Do Contented Customers Make Shareholders Wealthy? - Implications of Intangibles for Security Pricing

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Abstract

We explore the relation between an outcome variable of organizational capital, customer satisfaction, and security returns. Building on recent research showing that customer satisfaction is related to stock returns, we test whether this relation is due to a systematic source of risk (as suggested by Eisfeldt and Papanikolaou (2013)) or to mispricing. We show that firms with high levels of customer satisfaction earn excess returns. This result is robust to a large number of model specifications (including the Carhart (1997) model, the Fama and French (2015) 5-factor model, the Hou et al. (2015) q-factor model and the Stambaugh and Yuan (2017) mispricing factor model) and test methodologies (time-series regressions, matching on firm characteristics and Fama and MacBeth (1973) regressions). Our results thus favor an explanation based on mispricing. We also explore the relation between customer satisfaction and measures of intangible asset value proposed in the recent literature.

Keywords: Intangible Capital, Customer Satisfaction, Anomalies, Stock Returns, Factors
JEL Classifications: E22, G12, G14, M31

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1 Introduction

Recent research has presented evidence that stock returns of firms with high levels of a particular market-based intangible, namely customer satisfaction, seem to outperform the market on a risk-adjusted basis, and that a hedge fund which implements a customer satisfaction-based strategy generates significant abnormal returns (e.g. Aksoy et al. (2008), Fornell et al. (2006) and Fornell et al. (2016b)). In this paper we address this issue and thus the link between intangible assets and security returns from a finance perspective. A link between customer satisfaction, an outcome variable of intangible organizational capital, and stock returns may exist if either customer satisfaction is related to a source of systematic risk not controlled for, or if there is misvaluation. Eisfeldt and Papanikolaou (2013) develop a theoretical model which suggests that firms sustaining high levels of customer satisfaction may indeed be more risky. We use data on the American Customer Satisfaction Index (ACSI) and stock return data to test empirically whether standard risk factors capture this source of risk. We provide evidence that this is not the case. A trading strategy based on the ACSI yields significant abnormal returns even after controlling for a large number of standard risk factors. This finding is robust both to variations in the set of factors included in the regression and to the test methodology. Specifically, we estimate time-series regressions, we match firms based on characteristics, and we run Fama and MacBeth (1973) regressions. Our results thus favor a mispricing-based explanation of the relation between customer satisfaction and stock returns.

Our paper is related to several strands of the finance literature. Most papers analyzing return "anomalies" and the profitability of trading strategies building on them, consider accounting-related firm characteristics. Recently, however, there has been growing interest in the role and valuation of intangible assets. Corrado and Hulten (2010) estimate that intangible assets account for 34% of firm value. Following the taxonomy proposed by Peters and Taylor (2017), intangible assets of a firm are composed of its knowledge capital and its organization capital. The latter, among other things, includes human capital and the value of customer relationships (or the customer capital, as Gourio and Rudanko (2014) name it). Our measure of customer satisfaction is related to the firm's customer capital and thus to one of the major components of a firm's organization capital, which holds if we follow the decomposition of Peters and Taylor (2017).

Edmans (2011) provides evidence that stock prices are slow in reacting to news about intangible assets. Specifically, he shows that stock prices do not fully incorporate readily available information on employee satisfaction. His results thus point towards misvaluation. Eisfeldt and Papanikolaou (2013) develop a formal model in which firms with higher levels of organization capital are more risky and therefore should yield higher returns. The logic of the model extends to customer satisfaction which, as outlined above, is a measure of customer capital. Eisfeldt and Papanikolaou (2013) also present empirical results, which are consistent with the predictions of their model. They show that the stock of firms with high levels of organization capital earn higher returns. These findings are supported by Belo et al. (2014). They report that the stocks of firms with higher brand capital (a component of organization capital) intensity deliver higher returns. In contrast, Tuli and Bharadwaj (2009) find that firms with higher levels of customer satisfaction have lower market risk and lower idiosyncratic risk. Larkin (2013) performs an empirical analysis of customer brand perception. She finds that firms with stronger brand perception are less risky. They have less volatile cash flows and better credit ratings. These results are in contrast to the predictions made by the model of Eisfeldt and Papanikolaou (2013) and to the empirical results presented by the authors.

Our paper contributes to the literature in several ways. First, we contribute to the emerging literature on the valuation of intangible assets and the implications of investments in intangible assets for stock returns. Second, we provide evidence that customer satisfaction is systematically related to firm characteristics associated with and cost-based measures of intangible asset value. These relations support our view that customer satisfaction can be interpreted as an output-based measure of organization capital. Third, we shed light on the important question whether the abnormal returns earned by firms with high levels of organization capital are a reflection of a different level of risk, as is predicted by the model of Eisfeldt and Papanikolaou (2013) and supported by the evidence presented therein and in Belo et al. (2014), or are evidence of mispricing, as the results of Edmans (2011), Tuli and Bharadwaj (2009) and Larkin (2013) would suggest. We find that a customer satisfaction based strategy earns significant excess returns even after controlling for a wide array of (risk and/or mispricing) factors. Our results thus favor a mispricing-based explanation for the high returns of customer-satisfaction-related investment strategies.

The remainder of the paper is organized as follows. Section 2 provides a brief survey of the relevant literature and motivations for either a risk- or misvalution-based view. In section 3 we describe our data set and present descriptive statistics. We put particular emphasis on the construction of the ACSI index, and on the characteristics of the firms which are included in the index. In section 4 we relate our measure of customer satisfaction to several measures of intangible asset value proposed in the recent literature and we examine the riskiness of cash flows of the firms in the ACSI index. Section 5 presents our main results on the implications for stock returns of customer satisfaction. In section 6 we report the results of several robustness checks. Section 7 concludes.

2 Literature and Motivation for Explanatory Approaches

An extensive body of literature analyzes the profitability of investment strategies which are based on accounting-related firm characteristics. This literature focuses almost exclusively on tangible assets, the value of which can be derived from the firm's balance sheet. A potential reason for this focus may be rooted in the neoclassical theory of investments. As Peters and Taylor (2017) point out, the theory has been developed in a time when firms were mainly holding tangible assets. Since then the structure of economies in developed countries has shifted significantly, with service and technology industries having the largest shares in GDP and market capitalization nowadays. At the same time intangible assets became increasingly important (e.g. Corrado and Hulten (2010)). Several papers provide evidence on the importance of intangible assets for firm value. Corrado and Hulten (2010) estimate that intangible assets on average account for 34% of a firm's total capital. Vitorino (2013) reports that brand equity alone accounts for 23% of firm value. The management literature plainly considers human capital and brand value to be a firm's most valuable assets (e.g. Vomberg et al. (2015)). Li et al. (2017) show empirically that acquisitions made by acquirers with higher level of organization capital are more profitable in terms of both abnormal stock performance and operational performance than acquisitions made by low organization capital acquirers. These findings imply that organization capital is a valuable resource. Corrado et al. (2009) explore the implications of investments in intangible assets for the growth of the US economy while Lim et al. (2016) analyze the extent to which intangible assets support debt financing. Peters and

Taylor (2017) propose a modified Tobin's q that accounts for intangible assets and demonstrate that it is a better proxy for physical and intangible investment opportunities. Clausen and Hirth (2016) discuss an alternative indirect measure for the value of intangible assets, linking the return on tangible assets to intangible intensity.

Peters and Taylor (2017) categorize a firm's intangible capital into its knowledge capital and its organization capital. R&D expenses are interpreted as an investment into the firm's knowledge capital while a fraction of a firm's SG&A spending constitutes an investment into organization capital. The latter comprises human capital, brand values, the value of customer relations and distribution systems. Customer satisfaction, in this categorization, is a component of a firm's organization capital. Gourio and Rudanko (2014) propose a model in which the existence of search frictions in product markets provides an incentive for firms to invest in organization capital. They then build a theory of investments into organization capital in which a firm's customer base is a state variable. While their theory is concerned with the number of customers the intuition of the model should carry over to customer satisfaction because satisfied customers buy more, and / or are less likely to buy from competitors.

Eisfeldt and Papanikolaou (2013) assume that a firm's organization capital is embodied in "key talent".[1] Key talent can be thought of as management and other personnel with specific knowledge that is essential to the firm. These persons have the option to leave the firm and therefore can extract rents from the shareholders of the firm. Specifically, when the productivity of organization capital in other firms increases, the outside option of key talent improves and they can extract higher rents from the shareholders. More exactly, key talents have a claim on cash flows accruing from organizational capital, and their share depends on their outside options, implying that shareholders can only adopt a fraction of the respective cash flows. This, in turn, exposes the shareholders to an additional source of systematic risk that is compensated in equilibrium. The exposure to this source of risk is increasing in the ratio of organization capital to physical capital (denoted the O/K ratio). Consequently, shares of firms with higher O/K ratios have higher expected rates of return.

[1] An alternative view, taken by e.g. Atkeson and Kehoe (2005), is that organization capital is accumulated within and embodied in the organization as a whole.

Eisfeldt and Papanikolaou (2013) construct a measure of organization capital from data on SG&A expenditure. They find that a portfolio that is long firms with high O/K ratios and short firms with low O/K ratios earns a 4.7% annual rate of return. Further, the portfolio return cannot be explained by the Carhart (1997) four-factor model.

The intuition of the Eisfeldt and Papanikolaou (2013) model implies that firms with higher levels of customer satisfaction are more risky. The authors argue that other stakeholders, namely key talents, have a claim on cash flows accruing from organizational capital, implying that shareholders can only adopt a fraction of the respective cash flows. Customers have the option to change the supplier of a product, provided there is competition in the market. Hence, similar to key talents customers might be able to extract rents from shareholders. This might occur directly through lower prices or indirectly, implying higher costs for the firm. The investment undertaken to sustain the customer relationship (e.g. in product quality, innovation or especially advertising), cannot accrue to the shareholders of the firm. At the same time, those investments should result in higher customer satisfaction. Thus, shareholders of firms with higher customer satisfaction should suffer from risk of cash flow alleviation. There are two further arguments to support this risk-based view. First, customer satisfaction is an alternative measure of organization capital. While SG&A expenses are an input-based measure, customer satisfaction can be interpreted as an output-based measure of organization capital. Second, the level of customer satisfaction is related to the activity of key talent of the firm. Specifically, customer satisfaction depends on the scope and efficiency of a firm's marketing activities, on the distribution network of the firm and the efficiency with which it is used, and on the quality and design of the firm's products. Consequently, it depends on the activity of key talent in marketing, distribution, product design and product development.

The model of Eisfeldt and Papanikolaou (2013) predicts that higher levels of organization capital cause higher systematic risk and, consequently, higher returns. Several papers indeed find that stocks of firms with higher levels of customer satisfaction earn higher risk-adjusted returns (Fornell et al. 2006, Aksoy et al. 2008, Luo et al. 2010 and Fornell et al. 2016a).[2] This finding is confirmed

[2]In contrast to the papers cited in the text, O'Sullivan et al. (2009) conclude that firms with high levels of customer satisfaction do not outperform standard three and four factor models. Jacobson and Mizik (2009) conclude that the outperformance of high customer satisfaction firms is limited to firms in the computer and internet industries.

by Fornell et al. (2016b). These authors show that a hedge fund that uses an ACSI-based long-short strategy significantly outperforms one-, three- and four-factor models. They further provide evidence that firms with higher levels of customer satisfaction subsequently have higher earnings and higher earnings surprises. Brand value (Madden et al. 2006 or Belo et al. 2014) and human capital (Edmans 2011) also appear to be positively related to risk-adjusted stock returns.

However, there is little evidence that higher organization capital intensity is associated with higher risk levels. In fact, several papers conclude that firms with higher levels of customer satisfaction are actually less risky (Gruca and Rego 2005, Tuli and Bharadwaj 2009, Fornell et al. 2016b). Larkin (2013) considers customer brand perception rather than customer satisfaction and finds that more positive brand perception is associated with lower levels of risk. The combined evidence of high returns and low risk suggests that either a relevant source of systematic risk is not accounted for, or that the market may not be correctly valuing organization capital. Anderson et al. (2004) and Fornell et al. (2006) find that firms with higher levels of customer satisfaction have higher Tobin's q and higher market capitalization, respectively, findings which are inconsistent with the notion that these firms are more risky. The evidence presented by Vomberg et al. (2015) points in a similar direction. These authors report that a score based on product quality perception and brand awareness is positively related to Tobin's q.

Edmans (2011) provides evidence that stock prices are slow in reacting to news about intangible assets. He shows that stock prices do not fully incorporate readily available information on employee satisfaction. To the extent that these results carry over to other nontangible assets, we might expect that firms with high level of customer satisfaction have positive alphas after controlling for systematic risk factors. The empirical evidence reviewed above implies that this is indeed the case, and is thus consistent with a mispricing-based explanation. To summarize, while a positive relation between customer satisfaction and other measures of organization capital and stock returns is well-established, it is much less clear why this relation exists. In this paper we analyze whether customer satisfaction is related to sources of systematic risk not accounted for in earlier studies, or whether the relation between customer satisfaction and returns is evidence of mispricing.

3 Data

The data we use to measure customer satisfaction is taken from the American Customer Satisfaction Index (ACSI), introduced by Fornell et al. (1996). This index encompasses customer satisfaction data for US-customers and is published by the same named company. It is released on the aggregate US level, the aggregate industry level, as well as on the firm level and includes foreign and domestic firms that have a significant share in the US market. The scores can be obtained directly from the ACSI.[3] Each year around 180,000 responses with respect to the evaluation of customer satisfaction are collected in order to determine the final customer satisfaction values. The ACSI uses a cause-and-effect model, which identifies customer satisfaction based on its drivers and outcomes. The final customer satisfaction (CS) value is determined such that it maximizes the explanatory power of the model. The final firm level CS value is published one time per year. For all firms in a certain industry scores are published at the same point in time. These industries are defined by the ACSI. The industry level CS values include more firms than only those for which individual CS values are published. All firms for which not a certain amount of data points is reached are summarized by industry under the notion “all others”. In our final sample, we have 33 industries that include at least 3 firms. Until May 2010, the data was published quarterly, since May 2010 the data is published monthly. Additionally, we are able to obtain the exact announcement dates back until 2000. The announcement dates are the days on which the press release of the scores took place. Appendix A.1 provides a more detailed description of the way data is gathered, the functioning of the cause-and-effect model and the industry definitions.

Although on the firm level there is only one observation per year, on the corporation level there might be more than one value. This is due to the fact that scores might also be released for different subsidiaries. We aggregate those scores to one yearly value if the announcements are made in the same month. If the announcements are made in different months, we leave two separate values per year and company, such that the customer satisfaction value is updated two times in a year for the respective company.[4] We construct different variables from the ACSI customer satisfaction

[3]The data is available on www.theacsi.org

[4]We aggregate on the CRSP permco level. Only on this level corporation stock market data exists, although one corporations might have multiple securities outstanding (multiple permnos).

scores. The first measure is the CS level, which is the normal customer satisfaction score value as reported by the ACSI. As certain industries in general might be exposed to a higher level of customer satisfaction, we also construct an industry demeaned CS level. This variable is computed by cross-sectionally demeaning the CS level by the respective industry CS score. By proceeding this way, it is ensured that inter-industry variation is eliminated and only intra-industry variation is maintained. As the publication date depends on the industry, firm-level and industry-level CS values are published in the same month. Since in previous studies the focus has also been put on changes in customer satisfaction[5], we construct a CS delta, which is defined as the change in the CS level from period t-1 to period t, which in our case is the change from one year to the next. Moreover, an industry demeaned CS delta is computed, which is defined as the change in the industry demeaned CS level from period t-1 to period t. Our sample period lasts from February 2000 until December 2016. The first reason for choosing this time period are the announcement dates, which can only be determined with certainty back to February 2000. Moreover, we overlap in this case with the trading period of the customer satisfaction based hedge fund studied in Fornell et al. (2016b).

