Is Customer Satisfaction Priced or Not? A Fama-French Portfolio Level Test*

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Executive Summary

This research intends to test if customer satisfaction is priced by financial markets or not. Keys points of this research are:

- We demonstrate to marketing researchers a finance tool—portfolio construction in asset pricing models, which can benchmark monthly excess returns of stock portfolios with different customer satisfaction scores (measured by ACSI). We bring ACSI with state-of-the-art asset pricing models and calendar time portfolio construction processes from finance. We hope this will help elevate the rigor of future satisfaction and other marketing asset research with cutting-edge finance theory, methodologies, and data skills. More MSI research can apply this standard tool direct from finance to more rigorously value brand/customer equity, innovation/patents, and/or corporate social responsibility at the portfolio level, beyond the common firm level analysis.
- This study is among the first to use portfolio level excess returns (excess to risk-free rates) to show that (1) stocks with higher customer satisfaction scores tend to outperform stocks with lower customer satisfaction scores and (2) this superiority of higher customer satisfaction also leads to lower volatility/variability in stock return.
- We are able to show portfolio level abnormal returns (after adjusting for market wide investor expectations and required returns for large caps and growth stocks) to ACSI. Our findings suggest that high ACSI quintile portfolio return outperformed that of market wide risk-adjusted benchmark portfolio based on abnormal portfolio returns from the Fama-French 3 factor model. This adds more credibility and evidence for the results reported in the study by Fornell et al. (2006). Interestingly and more important, beyond Fornell et al. (2006), this research suggests that this market anomaly tends to disappear in the presence of state-of-the-art model of Fama-French 3 factor plus Carhart Momentum. By and large, financial markets are efficient and have systematically incorporated the information content of ACSI. Although our results indicate that customer satisfaction is priced in financial markets, it is neither a size nor a value effect.
- Our results indicate different finance models of asset pricing may lead to different implications. With or without adding momentum effect, Fama-French 3 factor model may lead to a different conclusion for the high ACSI portfolio case. Thus, future research at the marketing-finance interface should pay attention to the ramifications of applying different finance models.

Our study significantly departs from extant literature on linking customer satisfaction to stock returns. For example, while the unit of analysis was at the *firm* level in most past studies, our unit of analysis is at the *portfolio* level. Our proposal intends to offer future marketing scholars a brand new way to look at research projects in the marketing-finance interface. We agree with Jacobson and Mizik (2007, p. 1) that "key implications of financial market theories [efficient market hypothesis] have not been integrated into marketing research." Yet, efficient market hypothesis is at the *portfolio* level, while their study is at the firm level. Our research is among the first to investigate at the portfolio level so as to match the finance theory and meet the standard bar in a finance test.

Finally, given the powerful influence of satisfaction in marketing and the dominant position of efficient market hypothesis in finance, we feel that this proposal is only the first step for the boom of research stream at the marketing-finance interface (Srinivasan and Hanssens 2007; Srivastava et al. 1998).

Is marketing asset, i.e., customer satisfaction, priced in financial markets? On the one hand, if financial markets are efficient and stock prices reflect all public information available in the past about the company, then the answer would be yes. If so, then investors holding a portfolio with high customer satisfaction stocks would not earn higher abnormal stock returns than investors holding a portfolio with low customer satisfaction stocks, after accounting for market-wide risk factors. In this case, expected returns of an investing strategy based on satisfaction scores would not outperform market-wide risk-adjusted benchmark portfolio, confirming efficient market hypothesis.

On the other hand, if markets are not perfectly efficient and pockets of anomalies exist, then the answer to the same question would be no. In this scenario, stock price of a security is not at the equilibrium, perhaps because customer assets are intangible, costly to gauge, and hard for investors to update their expectations regarding the firm's discounted future cash flows. If so, then investors holding a portfolio with high customer satisfaction stocks would earn higher abnormal stock returns than investors holding a portfolio with low customer satisfaction stocks, after accounting for market-wide risk factors. As a result, securities are mispriced; financial markets systematically underprice the value of firms' satisfied customers.

The intent of this proposed research is to test these ideas. Given the powerful influence of satisfaction in marketing and the dominant position of efficient market hypothesis in finance, it is important to explore these ideas and their research implications. In addition, customer satisfaction can be regarded as an investment sentiment metric, or "a form of tastes for assets" (Fama and French 2007, p. 675), likely having emotional contagion effects in financial markets, an issue that is of tremendous interest to investors. As a result, this study seeks to investigate:

- Are there excess portfolio returns (excess to risk-free rates) of stocks with different customer satisfaction scores? How do they relate to firm market equity and book-to-market ratio? What are the abnormal portfolio returns (after adjusted market wide investor expectations and required returns for large caps and growth stocks) to customer satisfaction?
- Whether or not there is systematic mispricing in financial markets due to the customer satisfaction effect. Under what conditions mispricing of satisfaction is possible and/or what conditions would it disappear at the stock portfolio level?
- The ramifications of applying which finance models of asset pricing and the resultant implications for research at the marketing-finance interface.

