand equity.* Interbrand has been publishing the financial value of the Top 100 global brands since 1992. We obtain this data either from publications in Financial World, Business Week, or the website of the Interbrand Group (www.interbrand.com). For multi-brand firms in our data set, we aggregate the available values across individual brands.

*Corporate reputation.* Corporate reputation scores are obtained from Fortune's annual report on America’s Most Admired Corporations. The overall reputation score ranges from 0-10 and combines the earlier mentioned eight dimensions. Responses are solicited mostly from company executives. Reputation data have been published since 1991.

*Financial and other control variables.* We follow previous studies for the definition of financial variables. We measure growth by the growth rate in total assets (e.g., Beaver et al., 1970). Dividend payout is the ratio of cash dividends with respect to earnings available to common stockholders (e.g., McAlister et al., 2007). We measure leverage by total senior securities (preferred stocks and bonds) divided by total assets (e.g., Beaver et al., 1970). Liquidity is the current
ratio of the firm (e.g., McAlister et al., 2007). Earnings variability is measured as the standard
deviation of the earnings-price ratio (Beaver et al., 1970; McAlister et al., 2007). The log of total
assets determines firm size (e.g., Rego et al., 2009). Pretax interest coverage is the operating in-
come after depreciation plus interest expense divided by the interest expense (e.g., Blume et al.,
1998). We compute the operating margin by dividing operating income before depreciation by
firm sales (e.g., Blume et al., 1998). We measure competitive intensity with the C4-concentration
index. This index cumulates the market shares of the four largest firms at the two-digit North
American Industry Classification System (NAICS) level. Data on these financial control variables
is obtained from COMPUSTAT. The Appendix Table A1 provides the exact data definitions
used in our analysis.

*Data merging procedure*. Figure 2 summarizes the release dates of the financial and non-
financial metrics that are supposed to drive credit spreads and beta. It also shows the period over
which the variables in our empirical models are measured. As is evident from this figure, the
non-financial metrics are only measured once every year, whereas the release dates differ across
the year. Annual ACSI data are collected in different quarters for different industries. Interbrand
tracks brands across the year and releases new brand values in the third quarter (usually Septem-
ber). Fortune releases data on corporate reputation in the first quarter (usually March).

== Insert Figure 2 about here ==

Our dependent variables credit spread and beta reflect the level at the end of each year. The
financial control variables are reported by COMPUSTAT at the annual and quarterly level,
whereas quarterly information is usually not available from the start of the time-series in 1989.

The structure of the data has important implications for model building. First, since the focal
metrics are only measured at the annual level, year is the periodicity of our empirical analysis.
Ideally, we would align our dependent variables with the release dates of the financial and non-financial information. For example, beta would be calculated over the 12 months preceding the release date of new satisfaction ratings for a firm. Unfortunately, this alignment is not possible with our data since the non-financial metrics are released at different points in time within a year. While this may be a limitation from this database we believe it is offset by the new insights that we generate with respect to the joint role of the three non-financial metrics.²

Second, we note that financial control variables themselves could be influenced by the cost of capital, i.e., stock-market beta and credit ratings. To avoid such reverse causality between the dependent variables and the financial control variables we include financial controls of the previous period (t-1) in our models. Consistent with our hypotheses, the announcement of the non-financial metrics has informational value for investors. Hence, we regress credit spread and beta in period t on values announced in period t. To account for potential simultaneity issues we use an instrumental variables estimation approach that we describe later.

**Descriptive and correlation statistics.** Table 4 displays the descriptive statistics of our sample. As Table 4 shows, mean beta is close to 1. The mean credit spread amounts to 1.24 percent. Both dependent variables demonstrate a large variation. The average brand in our sample is worth of US$ 8,337 m. We multiply the brand values with the firm-specific WACC by period to correct for the discounting applied by Interbrand. As a result, we obtain average annual future branded earnings of US$ 620.2 m. Mean satisfaction and reputation scores are 75.7 (scale 0-100) and 6.6 (scale 0-10), respectively. Means and standard deviations for the control variables can be obtained from Table 4. They are comparable to other studies (e.g., Blume et al., 1998; McAlister et al., 2007). All predictor variables show sufficient variation.

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² We also estimated models for credit spreads and beta that account for the different release dates of satisfaction. We found no evidence that the release date moderates the influence of satisfaction on capital costs.
Table 5 displays the correlation matrix. We note that there is no excessive correlation that would indicate collinearity issues. Nevertheless, we check for potential collinearity issues later. Interestingly, reputation scores are stronger correlated with satisfaction than with brand equity (0.31 vs. 0.23). There is virtually no correlation between the WACC-corrected brand equity and customer satisfaction (0.12; p > 0.10). The correlations of brand equity and corporate reputation with beta are negative, but practically not significant. In contrast to that, the correlation of customer satisfaction with beta is strongly significant (-0.26; p < 0.01). On the contrary, the correlations of the three non-financial metrics with credit spread are all negative and highly significant (satisfaction: -0.24; p < 0.01; brand equity: -0.16; p < 0.05; reputation: -0.44; p < 0.01).

Consistent with our theoretical arguments (see table 2 again), brand equity and reputation are positively and significantly correlated with growth (brand equity: 0.12; p < 0.05; reputation: 0.20; p < 0.01), while there is no significant correlation of growth with customer satisfaction (-0.02; p > 0.10).

5.2 Model

Building on extant research in accounting, finance, and marketing (e.g., Beaver et al., 1970; Blume et al., 1998; McAlister et al., 2007), we specify the following two equations to explain the components of capital cost. We adopt the models by Beaver et al. (1970) and Blume et al. (1998) as baseline specification for Equations (2) and (3), respectively:
\[ SPREAD_{it} = \alpha_{0i} + \alpha_1SPREAD_{it-1} + \alpha_2BE_{it} + \alpha_3SAT_{it} + \alpha_4REP_{it} + \alpha_5SAT_{it} \ast BE_{it} + \alpha_6SAT_{it} \ast REP_{it} + \alpha_7BETA_{it-1} + \alpha_8INT_{it-1} + \alpha_9OPER_{it-1} + \alpha_{10}LEV_{it-1} + \alpha_{11} \ln(ASSET_{it-1}) + \alpha_{12}CONC_{it-1} + \sum_{t=1}^{L-1} \alpha_{13+t}ID_{it} + \nu_t, \]  

\[ BETA_{it} = \beta_{0i} + \beta_1BETA_{it-1} + \beta_2BE_{it} + \beta_3SAT_{it} + \beta_4REP_{it} + \beta_5SAT_{it} \ast BE_{it} + \beta_6SAT_{it} \ast REP_{it} + \beta_7DIV_{it-1} + \beta_8GROWTH_{it-1} + \beta_9LEV_{it-1} + \beta_{10}LIQ_{it-1} + \beta_{11}EVAR_{it-1} + \beta_{12} \ln(ASSET_{it-1}) \]

\[ + \beta_{13}CONC_{it-1} + \sum_{t=1}^{L-1} \beta_{14+t}ID_{it} + \epsilon_t, \]

with \( \nu_{it} \sim N \left(0, \sigma^2_{\nu} \right), \alpha_{0i} = \bar{\alpha} + \phi_i \) and \( \phi_i \sim N \left(0, \sigma^2_{\phi} \right), \) \( \text{Cov}(\nu_{it}, \phi_i) = 0, \)