We merge the ACSI data with monthly CRSP stock market data by assigning the ACSI data to the CRSP data in the month subsequent to the announcement month. ACSI data is then retained until new information for the same corporation is announced. Moreover, we merge the data with accounting data from Compustat and total q data from WRDS. We follow the convention in asset pricing studies and merge all accounting data with fiscal year end in calendar year t-1 to July of year t and keep this data until June of year t+1. This way it is ensured that the accounting information is known in month t and that information from the ACSI and Compustat overlap temporally. In our sample period, we can link ACSI data to stock market data for 233 firms. The dataset is an unbalanced panel, because not in every case we have the full time-series period covered for each firm. We also only keep firms with common stock (share code 10 or 11) that trade on either the NYSE, NASDAQ or AMEX. Consequently, after filtering each month in average we are left with 145 firm level customer satisfaction values. Compared to other proxies for intangible assets not derived from balance sheet data, from an asset pricing view the ACSI data has a main

[5]E.g. Aksoy et al. (2008) or Jacobson and Mizik (2009)

advantage: With this customer satisfaction measure one can distinguish between good and bad firms and hence between strong and weak performing firms. With other similar datasets[6], this is not possible and only strong firms can be identified. We claim that this makes the customer satisfaction data specific with respect to other proxies for intangible capital. First, this suggests that the components influencing customer satisfaction differ compared to those influencing similar intangibles. Moreover, we argue that there is a significant unique fraction of intangible capital embedded in customer satisfaction, which is orthogonal to intangible capital embedded in other proxies.

Insert table 1 here

Panel A in table 1 shows summary statistics for the different customer satisfaction variables introduced previously. It can be seen that the 0 to 100 scale is not being exhausted and most of the CS level values lie above 60 and below 90, therefore leading to a narrower span than feasible. In addition, the span of the industry demeaned CS values is lower than for the general level, indicating that industry matters for the customer satisfaction scores. Changes generally are not very large in average, but are relatively strong in the extremes. This rather low level in changes is also supported by the relatively high AR(1) coefficient of the CS level of 0.88. Panel B reports summary statistics for various firm characteristics and separates between all firms in the final ACSI universe and all firms in the CRSP/Compustat universe that are employed to merge stock market and accounting data with the ACSI sample. The samples differ in one specific domain: ACSI firms are mostly firms with large capitalization. The observation of a larger average market capitalization of the ACSI firms is not surprising. The larger a firm, the larger should also be its customer base and this increases the probability that there will be sufficient responses in surveys and interviews about the customer satisfaction of this firm.

4 Intangible Capital and Customer Satisfaction

We have claimed that customer satisfaction, and the linked customer capital, is a measure and component of intangible capital. Peters and Taylor (2017) partition non-balance sheet intangible

[6]For instance the "The Best Companies to Work for" employed by Edmans (2011)

capital, which our measure can be ascribed to, in two components, knowledge capital and organization capital. It can be said that customer satisfaction and customer capital is not part of knowledge capital, as it is not part of the knowledge about processes or technology a firm employs to generate its products. Thus, following the taxonomy of Peters and Taylor (2017), customer capital should be part of organization capital.[7] We forge a bridge from the risk theory of Eisfeldt and Papanikolaou (2013) to customer satisfaction and claim that the risk concept might carry over. Eisfeldt and Papanikolaou (2013) use a concept that refers to capital that is embedded within the firm's employees. This concept that organization capital can be seen as information about employees and task characteristics that influences a firm's productivity was introduced by Prescott and Visscher (1980), which were among the first to introduce the idea of organization capital. We can apply this theory if we built on the extended concept of intangible and organization capital of Atkeson and Kehoe (2005). In their concept, organization capital is not only employee-, but firm-specific and embedded within the firm. In that case, customer satisfaction and customer capital can be interpreted as an outcome of the employee's work and the organizational processes within a firm in the manner of Lev and Radhakrishnan (2015) and thus as an outcome of organization capital. In the following we employ various analyses to show that indeed customer satisfaction can be linked to specific parts of organization capital and to variables that should be linked to the related risk concept of Eisfeldt and Papanikolaou (2013). In this case, customer satisfaction can be interpreted as a "specific" type of firm-specific intangible organizational capital.

The finance and economics literature employs various measures for different types of intangible capital. These measures for intangible capital are usually based on the accumulated amount of a specific type of cost, which is then interpreted as the amount of specific intangible capital a firm possesses. Those measures are not based on expected future values. This might be a weakness, as customer satisfaction could also have an influence on expected future cash flows. Generally, the different types of intangible capital are computed by employing the perpetual inventory method on a specific cost variable. Intangible capital is then estimated by the equation

[7] Lev and Radhakrishnan (2015, p. 1) describe that "organization capital consists of business processes and systems [...] that enable tangible and intangible resources, such as patents, brands and human capital, [...] to be productive." Thus if customer satisfaction is high, following this definition, organization capital should also be higher, as the respective processes and systems are "productive".

$IC_{it} = (1 - \delta_c)IC_{i,t-1} + investment\ costs_{it}$.[8] To compute organizational capital we follow Eisfeldt and Papanikolaou (2013) and Eisfeldt and Papanikolaou (2014). They use 30% of selling, general and administrative expenses as proxy for investment in organizational capital.[9] Selling, general and administrative expenses encompass for instance advertising expenses, expenditures for distribution systems, staff expenses or costs for other brand enhancement activities (see for instance Lev and Radhakrishnan (2005) for a more detailed summary).

Moreover, we separately capitalize advertising and staff expenses in order to analyze these specific cost components. We deduct R&D expenses from SG&A expenses and employ R&D expenses to capitalize knowledge capital, following Peters and Taylor (2017).[10] For simplification, as initial stock we always use $IC_{i,0} = investment\ costs_{i1}/(g + \delta_c)$, with g being the assumed growth rate of investment, which here is 10%, following the sample average of growth in SG&A and Eisfeldt and Papanikolaou (2013). Lev and Radhakrishnan (2015) decompose a firm's market value of assets into a fraction that can be explained and a fraction that cannot be explained by traditional investments in both tangible and intangible assets. We follow this approach and employ the organizational and knowledge capital values, together with the value of property, plant and equipment as proxy for tangible assets, in order to compute the fraction of market value explained. A higher unexplained fraction can hint at intangible capital that is not yet incorporated into the calculation, which among others could be the value of customer relations.

4.1 Portfolio Sorts

In order to determine how strong the customer satisfaction measure is related to the intangibles measures based on accumulated capital, we sort firms into portfolios. The portfolio sorting interval we apply results from the publication frequency of the ACSI data. Until May 2010, we rebalance portfolios quarterly. From May 2010 on, we rebalance portfolios monthly. At the end of each ACSI reporting month, we sort firms into 5 portfolios based on their CS level using the respective quintile breakpoints. Panel A in table 2 reports the time-series averages of monthly cross-sectional portfolio

[8] δ_c is the depreciation rate for the specific type of capital, for SG&A it is assumed to be 20% per year, following Eisfeldt and Papanikolaou (2013).

[9] These type of investment costs is scaled by the value of the consumer price index: $SG\&A_{it}/cpi_t$

[10] δ_{KC} is taken from Li and Hall (2016), table 4, if available for a specific SIC-code, else it is 20%

mean values of different firm characteristics and intangible capital proxies. The intangible capital proxies are all scaled by book value of total assets.[11]

Insert table 2 here

All variables based on customer satisfaction are monotonically increasing in the CS level. Firms with higher CS therefore have the tendency to be exposed to positive changes in CS. Firms with higher CS also have higher total q than low CS firms. Both leverage variables, financial and operating leverage, exhibit lower values for the high CS portfolio, such that these firms seem to be less levered. Interesting are the observations for cash holdings. Larkin (2013) argues that in order to insure against potential operating and financial losses linked to low cash flows, firms hold more liquid assets. If this holds true, firms that have relatively certain cash flows should hold less cash as backup; if operating cash flows are safe, then this source of liquidity allows for holding less cash. Firms with higher customer satisfaction clearly have higher cash holdings. This might be the case as cash flows might be less secure for firms with higher CS than for firms with lower CS and is a first indication for the relation between CS and the riskiness of cash flows.

For the organizational capital proxies, the results vary. The standard SG&A based proxy is only weakly related to CS and is almost equally distributed across portfolios. This does not hold for both the proxy based on advertising expenses and the proxy based on staff expenses. Both with the advertising proxy (7.9% vs. 22.5%) and with the staff expenses proxy (46.2% vs. 98.0%) higher values for the high CS level portfolio can be observed. This shows that firms with high customer satisfaction have realized their CS level, among others, by investing in advertising. Likewise, these firms have payed more for staff, which indicates that they might have tried to keep the "key talents", which appear in the model of Eisfeldt and Papanikolaou (2013). While no relation can be documented for the knowledge capital proxy, there is a clearly higher fraction of market value of assets unexplained for high CS firms. This is an additional hint that customer satisfaction exhibits some intangible value that cannot be measured directly by financial variables. As the intangible capital proxies are based on financial variables, this might explain, why they do not fully incorporate the value of customer satisfaction. Moreover, the claim is supported that there is

[11] Employing sales or PP&E to scale the proxies delivers similar results.

a significant unique fraction of intangible capital embedded in customer satisfaction. Results for sorts into portfolios based on the industry demeaned CS level confirm the findings, as cash flows and capitalized advertising expenses are also clearly the highest in the high industry demeaned CS portfolio.[12]

In panel B of table 2 we study return statistics and Sharpe ratios of long/short strategies and factors related to customer satisfaction and to various relevant firm characteristics. For customer satisfaction we show results both for a quintile based long/short strategy and for Fama-French type factors. The annualized Sharpe ratio is clearly the highest for the strategy (0.84) and factor (0.81) based on the industry demeaned CS level. No other factor has a similarly high Sharpe ratio. The next highest Sharpe ratio can be observed for the betting-against-beta factor (0.68) and the investment factor from the q-factor model (0.51).[13]

4.2 Total Q and Cash Flows

Before linking customer satisfaction to stock market data, we aim at understanding which other variables that are important in our context are measured by and linked to this market-based intangible. Specifically, we look at total q and cash flows. We use total q to examine the link of customer satisfaction to firm value. Peters and Taylor (2017) propose total q to measure the market value of a firm relative to its owned assets if a firm is holding a significant amount of intangible capital. Cash flows are important, as the risk channel proposed by Eisfeldt and Papanikolaou (2013) is operating through cash flows to shareholders. We employ yearly fixed effects panel regressions of total q on the different customer satisfaction variables. We take the first value of the customer satisfaction variables that we can obtain after the fiscal year end and assign it to the respective accounting values. We use standard controls in our regression and year-fixed effects and either firm- or industry fixed effects, where we use the ACSI industry definition. Moreover, we use double-clustered standard errors as advised by Petersen (2009), employing the clustering approach

[12] Results can be found in table A1 in the appendix. With industry demeaned CS sorts the different firm characteristics and the proxies for capitalized intangible capital are standardized by industry, where ACSI industry definitions are applied.

[13] Applying volatility scaling on momentum following Barroso and Santa-Clara (2015) and on the other factors following Moreira and Muir (2017) does improve the Sharpe ratio of momentum to 0.57, but does not significantly improve the Sharpe ratio of the other strategies.

of Cameron et al. (2011). We cluster by the same dimensions, on which the fixed effects are based in the respective specification. Table 3 presents the regression results.

Insert table 3 here

Independently of whether we apply firm- or industry-fixed effects, the coefficients are significant on both the unadjusted and industry demeaned CS level. The highest economic significance can be detected in case of the industry demeaned CS level with firm-fixed effects. When industry fixed effects are applied, then the coefficient on both the unadjusted and industry demeaned CS level is of similar statistical and economic significance. As can be seen in column (4), the coefficient then has half the magnitude as in the other specification. Hence, the second specification is more strict. In case of column (4), economically the coefficient implies that a one-standard-deviation increase in industry demeaned CS is associated with a 13.5% (= 2.94×0.046) increase in total q. For both the unadjusted and industry demeaned CS level variable the results imply that there is a statistically significant positive association between customer satisfaction and total q. When a variable based on changes in customer satisfaction is among the independent variables, we use the change in total q as dependent variable. However, the results are not significant when changes are studied. Overall, our findings are in line with Gourio and Rudanko (2014). They demonstrate that industries with higher product market frictions are exposed to higher Tobin's q. We have shown that this also holds for firms with higher CS and total q.[14]

To support the claim that risk is driving returns behind customer satisfaction based strategies, we first analyze cash flows. Eisfeldt and Papanikolaou (2013) argue that other stakeholders, namely key talents, have a claim on cash flows accruing from organizational capital, implying that shareholders can only adopt a fraction of the respective cash flows. Following this intuition, this effect should also show up in case of the customer relationship. The investment undertaken to sustain the customer relationship (e.g. in product quality, innovation or advertising), cannot accrue to the shareholders of the firm. At the same time, those investments should result in higher customer satisfaction. Thus, shareholders of firms with higher customer satisfaction should suffer from risk

[14]Hirsch and Seaks (1993) advise the use of a semilog form in regressions with Tobin's q as dependent variable. Table A3 in the appendix shows that in this case the results are even stronger.

of cash flows attenuation. It should be noted that it is the cash flow level and not the volatility that is influenced. Our hypothesis is that if the described effect exists, then firms with higher customer satisfaction should have lower cash flows than firms with similar leverage but lower customer satisfaction. In order to test this hypothesis, we match each firm with high customer satisfaction to one firm from the ACSI universe with low customer satisfaction. We define a high customer satisfaction firm as a firm that has a CS level above the 80% percentile. We employ both the normal and industry demeaned CS level. Matching is done month by month based on the propensity score that is computed employing financial market leverage, based on yearly data, and operating leverage, based on quarterly data. Subsequently, we compare the mean and median cash flows of the original top portfolio firms and their matched correspondents. The results are shown in table 4. The cash flow definition follows Peters and Taylor (2017): $CF_{it} = (IB_{it} + DP_{it})/PPE_{it}$.[15]

Insert table 4 here

We compute both the time-series mean and time-series median of the monthly cross-sectional average and monthly cross-sectional median. Considering the monthly cross-sectional average of the cash flows in the original and matched portfolio, it can be seen that firms with high CS and firms with high industry demeaned CS are exposed to lower cash flows than their matched equivalents, as hypothesized. High CS firms have a mean cash flow level of 25.2% of fixed assets, whereas for the matched firms with similar leverage, but lower CS the level is 32.1%. When looking at the cross-sectional median results, the results are no longer in the expected direction for the CS level. They are similar for both groups, being even slightly lower for the matched firms. However, for the industry-demeaned CS level the results are still as expected. Firms with high industry-demeaned CS have a cross-sectional median cash flow of in the mean 12.9% of fixed assets, whereas for the matched firms with lower CS the level is 16.8%. Thus, the analysis concerning the cash flow level shows robust results for the industry-demeaned CS level, supporting the established hypothesis. This result suggests that the risk channel proposed by Eisfeldt and Papanikolaou 2013 could indeed be operating in the case of customer satisfaction, although only cash flows and no other impacts of riskiness of key employees are examined here.