Our study significantly departs from extant literature on linking customer satisfaction to stock returns. For example, while the unit of analysis was at the *firm* level in most past studies, our unit of analysis is at the *portfolio* level. Because in reality investors typically hold a portfolio of diversified stocks in financial markets, it seems valid and important to explore the issue of pricing customer satisfaction at the portfolio level. Unfortunately but interestingly, this has been largely ignored in the extant marketing literature. However, without explicitly addressing this issue at the portfolio level, marketers would speak different languages from investors. If so, then marketers would have little to directly influence investors' trading strategies.

An exception at the portfolio level, the only one we know of, is a recent study by Fornell et al. (2006) with the American Customer Satisfaction Index (ACSI). Yet, while breaking ground in many ways, that article was based on "paper portfolio with simple trading rules" (p. 8). They conclude that there seems to be mispricing of satisfaction, but call for more research in this

direction: "whether that [mispricing of satisfaction] will be the case with the customer satisfaction effect is yet to be determined" (p. 11).

Therefore, we respond to their call in this study. We do so with a high-caliber approach. That is, we bring ACSI with state-of-the-art asset pricing models and calendar time portfolio construction processes from finance. We hope this will help elevate the rigor of future satisfaction and other marketing asset research with cutting-edge finance theory, methodologies, and data skills.

Our findings are interesting and not hard to summarize.

- Based on excess portfolio return, portfolios with higher level of customer satisfaction tend to perform better. The mean monthly excess return for the low ACSI quintile portfolio is 0.82% per month (10.30% annualized), while the mean excess return for the high ACSI quintile portfolio is 0.90% per month (11.35% annualized). It appears that ACSI overall sample is limited to large cap companies and growth firms (low B/M) have higher customer satisfaction.
- Based on abnormal portfolio return, we find that the high ACSI quintile portfolio have statistically outperform (0.45% per month or 5.40% annualized) market wide risk-adjusted benchmark portfolio in the Fama-French 3-factor model. But, the abnormal portfolio returns for all other ACSI quintile portfolios are not significant (p>.10). Thus, there is limited evidence for the notion that customer satisfaction is not priced. As such, market anomaly due to customer satisfaction seem exist only for the special case in the highest ACSI portfolio.
- When adding momentum to the Fama-French 3-factor risk factor model of asset pricing, the abnormal portfolio returns are not significant for all ACSI quintile portfolio (including high ACSI portfolio). This suggests that even if there is market anomaly for high ACSI portfolio, momentum effects would explain away this anomaly and support efficiency market hypothesis. Overall, it seems that customer satisfaction is priced in financial markets.

The next sections will present the portfolio construction, different asset pricing models, data and results. Implications are discussed in the end.

PORTFOLIO CONSTRUCTION

Portfolios are constructed based on a ranking of ACSI-based customer satisfaction scores. In July of each year t from 1996 to 2005, we first sort all the stocks in the sample by ACSI in

descending order. Then, we split the sample into ACSI quintiles, which has 5 portfolios. The top portfolio (top quintile) has firms with the highest ACSI scores. We label it as high ACSI portfolio. In contrast, the bottom portfolio (bottom quintile) includes firms with lowest ACSI scores. We call this as low ACSI portfolio.

Once the ACSI portfolios are constructed, we can calculate the monthly excess return for each stock by subtracting the risk-free rate from the raw portfolio return for that month. We rebalance the ACSI portfolios once a year (in the beginning of July) which is based on the fact that all the fiscal information for the previous year has been released, including customer satisfaction. [1] So during that 1 year, it is monthly stock return based on the past one year customer satisfaction score. Each stock's excess return is then averaged to derive the equally-weighted excess monthly returns for each ACSI quintile portfolio.[2]

Shumway (1997) and Shumway and Warther (1999) find that there is a survivorship bias inherent in CRSP for performance-related delisted firms. To mitigate the problem, we follow Shumway and Warther (1999) and substitute -30% as the last month return for NYSE/AMEX firms and -55% as the last month return for NASDAQ firms. The substitutions are only applied to firms that are delisted due to performance reasons in ACSI portfolios.

To be included in the ACSI portfolios, a firm must meet the following criteria. First, it must have the CRSP stock prices for July of year t and June of year $t+1$ and the COMPUSTAT book equity for December of year $t-1$. Second, the firm must not have negative book equity for the end of fiscal year $t-1$. Third, the firm must have appeared in the COMPUSTAT database for two years to avoid potential survivorship bias problems.

[1] Using July as a rebalancing month is also common in finance literature (see Fama and French, 1992).
[2] We use the equally-weighted portfolio return instead of the value-weighted because the latter one can be influenced by the size of the company. Nonetheless, the weighting scheme does not qualitatively change our results. For more discussion on weighting see Fama (1998).

