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By

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Abstract

An Empirical Analysis of Customer Satisfaction in Short Selling

By

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Using an event study along with basic linear regressions, this paper sets out to find if customer

satisfaction factors into asset pricing, and if short sellers predict or react to the announcement,

then capitalize on the mispricing. By using customer satisfaction data from the ACSI index and

security pricing data from WRDS it is possible to test whether the absolute level of customer

satisfaction factors into a short selling investor's actions within the market, or if an increase or

decrease in satisfaction from the previous year is recognized by short sellers.

Introduction:

When pricing an asset there are two fundamental lines of thought. The first is the Efficient

Market Hypothesis, which was proposed by Fama (1970) in his groundbreaking work. The price

of a stock reflects all available information and provides an unbiased estimate of the value of a

firm. This theory implies that every movement of the price of an asset perfectly captures the

impact of particular news events within the pricing of an asset (depending on the degree one

believes in efficient markets). Contrary to this view is the idea that certain news events have

differing interpretations, or take time for the market to correctly price certain assets or decisions

made by the firm's management. Daniel and Titman (2003) conclude that "there is considerable

evidence that investors underreact to information conveyed to management decisions." This would imply that markets may misprice certain aspects of a company's intangible assets. This mispricing would lead to statistically significant abnormal returns when compared to the market. Some have suggested that marketing fundamentals such as brand loyalty or customer satisfaction are examples of these intangible assets that are mispriced by financial markets. This could be a result of the long-term nature of marketing fundamentals on company performance, making an immediate calculation of future earnings fully uncertain. In a study by Fornell, Mithas, and Morgenson (2006), they claim that financial markets misprice customer satisfaction. The relationship between customer satisfaction and asset prices can be easily shown through the simple example of the dividend growth model. Customer satisfaction includes things like customer loyalty, perceived quality and customer complaints. A company with high customer satisfaction will likely also have high retention rates, greater word of mouth advertising, and better growth prospects than companies with low customer satisfaction scores within the same industry. Given the simple (and unrealistic) equation for the dividend discount model, it becomes clear that in theory, a company with high (low) customer satisfaction could increase (decrease) their earnings, which in turn increases (decreases) their dividend payments to shareholders thereby causing the asset price to increase (decrease). Or similarly the growth rate increases, thereby causing the price of the asset to increase (decrease).

$Price_0 = D1 \,/\, r - g$

 Fornell et al. (2006) attempts to show that ACSI firms outperform the market and that the returns are statistically and economically significant. According to their analysis, a portfolio of strong and improving customer satisfaction has an annualized return of 6.4% over a ten year period, and a portfolio of weak and declining customer satisfaction has a negative abnormal

return of 1.4%. These large returns have come under scrutiny, and have been shown to be reduced to zero when subjected to various robustness checks. For instance, Jacobson and Mizik 2009 show that the results from Fornell, Mithas and Morgenson were driven completely by a small group of overpriced internet firms, and when excluding those from the portfolio ACSI firms do not outperform the market by any statistically significant measure. With so much contention as to the true impact of customer satisfaction on asset pricing and ultimately investor's returns, this study attempts to use a different measure when looking at them impact of customer satisfaction. The role of the short seller within markets becomes extremely important moving forward.

It is well known that the role of short selling promotes market efficiency. By allowing the bearish view to be present within markets it allows asset prices to return to their efficient levels faster by balancing out the upward pressure of bullish investors. The initial theory for this paper is laid out in Diether, Lee, and Werner (2009). This study examines short selling in US stocks based on SEC-mandated data for 2005. Results show that short sellers increase their trading following positive returns and they correctly predict future negative abnormal returns. These results suggest that short sellers are informed investors when it comes to short time horizons. This paper specifically indicates that short selling is strongly related to past returns, where "a five-day return of 10% results in an increase in short selling as a fraction of daily share volume of 3.71" (576). Knowing that short sellers are informed, and that markets might be mispricing long term strategic decisions such as a firm's investment in customer satisfaction, the logical progression is to ask whether or not short sellers are taking advantage of the mispricing if it actually exists. This line of questioning leads to the two main hypotheses of the paper:

1) Short sellers predict announcement scores and thereby increase or decrease the short volume in the month preceding the ACSI announcement.

2) Short sellers react to the ACSI announcement and adjust short-selling volume accordingly in the month after the announcement.