[15] IB is income before extraordinary items, DP is depreciation expense and PPE is property, plant and equipment.

5 A Customer Satisfaction Investment Strategy

We wish to analyze whether factors that have been shown to be priced in recent empirical research are able to explain the return of a customer satisfaction based investment strategy. The strategy is long in the quintile portfolio of high customer satisfaction stocks and short the quintile portfolio of low customer satisfaction stocks. We test four versions of this strategy, two based on unadjusted CS levels and two based on industry demeaned CS levels. In both cases we construct value-weighted portfolios (full results shown in table 5 and table 6 for both strategies based on the CS level variables) and equally-weighted portfolios (only alphas are shown in table 5 and table 6 for the level based strategies and in table 7 for all other strategies). According to data availability the portfolios are rebalanced quarterly (until the first quarter of 2010) or monthly (from May 2010 onwards). Ten factor models, respectively factor combinations, are employed as benchmark models. These factor combinations are subsequently used to estimate factor based equations of the following type:

$$r_{it}^{e} = \alpha_i + \sum_{j=1}^{J} \beta_i^j Fac_t^j + \epsilon_i \tag{1}$$

The excess return of portfolio i at time t is estimated to be the sum of the alpha and of the product of the factor sensitivities β^j and the respective J factors included in the respective specification. We are interested in the alphas the models deliver. The first four models are the CAPM, the Carhart (1997) four-factor model, the Fama and French (2015) 5-factor model, and the Hou et al. (2015) q-factor model. Models 5 combines the Fama and French (1993) factors with the Asness et al. (2017) quality-minus-junk factor and the Frazzini and Pedersen (2014) betting-against-beta factor. Model 6 is the Stambaugh and Yuan (2017) mispricing factor model. Models 7 and 8 combine the Fama and French (1993) factors with the Fama and French (1993) factors with the short-term and long-term reversal factors of Fama and French (1996) (model 7) and the Pástor and Stambaugh (2003) liquidity factor (model 8). Model 9 combines the market risk premium, the size factor and an operating leverage factor (denoted OL). We construct the operating leverage factor ourselves, based on the operating leverage measure proposed by Mandelker and Rhee (1984), in the same manner as the Fama-French factors. Eventually, model 10 consist of the market factor and a return factor (MFTRALL) controlling for GDP risk, based on Vassalou (2003).

Insert table 5 here

Table 5 presents results for the unadjusted CS strategy. The alpha of the value-weighted strategy is positive in nine out of ten cases, but in only three cases is significant at the 5% level. The equally-weighted strategy (alpha reported in the last line of Table 5) performs much better. The alphas are always positive, they are economically much larger than those for the value-weighted strategy, and nine of them are significant at the 10% level (one model) or at a even higher level (eight models). The one model which does not yield a significant alpha is the model including the quality-minus-junk factor and the betting-against-beta factor. We obtain a particularly high loading on the quality-minus-junk factor, suggesting that this factor might explain the excess return of the customer satisfaction strategy. In any case, the strategy based on the unadjusted CS level has a high exposure to the quality strategy.

Insert table 6 here

The results for the strategy based on the industry demeaned CS are shown in table 6. The alphas for both the value-weighted and the equally-weighted portfolio are positive and large, and all alphas but one are statistically significant. It thus appears that none of the models under investigation explains the excess return of the industry demeaned customer satisfaction based strategy. The model which fares best is the model which includes the operating leverage factor. This model delivers relatively low alphas for both the value-weighted and the equally-weighted portfolio, and the alpha is insignificant for the value-weighted portfolio and significant only at the 10% level for the equally-weighted portfolio. Moreover, although all alphas are statistically significant for the equally-weighted portfolios, the alphas for the value-weighted portfolios are of economically larger magnitude.

Insert table 7 here

Table 7 provides results for several variations of the customer satisfaction-based strategies. Panel A reports alphas for (value-weighted and equally-weighted) portfolios of *all* stocks included in the ACSI index. The alphas, although smaller than those shown in table 5 and table 6, are all positive, and 17 out of 20 are significant at the 10% level or lower. This finding implies that the firms included in the ACSI index are not a random sample from the universe of all listed stocks.[16] We note, though, that the Fama and French (2015) 5-factor model explains the excess returns of the ACSI portfolio reasonably well. Moreover, again the specification that combines the Fama-French 3-Factor model with the Quality-Minus-Junk and Betting-Against-Beta factors has an significant impact on the results. This variation renders the value-weighted alpha insignificant and significantly lowers the magnitude of the equally-weighted alpha.

Panel B of table 7 repeats the analyses of tables 5 and 6, but uses long-short portfolios based on CS deltas, which are defined as the first differences (rather than levels) of the unadjusted and the industry-demeaned CS values. Although almost all alphas for the strategies based on changes are positive, they are smaller in magnitude than those in case of level based strategies, and most of them are insignificant. We thus conclude that strategies based on changes in CS values do neither in its unadjusted nor in its industry demeaned version result in outperformance relative to standard asset pricing models. In Panel C the CS-based long-short strategy is replaced by a factor constructed along the lines of the Fama and French (1993) SMB and HML factors or the Fama and French (2015) CMA and RWM factors. Specifically, all firms included in the ACSI index are sorted into three portfolios according to their (either unadjusted or industry-demeaned) CS level, using the 20% and 80% percentiles for all ACSI index firms as breakpoints. Further, the firms are independently sorted into two size portfolios using the median size value as breakpoint. For the six resulting portfolios the value-weighted mean is computed. The factor return is then constructed as the equally weighted mean of the big and small high-CS portfolios minus the equally weighted mean of the big and small low-CS portfolios. Regressing this factor on our ten models yields large positive and mostly significant alphas. Thus, none of the ten models is able to explain the excess return of the CS factors. Moreover, this way of constructing a factor for the unadjusted CS level considerably increases its statistical significance, supporting the robustness of our findings.

Panel D and panel E of table 7 employ a variety of long/short factors in order to test whether there is no other relevant firm characteristic based strategy that might capture the premium of

[16]The finding that all stocks included in the ACSI index outperform most asset pricing models suggests that a strategy which is long high CS stocks and short low CS stocks may not be optimal. We therefore analyze the performance of long-only strategies below (see table 8).

the CS strategy, especially of the industry demeaned CS strategy. CS strategy returns employing value-weighted portfolio returns, both based on the unadjusted and industry demeaned level, are regressed on the market factor and a factor based on the respective indicated firm characteristic. Selection of characteristics is based on different criteria. Either the related strategy should be highly significant or relevant in the context of customer satisfaction. As first criterion we use strategies from the categories of intangibles, value and profitability, which are significant in- and out-of-sample in Hou et al. (2017) and economically strong. Second, we use the proxies for organizational and knowledge capital and its components introduced previously. Moreover, we use others measures which we think could matter, as idiosyncratic volatility and tail risk.[17] For the unadjusted CS strategy there are some benchmarks which explain the returns, for instance quarterly return on equity or advertising based organizational capital give small alphas. For the industry demeaned CS strategy, there are only two specifications where the alpha is statistically significant worse than the 5% level. This is the cost based direct operating leverage measure and again advertising based organizational capital. Overall, the results are in line with the previous factor regressions.

Insert table 8 here

Table 8 shows results for the excess return of the long leg of the CS-based strategies, that is results for a (value-weighted or equally-weighted) long-only portfolio of the quintile of firms with the highest (unadjusted or industry-demeaned) level or change in CS values. We have eight versions of the customer satisfaction-based strategy (unadjusted versus industry-demeaned, levels versus first differences, value-weighted versus equally-weighted) tested against ten asset pricing models. All 80 alphas are positive, most of them are large, and all but two of them are significant at the 10% level or higher. These findings imply that the outperformance of the CS-based strategies is due to the long positions in high-CS stocks rather than to the short positions in low-CS stocks. Similar as for the long-short strategies, the highest equally-weighted excess returns can be observed with the strategy based on the unadjusted CS level, and the highest value-weighted excess returns can be observed with the strategy based on the industry demeaned CS level. The results for the alphas of the equally-weighted and unadjusted CS level is striking, as both the magnitude and the t-statistics are high and robust.

[17] The description of all employed variables can be found in appendix A.3.

In the appendix (Table A2) we analyze the performance of the "ACSI Long/Short Equity" hedge fund which implements a customer satisfaction-based strategy and is studied in Fornell et al. (2016b). We obtain the data from Eurekahedge. For all nine model specifications that we test (including the Fung and Hsieh (2004) 7-Factor hedge fund benchmark model) we find positive and significant alphas. This finding is consistent with our previous results and with Fornell et al. (2016b).

6 Testing the Robustness of Results

We claim that our results are attributable to the intangible value of customer satisfaction. In order to show that our results indeed stem from differences in customer satisfaction and that differences in customer satisfaction lead to differences in returns, for both the unadjusted and industry demeaned version of CS, we employ further analyses to substantiate our results.

6.1 Characteristic Matching

We employ characteristic based matching as our first analysis. The intuition of the analysis is that if the long/short portfolio returns cannot be replicated with similar firms with respect to various characteristics, then these returns should be attributable to the variables in which the firms differ, respectively to the variables that cannot be observed for the matched set of firms. To this variables belongs customer satisfaction as intangible asset. As a considerable amount of firms from the CRSP/Compustat universe does not appear in the ACSI universe, to each firm in the ACSI universe we match one firm from the CRSP/Compustat universe. For robustness, we use two matching procedures: Matching based on the propensity score and covariates matching with the Mahalanobis distance. As matching algorithm in both cases we apply nearest neighbor matching without replacement. Moreover, we require the matched firms to be in the same industry.[18] By following this approach, each month we assign to each firm in the ACSI universe exactly one firm, which is in the filtered CRSP/Compustat universe, but not in the ACSI universe.

[18]Here we take the first NAICS digit as industry definition, as for the non-ACSI firms there is no ACSI industry classification and ACSI industry classifications are based on NAICS codes.

For robustness, we take two sets of firm characteristics to compute the matching metrics. The first set consists of size, book-to-market, gross profitability, asset growth and momentum and can be seen as variables related to the Fama-French factor models, representing systematic risk. The second set consists of size, total q and idiosyncratic volatility and is supposed to capture intangible adjusted firm value and idiosyncratic risk. Hence, there should be a considerable difference in the information, which these two sets carry. Subsequently, as previously, we first sort ACSI firms into quintile portfolios, based on the different customer satisfaction variables. Then we assign the corresponding matched firm of each ACSI firm to the portfolio into which the respective ACSI firm has been sorted. We replicate the portfolios with the matched firms and compute both value-weighted and equally-weighted portfolio returns. This way, only the matched firms form the portfolios and not the original ACSI firms. Table 9 shows the replicated long/short-strategy returns, employing the matched firms in the long and short portfolios. The second left column shows the returns of the original strategies, as analyzed in the previous factor regressions. The four right columns show the returns of the replicated strategies. The matching procedure and set of firm characteristics used for matching are indicated above.

Insert table 9 here

Panel A shows results for the long/short strategies. All level strategies that are significant, both in the unadjusted and industry demeaned version, experience clearly higher returns in case the original ACSI firms are employed to construct the respective portfolios. In fact, the returns for all replicated long/short strategies are not statistically significant on any common level. For comparison, the equally-weighted CS level and the value-weighted industry demeaned CS level strategy earn roughly 0.8% monthly, whereas the highest replicated strategy earns roughly 0.3% a month and is statistically insignificant. This result suggests that the returns based on CS sorts are not subsumed by the various relevant firm characteristics, which we control for. The return spread can therefore not be attributed to the domain in which the firms are similar, but to a domain in which these firms differ, from which one known is customer satisfaction. Hence, the results support the hypothesis that the return spread can be attributed to the difference in customer satisfaction of these firms.

To see that these results do not stem from weak matching, the strategies based on changes in CS deliver further insights. The equally-weighted CS delta strategy and the value-weighted industry demeaned CS delta strategy are both significant on the 10%-level, with a return of approximately 0.3%. In both cases, the replicated strategies are close in economic magnitude, especially when the set with idiosyncratic volatility and total q is employed. These results suggest that the original strategy returns are related to the respective firm characteristics and cannot be solely attributed to the respective CS variable. Similar results with respect to the economic magnitude of returns of the replicated strategies can be found for the other strategies based on first differences. Moreover, comparing the excess returns of a portfolio consisting of all ACSI firms and a portfolio consisting of all matched firms supports this conclusion. Panel B shows that the returns are similar in both economic and statistical significance. Thus, the outperformance of the long-only portfolio rather stems from the exposure to certain firms characteristics than from customer satisfaction. Again, this shows that matching is not arbitrary and works well, such that the conclusion with respect to CS level based long/short strategies can be upheld.

6.2 Brand Value

A potential point of inquiry that could be remarked in context of our analysis is that our results capture concepts related to customer satisfaction and not customer satisfaction itself. The most striking concept that comes to mind is naturally brand value. We obtain brand value data from Brand Finance Brandirectory.[19] This dataset gives financial estimates of brand values that are updated once a year. Keller (1993, p. 2) defines brand equity as ”the differential effect of brand knowledge on consumer response” to the brand.[20] As there are a multitude of methods to obtain a financial value of a brand, with employing Brand Finance brand values we focus on one plausible income-based approach that should capture both brand awareness and brand image. Brand Finance uses the royalty relief method to compute the brand value. The approach is based on hypothetical royalty payments that a random company would pay to license the brand, based on future revenues attributable to a brand. Appendix A.2 provides further details about the computation and the advantages of this method. Moreover, the dataset includes a relative large amount of brands.

[19]The data is available on www.brandirectory.com.

[20]She further splits brand knowledge into two components: brand awareness and brand image.

In total, we can obtain brand value estimates for 185 firms from the filtered CRSP/Compustat universe each year and for approximately 60% of firms in the ACSI universe. The weakness of the dataset however is, that it only start in January 2007, such that we can only compute strategy returns beginning from February 2007 on.