\( \epsilon_{it} \sim N \left(0, \sigma^2_{\epsilon} \right), \beta_{0i} = \bar{\beta} + \kappa_i \) and \( \kappa_i \sim N \left(0, \sigma^2_{\kappa} \right), \) \( \text{Cov}(\epsilon_{it}, \kappa_i) = 0; \)

where

- \( SPREAD_{it} \) : Credit spread of firm \( i \) at period \( t \)
- \( BE_{it} \) : Brand equity of firm \( i \) at period \( t \)
- \( SAT_{it} \) : Customer satisfaction rating of firm \( i \) at period \( t \)
- \( REP_{it} \) : Corporate reputation of firm \( i \) at period \( t \)
- \( BETA_{it-1} \) : Systematic risk of firm \( i \) at period \( t-1 \)
- \( INT_{it-1} \) : Three-year average of pretax interest coverage of firm \( i \) at period \( t-1 \)
- \( OPER_{it-1} \) : Three-year average of operating margin of firm \( i \) at period \( t-1 \)
- \( LEV_{it-1} \) : Three-year average of leverage of firm \( i \) at period \( t-1 \)
- \( ASSET_{it-1} \) : Three-year average of asset size of firm \( i \) at period \( t-1 \)
- \( DIV_{it-1} \) : Three-year average of dividend payout of firm \( i \) at period \( t-1 \)
- \( GROWTH_{it-1} \) : Three-year average of asset growth of firm \( i \) at period \( t-1 \)
- \( LIQ_{it-1} \) : Three-year average of liquidity of firm \( i \) at period \( t-1 \)
- \( EVAR_{it-1} \) : Three-year average of earnings variability of firm \( i \) at period \( t-1 \)
- \( CONC_{it-1} \) : Industry concentration (C4-Index) relevant for firm \( i \) at period \( t-1 \)
- \( ID_{il} \) : Industry dummy for firm \( i \) and industry \( l \) \((1 = \text{firm } i \text{ belongs to industry } l; 0 \text{ else})\)
- \( \nu_{it}, \epsilon_{it}, \phi_i, \kappa_i \) : Error terms
- \( \sigma^2_{\nu}, \sigma^2_{\phi}, \sigma^2_{\epsilon}, \sigma^2_{\kappa} \) : Variances
- \( \alpha, \beta \) : Parameters to be estimated
- \( i = 1, \ldots, I \) (number of firms)
- \( t = 1, \ldots, T \) (number of periods)
- \( l = 1, \ldots, L \) (number of industries).

Beaver et al. (1970) as well as Blume et al. (1998) explain in detail the financial control variables and their expected impact, which we do not repeat here. We extend their models in several
ways. First, we add our three focal non-financial metrics and their interactions with customer satisfaction to the baseline model. Second, we include the industry’s competitive intensity (McAlister et al., 2007) and time-invariant industry dummies to control for heterogeneity at the industry level. Higher concentrated industries signal opportunities for new competitors to enter the market and threaten the cash-flow stream of incumbents. We therefore expect a positive effect on beta. For credit spreads, the effect of industry concentration is not uniform. On the one hand, firms in concentrated industries have above average profits. On the other hand, higher concentrated industries signal opportunities for new competitors to enter the market and threaten the cash-flow stream of incumbents. Thus, we do not make a sign prediction in this case. Third, we specify a random constant in our models that captures unobserved heterogeneity. This random constant controls for other firm-specific differences in systematic risk and credit spread, respectively, that we do not observe but may affect our estimates. Finally, we capture dynamic effects by including the lagged dependent variable. Moreover, the inclusion of lagged dependent variables also controls for inertia, persistence, and different initial conditions (Tuli & Bharadwaj, 2009).

5.3 Estimation

Two-step estimation approach. Note that both Equations (2) and (3) include a random constant to account for unobserved firm heterogeneity (Greene, 2008). The terms $\phi_i$ and $\kappa_i$ denote firm-specific deviations of the heterogeneous constant from its mean ($\bar{\phi}, \bar{\kappa}$) and are assumed to be drawn from a normal distribution with zero mean and constant variance. In addition, we acknowledge the possibility that our non-financial variables are endogenous. Changes in these metrics are a result of investments, which are in turn influenced by the cost of capital creating potential simultaneity issues. We follow Fischer et al. (2010) and adopt their two-step estimation approach. In the first step, we obtain instrumental variables by regressing the respective endoge-
nous variable on its instruments. We then estimate the models with the instrumental variables by using the simulated maximum likelihood technique. The estimator is consistent and asymptotically normal distributed under the usual regularity conditions.

*Measurement-induced endogeneity of financial brand equity.* We acknowledge potential concerns with respect to a financial brand equity measure such as Interbrand’s that involves discounting future brand-induced cash flows. We multiply each brand value with the WACC of the parent company. The result is a value for the average brand-induced future cash flow per annum. Note that dividing annual cash flows by WACC produces the net present value of this cash flow stream. By this transformation we remove the effect of capital cost on computing the financial brand equity measure. To account for other sources of endogeneity, we still need to instrument this transformed brand equity variable as we do for the other non-financial metrics.

*Identification of endogenous non-financial metrics.* All predictor variables in the Equations (2) and (3) that are not endogenous serve as instruments. Specifically, we consider brand equity (i.e., the transformed variable), satisfaction, corporate reputation, and the interaction of brand equity and corporate reputation with satisfaction as endogenous in Equation (2) and (3). Pretax interest coverage, operating margin, leverage, asset size (log of total assets), asset growth, dividend payout, liquidity, earnings variability, and industry concentration, which are measured in period t-1, are assumed to be exogenous. We extend this set of instruments by dividend payout, leverage, log of total assets, interest coverage, liquidity, earnings variability, and operating margin, which are measured in period t-2. These 7 two-period lagged instruments plus dividend payout, asset growth, liquidity, and earnings variability provide the overidentifying restrictions for Equation (2), which includes 5 endogenous variables (brand equity, customer satisfaction, corporate reputation, interaction of brand equity and corporate reputation with satisfaction). In Equa-
tion (3), the same 7 two-period lagged instruments plus interest coverage and operating margin provide the overidentifying restrictions for 5 endogenous variables. Conceptually, especially operating margin, industry concentration, and interest coverage should provide the identification for the endogenous non-financial metrics. First, profitability is a determinant of financial brand equity (Interbrand, 2012), so that operating margin should be a good instrument for brand equity. Second, customers in less concentrated industries are usually more satisfied. Third, interest coverage is an indicator of the financial resources that are available for investments in corporate reputation.

*Testing the exogeneity assumption.* Although we have good conceptual reasons for our choice of instruments, we test for their exogeneity. We proceed as follows. First, we examine whether the predetermined predictor variables in Equation (2) and (3) – which serve as instruments – are indeed exogenous. In Equation (2), these variables are pretax interest coverage, operating margin, leverage, log of total assets, and industry concentration, which are all measured in t-1. In Equation (3), these variables are dividend payout, asset growth, leverage, liquidity, earnings variability, log of total assets, and industry concentration, which are all measured in t-1. We apply the Durbin-Wu-Hausman test (Davidson & MacKinnon, 1993) to test the independence assumption for these regressors with respect to the error term. Specifically, we regress each instrument on all other exogenous variables and obtain the residuals from this regression. These residuals are then included in the Equation (2) and (3) and the significance of the residuals’ coefficients is tested. However, none of these coefficients is significant ($p > 0.10$). These test results suggest that the exogeneity assumption for our predetermined variables in Equation (2) and (3) cannot be rejected.