Following Fama and French (1992), we match stock returns for the period of July of year *t* to June of year *t + 1* to customer satisfaction data of a firm for the fiscal year ending in year *t – 1*. This ensures that customer satisfaction information is known before it is used for testing. Firms with one or more missing monthly returns are excluded from the ACSI portfolios.

PORTFOLIO LEVEL ASSET PRICING MODELS

This section presents different asset pricing models at the portfolio level. First, the performance of the ACSI portfolios is evaluated with a single-factor model that includes the market solely. This is the original Capital Asset Pricing Model (hereafter CAPM) by Sharpe (1964) and Markowitz (1952), a Nobel Prize-winning work.[3]

$$R_{pt} = a_{p0} + b_{p1}\, RMRF_t + \varepsilon_{pt}, \qquad (1)$$

where the R_{pt} is the month *t* excess return on quintile portfolio *i* and the $RMRF_t$ is the time series excess return of the value-weighted CRSP market index.

Second, the performance of the ACSI portfolios is evaluated with the Fama-French 3-factor model that includes the market, size, and value factors. This is the updated CAPM by Fama and French (1993), which is widely accepted in finance.

$$R_{pt} = a_{p0} + b_{p1}\, RMRF_t + b_{p2} SMB_t + b_{p3} HML_t + \varepsilon_{pt}, \qquad (2)$$

where the SMB_t is the size factor, equal to the average monthly return difference between small stocks and large stocks, and HML_t is the valuation factor, computed as the average monthly difference in returns between value and growth stocks,

Third, the performance of the ACSI portfolios is evaluated with a four-factor model that combines the market, size, and value factors of Fama-French (1993) with the Carhart (1997) momentum factor. This model is now dominating the research efforts in finance.

[3] William Sharpe and Harry Markowitz shared the Nobel Prize for pioneering the work in asset pricing and for contribution to modern portfolio theory.

$$R_{pt} = a_{p0} + b_{p1}\, RMRF_t + b_{p2}SMB_t + b_{p3}HML_t + b_{p4}UMD_t + \varepsilon_{pt}, \qquad (5)$$

where UMD_t is the momentum factor, defined as the average return on the two high prior return portfolios minus the average return on the two low prior return portfolios.[4]

In these asset pricing models, if abnormal portfolio return, the intercept term or Jensen's alpha (a_{p0}), equals to 0, then the observed ACSI portfolio return is the same as the expected portfolio return, or the market wide risk-adjusted benchmark portfolio. In this case, customer satisfaction is priced in financial markets and thus there is no systematic mispricing in financial markets due to the customer satisfaction effect. This would suggest that financial markets are efficient.

In contrast, if the abnormal portfolio return, intercept term Jensen's alpha (a_{p0}) does not equal to 0, then the observed ACSI portfolio return is different from the expected portfolio return. In this case, customer satisfaction is not priced in financial markets and thus there is systematic mispricing in financial markets due to the customer satisfaction effect. As such, financial markets are inefficient. Because mispricing can have two types, underpricing and overpricing, we can determine with the criteria as follows: if the intercept term (a_{p0}) is positive, then portfolios with higher level of customer satisfaction tend to outperform market wide risk-adjusted benchmark portfolio, supporting the phenomenon of underpricing customer satisfaction. However, if the intercept term Jensen's alpha (a_{p0}) is negative, then portfolios with higher level of customer satisfaction tend to underperform market wide risk-adjusted benchmark portfolio, supporting the phenomenon of overpricing customer satisfaction in stock markets.

DATA DESCRIPTION

[4] More information on the construction of the four factors can be obtained from the website of Professor Kenneth French (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html).

ACSI Data for Customer Satisfaction

For customer satisfaction, we used data of the annual customer satisfaction index by ACSI (1995-2005). This index provides a customer-based (not expert-based) measure of overall satisfaction at the firm level. It is designed to represent the health of the national economy as a whole, covering all major economic sectors such as manufacturing durables and non-durables, transportation, communications, utilities, retail, finance, insurance, and others. It comprises about 43% of the US economy (Anderson et al. 2004; Fornell et al. 1996; Luo and Homburg 2007).

In compiling this customer satisfaction index, ACSI interviews over 200 customers on average per firm for nearly 200 large companies. More than 65,000 consumers are identified and interviewed annually. Interviewees are from 48 replicate samples of households with telephone services and Internet samples for e-businesses. Each respondent (real user of the products/services) has to pass screening questions related to predefined purchase and consumption time periods before participating in the survey. The survey questionnaire has multiple items for multiple constructs that are used to estimate the latent variable of overall customer satisfaction. The resulting customer satisfaction for an individual firm indicates its served customers' overall evaluation of total consumption experiences. This measure ranges from 0 to 100 (the highest). For ACSI portfolio sorting, we have complete data for about 74 firms over 1995-2005.