Insert table 10 here

In panel A of table 10, we again employ the 10 factor models and factor combinations as previously for customer satisfaction. The economic magnitude of the brand value strategy alphas is considerable, both with equally-weighted and value-weighted portfolios. However, in the first case the statistical significance is low in average. In case of value-weights, the Fama and French (2015) 5-factor model and the 3-factor model augmented with the quality-minus-junk and betting-against-beta factor give statistically and economically low alphas. For 7 out of 10 benchmarks the alpha is statistically significant on the 5% level or better. When regressing the various customer satisfaction strategies on a market factor and a factor based on the brand-value to market-equity ratio, it can be observed that neither the equally-weighted nor the value-weighted industry demeaned CS level strategy can be explained. The same holds for the equally-weighted unadjusted CS level strategy. However, the loadings of the brand value factor are significant in all cases, but the value-weighted industry demeaned CS level. Regressing the brand value strategy on CS based factors also yields significant alphas. However, the loadings on both the unadjusted and the industry demeaned CS level factor are significant. The 22 benchmark factor returns in panel C show that there are some specifications that can explain the brand value strategy. The lowest alphas are obtained with strategies based on the cost based operating leverage measure, quarterly return on equity, and with organizational capital proxies in general.

6.3 Fama-MacBeth Regressions

In Table 11 we show results for another assets pricing test, Fama and MacBeth (1973) cross-sectional regressions. Unlike in portfolio sorts, this approach employs all firms jointly, without imposing portfolio breakpoints. However, these regressions weight each observation equally and impose a parametric relation between returns and the independent variables. In each month, we regress the individual firm level returns on one of the four introduced customer satisfaction variables and various firm characteristics. We show two specifications. The first specification includes variables that are related to either firm value or leverage. This specification includes total q and market beta, as well as operating and financial leverage. In the preceding analyses, examining total q and cash flows, it has been shown that these variables play a role in the context of customer satisfaction. The second specification adds a bunch of variables that have been shown to be related to returns: accounting based firm characteristics as size, book-to-market, profitability and asset-growth (as in Fama and French (2015) and Hou et al. (2015)), and moreover return related variables as idiosyncratic volatility (Ang et al. (2006)) and momentum. Table 11 reports the time-series averages of the cross-sectional regression coefficients.

Insert table 11 here

The table shows significant and robust results for the industry demeaned CS level. Independent of which specification is chosen, the economic magnitude of the coefficients and the t-statistics remain on a similar level. The results confirm that the industry demeaned customer satisfaction level is also able to predict returns in the cross-section of returns. For the unadjusted CS level, it can be observed that the coefficients are significant on the 10%-level in the first specification, but are no longer in the second specification.[21] The industry demeaned CS level is always significant, with similar coefficients and t-statistics. For the unadjusted CS level, it depends on the included firm characteristics controls how significant the respective coefficient is.

To assess the predictive power, the coefficients need to be compared to those of other firm characteristics. The results show that the sample is in some sense specific. The only variables that are of relevant significance are operating leverage, total q and size. The significance of total q depends on the specification and is weaker in the second specification. Size is negatively significant, as one would expect. Finally, operating leverage is negatively significant and this significance is robust to the specification. Operating leverage seems to matter for these firms, supporting the claim that the cost structure influences the riskiness of these firms. The t-statistics on the industry demeaned CS level is the highest compared to all other firm characteristics, only operating leverage has a similar value. This confirms the relevance of customer satisfaction for firm-level returns.

[21] Results with other combinations of firm characteristic in table A4 in the appendix confirm the results.

6.4 CDS Spreads

A further aspect to consider is risk not reflected in equity, but in other security classes. Specifically, in order to shine more light on other securities, we study the default risk of the firm's corporate bonds implied by the market by using credit default swaps as measure for a firm's credit quality. Credit default swaps are the most popular credit derivative instrument and are regularly traded in financial markets since the early 2000s. We employ the 5-year maturity CDS contracts, as they are the most liquid. Moreover, we focus on CDS on senior unsecured debt with modified restructuring (MR) and no restructuring (XR) clauses. Our primary data source is Bloomberg. This data start in January 2001. For all firms in our sample, for which we cannot obtain CDS data from Bloomberg, we employ data from Thomson Reuters Eikon. However, this data only starts in January 2008. We merge the CDS spreads of the respective month to the merged CRSP/Compustat data. We use monthly data, where we use the end of months quoted spread, in order to fit to the frequency of change of the customer satisfaction data. In the end, we can match CDS data to ACSI data for 133 firms in our sample. To obtain robust results, we employ two types of regressions: Fixed effects regressions with industry and time fixed effects, where standard errors are clustered by firm and time, and cross-sectional Fama and MacBeth (1973) regressions. Table 12 shows the results.

Insert table 12 here

We use two regression specifications, where we regress the CDS spread on the unadjusted and industry demeaned CS level and various control variables, which either are standard in the literature or which we consider relevant.[22] The coefficient on the customer satisfaction level is negatively significant in seven out of eight regressions. Only the the Fama-MacBeth regression on the CS level, where we control for organizational capital and operating leverage, does not yield a significant result. Moreover, the magnitudes of the coefficients are generally lower if we control for these two variables. The results imply that a higher CS level, both unadjusted and industry demeaned, goes along with a lower CDS spread, suggesting lower credit risk for high CS firms. The flows to debt holder of high CS firms therefore do not seem to be more uncertain or more risky, at least this is not implied by the market. However, the results suggest that equity is not the only

[22] See for instance Zhang et al. (2009) or Eisenthal et al. (2017).

security for which a link to customer satisfaction exists. CS is also priced in credit default swaps and hence in debt derivatives.

7 Conclusion

In this paper we consider the link between intangible assets and security returns. Specifically, in order to pin down this nexus, we study returns related to a particular market-based intangible, customer satisfaction. Several papers have presented evidence that there is a positive relation between customer satisfaction and stock returns (e.g. Aksoy et al. (2008), Fornell et al. (2006) and Fornell et al. (2016b)). We propose a theoretical foundation for this positive relation based on the theoretical model in Eisfeldt and Papanikolaou (2013). The model predicts that firms maintaining higher levels of organization capital are more risky and therefore earn higher expected returns. We argue that customer satisfaction is an output-based measure of organization capital, following the taxonomy of Peters and Taylor (2017).

For our empirical tests we combine data on the American Customer Satisfaction Index with CRSP and Compustat data. We first relate customer satisfaction to firm characteristics and to several measures of intangible asset value proposed in the recent literature. Higher customer satisfaction is related to higher values of Peters and Taylor (2017) total q, to lower financial and operating leverage, and higher cash holdings. Further, higher customer satisfaction is positively related to capitalized advertising and staff expenses, which are proxies for specific fractions of organization capital. These results support the interpretation of customer satisfaction as an output-based measure of organization capital. Moreover, firms with a higher level of customer satisfaction, especially when high relative to its industry peers, have in average a lower cash flow level. This supports the hypothesis that customers as specific stakeholders can extract rents from shareholders in form of a specific cash flow share.

We next explore the relation between customer satisfaction and stock returns. We show that firms with high levels of customer satisfaction have positive and significant alphas. This result is robust to a large number of model specifications (including the Carhart (1997) model, the Fama and French (2015) 5-factor model, the Hou et al. (2015) q-factor model, the Stambaugh and Yuan (2017) mispricing factor model and further factor combinations) and test methodologies (time-series regressions, matching on firm characteristics and Fama and MacBeth (1973) regressions). Our results therefore do not favor risk-based explanations of the relation between customer satisfaction and returns but rather favor an explanation based on mispricing. In this respect our findings are consistent with those of Edmans (2011) who provides evidence that stock prices are slow in reacting to news about intangible assets.

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Table 1: Summmary Statistics

Panel A reports summary statistics for customer satisfaction related variables based on ACSI data, using data from 2000 to 2016. It includes the CS (customer satisfaction) level and the industry demeaned CS level, which is the CS level demeaned by the cross-sectional industry mean, employing the ACSI industry definitions. Moreover, the CS delta and the industry demeaned CS delta are listed, which in the first case is the change of the CS level from period t-1 to period t and in the second case the industry-demeaned change of the CS level. The mean, standard deviation and various percentile values are reported. Panel B reports mean, median and extreme percentile values for different firm characteristics. Market equity is the market capitalization, price is the stock price from CRSP, market beta is computed by regressing 36 month of firm-level excess returns on market excess returns, momentum is the return from month t-12 to month t-2, book-to-market the book value of equity scaled by market equity, total q is taken from Peters and Taylor (2017), market leverage is long-term debt plus current liabilities scaled by the numerator plus market equity, operating leverage is the regression based measure from O'Brien and Vanderheiden (1987), the investment rate is capital expenditure scaled by the one year lagged value of property, plant and equipment, gross profitability is sales minus costs of goods sold scaled by total assets and cash holdings is cash over total assets. For comparison purpose, the computation is first done for all firms in the ACSI sample only and subsequently for all firms, which are in the CRSP/Compustat sample that is used to merge stock market and accounting data with the ACSI data. Only firms with common stocks that trade on either the NYSE, NASDAQ or AMEX are included.

Panel A: Customer Satisfaction Statistics

	Mean	SD	P1	P25	Median	P75	P99
CS Level	75	6.2	58	71	76	80	87
Industry Demeaned CS Level	0.04	3.60	-8.70	-1.90	-0.08	2	9
CS Delta	-0.02	3	-9	-2	0	2	7
Industry Demeaned CS Delta	-0.07	2.40	-7.20	-1.40	0	1.4	5.4

Panel B: Firm Characteristics Statistics

	ACSI sample firms				CRSP/Compustat sample firms			
	Mean	Median	P5	P95	Mean	Median	P5	P95
Market Equity	40.26	14.34	0.67	189.85	3.43	0.30	0.01	12.71
Price	51.46	37.81	7.28	108.56	49.05	13.89	1.01	64.95
Market Beta	0.94	0.82	0.04	2.33	1.17	1.03	-0.03	2.95
Momentum	0.11	0.09	-0.43	0.67	0.11	0.04	-0.67	1.11
Book to Market	0.64	0.49	0.07	1.58	0.79	0.57	0.09	2.22
Total Q	1.40	0.79	0.02	4.72	1.78	0.73	-0.26	6.61
Market Leverage	0.39	0.36	0.09	0.78	0.32	0.26	0.03	0.80
Operating Leverage	1.66	1.19	-0.23	7.31	1.57	1.19	-0.52	5.35
Investment Rate	0.12	0.09	0.03	0.31	0.17	0.10	0.01	0.54
Gross Profitability	0.33	0.28	0.04	0.80	0.28	0.25	-0.07	0.81
Cash Holdings	0.07	0.04	0.00	0.23	0.14	0.07	0.00	0.53

Table 2: Portfolio Mean Values and Return Statistics

This table presents summary statistics for customer satisfaction sorted portfolios and for strategy returns. Panel A shows time-series averages of the cross-sectional portfolio means of firm characteristics and of intangible capital proxies calculated based on capitalized expenses. Firms are sorted into five portfolio based on their customer satisfaction level. Until May 2010 portfolios are rebalanced quarterly, subsequent to an ACSI reporting month. From May 2010 rebalancing is done monthly. Variable definitions follow table 1. Moreover, idiosyncratic volatility is computed following Ang et al. (2006). The proxies for capitalized intangible capital are separated in the category of organizational capital and knowledge capital. All proxies are scaled by book value of total assets. The market value of assets is defined as market capitalization plus total liabilities and the explained amount of asset value is defined as organizational capital (30% of SGA-XRD) plus knowledge capital (R&D) plus property, plant and equipment (PPEGT). Panel B compares the performance of different value-weighted long-short trading strategies and return factors related to customer satisfaction with various other factors: the size (SMB), book-to-market (HML), profitability (RMW) and investment factor (CMA) from Fama and French (1993) and Fama and French (2015), the investment and profitability factor from Hou et al. (2015), a momentum factor (WML), the betting-against-beta (BAB) factor from Frazzini and Pedersen (2014), and the quality-minus-junk (QMJ) factor from Asness et al. (2017). The Fama and French factors and the momentum factor are from Kenneth French's website and the QMJ and BAB factors from the AQR website. We construct the q-factors ourselves. Reported are the annualized average excess return, the minimum and maximum one-month returns, the annualized standard deviation, the skewness, the kurtosis, and the annualized Sharpe ratio. The sample comprises the years 2000 to 2016.

Panel A: Mean Values of Customer Satisfaction Level Sorted Portfolios

Portfolio	Bottom	2	3	4	Top
CS Level	66.57	72.76	76.05	79.10	83.26
Industry Demeaned CS Level	-2.93	-1.00	0.68	1.72	1.97
CS Delta	-1.04	-0.55	0.21	0.33	0.81
Industry Demeaned CS Delta	-0.67	-0.28	0.03	0.18	0.47
Market Equity (Bn$)	41.38	43.36	38.49	28.74	43.42
Price	42.98	45.91	49.58	44.80	61.31
Book-to-Market	0.812	0.667	0.655	0.679	0.421
Total q	1.178	1.331	1.330	1.531	1.890
Market Leverage	0.504	0.387	0.375	0.352	0.295
Operating Leverage	2.096	1.624	1.707	1.688	1.183
Investment Rate	0.135	0.121	0.117	0.119	0.122
Gross Profitability	0.214	0.335	0.362	0.328	0.409
Cash Holdings	0.054	0.068	0.064	0.065	0.076
Idiosyncratic Volatility	1.674	1.465	1.479	1.450	1.264
Capitalized Expenses					
Organizational Capital (SGA - XRD)	0.103	0.185	0.222	0.186	0.177
Organizational Capital (ADV)	0.052	0.153	0.202	0.197	0.246
Organizational Capital (Staff)	0.461	0.517	0.477	0.681	0.983
Organizational Capital (Pensions)	0.021	0.019	0.018	0.020	0.027
Knowledge Capital (R&D)	0.084	0.123	0.080	0.076	0.093
MV of Assets unexplained	0.185	0.226	0.151	0.280	0.399

Panel B: Return Statistics

Strategy/Factor	Mean	Minimum	Maximum	Standard Deviaton	Skewness	Kurtosis	Sharpe Ratio
CS Level	4.49	-16.75	12.11	12.56	-0.54	5.54	0.36
Industry Demeaned CS Level	11.81	-13.93	15.93	14.08	-0.22	5.07	0.84
CS Delta	0.69	-13.66	9.67	7.71	-0.11	6.64	0.09
Industry Demeaned CS Delta	2.57	-8.23	15.72	11.47	1.10	7.80	0.22
Factor - CS Level	4.94	-11.45	14.34	13.71	0.06	4.53	0.36
Factor - Ind Dem CS Level	9.69	-11.11	9.86	11.90	-0.30	4.44	0.81
Momentum (WML)	1.84	-34.86	18.11	18.33	-1.60	12.24	0.10
Size (SMB)	3.69	-17.17	22.08	8.21	0.96	14.14	0.45
Book-to-Market (HML)	4.38	-11.25	12.91	14.96	0.14	5.92	0.29
Profitability (RMW)	6.45	-19.11	13.52	14.08	-0.45	11.84	0.46
Profitability (ROE^{QF})	5.23	-13.78	10.65	13.28	-0.65	6.51	0.39
Investment (CMA)	4.55	-6.55	9.55	10.70	1.02	6.15	0.43
Investment (IAT^{QF})	4.60	-7.16	9.84	8.97	0.78	6.62	0.51
Betting-Against-Beta (BAB)	11.07	-14.37	13.69	16.32	-0.34	5.58	0.68
Quality-Minus-Junk (QMJ)	6.11	-10.33	12.91	15.16	0.16	4.53	0.40

Table 3: Total Q Regressions

The independent variable is total q, a tobin's q measure extended by intangible capital in the denominator and proposed by Peters and Taylor (2017). When a variable based on changes in customer satisfaction is among the independent variables, then the dependent variable is the change in total q from period t-1 to period t. The independent variables are the customer satisfaction level, the customer satisfaction level demeaned by industry, the change in customer satisfaction from period t-1 to period t, and the change in customer satisfaction demeaned by industry. Controls are the investment rate defined as capital expenditures scaled by property, plant and equipment, the logarithm of total assets, book leverage and property, plant and equipment scaled by total assets as proxy for fixed assets. The specifications include year fixed effects and either ACSI industry of firm fixed effects. T-statistics are based on robust standard errors that are double-clustered at the year-level and, depending on the used fixed effects, the industry- or firm-level and are given in parentheses. The accounting based variables are winsorized at the 1% and 99% levels. The sample period encompasses the years 2000 to 2016. ***, **, and * refers to statistical significance at the 1%, 5%, and 10% level, respectively.