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3 Detailed results for the significance of each residual’s coefficients can be obtained from the authors upon request.
Second, we applied the specification test (HT-Test) outlined in Hausman and Taylor (1981). We use this test to test for the exogeneity of all other instruments that are not included in the estimation equations. Given a set of exactly identified instruments, the HT-Test examines the exogeneity of additional, overidentifying instruments. For Equation (2), the one-year and two-year lagged exogenous variables pretax interest coverage, operating margin, leverage, asset size as well as the one-year lagged variable industry concentration provide the initial set of instruments. We test for the following set of overidentifying instruments: dividend payout, asset growth, liquidity, and earnings variability, which are measured in period t-1. The HT-Test is not rejected ($\chi^2(4) = 1.52, p = 0.82$). For Equation (3), the one-year and two-year lagged exogenous variables dividend payout, growth rate, leverage, liquidity, earnings variability, log of total assets as well as the one-year lagged variable industry concentration provide the initial set of instruments. We apply the HT-Test on the overidentifying instruments pretax interest coverage and operating margin. The test is not rejected ($\chi^2(2) = 1.48, p = 0.48$).

**Strength of instruments.** Establishing evidence on the exogeneity of instruments is necessary but not sufficient as instruments may be weak. We therefore check for the strength of our set of instruments. First-stage regressions for the endogenous non-financial metrics brand equity, satisfaction, and corporate reputation show satisfactory levels of $R^2$ and F-value. Mean $R^2$ is at 0.35 and all F-values exceed the threshold of 10 indicating no weak-instrument issues (Stock, Wright, & Yogo, 2002). In addition, variables such as operating margin, industry concentration, and interest coverage show significant effects in the direction that is consistent with our conceptual arguments of identification ($p < 0.01$).

**Identification of carryover effects.** Lagged credit spread and beta in Equation (2) and (3) measure carryover effects. In the estimation, we use the lagged deviations of credit spread and

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4 Detailed estimation results from the first stage-regressions can be obtained from the authors upon request.
beta from the firm-specific mean. This procedure is necessary to isolate the true dynamic effects from heterogeneity effects that are associated with the lagged dependent variable in a panel (e.g., Arellano, 2003; Fischer & Albers, 2010). In addition, lagged beta is a predictor of credit spread in Equation (2). Since the equation system is recursive we can use observed values for lagged beta in Equation (2).

5.4 Estimation Results

Tables 6 and 7 summarize the estimation results with respect to credit spread and beta, respectively. In these tables, we show the results for models that include a varying set of predictors. The last column of Table 6 and 7 displays the results if all predictors of Equation (2) and (3) are incorporated. As mentioned above, this creates the highest demand for joint observations reducing the sample sizes significantly. Therefore, including the results for varying predictor sets helps us to better assess the stability of our results.

== Insert Tables 6 and 7 about here ==

Overall, model fit is very good for this class of data. Pseudo R², which is based on the squared correlation between predicted and actual values of the criterion variable, ranges from 0.59 to 0.69 for the beta regressions and from 0.58 to 0.76 for the credit spread regressions.

Results for credit spreads. We start our discussion with the results of the first column in Table 6. Here, we estimated a model that includes only the financial and other control variables. All estimation results show the expected sign. Our results are largely consistent with prior studies (e.g., Anderson & Mansi, 2009; Blume et al., 1998).

The next three columns display the results for models that include only one non-financial metric. We find a significant negative effect (p < 0.05) on credit spreads for all three focal variables. The fifth column of Table 6 presents the findings for the model including all three non-
financial metrics at once. Noteworthy, although we have a reduced sample size, the picture does not change substantially. Effects are again in the expected direction and reach significance. Hence, they support all three hypotheses H1, H2, and H3 (main effects). Customer satisfaction (-0.005; p < 0.01), brand equity (-4.8×10^{-4}; p < 0.05), and corporate reputation (-0.077; p < 0.05) contribute to reducing credit spreads. Since all variables are included at once the effects are indeed incremental to each other. Moreover, the impact of beta is still positive and significant (0.155; p < 0.05). Thus, customer satisfaction also influences credit spreads indirectly via beta.

The moderating effects of brand equity (3.3×10^{-7}; p < 0.05) as well as of reputation (-5.7×10^{-4}; p < 0.01) with regard to customer satisfaction are both significant and show the expected sign. The likelihood ratio test also supports this model extension ($\chi^2(2) = 8.68; p < 0.05$). Brand equity significantly attenuates the negative effect of customer satisfaction on credit spreads (H5), while corporate reputation amplifies this negative impact (H6).

To summarize, we find support for hypotheses H1 to H3 as well as H5 and H6. Customer satisfaction, brand equity, and corporate reputation significantly decrease credit spreads. We will discuss the relative impact of the focal variables (H4) subsequently when we compute elasticity estimates.

Results for stock-market beta. We start our discussion with the results of the first column in Table 7. Here, we estimated a model that includes only the financial and other control variables. All effects for the financial control variables show the expected sign. Results are very similar to those in previous studies (Beaver et al., 1970; McAlister et al., 2007).

The next three columns of Table 7 demonstrate the estimation results if we add only one non-financial metric at a time. We find a strong negative impact of customer satisfaction (-0.009; p < 0.01), which strongly supports H7. We have suggested arguments for a positive as well as a nega-
tive impact of brand equity and corporate reputation on beta. In fact, we do not find a significant influence for these two non-financial metrics (brand equity: $-2.5 \times 10^{-5}$, $p > 0.05$; reputation: $-0.026$, $p > 0.05$), which might suggest that both lines of arguments are relevant and the opposing effects offset each other. This conclusion does not change if we jointly estimate the effects for all three non-financial metrics (fifth column of Table 7). The coefficient associated with customer satisfaction ($-0.008$, $p < 0.01$) is still highly significant and of similar size even though the sample size is substantially smaller.

The sixth column of Table 7 presents the results for a model where we also consider potential moderator effects of brand equity and corporate reputation with regard to customer satisfaction. However, these additional variables (brand equity $\times$ satisfaction: $-3.5 \times 10^{-7}$, $p > 0.10$; reputation $\times$ satisfaction: $0.008$; $p > 0.10$) are neither significant nor do they improve model fit. The likelihood ratio test does not support this model extension ($\chi^2(2) = 1.36$; $p > 0.10$).

5.5 Robustness Tests

We performed several tests to assess the robustness of our results. First, we note that the results in Table 6 and Table 7 already indicate a relatively high stability of the estimated effects across several models with varying numbers of predictor variables. To assess the stability of our focal variables we calculate the coefficient of variation, which is the standard deviation of estimates divided by their mean across different models. For the credit spread regressions, the values are $0.327$ (satisfaction), $0.251$ (brand equity), and $0.197$ (corporate reputation). For the beta regressions, we obtain values of $0.284$ (satisfaction), $0.141$ (brand equity), and $0.137$ (corporate reputation). Overall, we have a quite low relative variance of coefficient estimates across different models with varying sample sizes and predictor variables.
Second, we checked whether our results are subject to collinearity issues. Following the “artificial orthogonalization” procedure by Hill and Adkins (2008), we regressed customer satisfaction on brand equity and corporate reputation, respectively, and computed the residuals, which are orthogonal to the regressors by definition. We substituted the residuals into the Equations (2) and (3) separately for each interaction term and estimated the equations again. The results for our interaction terms are not significantly different from the results in Table 6 and 7. However, we note that the coefficient of the substituted, collinearity-free variable is consistently estimated, but coefficients for the other variables are biased (Hill & Adkins, 2008).

