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Empirical Evidence of the Stock Market's (Mis)Pricing of Customer Satisfaction

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Abstract

Recent portfolio studies provide conflicting evidence on whether the stock market (mis)prices the value of customer satisfaction, as measured by the American Customer Satisfaction Index (ACSI), and whether ACSI based trading strategies provide market beating returns. The current research aims is to shed new light on these issues. We reexamine two ACSI based trading strategies considered in prior research – one ofa specific trading strategy which has been presented as evidence of mis-pricing. Applying a methodology which deals with three interlinking issues: risk adjustment, abnormal returns estimation and portfolio aggregation, we find that the proposed trading strategy does not offer market beating returns and does not provide compelling evidence that the market mis-prices the value of customer satisfaction. Our study contributes to the current debate on the (mis)pricing of customer satisfaction by demonstrating the application of a framework within which the robustness of observed anomalies can be more fully assessed.

Keywords: customer satisfaction, firm value, mis-pricing, risk.

The positive relationship between marketing assets and firm value is widely accepted and extensively studied (e.g., Anderson, Fornell & Mazvancheryl, 2004; Gupta, Lehmann & Stuart, 2004; Srivastava, Shervani & Fahy, 1998). There is, however, less certainty as to whether the stock market provides a timely and accurate response to changes in the value of marketing assets (Fornell, Mithas, Morgeson & Krishnan, 2006; Rust, Ambler, Carpenter, Kumar & Srivastava, 2004). In an efficient market, stock prices should reflect all publicly available information on a firm's worth (Fama 1970) and most empirical studies tend to confirm this expectation. Yet, the speed and accuracy with which the market reacts to changes in the value of intangible assets is uncertain (Bond & Cummins, 2000). It has been suggested that analysts tend to give insufficient attention to such assets (Gupta et al., 2004) and do a poor job of recognizing their value relevance (Gu and Wang, 2005). Reflecting this, security mis-pricing has been reported with respect to investments in marketing (Penman & Xiao-Jun, 2001), quality (Hendricks & Singhal, 2001) and innovation (Gu, 2005).

The issues of whether and when changes in customer satisfaction are reflected in a firm's share price have been a particular focus of research interest. Drawing on the American Customer Satisfaction Index (ACSI), researchers have considered both the issue of value relevance (whether the Index provides incremental power to accounting data in explaining stock returns) and market efficiency/inefficiency in responding to ACSI data. Research has shown that ACSI is positively and significantly associated with future firm value (e.g., Anderson et al., 2004; Fornell et al., 2006; Gruca & Rego, 2005). However, Ittner & Larcker (1998) and Fornell et al. (2006) both find that, over an event window of 8 to 10 days, the market does not react to positive or negative ACSI announcements. This muted response has led researchers to examine the possibility that the market is inefficient with respect to ACSI.

Recent portfolio studies provide conflicting evidence on the pricing / mis-pricing of ACSI. In the first such study, Fornell et al. (2006) document significantly higher returns from a portfolio constructed from the top 20% of ACSI firms (relative to competition and with scores above the ACSI national average) compared to the S&P500 and the remaining 80% of ACSI firms for the sample period. Fornell et al. (2006) present the returns achieved from their ACSI based trading strategy, coupled with results from an event study as evidence that the market is inefficient in responding to changes in customer satisfaction. Aksoy et al. (2008) also present findings from ACSI based trading strategies. In their study, an ACSI portfolio is shown to achieve market beating returns, but only in expansionary economic conditions. In weaker economic conditions, the ACSI portfolio does not outperform the market. Further, in a comprehensive examination of the value relevance of ACSI, Jacobson & Mizik (2008) find no evidence of widespread mis-pricing of customer satisfaction. They suggest that any mis-pricing of firms observed in their study is limited to the computer and internet sectors and is unlikely to be related to customer satisfaction.[1] The current study is motivated by this conflicting evidence.

Our aim is to shed further light on the market's pricing/mis-pricing of customer satisfaction. To do so, we revisit two ACSI based trading strategies considered in prior resarch to consider whether portfolios formed following these specifications generate abnormal returns and allow investors to outperform the market. In doing so we draw on insights from recent portfolio studies in marketing (e.g., Sorescu, Shankar & Kushwaha, 2007; Srinivasan, Pauwels, Silva-Risso & Hanssens, 2006) and approaches developed in the finance literature to provide statistical tests for measuring portfolio performance. We initially estimate Sharpe (1966) ratios to identify risk-return reward for each portfolio. Next, we formally adjust portfolio returns for market, size,

[1] Jacobson and Mizik (2008) further find that ACSI has no incremental value relevance beyond these sectors, thereby providing an alternative explanation for the muted market response observed in earlier event studies.

book-to-market and momentum risk. Finally, we statistically test each portfolio for abnormal returns. We find that the returns of ACSI based stock portfolios are not excessive, relative to risk, and do not indicate that the market mis-prices ACSI. This result bears directly on the current debate as to whether the market mis-prices the value of customer satisfaction.