	Total q				Δ Total q			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CS	0.063**	0.041*						
	(2.066)	(1.842)						
Demeaned CS			0.085**	0.046*				
			(2.416)	(1.838)				
CS Delta					-0.014	-0.016		
					(-0.214)	(-0.307)		
Demeaned CS Delta							-0.056	-0.043
							(-0.666)	(-0.676)
Investment	0.383**	0.511***	0.372**	0.507***	-0.187	-0.179	-0.191	-0.181
	(2.530)	(3.625)	(2.494)	(3.635)	(-0.693)	(-0.746)	(-0.691)	(-0.752)
Log Assets	-0.493	-0.004	-0.472	-0.003	15.095	22.771	14.842	22.684
	(-0.862)	(-0.046)	(-0.832)	(-0.035)	(1.662)	(1.522)	(1.675)	(1.524)
Book Leverage	-0.957	0.379	-0.972	0.390	-1.339***	-1.288**	-1.321***	-1.279**
	(-1.102)	(0.582)	(-1.131)	(0.599)	(-5.170)	(-2.723)	(-5.760)	(-2.725)
Fixed Assets	-1.224**	-0.511	-1.110*	-0.491	0.589	1.766	0.560	1.758
	(-2.030)	(-1.347)	(-1.776)	(-1.288)	(0.621)	(1.257)	(0.601)	(1.257)
FirmFE	Yes	No	Yes	No	Yes	No	Yes	No
IndustryFE	No	Yes	No	Yes	No	Yes	No	Yes
TimeFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	2084	2084	2084	2084	1963	1963	1963	1963

* p<0.10, ** p<0.05, *** p<0.01

Table 4: Matched Cash Flows

In the first step, firms are sorted into 5 portfolios, in panel A based on the CS level and in panel B based on the industry demeaned CS level. Subsequently, to each firm in the top portfolios one firm from the ACSI universe is matched, which is not in the top portfolio. Matching is done month by month based on the propensity score employing financial market leverage and operating leverage as matching variables. Market leverage is long-term debt plus current liabilities scaled by the numerator plus market equity, operating leverage is the regression based measure from O'Brien and Vanderheiden (1987) with quarterly data, employing 20 rolling quarters. Afterwards, for both the top level firms and the matched firms in each month the mean and median cash flow is computed. The cash flow definition follows Peters and Taylor (2017) and is income before extraordinary items plus depreciation expense scaled by property, plant and equipment: $CF_{it} = (IB_{it} - DP_{it})/PPE_{it}$. The sample encompasses the years 2000 to 2016. The table shows various summary statistics for both the monthly mean and monthly median cash flow of the top and matched portfolios.

	Mean	Median	SD	Min	Max
Panel A: CS Level Sorted Portfolios					
Monthly Average					
CF top CS level portfolio	0.252	0.265	0.064	0.113	0.380
CF top CS level matched firms	0.321	0.308	0.081	0.128	0.581
Monthly Median					
CF top CS level portfolio	0.209	0.210	0.025	0.147	0.259
CF top CS level matched firms	0.181	0.179	0.036	0.106	0.287
Panel B: Industry Demeaned CS Level Sorted Portfolios					
Monthly Average					
CF top demeaned CS level portfolio	0.195	0.230	0.118	-0.263	0.365
CF top demeaned CS level matched firms	0.277	0.242	0.105	0.090	0.609
Monthly Median					
CF top demeaned CS level portfolio	0.129	0.133	0.020	0.084	0.207
CF top demeaned CS level matched firms	0.168	0.159	0.037	0.100	0.274

Table 5: Customer Satisfaction Level Strategies

The table presents results of factor-spanning regressions. All firms in the ACSI universe are sorted into 5 portfolios based on their level of customer satisfaction. Until May 2010 portfolios are rebalanced quarterly, subsequent to an ACSI reporting month. From May 2010 rebalancing is done monthly. The strategy return is the return of a self-financing portfolio that is long the high customer satisfaction portfolio and short the low customer satisfaction portfolio. Alpha is the intercept in a time-series regression of monthly strategy returns on various factor models and factor combinations. The value-weighted strategy is based on long/short portfolios that use the one-month lagged market capitalization as portfolio weights. The benchmark models used are the CAPM, the Carhart (1997) 4 factor model, the Fama and French (2015) 5-factor model, the Hou et al. (2015) q-factor model and the Stambaugh and Yuan (2017) mispricing factor model. Further combinations contain the Fama and French (1993) 3-factor model. It is extended by either the Pástor and Stambaugh (2003) liquidity factor, the Asness et al. (2017) quality-minus-junk and the Frazzini and Pedersen (2014) betting-against-beta factor or the short-term and long-term reversal factor based on Fama and French (1996). Moreover, we use a model with a size factor and a self-constructed operating leverage (OL) factor, based on the operating leverage measure from Mandelker and Rhee (1984), and a model containing the GDP-related factor MFTRALL from Vassalou (2003). We obtain the Fama-French factors SMB (size), HML (book-to-market), CMA (investment), RMW (profitability), STR (short-term reversal), LTR (long-term reversal) and the momentum factor (UMD) from Kenneth French's website. The liquidity factor LIQ is from Lubos Pastor's website, QMJ (quality-minus-junk) and BAB (betting-against-beta) are from the AQR website, and the mispricing factors MGMT (management) and PERF (performance) are from Yu Yuan's website. We construct the q-factors, the OL factor and the GDP factor ourselves. The sample period runs from February 2000 to December 2016. Returns and alphas are in monthly percent, heteroscedasticity and autocorrelation robust Newey and West (1986) t-statistics are shown below the coefficient estimates. ***, **, and * refers to statistical significance at 1%, 5%, and 10% level, respectively.

Model	CAPM	C4	FF5	Q-Factor	FF3+ QMJ+BAB	MISP	FF3+ STR+LTR	FF3+LIQ	MKT+ SMB+OL	MKT+GDP
Value-Weighted Strategy:										
MKT	-0.214***	-0.133	-0.064	0.015	0.062	-0.016	-0.193*	-0.203**	-0.221**	-0.128
	(-3.144)	(-1.529)	(-0.709)	(0.178)	(0.577)	(-0.152)	(-1.941)	(-2.056)	(-2.411)	(-1.585)
Size		-0.092	-0.018	0.013	0.071	-0.069	-0.109	-0.148	-0.112	
		(-0.985)	(-0.171)	(0.142)	(0.777)	(-0.753)	(-0.878)	(-1.300)	(-1.012)	
HML		-0.221***	-0.553***		-0.327***		-0.182**	-0.235***		
		(-2.891)	(-5.298)		(-4.493)		(-2.049)	(-2.762)		
UMD		0.180***								
Investment			0.253	-0.151						
			(1.418)	(-1.080)						
Profitability			0.608***	0.545***						
			(4.445)	(3.820)						
QMJ					0.516***					
					(3.923)					
BAB					0.199***					
					(2.693)					
MGMT						-0.283***				
						(-4.151)				
PERF						0.407***				
						(7.078)				
STR							-0.014			
							(-0.192)			
LTR							-0.122			
							(-0.685)			
LIQ/OL/MFTRALL								0.226	0.260	-1.601***
								(0.208)	(1.048)	(-2.820)
alpha	0.366	0.415**	0.136	0.084	-0.050	0.133	0.462**	0.477**	0.340	0.301
	(1.500)	(2.030)	(0.517)	(0.388)	(-0.176)	(0.741)	(2.091)	(2.281)	(1.433)	(1.317)
Equal-Weighted Strategy:										
alpha	0.925***	0.879***	0.551**	0.574**	0.371	0.530*	0.903***	0.973***	0.851***	0.836***
	(3.284)	(2.951)	(2.176)	(2.114)	(1.371)	(1.798)	(3.027)	(3.300)	(3.142)	(2.963)

Table 6: Industry Demeaned Customer Satisfaction Strategies

The table presents results of factor-spanning regressions. All firms in the ACSI universe are sorted into 5 portfolios based on their level in industry demeaned customer satisfaction. Industry definitions are taken from the ACSI and firm-level values are demeaned by the cross-sectional monthly mean. Until May 2010 portfolios are rebalanced quarterly, subsequent to an ACSI reporting month. From May 2010 rebalancing is done monthly. The strategy return is the return of a self-financing portfolio that is long the high industry demeaned CS portfolio and short the low industry demeaned CS portfolio. Alpha is the intercept in a time-series regression of monthly strategy returns on various factor models and factor combinations. The value-weighted strategy is based on long/short portfolios that use the one-month lagged market capitalization as portfolio weights. The benchmark models used are the CAPM, the Carhart (1997) 4 factor model, the Fama and French (2015) 5-factor model, the Hou et al. (2015) q-factor model and the Stambaugh and Yuan (2017) mispricing factor model. Further combinations contain the Fama and French (1993) 3-factor model. It is extended by either the Pástor and Stambaugh (2003) liquidity factor, the Asness et al. (2017) quality-minus-junk and the Frazzini and Pedersen (2014) betting-against-beta factor or the short-term and long-term reversal factor based on Fama and French (1996). Moreover, we use a model with a size factor and a self-constructed operating leverage (OL) factor, based on the operating leverage measure from Mandelker and Rhee (1984), and a model containing the GDP-related factor MFTRALL from Vassalou (2003). We obtain the Fama-French factors SMB (size), HML (book-to-market), CMA (investment), RMW (profitability), STR (short-term reversal), LTR (long-term reversal) and the momentum factor (UMD) from Kenneth French's website. The liquidity factor LIQ is from Lubos Pastor's website, QMJ (quality-minus-junk) and BAB (betting-against-beta) are from the AQR website, and the mispricing factors MGMT (management) and PERF (performance) are from Yu Yuan's website. We construct the q-factors, the OL factor and the GDP factor ourselves. The sample period runs from February 2000 to December 2016. Returns and alphas are in monthly percent, heteroscedasticity and autocorrelation robust Newey and West (1986) t-statistics are shown below the coefficient estimates. ***, **, and * refers to statistical significance at the 1%, 5%, and 10% level, respectively.

Model	CAPM	C4	FF5	Q-Factor	FF3+ QMJ+BAB	MISP	FF3+ STR+LTR	FF3+LIQ	MKT+ SMB+OL	MKT+GDP
Value-Weighted Strategy:										
MKT	0.335***	0.185	0.289***	0.210	0.274***	0.248**	0.208*	0.217**	0.196***	0.284***
	(5.097)	(1.526)	(3.129)	(1.495)	(2.707)	(2.116)	(1.795)	(2.180)	(3.049)	(2.924)
Size		0.172	0.269	0.098	0.238	0.053	0.292**	0.155	0.288	
		(1.093)	(1.597)	(0.688)	(1.285)	(0.379)	(1.980)	(0.880)	(1.236)	
HML		-0.479***	-0.487***		-0.486***		-0.285**	-0.446***		
		(-4.837)	(-3.052)		(-3.817)		(-2.430)	(-4.284)		
UMD		-0.056								
Investment			-0.503***	-0.713***						
			(-2.711)	(-3.545)						
Profitability			0.427***	-0.052						
			(2.662)	(-0.246)						
QMJ					0.139					
					(0.682)					
BAB					0.027					
					(0.245)					
MGMT						-0.660***				
						(-7.044)				
PERF						0.179				
						(1.504)				
STR							0.054			
							(0.393)			
LTR							-0.369**			
							(-2.530)			
LIQ/OL/MFTRALL								1.372*	0.272	1.008
								(1.767)	(1.076)	(0.744)
alpha	0.659**	0.838***	0.650**	0.928***	0.690**	0.829**	0.724**	0.716**	0.546	0.596*
	(1.984)	(2.814)	(2.153)	(2.699)	(2.104)	(2.543)	(2.340)	(2.409)	(1.568)	(1.897)
Equal-Weighted Strategy:										
alpha	0.476*	0.583***	0.541***	0.595***	0.470*	0.607***	0.633***	0.682***	0.485*	0.491**
	(1.772)	(2.748)	(2.818)	(2.652)	(1.952)	(2.737)	(3.063)	(3.133)	(1.909)	(2.009)

Table 7: Further Alphas of CS Based Strategies

The table presents time-series regressions intercepts of monthly strategy returns on various factor models and factor combinations. Different strategies based on customer satisfaction are included as dependent variable. Panel A uses the excess return over the risk-free rate from a portfolio that includes all firms for which a ACSI customer satisfaction value has been reported in the past 12 month. Panel B uses long/short strategy returns based on either the change in customer satisfaction compared to the last published value or the industry demeaned change in customer satisfaction. Panel C uses factor returns from factor mimicking portfolios constructed following Fama and French (2015) and Stambaugh and Yuan (2017). All firms in the ACSI universe are sorted into 3 portfolios based on their 20% and 80% breakpoints for either the CS level or the industry demeaned CS level. Independently, all firms are sorted into two size groups based on their median value. The factor are constructed from 2x3 sorts as are the Fama-French factors. The models and factors used are the same as in table 5 and 6. Panel D and panel E report alphas from regressions of value-weighted strategies based on the CS level and the industry demeaned CS level on a model that includes the market factor and a long/short factor based on the respective labelled firm characteristic. The explanation for the abbreviations and the definitions of the variables can be found in the appendix. The respective dependent strategy is indicated above the results. The sample period runs from February 2000 to December 2016. Returns and alphas are in monthly percent, heteroscedasticity and autocorrelation robust Newey and West (1986) t-statistics are shown below the coefficient estimates. ***, **, and * refers to statistical significance at 1%, 5%, and 10% level, respectively.