The ACSI dataset offers a unique and reliable measure of customer satisfaction because it employs identical survey methods, interview procedures, sampling, and estimation methods across firms and years. A comprehensive test of the validity and reliability of this satisfaction measure can be found in Fornell and colleagues (1996). An increasingly emerging body of

literature has successfully employed this satisfaction database (e.g., Anderson, Fornell, and Mazvancheryl 2004; Fornell et al. 2006; Luo and Bhattachaya 2006; Luo and Homburg 2007).

CRSP and COMPUSTAT Data

Monthly data on stock returns are obtained from CRSP. The sample period for stock returns for ACSI portfolio is from July 1995 to June 2005. Data for the Fama-French four factors ($RMRF_t$, SMB_t, HML_t, UMD_t) are from the website of Kenneth French (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html). Risk-free rates are 30-day Treasury bill rates.

Company financial data such as market equity, sales, long-term debt and capital expenditures are gathered from COMPUSTAT and CRSP. Market equity is computed as the price at the end of June of year *t* multiplied by number of shares outstanding. Book-to-market ratio is computed as book equity divided by market equity on December of year *t*. The units of measurement for market equity are in millions of dollars from COMPUSTAT.

PRELIMINARY RESULTS

Descriptive Results

Table 1 presents the sample descriptive statistics. Panel A reports the mean for customer satisfaction, size and book-to-market for ACSI quintile portfolios. It appears that there is a monotonic inverse relation between customer satisfaction and firm size. Firms in the lowest ACSI quintile portfolio have an average market cap of $23,000 million while firms in the highest ACSI quintile portfolio have an average market cap of $38,000 million. The size statistics suggest that our overall sample is limited to large cap companies. This finding is quite consistent with the findings in prior research (Fornell et al. 2006). The mean book-to-market in the lowest

ACSI quintile portfolio is close to unity while the mean book-to-market in the highest ACSI quintile portfolio is 0.40 indicating that, on average, growth firms (low B/M) have higher customer satisfaction. This also means that value firms (high B/M) tend to have lower customer satisfaction.

Table 1

Summary Statistics and Correlogram

Panel A presents the mean customer satisfaction, market equity and book-to-market ratio by ACSI quintiles. Market equity is computed as the price at the end of June of year *t* multiplied by number of shares outstanding. Book-to-market ratio is computed as book equity divided by market equity on December of year *t*. The units of measurement for market equity are in millions of dollars. Panel B reports pairwise correlations. *, ** and *** represent significance at the 10%, 5% and 1% levels, respectively. The correlations are expressed in percentages.

Panel A

ACSI Portfolios	ACSI	Market Equity	Book-to-Market
LOW	66.98	23,295.50	0.99
2	73.23	23,602.54	0.67
3	76.15	28,378.79	0.70
4	80.15	32,440.66	0.51
HIGH	84.23	37,836.47	0.39
			0.67
All Firms	75.54	28,550.26	

Panel B

Year	t	t - 1	t - 2	t - 3	t - 4
t - 1	90***				
t - 2	88***	91***			
t - 3	86***	89***	90***		
t - 4	83***	86***	88***	89***	
t - 5	80***	83***	85***	86***	90***

Results on ACSI Portfolio Monthly Excess Return

Table 2 reports monthly excess (in excess to risk-free rates) return distribution for ACSI quintile portfolio. The mean excess return for the low ACSI quintile portfolio is 0.82% per

month (10.30% annualized), while the mean excess return for the high ACSI quintile portfolio is 0.90% per month (11.35% annualized).

In addition, we checked a hedge, zero-cost portfolio (*SPREAD*), which takes a long position in the low ACSI quintile portfolio and a short position in the high ACSI quintile portfolio. We use the return on the *SPREAD* portfolio to measure the premium associated with investing in low customer satisfaction stocks. The *SPREAD* portfolio has a premium of -0.08% (-0.96% annualized). As such, these results on the excess returns suggest that firms with higher level of customer satisfaction tend to perform better. This is quite consistent with prior ACSI literature showing higher customer satisfaction leads to higher future stock returns (Anderson et al. 1997, 2004; Gruca and Rego 2005; Luo and Bhattachaya 2006; Luo and Homburg 2007).

Table 2

Monthly Excess Return on ACSI Portfolios

Table 2 presents the distribution of excess returns for all five ACSI portfolios and the Spread portfolio. The statistics include the mean, standard deviation, maximum, median and minimum values (equally-weighted). At the beginning of each July of year t, all stocks are sorted into quintiles based on their customer satisfaction measure in descending order to form five ACSI portfolios. Equally-weighted excess returns on a portfolio are calculated as compounded monthly returns from July of year t to June of year t+1. The *SPREAD* portfolio is a zero-cost portfolio that has a long position in the *LOW* ACSI portfolio and short position in the *HIGH* ACSI portfolio. The return series for the spread portfolio is the difference between the low ACSI portfolio return and the high ACSI portfolio return. All portfolios are rebalanced each year. Returns are reported in decimals. The *, ** and *** represent significance at the 10%, 5% and 1% levels, respectively.