Given the growing popularity of portfolio studies in marketing, our paper provides a timely framework for considering the robustness of observed pricing anomalies through reasonable extensions such as alternative risk measurement methodologies and portfolio aggregation strategies. In addition, our use of the Sharpe ratio focuses attention on the economic as well statistical significance of alleged mis-pricing - a point that is sometimes overlooked in the emerging literature. Economic significance is, in our view, a core consideration, since a statistically significant abnormal return can easily be negated by the transaction costs associated with the quarterly portfolio balancing required by the simulated trading strategies presented in prior work. To date, in contrast to work on widely accepted and long standing market anomalies - such as the post-earnings-announcement-drift (Bernard and Thomas, 1989; 1990) - issues related to economic significance and the associated impact of transaction costs have not been addressed in studies reporting ACSI-driven market anomalies.

CAN A TRADING STRATEGY BASED ON ACSI DATA GENERATE EXCESS RETURNS?

If, as the Fornell et al. (2006) study indicates, the market underweights ACSI, we would expect stocks with declining ACSI scores to be overvalued and stocks with increasing ACSI scores to be undervalued. By dividing stocks into portfolios according to ACSI data, and holding those portfolios for a time period, investors' longer-term reaction to ACSI announcements can be ascertained. If the market is delayed in reacting to ACSI announcements, portfolios of high scoring ACSI stocks will outperform portfolios of low scoring ACSI stocks. Indeed, Fornell et al. (2006), find evidence that it is possible to systematically outperform the market using ACSI based trading strategies. In this study we draw on the finance literature to further examine the performance of portfolios formed by their trading strategy.

Following evidence of market mis-pricing, it is common to test the robustness of a reported anomaly using alternative approaches (See, for example, Fama 1998).[2] Our study is in keeping with this tradition, employing the same sample period and portfolio construction techniques described by Fornell et al. (2006). The key differences in our analysis concern (1) lower aggregation of portfolios, (2) an alternative approach to risk adjustment, and (3) formal statistical tests of abnormal returns. We also examine two sample periods, one mirroring the original study and an extended sample. Table 1 illustrates the differences in methodologies, results and conclusions between the present study and the Fornell et al. (2006) study.

First, our approach to portfolio aggregation departs from Fornell et al. (2006). Their study compares the returns of a portfolio formed from the top 20% of firms on ACSI with a portfolio formed from the remaining 80% of firms. To allow a more detailed analysis of returns we adopt a lower level of aggregation and compare returns across five portfolios formed from the top 20% though to the bottom 20% of firms on ACSI. By evaluating the performance of portfolios of ACSI firms, rather than individual firms, we can diversify away unsystematic risks and attribute performance specifically to the levels of ACSI.[3]

Second, we draw on the asset pricing literature to account for the impact of risk when measuring abnormal returns. Recent work in marketing (McAlister, Srinivasan & Kim, 2007)

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[2] This practice reflects the challenge faced by any study reporting market inefficiency before it can be validated. For example it is common to test market anomalies in a range of sample periods and, to avoid bad-model problems, using a number of asset pricing model specifications.

[3] While we follow prior research in focusing on the impact of ACSI on the performance of portfolios, it is possible that ACSI is in fact acting as a summary proxy for factors such as competition intensity or service/product quality/availability.

has highlighted the importance of carefully recognizing risk in any assessment of a stock's performance. In effect, accurate assessment of returns require tests that determine whether higher returns are an indication of excess performance or a compensation for commensurately higher levels of risk. In our study, in line with the recommendations of Srinivasan and Hanssens (2008), exposure to systematic market wide risks are controlled for by including contemporaneous equity market risk factors such as the market, size, book-to-market and momentum factor returns. This inclusion of a wider set of control variables has the advantage of identifying the incremental impact of ACSI on returns. The incremental impact is not the same as the total impact – a point we return to in the discussion section.

Third, following common practice in finance we adopt Jensen's alpha (Jensen 1968) to formally test the statistical significance of abnormal returns for the ACSI portfolios. We also examine two sample periods, one mirroring Fornell et al. (2006) and, for robustness, an extended sample. Specifying an identical sample period to Fornell et al. (2006) enables a direct comparison between their results and findings from the asset pricing models specified in our study. The longer sample period provides additional robustness tests of both the present study and the Fornell et al. (2006) results.

The trading strategy proposed by Fornell et al. (2006) is just one of a vast number of potential ACSI based strategies. For example, Aksoy et al. (2008) and Jacobson and Mizik (2008) each test differing trading strategies – and arrive at different conclusions with regard to the (mis)pricing of customer satisfaction.[4] As the number of strategies is potentially limitless, we focus on the strategy presented by Fornell et al. (2006) and the strategy more recently considered

[4] To estimate abnormal returns, Jacobson & Mizik (2008) specify three models, using the Fama and French three-factor specification: buy-and-hold abnormal return; continuously compounded abnormal return; and cumulative abnormal return, before combining them in portfolios. They conclude that there is no evidence of widespread mis-pricing. Aksoy et al. (2008) conclude that it is possible to outperform the market using their ACSI based trading strategy. Their conclusion is based on the performance of an ACSI based portfolio formed from firms with positive changes in ACSI scaled by National ACSI (year-on-year) and higher than national average ACSI scores.

by Jacobson and Mizik (2008) as they provide conflicting evidence. We present our approach to testing the performance of these portfolios as a framework for future researchers who wish to assess the robustness of any observed anomaly to alternative specification.