Model	CAPM	C4	FF5	Q-Factor	FF3+ QMJ+BAB	MISP	FF3+ STR+LTR	FF3+LIQ	MKT+ SMB+OL	MKT+GDP
Panel A: All Firms in ACSI Index										
Value-Weighted	0.168**	0.199***	0.111	0.216**	0.097	0.160**	0.168***	0.184***	0.209***	0.118
	(2.188)	(2.679)	(1.458)	(2.351)	(1.400)	(1.996)	(2.666)	(2.762)	(3.051)	(1.550)
Equal-Weighted	0.496***	0.415***	0.199*	0.411***	0.264**	0.423***	0.334***	0.321***	0.449***	0.427**
	(2.954)	(4.089)	(1.693)	(3.612)	(2.297)	(3.809)	(3.003)	(2.731)	(3.184)	(2.932)
Panel B: Further CS Related Long/Short Strategies										
CS Delta VW	0.325	0.171	0.164	0.108	0.073	-0.133	0.219	0.257	0.235	0.353*
	(1.443)	(0.890)	(0.689)	(0.492)	(0.313)	(-0.511)	(0.961)	(1.275)	(1.067)	(1.688)
CS Delta EW	0.374**	0.283	0.375*	0.272	0.324*	0.165	0.442**	0.370*	0.401**	0.438**
	(2.017)	(1.645)	(1.798)	(1.454)	(1.710)	(0.884)	(2.428)	(1.921)	(2.214)	(2.437)
Industry Demeaned	0.288*	0.282*	0.271	0.308	0.416**	0.285*	0.284	0.298*	0.321*	0.252
CS Delta VW	(1.706)	(1.665)	(1.473)	(1.563)	(2.576)	(1.966)	(1.633)	(1.903)	(1.753)	(1.469)
Industry Demeaned	0.189	0.091	0.180	0.092	0.145	0.012	0.167	0.283*	0.208	0.213
CS Delta EW	(1.213)	(0.576)	(1.265)	(0.499)	(0.938)	(0.077)	(1.216)	(1.673)	(1.474)	(1.448)
Panel C: CS Based Factors										
Industry Demeaned CS	0.496*	0.692**	0.612**	0.793**	0.569**	0.793**	0.576**	0.638**	0.438	0.483*
	(1.675)	(2.460)	(2.228)	(2.575)	(2.027)	(2.464)	(2.151)	(2.272)	(1.433)	(2.134)
CS Level	0.604***	0.647***	0.452**	0.400*	0.308	0.432*	0.644***	0.685***	0.593***	0.633*
	(2.736)	(2.958)	(2.095)	(1.891)	(1.300)	(1.895)	(2.643)	(2.877)	(2.672)	(2.504)

Panel D: CS Strategy and Benchmark Returns

	R&D/M	Adv/M	Adv-Gr	OL^{NM}	HHI	CF/P	NPY	OCF/P	Ch/At	At-Liq	Vol^{CF}
alpha	0.510**	0.436*	0.448*	0.355	0.474**	0.445*	0.390	0.467*	0.446*	0.436*	0.419*
	(2.313)	(1.794)	(1.903)	(1.629)	(2.012)	(1.896)	(1.527)	(1.958)	(1.924)	(1.884)	(1.740)
	$R\&D^Q$/M	CF^Q/P	RoE^Q	Ea^Q/P	Ivola	Tail	OC	OC^{Adv}	OC^{Staff}	$OC^{Pension}$	KC
alpha	0.422*	0.549**	0.159	0.371	0.413	0.376	0.309	0.107	0.409**	0.205	0.432*
	(1.816)	(2.517)	(0.651)	(1.513)	(1.652)	(1.550)	(1.131)	(0.489)	(1.989)	(0.802)	(1.849)

Panel E: Industry Demeaned CS Strategy and Benchmark Returns

	R&D/M	Adv/M	Adv-Gr	OL^{NM}	HHI	CF/P	NPY	OCF/P	Ch/At	At-Liq	Vol^{CF}
alpha	0.779**	0.801***	0.870***	0.514	0.809**	0.790***	0.930***	0.773**	0.730**	0.711**	0.800**
	(2.553)	(2.728)	(3.069)	(1.445)	(2.517)	(2.651)	(3.046)	(2.542)	(2.298)	(2.264)	(2.509)
	$R\&D^Q$/M	CF^Q/P	RoE^Q	Ea^Q/P	Ivola	Tail	OC	OC^{Adv}	OC^{Staff}	$OC^{Pension}$	KC
alpha	0.672**	0.759**	0.691**	0.854***	0.951***	0.761**	0.792**	0.597*	0.685**	0.717**	0.705**
	(2.155)	(2.344)	(2.103)	(2.664)	(3.079)	(2.404)	(2.319)	(1.805)	(2.150)	(2.257)	(2.243)

Table 8: Top Quintile Portfolios

This table shows the alphas of top quintile portfolios. The top quintile portfolios are the long portfolios of various customer satisfaction based strategies. The alphas are the regression intercepts in time-series regressions of the excess return of the long portfolios of the respective strategy with respect to various factor models and factor combinations. The strategies are based on the CS level and CS delta, both in its unadjusted and industry demeaned version. The factors and models employed are the same as in table 5 and table 6. The sample period runs from February 2000 to December 2016. Returns and alphas are in monthly percent, heteroscedasticity and autocorrelation robust Newey and West (1986) t-statistics are shown below the coefficient estimates. ***, **, and * refers to statistical significance at 1%, 5%, and 10% level, respectively.

Model Strategy	CAPM	C4	FF5	Q-Factor	FF3+ QMJ+BAB	MISP	FF3+ STR+LTR	FF3+LIQ	MKT+ SMB+OL	MKT+GDP
CS Level										
Value-Weighted	0.436***	0.479***	0.239*	0.328**	0.189	0.349**	0.474***	0.497***	0.493***	0.355***
	(3.320)	(3.681)	(1.764)	(2.149)	(1.180)	(2.480)	(3.606)	(3.978)	(4.076)	(2.606)
Equal-Weighted	0.991***	0.908***	0.537***	0.804***	0.594***	0.790***	0.846***	0.874***	0.930***	0.883***
	(5.185)	(5.829)	(4.743)	(4.898)	(4.442)	(3.917)	(5.570)	(6.150)	(5.888)	(6.373)
Industry Demeaned CS Level										
Value-Weighted	0.434*	0.609***	0.415*	0.668***	0.402*	0.614***	0.537***	0.526**	0.427*	0.418**
	(1.873)	(3.139)	(1.955)	(2.627)	(1.779)	(2.629)	(2.982)	(2.421)	(1.816)	(2.061)
Equal-Weighted	0.651***	0.675***	0.496***	0.740***	0.516***	0.765***	0.591***	0.579***	0.605***	0.648***
	(5.384)	(5.682)	(3.734)	(5.040)	(4.205)	(5.194)	(5.006)	(4.292)	(5.159)	(5.259)
CS Delta										
Value-Weighted	0.416***	0.356***	0.305***	0.376***	0.248**	0.120	0.360***	0.351***	0.402***	0.287**
	(2.947)	(3.033)	(2.618)	(2.976)	(2.330)	(1.007)	(2.717)	(2.939)	(2.730)	(2.540)
Equal-Weighted	0.668***	0.532***	0.354**	0.524***	0.390**	0.441***	0.532***	0.460***	0.633***	0.584**
	(3.186)	(4.063)	(2.401)	(3.598)	(2.599)	(2.902)	(3.656)	(3.045)	(3.513)	(2.531)
Industry Demeaned CS Delta										
Value-Weighted	0.356**	0.373***	0.289*	0.397**	0.367**	0.349*	0.327***	0.332**	0.408***	0.272*
	(2.229)	(2.674)	(1.894)	(2.460)	(2.531)	(1.918)	(2.670)	(2.435)	(2.683)	(1.871)
Equal-Weighted	0.669***	0.536***	0.410***	0.515***	0.490***	0.519***	0.512***	0.521***	0.667***	0.622***
	(3.017)	(3.973)	(3.166)	(4.000)	(3.107)	(3.543)	(3.616)	(3.315)	(3.339)	(3.189)

Table 9: Characteristic Matched Firms

This table compares the returns of the original strategies with ACSI firms and of replicated strategies employing characteristic matched firms. Each month, all firms included in the ACSI Index in the respective month are matched, based on various firm characteristics and based on the industry, to a firm not included in the ACSI Index, but included in the filtered CRSP/Compustat universe. The two firm characteristic groups for matching are either size, book-to-market, profitability, asset growth and momentum or size, total q and idiosyncratic volatility. Industries are defined as the first naics code digit. Matching is done both on the propensity score and on the Mahalanobis distance. The second left column shows the original returns of long/short strategies from quintile sorted portfolios. Sorts are based on the variable in the left column and portfolio returns are either value- or equal-weighted, as indicated. Subsequently, for the firms sorted in either the long- or short portfolio the respective matched firms are taken and the return of a portfolio is computed that uses the matched firms, instead of the original firms. The respective long/short strategy returns of the characteristic matched firm portfolios are shown in the four right columns. In panel B the same is done for the whole ACSI-universe portfolio and the respective excess-returns of the original and matched strategies are displayed. Returns are in monthly percent. T-statistics of a test whether the strategy return is significantly different from zero with heteroscedasticity and autocorrelation robust Newey and West (1986) t-statistics are shown below the returns. The time period comprises February 2000 to December 2016.

	ACSI Firms	Matched Firms			
		Propensity Score Matching		Mahalanobis Distance Matching	
	Matched on:	Size, BM, Gross Profitability, Asset Growth, Momentum	Size, Total Q, Ideosyncratic Volatility	Size, BM, Gross Profitability, Asset Growth, Momentum	Size, Total Q, Ideosyncratic Volatility
Panel A: Long/Short Strategy Returns					
CS VW	0.300	0.442	0.149	0.129	0.083
	(1.197)	(1.320)	(0.490)	(0.513)	(0.358)
CS EW	0.813**	0.312	0.004	0.188	0.232
	(2.250)	(1.386)	(-0.014)	(1.032)	(1.072)
Ind Demeaned CS VW	0.735**	-0.210	0.298	0.079	0.050
	(2.519)	(-0.583)	(1.055)	(0.293)	(0.239)
Ind Demeaned CS EW	0.493*	-0.089	0.169	0.151	0.076
	(1.907)	(-0.363)	(0.655)	(0.722)	(0.356)
CS Delta VW	0.212	0.508	0.294	0.138	0.269
	(0.900)	(1.453)	(1.011)	(0.612)	(1.288)
CS Delta EW	0.373*	0.187	0.196	0.381	0.441***
	(1.959)	(0.685)	(0.900)	(1.500)	(3.340)
Ind Dem CS Delta VW	0.303*	0.176	0.388*	0.204	0.142
	(1.773)	(0.556)	(1.730)	(1.051)	(1.031)
Ind Dem CS Delta EW	0.166	-0.000	0.092	0.294*	0.250
	(0.870)	(-0.001)	(0.449)	(1.655)	(1.517)
Panel B: Excess Returns					
ACSI firms VW	0.420	0.196	0.200	0.232	0.436
	(1.260)	(0.492)	(0.493)	(0.598)	(1.252)
ACSI firms EW	0.785*	0.711*	0.689*	0.763*	0.803**
	(1.927)	(1.797)	(1.688)	(1.933)	(2.167)

* p<0.10, **p<0.05, *** p<0.01

Table 10: Performance and Dependence of Brand Value

This table shows results for analyses employing brand value. We use Brand Finance Brandirectory brand value computed with the royalty relief method. Panel A consist of factor-spanning regressions. All firms from the Brandirectory universe are sorted into 5 portfolios based on their brand value-to-market capitalization ratio. The portfolios are rebalanced yearly, in the month subsequent to the publication of the Brand Finance Global 500 report. The brand value strategy return is the return of a self-financing portfolio that is long the high brand value ratio portfolio and short the low brand value ratio portfolio. Both results for value-weighted and equally-weighted portfolio returns are shown. *alpha* is the intercept in a time-series regression of monthly strategy returns on various factor models and factor combinations. The models used are the same as in table 5 and table 6. Panel B examines the dependence of the customer satisfaction strategies and the brand value strategy. In case of customer satisfaction the indicated dependent strategy is regressed on a brand value factor. In case of brand value the strategy return is regressed on an unadjusted customer satisfaction level factor and an industry demeaned customer satisfaction level factor, respectively. Panel C reports alphas from regressions of the brand value strategy on a model that includes the market factor and a long/short factor based on the respective labelled firm characteristic. The explanation for the abbreviations and the definitions of the variables can be found in the appendix. The respective dependent strategy is indicated above the results. The sample period runs from February 2007 to December 2016. Returns and alphas are in monthly percent, heteroscedasticity and autocorrelation robust Newey and West (1986) t-statistics are shown below the coefficient estimates. ***, **, and * refers to statistical significance at 1%, 5%, and 10% level, respectively.

Panel A: Brand Value Strategy Performance

Model	CAPM	C4	FF5	Q-Factor	FF3+ QMJ+BAB	MISP	FF3+ STR+LTR	FF3+LIQ	MKT+ SMB+OL	MKT+GDP
alpha VW	0.462**	0.464**	0.206	0.579**	0.323	0.483	0.419**	0.522**	0.536**	0.461**
	(2.063)	(2.211)	(0.927)	(2.204)	(1.163)	(1.466)	(2.054)	(2.175)	(2.258)	(2.096)
alpha EW	0.428	0.478*	0.299	0.457	0.355	0.425	0.464*	0.538	0.497*	0.426
	(1.267)	(1.664)	(1.033)	(1.508)	(1.256)	(1.104)	(1.697)	(1.596)	(1.694)	(1.286)

Panel B: Dependence of Customer Satisfaction and Brand Value Strategies

Dependent Strategy	CS Level		Ind Dem CS Level		CS Delta		Ind Dem CS Delta		Brand Value	
Weighting Factor	EW	VW	EW	VW	EW	VW	EW	VW	CS Level	Demeaned CS Level
MKT	-0.286***	-0.282***	-0.165**	0.115	-0.094	0.002	-0.069	0.007	0.203***	0.156***
	(-4.092)	(-3.668)	(-2.576)	(1.328)	(-1.288)	(0.055)	(-1.460)	(0.117)	(4.033)	(3.593)
BV/CS Factor	0.430***	0.451***	0.165**	0.192	-0.117*	-0.017	-0.12	0.076*	0.208***	0.150**
	(5.164)	(3.225)	(2.390)	(1.111)	(-1.698)	(-0.331)	(-1.658)	(1.660)	(5.489)	(2.311)
alpha	0.496*	0.406	0.554**	0.596*	0.256*	-0.079	0.122	0.042	0.415*	0.403*
	(1.895)	(1.404)	(2.376)	(1.784)	(1.659)	(-0.425)	(0.656)	(0.186)	(1.732)	(1.758)

Panel C: Brand Value Strategy and Benchmark Returns

	R&D/M	Adv/M	Adv-Gr	OL^{NM}	HHI	CF/P	NPY	OCF/P	Ch/At	At-Liq	Vol^{CF}
alpha	0.432**	0.459**	0.455**	0.329	0.454**	0.463**	0.389	0.474**	0.460**	0.492**	0.453**
	(2.010)	(2.188)	(2.032)	(1.307)	(1.981)	(2.114)	(1.583)	(2.177)	(2.406)	(2.147)	(1.985)
	$R\&D^{Q}/M$	CF^{Q}/P	RoE^{Q}	Ea^{Q}/P	Ivola	Tail	OC	OC^{Adv}	OC^{Staff}	$OC^{Pension}$	KC
alpha	0.474**	0.475**	0.415	0.514*	0.577**	0.490**	0.314	0.362	0.410*	0.452*	0.430*
	(2.183)	(2.092)	(1.336)	(1.857)	(2.233)	(2.407)	(1.268)	(1.362)	(1.685)	(1.900)	(1.902)

Table 11: Fama and MacBeth Regressions

The table reports results from Fama and MacBeth (1973) regressions of returns on the customer satisfaction level, the industry-demeaned customer satisfaction level, the delta in customer satisfaction from period t-1 to period t, or the industry-demeaned customer satisfaction delta. Regressions include various controls, where the variable definitions follow table 1 and table 2. The independent control variables are winsorized at the 1% and 99% levels. The sample covers February 2000 to December 2016. Test statistics are in parentheses. The time-series averages of the coefficient estimates and their associated time-series t-statistics are reported. ***, **, and * refers to statistical significance at the 1%, 5%, and 10% level, respectively.