ACSI Portfolios	Mean		St. Dev.	Max	Med	Min
LOW	0.0082		0.0617	0.2309	0.0109	-0.1929
2	0.0079	*	0.0455	0.1297	0.0076	-0.1189
3	0.0082	**	0.0429	0.1055	0.0099	-0.1129
4	0.0069	*	0.0429	0.1012	0.0080	-0.1229
HIGH	0.0090	***	0.0415	0.1072	0.0106	-0.1064
SPREAD	-0.0008		0.0446	0.1568	-0.0044	-0.1296

Note: here are monthly returns. What we are assuming is we form the portfolios once a year (in beginning of July) which is based on the fact that all the fiscal info for previous year has been released, including customer satisfaction. We hold the portfolio for 1 year and rebalance. So during that 1 year, it is monthly return based on past one year customer satisfaction score.

Figure 1a. Mean of ACSI Portfolio Excessive Return

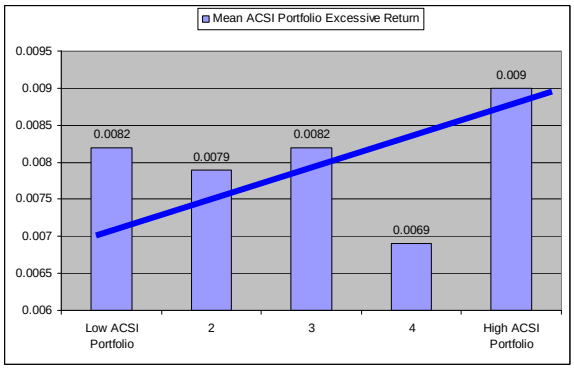
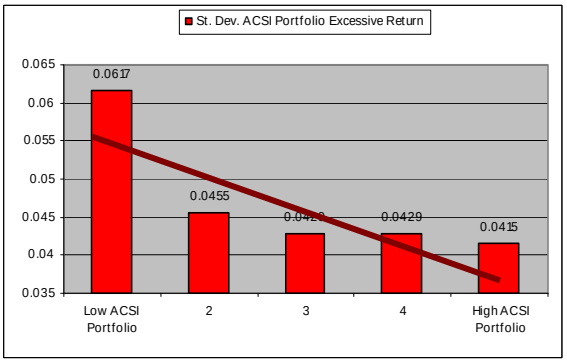


Figure 1a. Standard Deviation of ACSI Portfolio Excessive Return



Interestingly, the standard deviation of the ACSI portfolio excess return indicates an ignored aspect of ACSI. That is, it seems that there is a monotonic inverse relation between standard deviations of the portfolio excess return (Figure 1b) and the mean of ACSI portfolio excess returns (Figure 1a). As reported in Table 2, on average, standard deviation of the low ACSI excess portfolio return is larger (.0617) than that of the high ACSI excess portfolio return (.0415). This means that low customer satisfaction firms tend to have more volatile excess returns, while high customer satisfaction firms tend to have less volatile excess returns.

Collectively, these results so far are not trivial. To our best knowledge, this research is among the first to use portfolio level excess returns to show that (1) stocks with higher customer satisfaction scores tend to outperform stocks with lower customer satisfaction scores and (2) this superiority of higher customer satisfaction also leads to lower volatility/variability in stock return. Yet, our results till this point have not adjusted for market-wide expectations. These *excessive* portfolio returns are not *abnormal* portfolio returns, i.e., have not parceled out the required returns for large caps and growth stocks in ACSI. Next, we discuss this issue (which has also been ignored in extant satisfaction literature).

Results on ACSI Portfolio Monthly Abnormal Returns

CAPM and Fama-French 3-factor model results. To examine whether customer satisfaction is priced or not by the market wide factors with *abnormal* portfolio returns (the intercept Jensen's alpha, which has adjusted market-wide risks and the required returns for large caps and growth stocks in ACSI), we estimate the asset pricing models as described in equation 1 (CAPM model) and equation 2 (the Fama-French 3-factor model).

As reported in Table 3, the results show that interestingly, the abnormal portfolio return Jensen's alpha for the high ACSI quintile portfolio is statistically significant and positive (a_{p0}=0.55%, p<.10 monthly, or 6.6% annualized, for CAPM model; and a_{p0}=0.45%, p<.10 monthly, or 5.4% annualized, for Fama-French 3-factor model). This means that portfolios with highest level of customer satisfaction tend to outperform market wide risk-adjusted benchmark portfolio, supporting the phenomenon of underpricing customer satisfaction (Fornell et al. 2006) for this special case only.