Method

Following Fornell et al. (2006), we begin by examining the performance of a portfolio formed from the top 20% of ACSI, relative to competition, versus a portfolio formed from the remaining 80%, in addition to dividing the sample into quintiles. We also specify their sample period - February 1997 to May 2003, and as a further test, an extended sample from March 1996 to May 2006. We further examine the returns of five discrete equal sized portfolios – top 20% to bottom 20%. Next, we address the issue of risk. Riskier portfolio strategies are expected to be accompanied by higher returns. Therefore, when portfolio returns are examined it is necessary to adjust for risk. To increase efficiency in the adjustment of risk we specify asset pricing models that jointly estimate the risk and abnormal returns of the portfolios. We specify three alternative specifications: the market model derived from the Capital Asset Pricing Model (CAPM) of Sharpe (1964) and Lintner (1965), the Fama & French (1993) three-factor model and a four-factor model incorporating Jegadeesh & Titman's (1993) momentum effect.[5] Specifying these factors in our analysis allows us to control for risk, and as such, our analysis is based on abnormal (i.e., risk adjusted) returns.

The market model is a single index model, which assumes that all of a stock's systematic risk can be captured by one market factor. The equation to estimate this is the following:

$$R_{it} = \alpha_i + \beta_{i1} R_{Mt} + \varepsilon_{it} \qquad (6)$$

[5] We thank an anonymous reviewer for encouraging us to add the momentum factor.

where R_{it} is the return on the ACSI portfolio at time t in excess of the risk free rate, R_{Mt} is the excess return on the S&P500 for month t and ε_{it} is the error term.[6] α_i and β_{i1} are the intercept and the slope of the regression, respectively. The model assumes that portfolios of assets with the same beta will offer the same return. Although the market model is commonly used in the evaluation of securities, it has also been applied extensively in the performance measurement literature (e.g., Carhart, 1997; Jensen, 1968). The Fama & French (1993) three-factor stock model extends CAPM through the inclusion of two factors which take the size and book to market ratio of firms into account.[7] It is estimated from the following equation:

$$R_{it} = \alpha + \beta_{i1} R_{Mt} + \beta_{i2} SMB_t + \beta_{i3} HML_t + \varepsilon_{it} \tag{7}$$

where SMB_t is the factor mimicking portfolio for size (Small Minus Big) and HML_t is the factor mimicking portfolio for the book-to-market ratio (High Minus Low). Fama & French (1993) employ this model to examine risk factors in stock returns.

The final four-factor model is an extension of Fama & French's (1993) model and has recently been applied in portfolio studies in marketing (e.g., Sorescu et al., 2007). The four-factor model takes into account size, book to market and an additional factor for the momentum effect. Jegadeesh and Titman (1993) show that portfolios of stocks which are 'winners' in year *t-1* tend to continue to generate abnormal positive returns in year *t* while the opposite is the case for 'losers'. This well documented phenomenon is referred to as the 'momentum effect' in the finance literature. Several studies (e.g., Carhart, 1997; Liew & Vassalou, 2000) document the

[6] We specify the return on a one month treasury bill as the risk free rate. We specify the S&P500 as the benchmark market index consistent with Fornell et al. (2006).

[7] In studies of this kind it is common to control for size as size impacts on a firms expected returns- the market expects that smaller firms will outperform larger firms. In turn, this is reflects the fact that riskier stocks carry higher expected returns. Thus, to properly isolate any abnormal return we must first include variables such as size that contribute to our expected return. See Srinivasan and Hanssens (2008) for a recent review of this literature.

importance of momentum in asset pricing. The four-factor model is estimated from the following equation:

$$R_{it} = \alpha_i + \beta_{i1} R_{Mt} + \beta_{i2} SMB_t + \beta_{i3} HML_t + \beta_{i4} MOM_t + \varepsilon_{it} \quad (8)$$

where MOM_t is the factor mimicking portfolio for the momentum effect.[8]

To formally test the portfolios for abnormal returns we examine the estimated intercept, α_i, of the market and three-factor models. The intercept of the equation is commonly referred to as Jensen's alpha and is interpreted as a statistical measure of out- or under-performance. To test for abnormal returns we examine the alpha's sign and significance. The magnitude of the estimated alpha depends on the magnitude of the portfolio returns and the proportion of those returns unrelated to the market risk of the portfolio. Critically, the statistical significance of alpha also depends on the standard deviation of these returns. A statistically significant positive alpha is evidence that the portfolio generates positive abnormal returns. A statistically significant negative alpha is evidence that the portfolio generates negative abnormal returns over the sample period, while an alpha statistically insignificant from zero is evidence that after adjusting for risk, the portfolio generates no abnormal returns. Portfolios formed on ACSI data generating statistically significant positive abnormal returns would provide evidence of market inefficiency.

Data

Customer satisfaction data for the present study is drawn from ACSI for the years 1994 to 2006. This data was provided by the National Quality Research Centre at the University of Michigan. ACSI provides a firm level measure of customer satisfaction for approximately 200 American firms. These firms are spread across 40 industries and seven sectors of the US economy and account for more than 40% of the gross domestic product of the United States. For

[8] Data on *SMB*, *HML* and *MOM* was provided by Kenneth French. For details on the construction of *SMB* and *HML* see Fama & French (1993). For details on the construction of *MOM* see Carhart (1997).

each firm, raw data is collected from random telephone surveys with recent customers of the firm. ACSI data has been collected each year since 1994.[9] Asset price data was drawn from the DataStream database for the corresponding years.