Third, we estimated models that include changes in stock-market beta and credit spreads as dependent variables and changes in non-financial metrics and accounting/finance metrics as independent variables (e.g., Bharadwaj et al., 2011). A changes model is appropriate to lower the potential problems associated with time-invariant unobservable factors (Tuli & Bharadwaj, 2009) and multicollinearity. However, a changes regression reduces the power of tests as sample size and variation are significantly reduced. We use these changes models for every model in Table 6 and Table 7. Overall the results are similar to the results of the level models.

Fourth, for stock-market beta we tested if there are different effects for the non-financial metrics during economic upswings and downswings. We followed Lamey, Deleersnyder, Dekimpe, and Steenkamp (2007) in order to determine cyclical up- versus downturns. We included the non-financial metrics moderated by upturn and downturn dummies in our empirical model. Results are in line with our reasoning, i.e. show the expected sign. However, the majority of estimated coefficients is not significant because of the small sample size.\(^5\)

6. **Implications and Conclusions**

\(^5\) Estimation results can be obtained from the authors upon request.
6.1 Managerial and Research Implications

Our results provide interesting insights that should be useful for both managers and researchers. Conceptually, we provide a detailed distinction between the information content of the three non-financial metrics. Empirically, we find a strong impact of customer satisfaction on both stock-market beta and credit spreads. The conclusions are different for brand equity and corporate reputation. Both metrics do not seem to have an impact on beta, but they both directly influence credit spreads. In addition, our findings suggest that brand equity and corporate reputation significantly moderate the impact of customer satisfaction on credit spreads. We conclude that customer satisfaction, brand equity, and corporate reputation provide value-relevant information for investors, creditors, and credit rating agencies above and beyond each other metric. Hence, these stakeholders do not seem to substitute one metric for the other when assessing the various types of risks that are part of the cost of capital. Strictly speaking, we note that this conclusion refers to the information provided by the ACSI, Interbrand, and Fortune’s reputation index.

Given that all three non-financial metrics impact components of the cost of capital, we can use our estimates to assess their relative impact. Because the metrics are measured with different scales, we cannot compare coefficient estimates directly but need to transform them into elasticities. Table 8 summarizes the elasticity estimates. It shows the relative (percentage) increase in the cost of equity, cost of debt, and WACC in reaction to a relative (percentage) increase in customer satisfaction ratings, brand equity, and corporate reputation ratings. We take sample means for the risk-free rates, the capital structure, and so forth. We also differentiate between short-term and long-term effects. This separation has a direct practical implication because it enables investors to incorporate a time-varying discount factor in their valuation models. The long-term effect is obtained by dividing the short-term elasticity by (1-carryover coefficient). The estimation results in
Tables 6 and 7 show that dynamic effects are indeed present as the carryover coefficient associated with the lagged dependent variable is always significantly different from zero (p < 0.05). To better assess the robustness of elasticity magnitudes, Table 8 shows both estimates based on the credit-spread models with and without moderators. In the following discussion, we refer to the credit-spread model including the moderating effects.

== Insert Table 8 about here ==

Customer satisfaction shows a highly significant (p < .01) short-term and long-term elasticity with respect to the cost of equity (short-term: -0.205; long-term: -0.263; p < 0.01). An elasticity of around -.25 suggests decreasing marginal returns for the impact of satisfaction ratings on equity cost, but the magnitude appears to be quite substantial. Consistent with the estimation results, we do not estimate significant equity-cost elasticities with respect to brand equity and corporate reputation (p > .05).

The picture is different when we consider the effects on credit spreads. Note that we take into account the indirect effects of non-financial metrics via beta as well as the interaction effects with respect to customer satisfaction. We apply the delta method to obtain standard errors. Since this is a Taylor-series approximation of a non-linear random term estimates tend to be inflated. Interestingly, corporate reputation appears to exert the highest influence on the cost of debt. Its short-term elasticity is -.137 and its long-term elasticity -.244 (for both, p < .05). These elasticities are substantial. The elasticities for customer satisfaction are -.137 (short-term) and -.147 (long-term) and highly significant (p < 0.01). They are considerably smaller for brand equity (short-term: -0.023 and long-term: -0.041; both p < 0.10). Table 8 also shows the ultimate effects of the non-financial metrics on WACC. Here, we take into account the average capital structure. WACC elasticity is highest with respect to satisfaction (short-term: -0.148 and long-term: -0.206;
both $p < 0.01$), followed by corporate reputation (short-term: -0.091; and long-term: -0.147; both $p < 0.10$). The elasticity estimates with respect to brand equity are rather small and subject to a quite large approximated standard error.

Table 8 shows that the credit-spread elasticity is substantially higher for corporate reputation compared with brand equity and satisfaction. The difference is, however, only statistically significant with respect to brand equity ($p < 0.01$). Thus, we find partial support for hypothesis H4.

The estimated elasticities underline that the non-financial metrics contain information that drives the cost of capital in a significant manner. These results may serve as an input for a dialogue among senior accounting, finance, and marketing executives about the role of non-financial metrics for the terms of financing. Our findings help measuring the full financial impact of improving marketing metrics. Given that many studies show the contribution of marketing to financial success via an increase in the level of cash flows, these results complement the picture via the reduction in capital cost. As a consequence, cutting back investments in marketing, customer relationship management or reputation-building activities may not only harm a firm’s value with regard to future cash flows, but may also lead to higher hurdle rates for the required return on capital.

Our analyses show that all three non-financial metrics are relevant drivers of capital cost components. We find an amazing stability of coefficients across models of different sample size and different predictor sets. We have discussed the joint and distinct informational content with regard to the non-financial metrics. The moderation analysis with regard to the cost of debt reveals that it is important how to frame the communication and disclosure of customer satisfaction ratings to stakeholders of the firm. While strong brand equity dilutes the information content of customer satisfaction, demonstrating the operational efficiency makes the information derived from customer satisfaction much more valuable. Thus, marketing managers can more effectively communicate
the impact of these intangibles and make a stronger case for marketing in the boardroom (Luo et al., 2010).

6.2 Limitations and Future Research

We need to mention a few limitations of this study, which might stimulate future research. Even though results are stable across model estimations with very different sample sizes, the full model is estimated with a rather small sample size. Analysis of a larger sample is likely to further increase the precision of estimates.

Although we have good reasons for the choice of ACSI, Interbrand, and Fortune to measure customer satisfaction, brand equity, and corporate reputation, it might be interesting to investigate the sensitivity of results with respect to alternative measures of satisfaction, brand equity, and corporate reputation. Deviating results would indicate that investors pay attention to the source of qualitative information they use for assessing risks.