	Regressions of the form $r_{it} = \beta' x_{it} + \epsilon_{it}$							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CS	0.024*	0.016						
	(1.885)	(1.344)						
Demeaned CS			0.038**	0.043***				
			(2.486)	(2.915)				
CS Delta					0.035	0.021		
					(1.610)	(1.004)		
Demeaned CS Delta							0.015	0.021
							(0.703)	(0.990)
Total Q	0.088*	0.066	0.080*	0.060	0.107**	0.073	0.111**	0.074
	(1.907)	(1.399)	(1.733)	(1.246)	(2.297)	(1.549)	(2.366)	(1.585)
Beta	0.216	-0.014	0.219	0.018	0.179	-0.028	0.178	-0.023
	(0.512)	(-0.029)	(0.516)	(0.037)	(0.426)	(-0.056)	(0.422)	(-0.046)
Operating Leverage	-0.153**	-0.147**	-0.170***	-0.159**	-0.175***	-0.167***	-0.175***	-0.167***
	(-2.350)	(-2.379)	(-2.641)	(-2.597)	(-2.658)	(-2.637)	(-2.650)	(-2.621)
Market Leverage	0.726	-0.413	0.498	-0.441	0.595	-0.592	0.613	-0.661
	(1.493)	(-0.628)	(1.030)	(-0.679)	(1.184)	(-0.870)	(1.228)	(-0.970)
Log Size		-0.144**		-0.139**		-0.150**		-0.157**
		(-2.143)		(-2.051)		(-2.295)		(-2.397)
Book-to-Market		0.181		0.197		0.180		0.202
		(0.960)		(1.043)		(0.916)		(1.031)
Profitability (Gross)		0.046		0.202		0.008		-0.066
		(0.105)		(0.460)		(0.018)		(-0.148)
Asset Growth		-0.353		-0.361		-0.322		-0.280
		(-1.146)		(-1.171)		(-1.018)		(-0.891)
Idiosyncratic Vola		-0.177		-0.188		-0.184		-0.203
		(-1.130)		(-1.177)		(-1.154)		(-1.272)
$\text{Momentum}_{-12,-2}$		0.167		0.119		0.268		0.269
		(0.349)		(0.249)		(0.558)		(0.556)
$\text{Ret}_{-1,0}$		-0.016		-0.016		-0.016		-0.016
		(-1.097)		(-1.087)		(-1.115)		(-1.059)

Table 12: CDS Spreads

Monthly CDS spreads are regressed on either the unadjusted or the industry demeaned customer satisfaction levels and on various controls. Book leverage is total liabilities over total assets, equity volatility is the annualized standard deviation of monthly stock returns from the previous 36 months, distance-to-default is the logarithm of book leverage over equity volatility, return on assets is net income scaled by total assets, organizational capital is capitalized organizational capital based on selling, general and administrative expenses (30% of SGA-XRD) as in table 2 and asset growth is the change in total assets from year t-1 to year t scaled by total assets of year t-1. Fixed effects panel regressions with industry and time fixed effects, and Fama and MacBeth (1973) regressions as in table 11 are employed. The independent control variables are winsorized at the 1% and 99% levels. The sample covers October 2001 to December 2016. Test statistics are in parentheses. In case of fixed effects panel regressions standard errors are clustered by firm and time. In case of Fama and MacBeth (1973) regressions the time-series averages of the coefficient estimates and their associated time-series t-statistics are reported. ***, **, and * refers to statistical significance at the 1%, 5%, and 10% level, respectively.

	CDS Spread							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	FE Regression (Industry and Time)		Fama-MacBeth		FE Regression (Industry and Time)		Fama-MacBeth	
CS	-9.502***	-6.422*	-2.210***	-0.934				
	(-2.628)	(-1.897)	(-4.543)	(-1.491)				
Demeaned CS					-8.332**	-4.282*	-5.432**	-3.102***
					(-2.247)	(-1.656)	(-2.122)	(-4.427)
Book Leverage	370.053**		421.866***		383.766**		447.417***	
	(2.214)		(7.483)		(2.224)		(7.847)	
Market Leverage		371.673***		252.965***		377.982***		264.978***
		(4.123)		(12.209)		(4.067)		(12.927)
Equity Volatility	9.382***	5.915***	9.459***	6.446***	9.504***	5.967***	7.985***	5.593***
	(4.921)	(4.755)	(11.156)	(7.975)	(4.879)	(4.684)	(7.157)	(9.328)
Distance-to-Default	-27.773	8.359	-49.268***	-2.797*	-29.900	7.962	-51.514***	-2.911**
	(-1.202)	(1.096)	(-6.416)	(-1.934)	(-1.251)	(1.027)	(-6.720)	(-2.135)
Return on Assets	-295.985		-131.162***		-300.451		-183.811***	
	(-1.271)		(-3.080)		(-1.279)		(-4.215)	
Operating Leverage		30.002***		19.460***		30.099***		18.897***
		(3.258)		(5.419)		(3.177)		(5.060)
Organization Capital		14.080		-44.448***		9.489		-65.131***
		(0.185)		(-2.895)		(0.124)		(-3.901)
Asset Growth		-7.472		-20.284***		-10.435		-20.441***
		(-0.349)		(-3.386)		(-0.471)		(-3.366)
N	13554	11822	13554	11822	13554	11822	13554	11822

* p<0.10, ** p<0.05, *** p<0.01

Appendix A

A.1 ACSI Data

The American Customer Satisfaction Index (ACSI) relies on approximately 180,000 customer interviews per year in order to obtain the final customer satisfaction values. For this, customers are randomly asked questions about their purchase and use of specific products and service in the recent time via email.[23] Suited respondents are then asked from which company or which brand they have purchased the respective product. The surveys and interviews are mostly conducted in the quarter before the announcement of the ACSI values. The responses are then used as input to a proprietary multi-equation econometric model. It is a cause-and-effect model, which includes drivers for customer satisfaction on the left side, customer satisfaction itself in the center, and outcomes from customer satisfaction on the right side. Drivers are perceived quality, customer expectations and perceived value and outcomes are customer complaints and customer loyalty, which included customer retention and price tolerance. Each of these drivers and outcomes is measured from up to 10 elements, which consists of questions or assessments related to the respective industry products and services. The elements are weighted within the model with specific weights, such that for each driver and outcome a value between 0 and 100 is obtained, based on customer evaluations. The model subsequently quantifies the strength of the effect of the drivers on the outcomes. Eventually, customer satisfaction is obtained from this model, such that the customer satisfaction value maximizes the explanatory power of the model. The impact of the drivers is self-weighting, such that the explanatory power is maximized.

The customer satisfaction scores are reported on a 0 to 100 scale. Each firm in this index obtains a new customer satisfaction value one time per year. The point in time within a year is dependent on the industry a company belongs to. For all firms in a certain industry, the scores are reported on the same day in the same month. Until May 2010, the data was published quarterly in February, May, August and November; in each of these months for a different set of industries. Since May 2010, the data is published monthly, such that each month for another set of industries

[23] Information about the index and industry formation is from Fornell et al. (1996) and from the ACSI website: www.theacsi.org

information is released. There are a total of 42 industries, which again are ascribed to 10 different sectors. In the beginning, the industry definitions followed the SIC-codes and mainly were related to the two first digits of the SIC-codes, as described by Fornell et al. (1996). In 2004 there were slight differences in the definitions, as the industry basis changes from SIC-codes to NAICS-codes. This mainly affected the industries that were included in the time after this change, but also food service industries. In our sample period we can link ACSI data to stock market data for 233 firms with 248 stocks. For most firms there is not a consistent ACSI time-series of 17 years, but only a fraction of the years is covered. Before filtering, each month in average there are 157 firms for which we can link customer satisfaction data to stock market data. We only keep firms with common stocks with share code 10 or 11 that trade on either the NYSE, NASDAQ or AMEX. Consequently, after filtering each month in average we are left with 145 firms.

A.2 Brand Value Data (Brand Finance)

We obtain the brand value from Brand Finance Brandirectory.[24] Brand Finance defines brand as "Trademark and associated intellectual property including the word mark and trademark iconography". Following this definition brand value is part of the intangible capital of a firm. There are various definitions employed in the marketing brand literature. Keller (1993, p. 2) defines brand equity as "the differential effect of brand knowledge on consumer response" to the brand. Simon and Sullivan (1993, p. 29) define brand equity as "the incremental cash flows which accrue to branded products over and above the cash flows which would result from the sale of unbranded products".

With employing Brand Finance brand values we focus on one plausible income-based approach that should capture both brand awareness and brand image, following the definition of Keller (1993). Brand Finance uses the royalty relief method to compute the brand value. The approach is based on hypothetical royalty payments that a random company would pay to license the brand based on future revenues attributable to a brand. The method includes multiple steps: First, a brand strength score between 0 and 100 is obtained for each brand, based on e.g. financial performance or sustainability. Then the score is interacted with the royalty rate range, which can be observed in the market for the sector the brand belongs to. This gives the hypothetical royalty rate

[24] Information about the computation is from the Brandirectory website: www.brandirectory.com.

for a brand. In the following, past brand specific revenues are estimated, which are then applied, together with e.g. economic growth rates, to forecast brand specific revenues. The royalty rate is then applied on the forecasted brand revenues and the NPV of these royalty charges is then calculated as brand value.

Salinas and Ambler (2009) conclude that the royalty relief method is the most applied method for technical valuation in practice and specialist literature. The objective in technical valuation is to establish the financial market value of a brand. Hence, technical valuation is done in order to obtain a fair value on intangible assets, for instance in an acquisition. Therefore, for our purpose this is a suited approach, as if this claim holds true, brand value should be reflected in market value of a firm and be related to returns. Other public providers are for instance InterBrand and Kantar Millard Brown, which instead use a managerial valuation approach for brand value. The objective in managerial valuation is more intra-firm oriented and tries to estimate brand value for purposes such as corporate restructuring, budget allocation or assessment of brand performance. However, the datasets only have a relative small amount of brands covered in the cross-section and are therefore not suited for our purpose.

A.3 Construction of Relevant Variables

MFTRALL	Following Vassalou (2003) and Lamont (2001) we construct a factor mimicking GDP-tracking portfolio, MFTRALL, that is based on predictability of GDP growth. First, we run the following predictive regression: $\text{GDPGR}_{t,t+4} = \text{cB}_{t-1,t} + \text{kZ}_{t-2,t-1} + \epsilon_{t,t+4}$, where $\text{B}_{t-1,t}$ is a set of returns of base assets that are supposed to predict GDP-growth and $\text{Z}_{t-2,t-1}$ is a set of control variables that are supposed to predict the returns of the base assets. Our set $\text{B}_{t-1,t}$ consists of the 6 portfolios double sorted on size and book-to-market that are used to construct the HML and SMB factors, the momentum strategy return WML, the return on long-term government bonds minus the return on short-term government bonds TERM and the return on long-term corporate bonds minus the return on long-term government bonds DEF. Our set $\text{Z}_{t-2,t-1}$ of control variables consists of the risk-free rate RF, the yield spread of long-term Treasury bonds minus the T-bill rate TERMY, the yield spread of long-term corporate bonds minus the yield on long-term government bonds DEFY, the one-year inflation rate INF and the one-year growth in industrial production IPGR. The final factor is then computed with the base asset returns and the corresponding estimated sensitivities, employing monthly return data and quarterly GDP-data: $\text{MFTRALL}_t = \text{cB}_t$
Operating Leverage Regression Based	Operating leverage is either the regression based measure of Mandelker and Rhee (1984), or the detrending measure of O'Brien and Vanderheiden (1987). Depending on whether we study returns, where look-ahead bias might potentially exist, or whether we study the firm characteristic itself, we either use the Mandelker and Rhee (1984) measure in the first case, or the O'Brien and Vanderheiden (1987) measure in the second case. Mandelker and Rhee (1984) propose to regress the logarithm of earnings on the logarithm of sales in a rolling window time-series regression: $lnE_{it} = \alpha_{it} + ol_{it} lnS_{it} + \epsilon_{it}$. O'Brien and Vanderheiden (1987) claim that by this approach the growth trend of earnings relative to the growth trend of sales is primarily measured. They therefore propose to first linearly eliminate the growth trend from the logarithms before conducting the time-series regression: $\delta^E_{it} = \alpha_{it} + dol^{det}_{it} \delta^S_{it} + \epsilon_{it}$
OL^{NM}	The operating leverage definition following Novy-Marx (2011). Operating leverage is defined as cost of goods sold (Compustat item COGS), plus selling, general and administrative expenses (item XSGA) divided by total assets (item AT), all items from the same fiscal year.
OCF/P	We calculate operating cash flow-to-price as net cash flows from operating activities (item OANCF) from the fiscal year ending in calendar year t–1 divided by market equity (from CRSP) from the end of December of t–1.

CF/P CF^Q/P	We calculate cash flow-to-price as cash flows from fiscal year ending in calendar year t–1 divided by market equity (from CRSP) from the end of December of t–1 and quarterly cash flow-to-price as cash flows from the latest fiscal quarter ending at least four months before divided by market equity (from CRSP) at the end of month t–1. Cash flows are income before extraordinary items (IB or IBQ) plus depreciation (DP or DPQ).
R&D/M $R\&D^Q$/M	We calculate R&D expenses-to-market as R&D expenses (XRD) from fiscal year ending in calendar year t–1 divided by market equity (from CRSP) from the end of December of t–1 and quarterly R&D Expenses-to-Market as quarterly R&D expenses (Compustat quarterly item XRDQ) from the fiscal quarter ending at least four months before divided by market equity (from CRSP) at the end of month t–1. We keep only firms with positive R&D expenses.
RoE^Q	Quarterly return on equity is defined as income before extraordinary items (IBQ) divided by book equity lagged by one quarter. Book equity is defined as the stockholders equity (SEQQ) plus balance sheet deferred taxes and investment tax credit (TXDITCQ) minus the book value of preferred stock (PSTKQ). If stockholders equity is not availabe it is instead measured as the book value of common equity (CEQQ) plus the book value of preferred stock, or the book value of assets (ATQ) minus total liabilities (LTQ).
Ea^Q/P	Quarterly earnings-to-price is defined as income before extraordinary items (IBQ) divided by market equity (from CRSP) from the end of month t–1. We use quarterly earnings from the most recent quarterly earnings announcement dates (RDQ). The difference between the end of the fiscal quarter and the earnings announcement date should not exceed six months. Moreover, the earnings announcement date should be after the corresponding fiscal quarter end.
NPY	Net payout is defined as total payouts minus equity issuances. Total payouts are dividends on common stock (DVC) plus repurchases. Repurchases are the total expenditure on the purchase of common and preferred stocks (PRSTKC) plus any reduction (negative change over the previous year) in the value of the net number of preferred stocks outstanding (item PSTKRV). Equity issuance is the sale of common and preferred stock (SSTK) minus any increase (positive change over the previous year) in the value of the net number of preferred stocks outstanding (PSTKRV). The net payout yield is defined as net payout from the fiscal year ending in calendar year t–1 divided by market equity (from CRSP) from the end of December of t–1.
Ch/At	Cash-to-Assets is measured as cash holdings (CHEQ) scaled by total assets (ATQ).