Analysis and Results

Following Fornell et al. (2006), we ranked stocks (firms) based on first quarter ACSI scores. Stocks were allocated to portfolios as follows: we included Stock *i* in Portfolio 1 if it was in the top fifth of ACSI scores within its industry classification (defined by the National Quality Research Centre) announced that quarter.[10] Consistent with the earlier study, we also set the following criteria: for stock *i* to be included in Portfolio 1, the ACSI score had be greater than the national ACSI score. We allocated remaining stocks to portfolios 2 through 5 depending on whether they were in the second, third, fourth or fifth quintile. Next, on the announcement of second quarter ACSI scores, we rebalanced portfolios as follows: We added Stock *j* to Portfolio 1 if it was in the top fifth of ACSI scores in its industry group announced that quarter (again we applied the condition that the firm's ACSI score had to be greater than the national ACSI score for the stock to enter Portfolio 1). We allocated stocks to the other four portfolios as before. At this stage no stock was removed from any portfolio. In the third quarter, we ranked ACSI scores and allocated stocks in a repeat of the approach for quarters one and two. We again repeated the process in quarter four. In quarter one of year two we reiterated the process. However, in this instance, we moved any stock that no longer ranked in the same quintile into its new ranked quintile. To aid direct comparison with Fornell et al. (2006) we also aggregated portfolios 2 to 5 into one portfolio which represented the bottom 80% of ACSI stocks.

[9] The ACSI measures each company once a year. However, it is updated quarterly, on a rolling basis, with new data for one or more of the seven measured sectors of the economy replacing data collected the prior year.
[10] By dividing stocks into portfolios based on ACSI, relative to competition, we control for industry effects.

In his seminal work, Sharpe (1966) introduced a metric, now known as the 'Sharpe Ratio', for evaluating portfolio performance which he termed the '*reward to variability ratio'*. The core idea underlying this measure is that investors should expect higher returns in compensation for higher levels of volatility. Comparing Sharpe Ratios between portfolios allows for an assessment of whether the excess returns represent superior performance or compensation for higher levels of volatility. Sharpe (1994) provides a useful overview of the theoretical foundations, development and empirical applications of this measure which is widely used by both academicians and practitioners to compare the return / volatility relationship between portfolios. Comparing Sharpe ratios between portfolios, and against a relevant benchmark (in this case the S&P500) allows for an assessment of whether the excess returns are economically significant (i.e. represent relatively superior performance or compensation for higher levels of volatility).[11] In Table 2 we present descriptive statistics, including Sharpe ratios of the six portfolios formed from ACSI data over the sample period February 1997 to May 2003. The portfolio Sharpe ratios measure the economic significance of the portfolios returns.

Consistent with Fornell et al. (2006) cumulative returns of the high ACSI quintile are much larger than cumulative returns of the remaining 80% ACSI stocks and the S&P500 over the sample period. Portfolio 1 has the highest annual returns, averaging 8.42%, over the sample period. All of the portfolio exhibit large standard deviation of returns, ranging from 16.14% to 17.90% per annum. Portfolio 1's Sharpe ratio (reported in column four) is higher than the bottom 80% portfolio and the S&P500. However, considering the other four portfolios, Portfolio 3 has an almost identical Sharpe ratio.

[11] The measure is defined as $E[R_i - R_f]/\sigma_i$, where $E[R_i - R_f]$ is the expected excess return on portfolio i and σ_i is the standard deviation of the excess return following Sharpe (1994). Shackman (2006) provides an interesting analysis of the average annual Sharpe Ratios (in US dollars with the US risk free rate) for the stock markets of 39 countries from 1970 to 2000. For the US, the mean average annual Sharpe ratio for the period is 0.44 while the averages for developed and emerging markets are 0.32 and 0.24 respectively. Not surprisingly, Sharpe ratios can vary significantly over time as well as across industries and countries.

(Table 2 about here)

In Table 3 we report results from our OLS estimation of the market model and the Fama & French (1993) three-factor model, on the excess returns of the ASCI quintile portfolios and the aggregated bottom 80% ACSI portfolio.[12] We present results from estimating the market model in Panel A. We include *p*-values from the statistical test that $\alpha = 0$ and $\beta = 0$ for RMRF, SMB, HML and MOM in parenthesis.[13] All of the portfolios have significantly positive market betas ranging from .65 to .85. However, as no alpha is statistically different from zero, we find no evidence of abnormal returns. Portfolio 1 has an estimated market beta of .65 and alpha of .36. Though Portfolio 1 returns are higher and beta is lower than the market index, the alpha is not statistically significant from zero, due to the large standard deviation of returns. In Panel B, with the specification of *SMB* and *HML*, and in Panel C, with the specification of *MOM*, explanatory power increases, and again no evidence of abnormal returns is observed with Portfolio 1's estimated alpha reducing in magnitude and statistical significance.

(Table 3 about here)

It is worth noting, that while our results indicate that there is no mis-pricing, the inclusion of transaction costs would further militate against significant (market beating) gains from the proposed trading strategy. For the ACSI based portfolios, on average approximately 70% of the portfolio is rebalanced each year. Rebalancing of this nature incurs significant transactions costs including direct costs (brokerage) and indirect costs (bid-offer spreads and price impact costs). For a long-short investment strategy, such as that proposed by Aksoy et al. (2008), the issue becomes even more important since transaction costs are doubled. Inevitably, when

[12] Alpha and beta coefficients are estimated at the portfolio level.

[13] We used the ordinary least squares technique for coefficient estimation, then corrected the standard errors and covariance matrix using the Newey-West (1987) approach.

transaction costs are included in the analysis, the statistical significance of reported abnormal returns falls.