Our elasticity analysis shows that the effect of customer satisfaction ratings on capital cost, as an example, is substantial. This finding, however, does not imply that satisfaction ratings should be improved per se. Improvements require investments that are likely to be subject to decreasing returns of scale. Future research may determine the optimal investment level.
References


Table 1. Sample of Prior Research on Drivers of the Cost of Capital

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<th>Accounting/Financial Variables</th>
<th>Non-financial (marketing) metrics</th>
<th>Cost of Capital</th>
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<td>Luo, Homburg, &amp; Wieseke (2010)</td>
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<td>Madden, Fehle, &amp; Fournier (2006)</td>
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<td>McAlister, Srinivasan, &amp; Kim (2007)</td>
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<td>Orlitzky &amp; Benjamin (2001)</td>
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<td>Rego, Morgan, &amp; Billett (2009)</td>
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<td>Singh, Faircloth, &amp; Nejadmalayeri (2005)</td>
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<td>Tuli &amp; Bharadwaj (2009)</td>
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<tr>
<td>This study</td>
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* Authors only investigate one dimension of corporate reputation, which is corporate social responsibility.
* Authors investigate one dimension of brand equity, which is brand quality.
### Table 2. Main information content of focal non-financial metrics

<table>
<thead>
<tr>
<th>Construct (measure)</th>
<th>Customer Satisfaction (ACSI)</th>
<th>Brand Equity (Interbrand financial brand value)</th>
<th>Corporate Reputation (Fortune Reputation Index)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loyalty of existing customers</td>
<td>X</td>
<td>(X)</td>
<td></td>
</tr>
<tr>
<td>Willingness-to-pay by existing customers</td>
<td>X</td>
<td>(X)</td>
<td></td>
</tr>
<tr>
<td>Potential to grow with product/services into new markets/customer segments</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Innovativeness</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Familiarity with product and firm</td>
<td>X</td>
<td>(X)</td>
<td></td>
</tr>
<tr>
<td>Operational efficiency</td>
<td></td>
<td>X</td>
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<tr>
<td>Quality of management and employees</td>
<td></td>
<td>X</td>
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</tbody>
</table>

(X) means limited signaling content

### Table 3. Overview of hypotheses

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Credit Spread</th>
<th>Beta</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Direct Impact</td>
<td>Relative Strength</td>
</tr>
<tr>
<td>Customer satisfaction</td>
<td>- (H1)</td>
<td>H4: Strongest impact by corporate reputation</td>
</tr>
<tr>
<td>Brand equity</td>
<td>- (H2)</td>
<td>+ (H5)</td>
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<tr>
<td>Corporate Reputation</td>
<td>- (H3)</td>
<td>- (H6)</td>
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</table>
Table 4. Univariate Statistics

<table>
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<tr>
<th>Variables</th>
<th>N</th>
<th>Mean</th>
<th>Median</th>
<th>Std. Dev.</th>
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<td><strong>Beta</strong></td>
<td>4940</td>
<td>.95</td>
<td>.88</td>
<td>.54</td>
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<tr>
<td><strong>Credit Spread (in percent)</strong></td>
<td>3196</td>
<td>1.24</td>
<td>.92</td>
<td>.95</td>
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<tr>
<td><strong>Brand Equity ($m)</strong></td>
<td>1164</td>
<td>620.16</td>
<td>321.16</td>
<td>854.82</td>
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<tr>
<td><strong>Satisfaction (scale: 1-100)</strong></td>
<td>1893</td>
<td>75.71</td>
<td>76.01</td>
<td>6.47</td>
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<tr>
<td><strong>Reputation (scale: 1-10)</strong></td>
<td>1732</td>
<td>6.59</td>
<td>6.70</td>
<td>1.04</td>
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<tr>
<td><strong>Dividend Payout</strong></td>
<td>3992</td>
<td>1.09</td>
<td>.38</td>
<td>30.00</td>
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<tr>
<td><strong>Earnings Variability</strong></td>
<td>3598</td>
<td>.08</td>
<td>.02</td>
<td>.21</td>
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<tr>
<td><strong>Growth</strong></td>
<td>4785</td>
<td>.11</td>
<td>.07</td>
<td>.29</td>
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<tr>
<td><strong>Leverage</strong></td>
<td>5171</td>
<td>.44</td>
<td>.46</td>
<td>.18</td>
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<tr>
<td><strong>Ln Asset Size ($m)</strong></td>
<td>5130</td>
<td>9.08</td>
<td>9.24</td>
<td>1.80</td>
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<tr>
<td><strong>Liquidity</strong></td>
<td>4516</td>
<td>1.54</td>
<td>1.30</td>
<td>.57</td>
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<tr>
<td><strong>Industry Concentration</strong></td>
<td>6153</td>
<td>.17</td>
<td>.11</td>
<td>.17</td>
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<tr>
<td><strong>Pretax Interest Coverage (in percent)</strong></td>
<td>4712</td>
<td>24.90</td>
<td>5.93</td>
<td>249.22</td>
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<tr>
<td><strong>Operating Margin</strong></td>
<td>5053</td>
<td>.18</td>
<td>.17</td>
<td>.35</td>
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Table 5. Correlations (number of observations in parentheses)