At-Liq	The definiton of asset liquidity is following Ortiz-Molina and Phillips (2014). They measure asset liquidity as cash holdings (CHE) + 0.75×noncash current assets + 0.50×tangible fixed assets. Noncash current assets is defined as current assets (ACT) minus cash. Tangible fixed assets is defined as total assets (AT) minus current assets (ACT), minus goodwill (GDWL) and minus intangibles (INTAN). Asset liquidity is scaled by total assets from year t–1.
Vol^{CF}	The definiton of cash flow volatility is following Huang (2009). Cash flow volatility is the standard deviation of the operating cash flows-to-sales ratio. Quarterly operating cash flows are defined as income before extraordinary items (IBQ) plus depreciation and amortization (DPQ), and plus the change in working capital (WCAPQ) from the last quarter.
Adv/M	Advertising expenses-to-market is defined as advertising expenses (XAD) for the fiscal year ending in calendar year t–1 divided by market equity (from CRSP) at the end of December of year t–1. We keep only firms with positive advertising expenses.
Adv-Gr	Advertising Growth is defined as growth in advertising expenses. This is the growth rate of advertising expenses (XAD) from the fiscal year ending in calendar year t–2 to the fiscal year ending in calendar year t–1.
HHI	The firm industry concentration is measured with the Herfindahl Hirschman Index, which is defined as $\sum_{i=1}^{N_j} sales_{ij}^2$, where sales$_{ij}$ is the share of sales of a firm i in industry j, sales$_{ij}$ = sales$_i$/sales$_i$, and N$_j$ is the number of firms in an industry. Industries are defined as the first three digits of the SIC-code. We exclude financial firms (SIC-code 6000 to 6999) and regulated industries, which are gas and electric utilities (4900 to 4939).
Ivola	Idiosyncratic Volatility is the standard deviation of the residuals of returns relative to the Fama and French (1993) three factor model.
Tail	We use the tail risk measure from Kelly and Jiang (2014). First, we estimate the common time-varying component of return tail, λ_t: $\lambda_t = \frac{1}{K_t}\sum_{k=1}^{K_t} ln\frac{R_{k,t}}{u_t}$, where $R_{k,t}$ is the kth daily return that falls below the threshold value u_t, which in our case is the fifth percentile of all daily returns in month t, and K_t is the total number of daily returns that are below u_t. Then, we estimate tail risk sensitivities of individual stocks as the slope of a regression of a stock excess returns on one-month-lagged tail risk over the previous 120 months, where at least 36 observations need to be included.

Appendix B: Tables

Table A1: Portfolio Mean Values in Industry Demeaned CS Portfolios

This table presents time-series averages of the cross-sectional portfolio means of firm characteristics and of intangible capital proxies calculated based on capitalized expenses. Firms are sorted into five portfolio based on their industry demeaned customer satisfaction level, where the ACSI industry definitions are applied. Until May 2010 portfolios are rebalanced quarterly, subsequent to an ACSI reporting month. From May 2010 rebalancing is done monthly. Values shown for the CS related variables are regular values. The values shown for the different firm characteristics and for the proxies for capitalized intangible capital are standardized by industry, where ACSI industry definitions are applied. The variables are defined as in table 1 and table 2. The proxies for capitalized intangible capital are separated in the category of organizational capital and knowledge capital. All proxies are scaled by book value of total assets. The market value of assets is defined as market capitalization plus total liabilities and the explained amount of asset value is defined as organizational capital (30% of SGA-XRD) plus knowledge capital (R&D) plus property, plant and equipment (PPEGT). The sample comprises the years 2000 to 2016.

Industry Demeaned Customer Satisfaction Sorted Portfolios					
Portfolio	Bottom	2	3	4	Top
CS Level	69.68	74.95	75.84	77.72	79.38
Industry Demeaned CS Level	-4.61	-1.46	-0.07	1.58	5.06
CS Delta	-1.23	-0.53	-0.03	0.80	0.73
Industry Demeaned CS Delta	-1.17	-0.31	0.07	0.42	0.71
Market Equity (1000$)	-16	49	-3	-32	2
Price	-0.10	-0.12	0.02	0.04	0.17
Book-to-Market	0.22	-0.04	0.04	-0.05	-0.21
Total q	-0.17	0.00	-0.04	-0.02	0.22
Market Leverage	0.15	-0.01	0.08	0.02	-0.23
Operating Leverage	0.01	-0.03	-0.01	0.05	-0.03
Investment Rate	-0.10	-0.06	0.04	-0.01	0.13
Gross Profitability	-0.05	0.06	-0.08	0.02	0.07
Cash Holdings	-0.03	-0.08	-0.04	-0.02	0.13
Idiosyncratic Volatility	0.12	-0.02	-0.01	-0.05	-0.07
Capitalized Expenses					
Organizational Capital (SGA - XRD)	-0.058	0.145	-0.054	0.030	-0.097
Organizational Capital (ADV)	-0.036	0.021	-0.122	0.003	0.198
Organizational Capital (Staff)	0.035	0.066	-0.136	0.078	0.000
Organizational Capital (Pensions)	0.064	0.050	-0.130	0.079	-0.067
Knowledge Capital (R&D)	-0.127	0.038	0.176	-0.073	-0.183
MV of Assets unexplained	-0.142	0.025	-0.032	-0.012	0.160

Table A2: Hedge Fund Alphas

This table presents factor loadings and monthly alphas of the "ACSI Long/Short Equity" hedge fund, a fund which follows a customer satisfaction based investment strategy. We obtain the hedge fund return data from Eurekahedge. Alpha is the intercept in a time-series regression of monthly hedge fund returns on various factor models. The models used are the CAPM, the Carhart (1997) 4 factor model, the Fama and French (2015) 5-factor model, the Hou et al. (2015) q-factor model, the Stambaugh and Yuan (2017) mispricing factor model and the Fung and Hsieh (2004) 7-factor hedge fund benchmark model. Further combinations contain the Fama and French (1993) 3-factor model. It is extended by either the Pástor and Stambaugh (2003) liquidity factor or the Asness et al. (2017) quality-minus-junk and the Frazzini and Pedersen (2014) betting-against-beta factor. Moreover, we augment the Fama and French (2015) 5-factor model with a customer satisfaction factor CS, which is constructed in the same way as the Fama-French factors, with one dimension being the level of customer satisfaction. We obtain the Fama-French factors SMB, HML, RMW, CMA and the momentum factor UMD from Kenneth French's website. The liquidity factor LIQ is from Lubos Pastor's website, QMJ (quality-minus-junk) and BAB (betting-against-beta) are from the AQR website, and the mispricing factors MGMT (management) and PERF (performance) are from Yu Yuan's website. We construct the q-factors ourselves. The 7 hedge fund factors SP (Standard & Poor's 500 return), SCLC (Russell 2000 return - Standard & Poor's 500 return), 10Y (monthly change in the U.S. Fed 10-year yield), CredSpr (monthly change in the difference of Moody's Baa yield and the Fed's 10-year yield), BdOpt (return of portfolio of lookback straddles on bond futures), FXOpt (return of portfolio of lookback straddles on currency futures) and ComOpt (return of portfolio of lookback straddles on commodity futures) are from David Hsieh's website. The sample period runs from February 2000 to December 2016. Returns and alphas are in monthly percent, heteroscedasticity and autocorrelation robust Newey and West (1986) t-statistics are shown below the coefficient estimates. ***, **, and * refers to statistical significance at 1%, 5%, and 10% level, respectively.

Model	CAPM	C4	FF5	Q-Factor	FF3+LIQ	FF3+QMJ+BAB	MISP	FF5+CS	Fung and Hsieh 7F
MKT	0.705***	0.632***	0.653***	0.596***	0.644***	0.603***	0.674***	0.624***	
	(12.706)	(7.958)	(8.084)	(6.698)	(8.575)	(6.870)	(7.202)	(8.821)	
Size		0.195*	0.210*	0.141	0.207*	0.155	0.099	0.206**	
		(1.876)	(1.876)	(1.543)	(1.918)	(1.430)	(1.146)	(2.537)	
HML		0.014	-0.074		0.015	0.081	0.081	0.044	
		(0.253)	(-0.721)		(0.284)	(1.485)	(1.485)	(0.539)	
Investment			0.134	0.002				0.228	
			(0.681)	(0.012)				(1.554)	
Profitability			0.036	-0.184				-0.022	
			(0.304)	(-1.537)				(-0.185)	
UMD/LIQ/CS		-0.031			-0.122			0.370***	
		(-0.585)			(-0.269)			(5.298)	
QMJ						-0.033			
						(-0.319)			
BAB						-0.144***			
						(-2.850)			
MGMT							-0.000		
							(-0.003)		
PERF							-0.021		
							(-0.296)		
SP									63.860***
									(10.389)
SCLC									28.143***
									(5.077)
10Y									-1.124
									(-1.139)
CredSpr									0.704
									(0.870)
BdOpt									-2.811
									(-1.624)
FXOpt									1.065
									(1.275)
ComOpt									1.307
									(1.004)
alpha	0.688***	0.656***	0.602***	0.738***	0.651***	0.788***	0.788***	0.454***	0.511***
	(4.768)	(4.928)	(3.696)	(4.417)	(4.951)	(4.700)	(4.700)	(3.071)	(4.027)

Table A3: Log Total Q Regressions

The independent variable is the logarithm of total q, a tobin's q measure extended by intangible capital in the denominator and proposed by Peters and Taylor (2017). When a variable based on changes in customer satisfaction is among the independent variables, then the dependent variable is the change in the logarithm of total q from period t-1 to period t. The independent variables are the customer satisfaction level, the customer satisfaction level demeaned by industry, the change in customer satisfaction from period t-1 to period t, and the change in customer satisfaction demeaned by industry. Controls are the investment rate defined as capital expenditures scaled by property, plant and equipment, the logarithm of total assets, book leverage and property, plant and equipment scaled by total assets as proxy for fixed assets. The specifications include year fixed effects and either ACSI industry of firm fixed effects. T-statistics are based on robust standard errors that are double-clustered at the year-level and, depending on the used fixed effects, the industry- or firm-level and are given in parentheses. The accounting based variables are winsorized at the 1% and 99% levels. The sample period encompasses the years 2000 to 2016. ***, **, and * refers to statistical significance at the 1%, 5%, and 10% level, respectively.

	Log Total q				Δ Log Total q			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CS	0.026**	0.029**						
	(2.625)	(2.810)						
Demeaned CS			0.032***	0.031**				
			(3.047)	(2.864)				
CS Delta					0.001	0.002		
					(0.149)	(0.527)		
Demeaned CS Delta							0.003	0.006
							(1.125)	(1.041)
Investment	1.180***	1.817***	1.156***	1.819***	-0.029	-0.019	-0.029	-0.019
	(3.013)	(5.103)	(3.005)	(5.155)	(-0.873)	(-0.453)	(-0.845)	(-0.448)
Log Assets	-0.073	0.109*	-0.063	0.109**	-0.021	-0.084	-0.023	-0.086
	(-0.467)	(2.113)	(-0.403)	(2.123)	(-0.182)	(-1.012)	(-0.197)	(-1.016)
Book Leverage	-0.298	-0.067	-0.296	-0.065	-0.351**	-0.311*	-0.349**	-0.309*
	(-1.138)	(-0.191)	(-1.113)	(-0.186)	(-2.184)	(-2.094)	(-2.192)	(-2.093)
Fixed Assets	-0.803***	-0.079	-0.775***	-0.066	-0.156	-0.269**	-0.160	-0.273**
	(-3.749)	(-0.372)	(-3.523)	(-0.309)	(-0.922)	(-2.703)	(-0.944)	(-2.785)
FirmFE	Yes	No	Yes	No	Yes	No	Yes	No
InudstryFE	No	Yes	No	Yes	No	Yes	No	Yes
TimeFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	2084	2084	2084	2084	1868	1868	1868	1868

* p<0.10, ** p<0.05, *** p<0.01

Table A4: Further Fama and MacBeth Regression Specifications

The table reports results from further specifications of Fama and MacBeth (1973) regressions of returns on the customer satisfaction level, the industry-demeaned customer satisfaction level, the delta in customer satisfaction from period t-1 to period t, or the delta in industry-demeaned customer satisfaction level. Regressions include various controls, where the variable definitions follow table 1 and table 2. Moreover we include turnover, defined as monthly trading volume over shares outstanding. The independent control variables are winsorized at the 1% and 99% levels. The sample covers February 2000 to December 2016. Test statistics are in parentheses. The time-series averages of the coefficient estimates and their associated time-series t-statistics are reported. ***, **, and * refers to statistical significance at the 1%, 5%, and 10% level, respectively.

	Regressions of the form $r_{it} = \beta' x_{it} + \epsilon_{it}$							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CS	0.022*	0.027**						
	(1.720)	(2.347)						
Demeaned CS			0.042**	0.046***				
			(2.419)	(3.134)				
CS Delta					0.023	0.025		
					(1.090)	(1.324)		
Demeaned CS Delta							0.005	0.014
							(0.264)	(0.790)
Log Size	-0.119*	-0.090	-0.109	-0.087	-0.104	-0.076	-0.103	-0.071
	(-1.646)	(-1.391)	(-1.467)	(-1.342)	(-1.417)	(-1.202)	(-1.403)	(-1.124)
Book-to-Market	0.067	0.050	0.084	0.039	0.048	0.013	0.061	0.017
	(0.453)	(0.345)	(0.565)	(0.272)	(0.315)	(0.091)	(0.401)	(0.118)
Beta	0.044	-0.061	0.049	-0.018	0.019	-0.102	0.026	-0.081
	(0.108)	(-0.134)	(0.120)	(-0.039)	(0.046)	(-0.219)	(0.062)	(-0.173)
Profitability (Gross)	0.195		0.391		0.313		0.299	
	(0.506)		(0.993)		(0.797)		(0.765)	
Asset Growth	-0.014		-0.053		0.088		0.153	
	(-0.051)		(-0.202)		(0.326)		(0.572)	
Momentum		0.170		0.194		0.292		0.336
		(0.390)		(0.450)		(0.657)		(0.758)
$\text{Ret}_{-1,0}$		-0.021		-0.020		-0.021		-0.020
		(-1.545)		(-1.509)		(-1.579)		(-1.502)
Turnover		-0.134		-0.153		-0.104		-0.102
		(-1.443)		(-1.633)		(-1.157)		(-1.131)