Yet, the abnormal portfolio returns Jensen's alphas for all other ACSI quintile portfolios (except high ACSI quintile portfolio) are statistically insignificant (p>.10) and thus not different from zero (a_{p0}=0) in either CAPM or Fama-French 3-factor model. Thus, because the abnormal portfolio returns equal to 0 in most portfolios, the financial markets are quite efficient, and the observed ACSI quintile portfolio returns are the same as the expected portfolio return. In this case, we conclude that customer satisfaction is priced in financial markets and thus there is no systematic mispricing in financial markets due to the customer satisfaction effect, if following the Fama-French 3-factor model.

Thus, it seems that by and large, the securities are not mispriced. Yet, financial markets may still have some anomalies and systematically underprice the value of satisfied customers only for stocks with highest customer satisfaction scores, if following the Fama-French 3-factor model.

Table 3
Monthly Abnormal Return on ACSI Portfolios (CAPM and Fama-French 3-Factor Models)

Table 3 presents abnormal portfolio returns (measured as Jensen's alphas after adjusted market wide investor expectations and required returns for large caps and growth stocks in ACSI) and factor loading estimates from the following regression model:

$$R_{pt} = a_{p0} + b_{p1}\, RMRF_t + \varepsilon_{pt} \qquad \text{(CAPM Model)}$$

$$R_{pt} = a_{p0} + b_{p1}\, RMRF_t + b_{p2} SMB_t + b_{p3} HML_t + \varepsilon_{pt} \qquad \text{(Fama-French 3-Factor Model)}$$

This table presents results for the one-factor and 3-factor models. The dependent variables are the returns on the ACSI portfolios and the independent variables are the factor risk premia. RMRF is the market risk premium, SMB is the size premium, HML is the value premium, and α is the intercept. RMRF is calculated by subtracting the risk-free rate from the CRSP index return. SMB is the difference between the returns of small cap and large cap portfolios. HML is the difference between the returns of high book-to-market and low book-to-market portfolios. SPREAD is a zero-cost portfolio that takes a long position in the LOW ACSI portfolio and short position in the HIGH ACSI portfolio. Standard errors are in parentheses and *, ** and *** represent significance at the 10%, 5% and 1% levels, respectively.

	CAPM Model			Fama-French 3-Factor Model							
ACSI Portfolios	Alpha		RMRF		Alpha		RMRF		SMB	HML	
LOW	**0.0023**		**0.9748**	***	**-0.0004**		**1.1761**	***	**-0.0552**	**0.6461**	***
	(0.0039)		(0.0826)		(0.0028)		(0.0631)		(0.0780)	(0.0668)	
2	**0.0039**		**0.6660**	***	**0.0019**		**0.8207**	***	**-0.0625**	**0.4837**	***
	(0.0031)		(0.0657)		(0.0023)		(0.0523)		(0.0647)	(0.0553)	
3	**0.0046**		**0.5941**	***	**0.0027**		**0.7522**	***	**-0.0793**	**0.4840**	***
	(0.0030)		(0.0649)		(0.0023)		(0.0505)		(0.0625)	(0.0535)	
4	**0.0030**		**0.6454**	***	**0.0015**		**0.7727**	***	**-0.0653**	**0.3891**	***
	(0.0028)		(0.0606)		(0.0023)		(0.0522)		(0.0646)	(0.0553)	
HIGH	**0.0055**	*	**0.5755**	***	**0.0045**	*	**0.6829**	***	**-0.1014**	**0.2987**	***
	(0.0029)		(0.0625)		(0.0026)		(0.0589)		(0.0729)	(0.0624)	
SPREAD	**-0.0033**		**0.3993**	***	**-0.0049**		**0.4932**	***	**0.0462**	**0.3474**	***
	(0.0038)		(0.0801)		(0.0036)		(0.0795)		(0.0984)	(0.0842)	

Fama-French and Carhart momentum model results. With respect to the Fama-French and Carhart (1997) model as described in equation 3, our results are presented in Table 4 and Figure 2a. The abnormal portfolio returns Jensen's alphas of the ACSI portfolio returns decrease substantially and are uniformly insignificant (p>.10). In addition, as shown in Table 4, when momentum is added, the abnormal portfolio return of the high ACSI quintile portfolio return is no longer significant (a_{p0}=.0020, p>.10). This suggests that a momentum measure captures the

effect of customer satisfaction in the Fama-French 3-factor model. In other words, when momentum is modeled, financial markets seem efficient and customer satisfaction is well priced for all ACSI portfolios. Thus, the mispricing of satisfaction in the high ACSI portfolio based on the Fama-French 3-factor model disappears in the presence of the Fama-French and Carhart (1997) model.

Overall, the results suggest that customer satisfaction may have already been priced in stock markets. Although pockets of anomalies exist in some special cases, financial markets are in general efficient and have incorporated the information content of ACSI.