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<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
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<tbody>
<tr>
<td>1. Beta</td>
<td>1.00 (4940)</td>
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<tr>
<td>2. Credit Spread</td>
<td>0.09*** (3068)</td>
<td>1.00 (3196)</td>
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<tr>
<td>3. Brand Equity</td>
<td>-0.26*** (1721)</td>
<td>-0.24*** (1433)</td>
<td>0.12 (438)</td>
<td>1.00 (1893)</td>
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<tr>
<td>4. Satisfaction</td>
<td>-0.03* (1639)</td>
<td>-0.44*** (1311)</td>
<td>0.23** (511)</td>
<td>-0.31*** (836)</td>
<td>1.00 (1732)</td>
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<tr>
<td>5. Reputation</td>
<td>0.03 (3731)</td>
<td>0.00 (2543)</td>
<td>-0.03 (900)</td>
<td>-0.10*** (1370)</td>
<td>-0.03 (1343)</td>
<td>1.00 (3992)</td>
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<tr>
<td>6. Dividend Payout</td>
<td>0.11*** (3475)</td>
<td>0.24*** (2411)</td>
<td>0.08** (798)</td>
<td>-0.24*** (1401)</td>
<td>-0.37*** (1301)</td>
<td>0.01 (1732)</td>
<td>1.00 (3598)</td>
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<tr>
<td>7. Earnings Variability</td>
<td>0.22*** (4541)</td>
<td>0.02 (3049)</td>
<td>0.12** (1085)</td>
<td>-0.02 (1774)</td>
<td>-0.20*** (1674)</td>
<td>-0.06*** (3736)</td>
<td>-0.09*** (3172)</td>
<td>1.00 (4785)</td>
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<tr>
<td>8. Growth</td>
<td>0.17* (4201)</td>
<td>0.41*** (2733)</td>
<td>-0.18** (943)</td>
<td>-0.32*** (1560)</td>
<td>-0.51*** (1449)</td>
<td>0.00 (3412)</td>
<td>0.07*** (3415)</td>
<td>-0.11*** (4073)</td>
<td>1.00 (4303)</td>
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<tr>
<td>9. Leverage</td>
<td>-0.08*** (4781)</td>
<td>-0.25*** (3218)</td>
<td>0.40*** (1094)</td>
<td>-0.10*** (1789)</td>
<td>-0.08*** (1680)</td>
<td>-0.01 (3992)</td>
<td>-0.43** (3415)</td>
<td>-0.12*** (4785)</td>
<td>-0.25*** (4302)</td>
<td>1.00 (5130)</td>
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<tr>
<td>10. Asset Size (log)</td>
<td>-0.21*** (3807)</td>
<td>0.05** (2713)</td>
<td>-0.05 (980)</td>
<td>0.10*** (1603)</td>
<td>0.11*** (1447)</td>
<td>-0.03*** (3135)</td>
<td>-0.04** (2989)</td>
<td>0.25*** (3626)</td>
<td>-0.38*** (3923)</td>
<td>0.37*** (3923)</td>
<td>1.00 (4059)</td>
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<tr>
<td>11. Liquidity</td>
<td>0.02** (4896)</td>
<td>0.05* (3167)</td>
<td>0.11** (1162)</td>
<td>-0.35*** (1891)</td>
<td>-0.10*** (1730)</td>
<td>-0.01 (3980)</td>
<td>-0.02 (3590)</td>
<td>-0.02 (4776)</td>
<td>-0.15*** (4291)</td>
<td>-0.19*** (5118)</td>
<td>-0.12*** (4053)</td>
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<tr>
<td>12. Industry Conc.</td>
<td>0.05** (4429)</td>
<td>-0.08*** (2951)</td>
<td>0.06** (1017)</td>
<td>0.04 (1669)</td>
<td>0.08*** (1557)</td>
<td>-0.01 (3721)</td>
<td>0.02 (3082)</td>
<td>-0.02 (4401)</td>
<td>-0.18*** (4203)</td>
<td>-0.03** (4710)</td>
<td>-0.30*** (3649)</td>
<td>-0.01 (4712)</td>
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<tr>
<td>13. Pretax Int. Coverage</td>
<td>-0.05** (4744)</td>
<td>-0.22*** (3047)</td>
<td>0.26*** (1081)</td>
<td>-0.09*** (1762)</td>
<td>-0.20*** (1653)</td>
<td>-0.12*** (3939)</td>
<td>-0.28*** (3374)</td>
<td>-0.01 (4722)</td>
<td>0.21*** (4273)</td>
<td>0.14*** (5052)</td>
<td>-0.05*** (3901)</td>
<td>0.08*** (5041)</td>
<td>1.00 (4654)</td>
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<tr>
<td>14. Operating Margin</td>
<td>-1.66*** (1126)</td>
<td>-0.29*** (3004)</td>
<td>0.26*** (1081)</td>
<td>-0.09*** (1762)</td>
<td>-0.20*** (1653)</td>
<td>-0.12*** (3939)</td>
<td>-0.28*** (3374)</td>
<td>-0.01 (4722)</td>
<td>0.21*** (4273)</td>
<td>0.14*** (5052)</td>
<td>-0.05*** (3901)</td>
<td>0.08*** (5041)</td>
<td>1.00 (4654)</td>
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***, **, * denote statistical significance at the 1 %, 5 %, and 10 % levels, respectively (two-tailed).
Table 6. Estimation Results (*Equation 2*); Dependent Variable: Credit Spread

<table>
<thead>
<tr>
<th>Variables</th>
<th>Exp. Sign</th>
<th>Accounting/Financial Control Variables Only</th>
<th>Accounting/Financial Control Variables + Customer Satisfaction</th>
<th>Accounting/Financial Control Variables + Brand Equity</th>
<th>Accounting/Financial Control Variables + Corporate Reputation</th>
<th>Accounting/Financial Control Variables + All 3 Non-financial Metrics</th>
<th>Accounting/Financial Control Variables + All 3 Non-financial Metrics + Moderators</th>
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</thead>
<tbody>
<tr>
<td><strong>Constant</strong></td>
<td></td>
<td>3.399 (.275) ***</td>
<td>3.813 (.322) ***</td>
<td>3.497 (.297) ***</td>
<td>3.248 (.777) ***</td>
<td>3.639 (.848) ***</td>
<td>3.730 (1.085) ***</td>
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<tr>
<td><strong>Estimated SD</strong></td>
<td></td>
<td>.486 (.012) ***</td>
<td>.478 (.009) ***</td>
<td>.379 (.056) ***</td>
<td>.401 (.012) ***</td>
<td>.322 (.019) ***</td>
<td>.341 (0.044) ***</td>
</tr>
<tr>
<td><strong>Lagged Spread</strong></td>
<td>+</td>
<td>.557 (.127)***</td>
<td>.482 (.078)***</td>
<td>.424 (.144)***</td>
<td>.451 (.144)***</td>
<td>.385 (.122)***</td>
<td>.439 (.064)***</td>
</tr>
<tr>
<td><strong>Satisfaction</strong></td>
<td>-</td>
<td>- .006 (.001)***</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>- .005 (.002)***</td>
<td>- .003 (7.5·10⁻⁴)***</td>
</tr>
<tr>
<td><strong>Brand Equity</strong></td>
<td>-</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>-4.8·10⁻⁴ (2.7·10⁻⁴)***</td>
<td>-2.9·10⁻⁴ (2.1·10⁻⁴)***</td>
</tr>
<tr>
<td><strong>Reputation</strong></td>
<td>-</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>- .115 (.029)***</td>
<td>- .077 (.043)***</td>
</tr>
<tr>
<td><strong>Sat. * Br. Eq.</strong></td>
<td>+</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>3.3·10⁻⁷ (1.8·10⁻⁷)***</td>
</tr>
<tr>
<td><strong>Sat. * Reput.</strong></td>
<td>-</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>-5.7·10⁻⁴ (2.8·10⁻⁴)***</td>
</tr>
<tr>
<td><strong>Beta</strong></td>
<td>+</td>
<td>.198 (.120)***</td>
<td>.252 (.141)***</td>
<td>.214 (.121)***</td>
<td>.236 (.071)***</td>
<td>.155 (.093)***</td>
<td>.154 (.082)***</td>
</tr>
<tr>
<td><strong>Pretax Int. Cov.</strong></td>
<td>-</td>
<td>- .005 (3·10⁻⁴)***</td>
<td>- .008 (.003)***</td>
<td>- .002 (4.2·10⁻⁴)***</td>
<td>-8.8·10⁻⁴ (1.9·10⁻⁴)***</td>
<td>- .004 (9.1·10⁻⁴)***</td>
<td>-.004 (0.001)***</td>
</tr>
<tr>
<td><strong>Oper. Margin</strong></td>
<td>-</td>
<td>-1.462 (.345)***</td>
<td>-1.436 (.332)***</td>
<td>-1.264 (.384)***</td>
<td>- .876 (.286)***</td>
<td>-1.047 (.722)***</td>
<td>-.937 (.583)***</td>
</tr>
<tr>
<td><strong>Leverage</strong></td>
<td>+</td>
<td>1.301 (.181)***</td>
<td>1.207 (.278)***</td>
<td>1.246 (.512)***</td>
<td>.768 (.242)***</td>
<td>.589 (.422)***</td>
<td>.549 (.333)***</td>
</tr>
<tr>
<td><strong>Ln Asset Size</strong></td>
<td>-</td>
<td>- .108 (.029)***</td>
<td>- .125 (.033)***</td>
<td>- .058 (.020)***</td>
<td>- .056 (.033)***</td>
<td>- .020 (.006)***</td>
<td>-.014 (0.10)***</td>
</tr>
<tr>
<td><strong>Ind. Conc.</strong></td>
<td>+/-</td>
<td>- .047 (.118)***</td>
<td>.176 (.148)***</td>
<td>.217 (.167)***</td>
<td>.106 (.122)***</td>
<td>-.231 (.497)***</td>
<td>-.166 (.216)***</td>
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<tr>
<td><strong>Log L</strong></td>
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<td>-2066.61</td>
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<td>-354.71</td>
<td>-661.52</td>
<td>-41.28</td>
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<tr>
<td><strong>Pseudo R²</strong></td>
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<td>.578</td>
<td>.613</td>
<td>.633</td>
<td>.662</td>
<td>.734</td>
<td>.759</td>
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<tr>
<td><strong>N</strong></td>
<td></td>
<td>2509</td>
<td>1210</td>
<td>648</td>
<td>1049</td>
<td>133</td>
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</table>