Robustness tests indicate that the results reported in Table 3 are not sensitive to (i) the choice of market index (we also estimated abnormal returns relative to Fama & French's (1993) benchmark index and the Dow Jones Industrial Average with no difference in findings); (ii) the use of returns rather than excess returns; or (iii) the assumption of normality.[14] To test the sensitivity of these results to the time period we repeated the analysis for a longer sample period - from March 1996 to May 2006.

We present the descriptive statistics and Sharpe ratios for each of the portfolios in this period in Table 4 Panel A. Portfolios 1, 2, 3 and 5 all exhibit higher cumulative returns than the S&P500 over the extended sample period. Portfolio 1 and the remaining 80% had almost identical returns and risk over this period. Of the five quintile portfolios, Portfolio 5, a portfolio constructed from firms with the lowest ACSI scores exhibit the largest average annual return and Sharpe ratio.

(Table 4 about here)

In Table 5 we present results from estimating the market model and the three-factor model on the excess returns of the six ACSI portfolios over the extended sample period. Results are similar to those for the shorter time period. When the Fama & French (1993) model is specified none of the portfolios exhibit abnormal returns at an acceptable statistical level. When the market model is specified, Portfolio 5, which is made up of the lowest ACSI scoring stocks, exhibit a significantly positive alpha (10% level). When SMB and HML are specified the alpha is no longer significant and with the specification of MOM, is close to zero.

(Table 5 about here)

[14] Jarque & Bera (1987) test statistics fail to reject normality for the explanatory variables and estimated residuals.

Finally, we illustrate the application of our performance assessment framework by investigating a trading strategy based upon customer satisfaction growth considered by Jacobson and Mizik (2008). Each quarter stocks are ranked and sorted into portfolios based on customer satisfaction growth, defined as $\log(ACSI_t) - \log(ACSI_{t-1})$, rather than levels of satisfaction. We present the descriptive statistics and Sharpe ratio for each of the portfolios from March 1996 to May 2006 in Table 4 Panel B. The cumulative returns of the high ACSI quintile are much larger than the cumulative returns of the remaining 80% ACSI stocks and the S&P500 over the sample period. The Sharpe ratio (reported in column four) of Portfolio 1 which is made up of the highest customer satisfaction growth stocks, is higher than the bottom 80% portfolio, the S&P500 and the other four portfolios indicating the returns of a portfolio formed on growth in customer satisfaction is economically significant. In Table 6 we present results from estimating the factor models on the excess returns of the six ACSI portfolios over the extended sample period. Results are similar to those for the shorter time period. When the market model is specified, Portfolio 1 exhibited the highest alpha. When SMB HML and MOM are specified the alpha is close to zero.

(Table 6 about here)

Overall our findings provide mixed evidence on the performance of a trading strategy based on ACSI data. For the portfolios formed on the level of customer satisfaction (sample period mirroring Fornell et al. (2006) and the customer satisfaction growth portfolios, the top ACSI stocks do exhibit economically significant out-performance with a larger Sharpe ratio than the S&P500 and the remaining portfolios. However, results from estimating Jensen's alpha using the market, three-factor and four-factor models indicate the magnitude of these returns are not sufficient to generate abnormal returns statistically significant from zero, due to the large annual standard deviation of the top ACSI portfolio's returns. For longer sample period, the evidence is less favorable for portfolios formed on the level of customer satisfaction. The portfolio made up of the worst ACSI stocks produces the largest Sharpe ratio. The top ACSI portfolio Sharpe ratio is similar to that of the remaining 80% of ACSI stocks and none of the portfolios exhibit statistically significant abnormal returns.

GENERAL DISCUSSION

In the current study we consider the share market's responsiveness to changes in customer satisfaction. We draw on recent portfolio studies in marketing and techniques borrowed from the finance literature to reexamine the performance of ACSI based trading strategies. We assess whether these strategies provide market beating returns and evidence of mis-pricing. Our results do not support the view that the market is inefficient in responding to movements in customer satisfaction or that the proposed trading strategies offer investors the opportunity to systematically outperform the market. Risk adjusted returns from portfolios based upon high ACSI scores, low ACSI scores or changes in ACSI scores are not significantly positive. Given that our results include a close re-examination of the specific trading strategy proposed by Fornell et al. (2006), it is most likely that our differing results reflect the alternative methods of analysis employed.

In reexamining the portfolio construction proposed by Fornell et al. (2006), we adopt an alternative methodological design. Our methodology deals with three interlinking issues arising from the Fornell et al. (2006) study: risk adjustment, abnormal returns estimation and portfolio aggregation. It is worth noting that, as a further test, we consider two sample periods, the period examined in Fornell et al. (2006) and an extended sample period. Our results are robust in that, for both periods, we find no evidence of the portfolios generating statistically significant abnormal returns.

Our research makes a number of important substantive and methodological contributions. We shed new light on a recent debate with regard to the pricing / mis-pricing of customer satisfaction. We contribute to this debate by emphasizing the critical impact of alternative methodological choices in any exploration of market inefficiencies. We also demonstrate the application of a framework with which the robustness of observed anomalies can be fully assessed. While Jacobson & Mizik (2008) report that there is no evidence of the widespread mis-pricing of satisfaction, they do not test the specific trading strategy presented by Fornell, et al. (2006). Indeed, Jacobson & Mizik (2008) note that their study does not preclude the possibility of a market beating ACSI base trading strategy. Our study corroborates and extends the findings of Jacobson and Mizik (2008) by testing the ability of the specific trading strategy proposed by Fornell et al. (2006) to deliver market beating returns.