Table 4
Monthly Abnormal Return on ACSI Portfolios (Fama-French and Carhart Factors Model)

Table 4 presents abnormal portfolio returns (Jensen's alphas) and factor loading estimates from the following regression model:

$R_{pt} = a_{p0} + b_{p1}\,RMRF_t + b_{p2}SMB_t + b_{p3}HML_t + b_{p4}UMD_t + \varepsilon_{pt}$ (Fama-French and Carhart Factors Model)

where R is the portfolio return less the risk-free rate, RMRF is the market risk premium, SMB is the size premium, HML is the value premium, UMD is the momentum effect and α is the intercept. RMRF is calculated by subtracting the risk-free rate from the CRSP index return. SMB is the difference between the returns of small cap and large cap portfolios. HML is the difference between the returns of high book-to-market and low book-to-market portfolios and UMD is the difference between returns of last year's high return and low return portfolios. *SPREAD* is a zero-cost portfolio that takes a long position in the *LOW ACSI* portfolio and short position in the *HIGH ACSI* portfolio. Standard errors are in parentheses and *, ** and *** represent significance at the 10%, 5% and 1% levels, respectively.

	Fama-French and Carhart Factors Model									
ACSI Portfolios	Alpha		RMRF		SMB		HML		UMD	
LOW	**-0.0005**		**1.1798**	***	**-0.0535**		**0.6529**	***	**0.0066**	
	(0.0031)		(0.0764)		(0.0807)		(0.1045)		(0.0782)	
2	**0.0015**		**0.8348**	***	**-0.0561**		**0.5101**	***	**0.0257**	
	(0.0025)		(0.0633)		(0.0668)		(0.0865)		(0.0647)	
3	**0.0002**		**0.8358**	***	**-0.0414**		**0.6406**	***	**0.1528**	**
	(0.0024)		(0.0596)		(0.0629)		(0.0815)		(0.0609)	
4	**-0.0006**		**0.8457**	***	**-0.0322**		**0.5259**	***	**0.1334**	**
	(0.0025)		(0.0621)		(0.0655)		(0.0848)		(0.0634)	
HIGH	**0.0020**		**0.7659**	***	**-0.0638**		**0.4542**	***	**0.1516**	**
	(0.0028)		(0.0700)		(0.0739)		(0.0958)		(0.0716)	
SPREAD	**-0.0025**		**0.4138**	***	**0.0103**		**0.1987**		**-0.1449**	
	(0.0038)		(0.0954)		(0.1008)		(0.1305)		(0.0976)	

Figure 2a ACSI Portfolio Abnormal Return

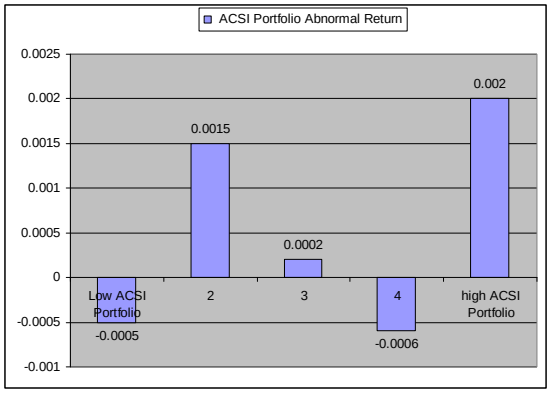
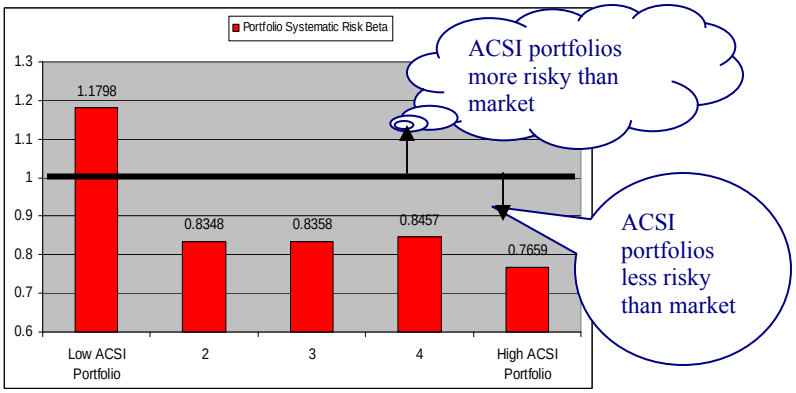


Figure 2b ACSI Portfolio Systematic Risk Beta (RMSF)



More Results

As reported in Table 4 and Figure 2b, the parameter estimate for RMRF of the ACSI quintile portfolios reveals that firms with low customer satisfaction have significantly higher systematic risk than firms with high customer satisfaction. These results confirm and extend Fornell et al.'s (2006) findings on "higher returns and lower risk" (i.e., systematic risk RMRF becomes lower as ACSI quintile portfolio moves from low to high customer satisfaction in our results, shown in Table 4 and Figure 2b).