Note: The standard errors are reported in parentheses. ***, **, * denote statistical significance at the 1 %, 5 %, and 10 % levels, respectively (two-tailed).***, ***, * denote statistical significance at the 1 %, 5 %, and 10 % levels, respectively, for variables with directional hypothesis (one-tailed).Non-financial variables are instrumented by all exogenous variables of model (2) plus dividend payout, growth, liquidity, and earnings variability. Coefficients of industry dummies are not reported, but can be obtained from the authors.
### Table 7. Estimation Results (Equation 3); Dependent Variable: Stock-Market Beta

<table>
<thead>
<tr>
<th>Variables</th>
<th>Exp. Sign</th>
<th>Accounting/Financial Control Variables Only</th>
<th>Accounting/Financial Control Variables + Customer Satisfaction</th>
<th>Accounting/Financial Control Variables + Brand Equity</th>
<th>Accounting/Financial Control Variables + Corporate Reputation</th>
<th>Accounting/Financial Control Variables + All 3 Non-financial Metrics</th>
<th>Accounting/Financial Control Variables + All 3 Non-financial Metrics + Moderators</th>
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</thead>
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<tr>
<td>Constant</td>
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<td>.714 (.144)**</td>
<td>.108 (.313)**</td>
<td>.819 (.299)**</td>
<td>.131 (.165)**</td>
<td>.199 (.601)**</td>
<td>.1404 (.714)**</td>
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<tr>
<td>Estimated SD</td>
<td></td>
<td>.229 (.018)**</td>
<td>.331 (.010)**</td>
<td>.278 (.010)**</td>
<td>.263 (.009)**</td>
<td>.244 (.022)**</td>
<td>.275 (.044)**</td>
</tr>
<tr>
<td>Lagged Beta(^b)</td>
<td>+</td>
<td>.412 (.135)(^{aa})</td>
<td>.341 (.051)(^{aa})</td>
<td>.433 (.086)(^{aaa})</td>
<td>.329 (.108)(^{aaa})</td>
<td>.219 (.131)(^{aa})</td>
<td>.228 (.104)(^{aaa})</td>
</tr>
<tr>
<td>Satisfaction(^c)</td>
<td>-</td>
<td>--</td>
<td>-.009 (.003)(^{aa})</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Brand Equity(^c)</td>
<td>+/-</td>
<td>--</td>
<td>--</td>
<td>-2.5·10(^{-5}) (2.2·10(^{-5}))</td>
<td>--</td>
<td>-1.9·10(^{-5}) (1.5·10(^{-5}))</td>
<td>-2.1·10(^{-5}) (3.4·10(^{-5}))</td>
</tr>
<tr>
<td>Reputa(^c)</td>
<td>+/-</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>-.026 (.017)</td>
<td>-.025 (.014)(^{*})</td>
<td>-.032 (.028)</td>
</tr>
<tr>
<td>Sat.(^c) * Br. Eq.(^c)</td>
<td>+/-</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>3.5·10(^{-7}) (3.9·10(^{-7}))</td>
</tr>
<tr>
<td>Sat(^c) * Reput(^c)</td>
<td>+/-</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>.008 (.007)</td>
</tr>
<tr>
<td>Dividend Pay.</td>
<td>-</td>
<td>-1.5·10(^{-4}) (2.8·10(^{-4}))</td>
<td>-.015 (.012)(^{a})</td>
<td>1.7·10(^{-4}) (2.1·10(^{-4}))</td>
<td>-1.9·10(^{-4}) (2.9·10(^{-4}))</td>
<td>-0.88 (.034)(^{aaa})</td>
<td>-1.04 (.056)(^{aaa})</td>
</tr>
<tr>
<td>Growth</td>
<td>+</td>
<td>.319 (.069)(^{aaa})</td>
<td>.067 (.073)(^{a})</td>
<td>.325 (.174)(^{aa})</td>
<td>.288 (.117)(^{aaa})</td>
<td>.291 (.367)(^{a})</td>
<td>.321 (.267)</td>
</tr>
<tr>
<td>Liquidity</td>
<td>-</td>
<td>-.089 (.085)(^{a})</td>
<td>-.221 (.148)(^{a})</td>
<td>-.077 (.116)</td>
<td>-.045 (.077)</td>
<td>-.077 (.053)(^{a})</td>
<td>-.098 (.054)(^{aa})</td>
</tr>
<tr>
<td>Earnings Var.</td>
<td>+</td>
<td>4.109 (1.376)(^{aaa})</td>
<td>3.094 (1.635)(^{aaa})</td>
<td>4.167 (1.322)(^{aaa})</td>
<td>2.268 (1.344)(^{aa})</td>
<td>4.213 (2.273)(^{aa})</td>
<td>3.873 (1.944)(^{aa})</td>
</tr>
<tr>
<td>Leverage</td>
<td>+</td>
<td>.583 (.083)(^{aaa})</td>
<td>.347 (.066)(^{aaa})</td>
<td>.142 (.082)(^{aa})</td>
<td>.441 (.123)(^{aaa})</td>
<td>.117 (.061)(^{aa})</td>
<td>.108 (.073)(^{a})</td>
</tr>
<tr>
<td>Ln Asset Size</td>
<td>-</td>
<td>-.038 (.006)(^{aaa})</td>
<td>-.022 (.013)(^{aa})</td>
<td>-.027 (.011)(^{aaa})</td>
<td>-.026 (.018)(^{a})</td>
<td>-.051 (.044)(^{a})</td>
<td>-.029 (.038)(^{a})</td>
</tr>
<tr>
<td>Ind. Conc.</td>
<td>+</td>
<td>.151 (.052)(^{aaa})</td>
<td>.229 (.047)(^{aaa})</td>
<td>.126 (.084)(^{a})</td>
<td>.146 (.082)(^{aa})</td>
<td>.028 (.152)(^{a})</td>
<td>.031 (.141)(^{a})</td>
</tr>
<tr>
<td>Log L</td>
<td></td>
<td>-612.73</td>
<td>-222.40</td>
<td>-118.13</td>
<td>-138.74</td>
<td>-33.62</td>
<td>-32.94</td>
</tr>
<tr>
<td>Pseudo R(^2)</td>
<td></td>
<td>.586</td>
<td>.651</td>
<td>.608</td>
<td>.646</td>
<td>.682</td>
<td>.688</td>
</tr>
<tr>
<td>N</td>
<td></td>
<td>3119</td>
<td>1266</td>
<td>795</td>
<td>1138</td>
<td>144</td>
<td>144</td>
</tr>
</tbody>
</table>