Our results offer additional support for the presumption of market responsiveness which, for example, underpins the use of event studies in contemporary marketing research (e.g., Balasubramanian et al., 2005). The assumption of market responsiveness has also informed the recommendations made by researchers regarding the disclosure of non-financial information. For example, Wiesel, Skiera & Villanueva (2008) have urged marketers to pay greater attention to communicating the benefits of their marketing investments to market participants as such disclosures can provide a basis for overcoming the short term financial impact of such investments. Relatedly, we contribute to the debate as to whether the stock market encourages managers to behave myopically (e.g., Mizik & Jacobson, 2007). It has been suggested that managerial myopia, arising from the market's reaction to short term indicators, leads to under investment in intangibles such as R&D and marketing (Graham, Harvey & Rajgopal, 2005; Lev, 2004). Specifically, our findings provide a counterpoint to the argument that stock market inefficiency in responding to changes in customer satisfaction disincentivizes managers from investing in customer related initiatives (Hart, 2007). In this sense, our findings, taken in conjunction with those of Gupta et al. (2004) and Jacobson & Mizik (2008), suggest that customer value is closely reflected in a firm's market value.

In the current study, we differ from Fornell et al. (2006) by controlling for additional factors that impact on expected returns. Doing so allows us to isolate the incremental impact of ACSI data and assess the market beating potential of ACSI based trading strategies. Separately, scholars have considered the related issues of whether ACSI impacts on returns (Anderson et al 2004), and whether this impact is incremental to accounting data (Jacobson & Mizik 2008). However, incremental impact is not the same as total impact. For example, higher levels of ACSI may lead to larger firm size. Thus, ours may be a conservative estimate of the impact of ACSI on returns. However, we feel our approach is justified in the present context as in the finance literature, the impact of each of the control variables on returns has been convincingly established. From this perspective, ignoring the impact of a variable such as size would lead to potentially spurious results. The isolation of the full – incremental and indirect impact of satisfaction on returns represents and important – albeit complex issue for future research.

Methodologically, our study contributes through the introduction and application of techniques from the finance literature to facilitate a consideration of portfolio performance. A number of recent papers have employed portfolio study methodologies to address the stock market's response to marketing activities and assets. In the current study we demonstrate that assessment of both a portfolio's risks and returns are sensitive to alternative specifications. We demonstrate the importance of fully controlling for risk factors through the application of a four-factor model which accounts for market risk, size, book-to-market value and momentum. We also demonstrate the application of the Sharpe ratio and Jensen's alpha to evaluate portfolio performance. As interest in the application of portfolio studies in marketing grows, enthusiasm for applying methods that test portfolio performance is likely to increase.

Our study is subject to a number of limitations. First, while our findings are consistent with the observations of Jacobson & Mizik (2008) that there is no evidence of widespread mis-pricing of customer satisfaction, it is difficult for any study to conclusively prove the null hypothesis – market efficiency. Accordingly, we present our study as a basis for rejecting a finding of market inefficiency. Indeed a recognition that there are an almost limitless number of potential trading strategies has given rise to a concern within finance with respect to the finding of seemingly significant but, in fact, spurious patterns in data. This has been recognized as a serious problem in portfolio studies which involve the analysis of historical datasets (Lo & MacKinlay, 1990). As tests of statistical significance rely on the probability of an observation arising by chance, it would be expected that 5% of tested trading rule variants will lead to a finding of significant abnormal returns at the 5% level. Second, while our research presents further evidence on the extent to which the market reacts to changes in customer satisfaction as measured by ACSI, our conclusions are limited to firms covered by the Index. An interesting extension of our research would be to consider whether the market values of firms covered by ACSI in a manner that more closely reflects their level of customer satisfaction than those that are not included in the ACSI database. Equally, it would be interesting to assess the equity market's sensitivity to other customer metrics.

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Table 1

Comparison of Methodologies Results and Conclusions Between Currnet Study and Fornell et al. 2006

	Fornell et al. (2006)	**Current Study**
Portfolio Construction Criteria	• Firms in the top 20% of ACSI (relative to their competition) • Firms ACSI score is higher than the national average	• Firms in the top 20% of ACSI (relative to their competition) • Firm's ACSI score is higher than the national average
Sample Period	One sample period considered • Feb 1997 to May 2003	Two sample periods considered • Feb 1997 to May 2003 • March 1996 to May 2006
Aggregation of Data	Compare performance of portfolio of top 20% relative to remaining 80% of ACSI firms	Compare performance of portfolio of top 20% to: 1. Returns from portfolio of remaining 80% of ACSI firms 2. Returns from each of 4 portfolios constructed from relative ACSI scores
Risk adjustment	1. Estimate market betas (S&P 500) 2. Compare average book to market ratios and revenues between top 20% and remaining 80% of ACSI firms	1. Control for market risk, book-to-market, size and momentum effects in one model 2. Estimate risk coefficients for 6 discrete portfolios
Tests for abnormal returns	No statistical tests of abnormal returns.	Estimate Jensen's alpha (Jensen 1968)
Results	Sample period Feb 97 – May 03 • Portfolio constructed from top 20% of ACSI firms returns 5% p.a. versus 3% p.a. for Dow Jones Industrial Average and remaining 80% of ACSI stocks • Report beta risk of 0.78 • Find no difference in average revenues and average book-to-market ratios	Sample period Feb 97 – May 03 • Returns from portfolio of top 20% of ACSI firm are higher than remaining 80% of firms • Sharpe ratios marginally higher for portfolio of top 20% of ACSI firms • The market model, Fama & French (1993) model, and four-factor model exhibit no significant abnormal returns for all portfolios Sample period March 96 – May 06 • Returns of portfolio constructed from bottom 20% of ACSI firms are highest. • Portfolio constructed from top 20% of ACSI firms provides a middle ranking return and exhibits average return-to-risk ratios • The market model, Fama & French (1993) model, and four-factor model exhibit no significant abnormal returns for all portfolios
Conclusions	• Find evidence of abnormal returns from buying stocks based on ACSI scores • Conclude that the market is inefficient in reacting ACSI announcements	• Find no evidence of abnormal returns from buying stocks based on ACSI scores • Find no evidence in support of the contention that the market is inefficient in reacting to ACSI announcements