In addition, the results in Table 4 show that the positive (but insignificant) slopes on SMB and HML indicate the relative style difference between low and high ACSI portfolios. Specifically, it appears that firms in the low customer satisfaction group tend to be smaller in size and have higher B/M ratio. The parameter estimates for UMD are of particular interest. The magnitude of the coefficients increase as the level of customer satisfaction rises, suggesting that firms with a high level of customer satisfaction tend to have higher stock returns in the ACSI portfolios in the previous year.

Table 1 Panel B sets forth the correlation between customer satisfaction values in year *t* and values in the subsequent years for the ACSI portfolios. If the cross-section of customer

satisfaction is a random phenomenon and independent from corporate strategic decisions, then there would be no reason to expect it to be stable over time. Hence, there should be no significant year-to-year correlation. However, if customer satisfaction is a systematic event, then there should be a positive relation between the current year and subsequent year values. Results in panel B of Table 1 reveal that correlations are positive and highly significant (r =.80 to .91; all p<.01). However, the magnitude of the correlation tends to decrease with longer lags, suggesting that firms do take action to improve the overall customer satisfaction level longitudinally speaking. Therefore, firm-level customer satisfaction does not appear to be a random measurement, but rather is highly dependent upon corporate strategies and marketing actions, according to the data for the ACSI portfolios.

IMPLICATIONS

This proposal was intended to test if customer satisfaction is priced by financial markets. Based on our data analyses, the answer to this question so far depends on the nature of the portfolios with different ACSI scores and the types of asset pricing models employed. By and large, we find that customer satisfaction may have already been priced, failing to reject efficient market hypothesis. The ACSI portfolio return results did not suggest any overpricing of customer satisfaction. Yet, we find limited evidence for underpricing of customer satisfaction in the high ACSI quintile portfolio compared to market-wide risk adjusted benchmark portfolio.

Implications for Customer Satisfaction Research

- We demonstrate to marketing researchers a finance tool—portfolio construction in asset pricing models, which can benchmark monthly excess returns of stock portfolios with different customer satisfaction scores. Future research can apply this standard tool direct from finance to more rigorously value customer based brand equity,

innovation patents, and/or corporate social responsibility at the portfolio level, beyond the common firm level analysis.

- We are among the first to use portfolio level excess returns to show that (1) stocks with higher customer satisfaction scores tend to outperform stocks with lower customer satisfaction scores and (2) this superiority of higher customer satisfaction also leads to lower volatility/variability in stock return.
- We are the first to employ portfolio level abnormal returns (after adjusting for market wide investor expectations and required returns for large caps and growth stocks) to show that mispricing of customer satisfaction is a special case. By and large, financial markets are efficient and have systematically incorporated the information content of ACSI. Although our results indicate that customer satisfaction is priced in financial markets, it is neither a size nor a value effect. We find that customer satisfaction is reflected through the momentum factor.
- Our results indicate different finance models of asset pricing may lead to different implications. With or without adding momentum effect, Fama-French 3 factor model may lead to a different conclusion for the high ACSI portfolio case. Thus, future research at the marketing-finance interface should pay attention to the ramifications of applying different finance models.

Our proposal intends to offer future marketing scholars a brand new way to look at research projects in the marketing-finance interface. We agree with Jacobson and Mizik (2007, p. 1) that "key implications of financial market theories [efficient market hypothesis] have not been integrated into marketing research." Yet, efficient market hypothesis is at the *portfolio* level,

while their study is at the firm level. In a similar vein, while McAlister et al. (2007) also rely on portfolio theory, that study is yet executed at the firm level. Our research is among the first to investigate at the portfolio level so as to match the finance theory and meet the standard bar in a finance test.

In addition, our findings suggest that high ACSI quintile portfolio outperformed that of market wide risk-adjusted benchmark portfolio based on abnormal portfolio returns from the Fama-French 3 factor model. This adds more credibility and evidence for the results reported in the study by Fornell et al. (2006). Interestingly and more important, beyond Fornell et al. (2006), this research suggests that this market anomaly tends to disappear in the presence of state-of-the-art model of Fama-French 3 factor plus Carhart Momentum. Overall, the results on portfolio returns after adjusting market wide risks (market returns, large caps, value stocks, momentum effects) find no significant difference in performances between low and high ACSI portfolios. This suggests that investors holding a portfolio with high customer satisfaction stocks would not earn higher abnormal stock returns than investors holding a portfolio with low customer satisfaction stocks, after accounting for market wide risk factors. In other words, expected returns of an investing strategy based on satisfaction scores would not outperform market wide risk-adjusted benchmark portfolio, largely confirming efficient market hypothesis.

In conclusion, given the powerful influence of satisfaction in marketing and the dominant position of efficient market hypothesis in finance, this proposal is only the first step for the boom of research stream at the marketing-finance interface (Luo 2007; Rust et al. 2004; Srinivasan and Hanssens 2007; Srivastava et al. 1998).

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