Note: The standard errors are reported in parentheses. ***, **, * denote statistical significance at the 1 %, 5 %, and 10 % levels, respectively (two-tailed). \(^{aa}\), \(^{aaa}\), \(^{a}\) denote statistical significance at the 1 %, 5 %, and 10 % levels, respectively, for variables with directional hypothesis (one-tailed). \(^{b}\) denotes that the variable is instrumented by its lagged deviation from the firm-specific mean. \(^{c}\) denotes that the variables are instrumented by all exogenous variables of model (3) plus interest coverage and operating margin. Coefficients of industry dummies are not reported, but can be obtained from the authors.
Table 8. Comparison of Estimated Short-Term and Long-Term Elasticities

<table>
<thead>
<tr>
<th>Due to (percentage change)</th>
<th>Short-term</th>
<th>Long-term</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N (Eq.2)</td>
<td>N (Eq.3)</td>
</tr>
<tr>
<td></td>
<td>Cost of equity</td>
<td>Cost of debt</td>
</tr>
</tbody>
</table>

**Joint impact (column 5 in Table 6 and 7) WITHOUT MODERATORS**
for credit spread equation

| Brand equity | 144 | 133 | -0.004 (0.003) | -0.041 (0.023)\(^{aa}\) | -0.020 (0.012) | -0.005 (0.004) | -0.067 (0.039)\(^{aa}\) | -0.032 (0.020) |
| Satisfaction  | 144 | 133 | -0.205 (0.103)\(^{aaa}\) | -0.065 (0.026)\(^{aaa}\) | -0.143 (0.069)\(^{aaa}\) | -0.263 (0.131)\(^{aaa}\) | -0.110 (0.046)\(^{aaa}\) | -0.193 (0.094)\(^{aaa}\) |
| Corporate reputation | 144 | 133 | -0.056 (0.031)\(^*\) | -0.073 (0.041)\(^{aa}\) | -0.064 (0.035)\(^*\) | -0.072 (0.040)\(^*\) | -0.120 (0.069)\(^{aa}\) | -0.093 (0.053)\(^*\) |

**Joint impact (column 6 in Table 6 and 7) WITH SIGNIFICANT MODERATORS**
for credit spread equation

| Brand equity | 144 | 133 | -0.004 (0.003) | -0.023 (0.016)\(^*\) | -0.012 (0.008) | -0.005 (0.004) | -0.041 (0.028)\(^*\) | -0.021 (0.015) |
| Satisfaction  | 144 | 133 | -0.205 (0.103)\(^{aaa}\) | -0.075 (0.019)\(^{aaa}\) | -0.148 (0.058)\(^{aaa}\) | -0.263 (0.131)\(^{aaa}\) | -0.134 (0.034)\(^{aaa}\) | -0.206 (0.088)\(^{aaa}\) |
| Corporate reputation | 144 | 133 | -0.056 (0.031)\(^*\) | -0.137 (0.071)\(^{aa}\) | -0.091 (0.049)\(^*\) | -0.072 (0.040)\(^*\) | -0.244 (0.128)\(^{aa}\) | -0.147 (0.079)\(^*\) |

Note: The standard errors are reported in parentheses. For long-term elasticities, they are approximated with the delta method.
The standard errors are reported in parentheses. ***, **, * denote statistical significance at the 1 %, 5 %, and 10 % levels, respectively (two-tailed).
\(^{aa}\), \(^{aaa}\), \(^*\) denote statistical significance at the 1 %, 5 %, and 10 % levels, respectively, for variables with directional hypothesis (one-tailed).
Mean values for cost of equity: 8.85 % (total sample), 9.02 % (sample with joint impact of non-financials)
Mean values for cost of debt: 7.24 % (total sample), 7.66 % (sample joint impact of non-financials)
Mean values for WACC: 8.37 % (total sample), 8.61 % (sample joint impact of non-financials)
Figure 1. Conceptual Model

- : Direct influence
- - : Moderating influence
Figure 2. Data Alignment

Measurement Periods

Financial Controls

Corporate Reputation

Brand Equity

Stock-market beta

Credit spreads

ACSI 1

ACSI 2

ACSI 3

ACSI 4

Year 1

Year 2

Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4

Release Dates

Financial controls

Corporate reputation (Fortune)

Brand equity (Interbrand)

Customer Satisfaction (ACSI)

Time Index in Models (2) and (3)

Note:

Denotes time span during which construct is measured

* ACSI 1 etc. denote the quarters when data are released for different economic sectors
## Appendix

**Table A1. Variable Definitions**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Definition</th>
<th>Measure</th>
<th>COMPUSTAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset Size</td>
<td>Three-year average of total assets</td>
<td>$(1/3) \cdot \sum \ln(\text{Total assets})$ for three years</td>
<td>DATA 6 (Total assets)</td>
</tr>
<tr>
<td>Dividend Payout</td>
<td>Three-year average of cash dividends / earnings</td>
<td>$(1/3) \cdot \sum \frac{\text{Cash dividend}}{\text{available income}}$ for three years</td>
<td>DATA 21 (Cash dividend); DATA 20 (income available for common stockholders)</td>
</tr>
<tr>
<td>Earnings Variability</td>
<td>Three-year average of standard deviation of earnings / price ratio</td>
<td>$(1/3) \cdot \text{Standard deviation of earnings / price ratio}$ for three years</td>
<td>DATA 20 (Income before extraordinary items – adjusted for common stock equivalents); DATA 24 (Price – close), DATA 25 (Common shares outstanding)</td>
</tr>
<tr>
<td>Growth</td>
<td>Three-year average of terminal total assets / initial assets</td>
<td>$(1/3) \cdot \ln(\text{Total assets}_3 / \text{Total assets}_1)$</td>
<td>DATA 6 (Total assets)</td>
</tr>
<tr>
<td>Industry Concentration</td>
<td>C4-concentration index</td>
<td>Sum of market shares of the top four firms in the industry defined at two digits of the NAICS</td>
<td>DATA 12</td>
</tr>
<tr>
<td>Leverage</td>
<td>Three-year average of total senior securities (preferred stocks and bonds) / total assets</td>
<td>$(1/3) \cdot \sum \frac{\text{Total senior securities}}{\text{Total assets}}$ for three years</td>
<td>DATA 5 + DATA 9 + DATA 10 (Total senior securities); DATA 6 (Total assets)</td>
</tr>
<tr>
<td>Liquidity</td>
<td>Three-year average of current ratio</td>
<td>$(1/3) \cdot \sum \frac{\text{Current assets}}{\text{Current liabilities}}$ for three years</td>
<td>DATA 4 (Current assets); DATA 5 (Current Liabilities)</td>
</tr>
<tr>
<td>Operating Margin</td>
<td>Three-year average of operating income before depreciation / sales</td>
<td>$(1/3) \cdot \sum \frac{\text{Operating income before depreciation}}{\text{sales}}$ for three years</td>
<td>DATA 13 (Operating income before depreciation); DATA 12 (Sales)</td>
</tr>
<tr>
<td>Pretax Interest Coverage</td>
<td>Three-year average of (operating income after depreciation + interest expense) / interest expense</td>
<td>$(1/3) \cdot \sum \frac{\text{Operating income after depreciation + interest expense}}{\text{interest expense}}$ for three years</td>
<td>DATA 178 (Operating income after depreciation); DATA 15 (Interest expense)</td>
</tr>
</tbody>
</table>