Table 2

Descriptive Statistics of Portfolios from Feb 1997 to May 2003 Formed Following Fornel et al. (2006)

	N	Cumulative Returns (%)	Annualized Mean Returns (%)	Annualized Standard Deviation of Returns (%)	Sharpe Ratio
Portfolio 1	75	54.39	8.42	16.14	0.27
Portfolio 2 – 5	75	26.63	5.39	16.97	0.08
SP500	75	13.12	4.15	16.54	0.01
Portfolio 2	75	22.05	5.69	19.63	0.08
Portfolio 3	75	49.69	7.88	16.21	0.24
Portfolio 4	75	-3.25	1.15	17.11	-0.17
Portfolio 5	75	31.59	5.95	17.90	0.11

Table 3

Market Model and Three-Factor Model Results from Feb 1997 to May 2003

	Alpha	RMRF	SMB	HML	MOM	Adj. R^2
Panel A: Market Model						
	Alpha	**RMRF**				**Adj. R^2**
Portfolio 1	.36	.65				.54
	(.37)	(.00)				
Portfolio 2	.13	.85				.63
	(.76)	(.00)				
Portfolio 3	.31	.66				.55
	(.47)	(.00)				
Portfolio 4	-.25	.71				.58
	(.56)	(.00)				
Portfolio 5	.15	.82				.70
	(.69)	(.00)				
Portfolio 2-5	.10	.77				.69
	(.78)	(.00)				
Panel B: Three-Factor Model						
	Alpha	**RMRF**	**SMB**	**HML**		**Adj. R^2**
Portfolio 1	.28	.70	.10	.30		.64
	(.39)	(.00)	(.19)	(.00)		
Portfolio 2	.03	.95	.09	.52		.86
	(.91)	(.00)	(.12)	(.00)		
Portfolio 3	.26	.73	-.01	.35		.72
	(.36)	(.00)	(.90)	(.00)		
Portfolio 4	-.36	.80	.16	.44		.79
	(.15)	(.00)	(.07)	(.00)		
Portfolio 5	.09	.88	.02	.35		.83
	(.70)	(.00)	(.71)	(.00)		
Portfolio 2-5	.03	.85	.06	.41		.89
	(.89)	(.00)	(.27)	(.00)		
Panel C: Four-Factor Model						
	Alpha	**RMRF**	**SMB**	**HML**	**MOM**	**Adj. R^2**
Portfolio 1	.12	.77	.15	.41	.11	.65
	(.73)	(.00)	(.06)	(.00)	(.28)	
Portfolio 2	.03	.96	.09	.52	.00	.86
	(.91)	(.00)	(.17)	(.00)	(.97)	
Portfolio 3	.00	.84	.06	.52	.17	.73
	(.99)	(.00)	(.32)	(.00)	(.00)	
Portfolio 4	-.56	.88	.21	.57	.13	.80
	(.02)	(.00)	(.00)	(.00)	(.17)	
Portfolio 5	-.06	.95	.06	.45	.10	.83
	(.80)	(.00)	(.24)	(.00)	(.16)	
Portfolio 2-5	-.11	.91	.10	.51	.09	.90
	(.55)	(.00)	(.06)	(.00)	(.10)	

p values are in parenthesis

Table 4

Panel A: Descriptive Statistics of Portfolios from March 1996 to May 2006 Formed on Customer Satisfaction Level

	N	Cumulative Returns (%)	Annualized Mean Returns (%)	Annualized Standard Deviation of Returns (%)	Sharpe Ratio
Portfolio 1	123	164.17	11.09	13.64	0.59
Portfolio 2 – 5	123	135.36	10.82	14.24	0.54
SP500	123	98.32	9.05	15.02	0.40
Portfolio 2	123	139.85	11.17	16.47	0.49
Portfolio 3	123	151.54	10.69	13.77	0.55
Portfolio 4	123	41.49	4.91	14.28	0.13
Portfolio 5	123	183.00	13.74	15.68	0.68

Panel B: Descriptive Statistics of Portfolios from March 1996 to May 2006 Formed on Customer Satisfaction Growth

	N	Cumulative Returns (%)	Annualized Mean Returns (%)	Annualized Standard Deviation of Returns (%)	Sharpe Ratio
Portfolio 1	123	175.44	10.80	13.12	0.59
Portfolio 2 – 5	123	122.07	8.48	11.61	0.47
SP500	123	98.32	9.05	15.02	0.40
Portfolio 2	123	75.73	6.38	13.17	0.25
Portfolio 3	123	113.29	8.16	12.24	0.42
Portfolio 4	123	125.77	8.80	12.93	0.44
Portfolio 5	123	166.49	10.52	13.58	0.55

Table 5

Market Model and Three-Factor Model Results from March 1996 to May 2006

	Alpha	RMRF	SMB	HML	MOM	Adj. R^2
Panel A: Market Model						
	Alpha	**RMRF**				**Adj. R^2**
Portfolio 1	.32	.66				.53
	(.22)	(.00)				
Portfolio 2	.23	.88				.64
	(.40)	(.00)				
Portfolio 3	.28	.68				.55
	(.33)	(.00)				
Portfolio 4	-.22	.73				.58
	(.42)	(.00)				
Portfolio 5	.45	.86				.68
	(.09)	(.00)				
Portfolio 2-5	.24	.80				.71
	(.33)	(.00)				
Panel B: Three-Factor Model						
	Alpha	**RMRF**	**SMB**	**HML**		**Adj. R^2**
Portfolio 1	.18	.71	.13	.30		.62
	(.43)	(.00)	(.04)	(.00)		
Portfolio 2	.03	.97	.11	.49		.82
	(.84)	(.00)	(.02)	(.00)		
Portfolio 3	.14	.75	.06	.35		.68
	(.50)	(.00)	(.27)	(.00)		
Portfolio 4	-.42	.80	.17	.43		.76
	(.02)	(.00)	(.01)	(.00)		
Portfolio 5	.30	.92	.10	.37		.78
	(.13)	(.00)	(.09)	(.00)		
Portfolio 2-5	.07	.87	.11	.41		.87
	(.65)	(.00)	(.01)	(.00)		
Panel C: Four-Factor Model						
	Alpha	**RMRF**	**SMB**	**HML**	**MOM**	**Adj. R^2**
Portfolio 1	.05	.75	.16	.38	.08	.62
	(.84)	(.00)	(.02)	(.00)	(.34)	
Portfolio 2	.00	.95	.12	.49	-.02	.84
	(.99)	(.00)	(.00)	(.00)	(.70)	
Portfolio 3	.00	.80	.09	.45	.10	.68
	(.98)	(.00)	(.11)	(.00)	(.00)	
Portfolio 4	-.57	.85	.21	.54	.10	.79
	(.00)	(.00)	(.00)	(.00)	(.20)	
Portfolio 5	.02	.98	.13	.47	.10	.81
	(.91)	(.00)	(.00)	(.00)	(.13)	
Portfolio 2-5	-.10	.90	.13	.48	.06	.88
	(.51)	(.00)	(.00)	(.00)	(.20)	

p values are in parenthesis

Table 6

Market Model and Three-Factor Model Results from March 1996 to May 2006

Panel A: Market Model

	Alpha	**RMRF**				**Adj. R^2**
Portfolio 1	.39	.60				.49
	(0.18)	(0.00)				
Portfolio 2	.02	.60				.49
	(0.94)	(0.00)				
Portfolio 3	.20	.51				.41
	(0.47)	(0.00)				
Portfolio 4	.24	.54				.40
	(0.30)	(0.00)				
Portfolio 5	.37	.58				.43
	(0.14)	(0.00)				
Portfolio 2-5	.21	.56				.55
	(0.30)	(0.00)				

Panel B: Three-Factor Model

	Alpha	**RMRF**	**SMB**	**HML**		**Adj. R^2**
Portfolio 1	.03	.77	.21	.45		.60
	(0.92)	(0.00)	(0.00)	(0.00)		
Portfolio 2	-.23	.75	-.01	.38		.62
	(0.23)	(0.00)	(0.81)	(0.00)		
Portfolio 3	-.05	.65	.04	.36		.52
	(0.83)	(0.00)	(0.49)	(0.00)		
Portfolio 4	-.06	.70	.08	.43		.53
	(0.74)	(0.00)	(0.20)	(0.00)		
Portfolio 5	.00	.77	.17	.48		.56
	(0.99)	(0.00)	(0.02)	(0.00)		
Portfolio 2-5	-.08	.72	.06	.41		.70
	(0.57)	(0.00)	(0.22)	(0.00)		

Panel C: Four-Factor Model

	Alpha	**RMRF**	**SMB**	**HML**	**MOM**	**Adj. R^2**
Portfolio 1	.02	.77	.21	.45	.00	.60
	(0.93)	(0.00)	(0.00)	(0.00)	(0.93)	
Portfolio 2	.00	.95	.12	.49	-.02	.84
	(.99)	(.00)	(.00)	(.00)	(.70)	
Portfolio 3	-.06	.66	.04	.36	.01	.51
	(0.81)	(0.00)	(0.51)	(0.00)	(0.81)	
Portfolio 4	-.07	.70	.08	.43	.00	.52
	(0.73)	(0.00)	(0.20)	(0.00)	(0.97)	
Portfolio 5	-.02	.77	.17	.49	.02	.56
	(0.91)	(0.00)	(0.02)	(0.00)	(0.59)	
Portfolio 2-5	-.08	.72	.06	.41	.00	.70
	(0.58)	(0.00)	(0.22)	(0.00)	(0.91)	

p values are in parenthesis