This paper will test both hypotheses in two different ways. The test of the first hypothesis focuses on the level of a company's ACSI score. This will separate companies into pseudo categories of "good" or "Bad" according to the level of their ACSI. The other specification will work with a differenced ACSI score to separate companies into "improving" or "declining" according to the annual customer satisfaction survey. It is generally accepted that short-sellers help correct short term deviations of stock prices from their fundamental value. One must ask what drives the deviation from fundamental value in the first place. Antweiler and Frank (2006) conduct event studies using Wall Street Journal articles from 1973-2001. They find that return responses vary wildly across news categories, but on average there is evidence of overreaction (leading to a return reversal). This would suggest that some news is critical in the pricing of assets, adding immediately to market efficiency, while other news muddies the waters with differing opinions leading to prices moving away from their fundamental value. The paper will be broken into three separate sections, where I first describe my data, then I describe my methods for the analysis, followed by my conclusions and inference into the study's implications.

Data

This paper examines short sales one month prior to and one month after the announcement of the American Customer Satisfaction Index (ACSI) for nearly 270 firms. While controlling for market factors such as size, book to market (a proxy for the inherent value of an investment), and

momentum (controlling for the serial correlation of returns as a stock that is up one month is likely to be up the next), it is possible to see if the most informed investors in the market actually do care about customer satisfaction and its effects on future earnings.

The ACSI comes out once a year for particular industries ranging from cell phone manufacturing to full service restaurants and grocery stores. The ACSI was developed at the University of Michigan's Ross School of Business and according to their web site:

"…is a cause-and-effect model with indices for drivers of satisfaction on the left side (customer expectations, perceived quality, and perceived value), satisfaction (ACSI) in the center, and outcomes of satisfaction on the right side (customer complaints and customer loyalty, including customer retention and price tolerance). The indexes are multivariable components measured by several questions that are weighted within the model. The questions assess customer evaluations of the determinants of each index. Indexes are reported on a 0 to 100 scale (theacsi.org)."

Using these measurements beginning in 1994 and stretching to 2014, along with the announcement date for each company in a particular industry, a panel data set was constructed consisting of over 5000 observations. The data tracks mergers and acquisitions of firms in the same industries along with the development of new categories for emerging technologies such as social media, electronic brokers, and online retailers. As a result some broadly diversified companies are included in the data set multiple times for different industries (along with multiple announcement dates), and some of the newer industries do not have the full 20 years of ACSI observations. The source of the data comes from the American Customer Satisfaction Index website, which was previously discussed, and Wharton Research Data Services (WRDS). Within WRDS, the center for research in security prices (CRSP) provides relevant stock information for a particular firm. For this study CRSP data was used to obtain share prices and

shares outstanding, which were later merged with the ACSI score panel. Compustat is another

program within WRDS, which provides financial statement data for all firms in North America.

This data was used to form the book to market control variable used in the regression. Short

selling data also comes from Compustat, and is reported on a monthly basis. All data ranges

from 1994- 2014 and was compiled and merged using SAS. Some limitations for this data

include its restriction to only firms listed in North America. Companies such as Mercedes Benz,

and Adidas were dropped from the sample as a result. Also there was substantial manipulation

and merging when compiling data, and so the set while handled with exceeding care, was still

subject to human error.

Analysis

Using the data set described above along with basic regression analysis I analyze both the effect

of the absolute level of customer satisfaction on short selling along with the difference year to

year in customer satisfaction. I start with the hypothesis that short sellers predict customer

satisfaction:

$$SI\_RATIO_{i,t-1} = \alpha + \beta ACSI_{i,t} + \varepsilon_{i,t-1}$$

This regression measures the effect ACSI at the time of the announcement has on short selling

one month prior to the survey's announcement.

t-1 Levels Regression					
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-3.88604	0.24737	-15.71	<.0001
num_score	1	0.00051164	0.00322	0.16	0.8738
obs = 1877					

With a t-value of 0.16, it seems that short sellers do not predict the level of an ACSI score. This could indicate that the level of a company's ACSI score does not play a factor in an investor's decision. The asset price does not fluctuate in regards to customer satisfaction. This could be a result of differing standards in customer satisfaction between industries. A company such as Comcast has relatively higher monopoly power when providing cable television, than Samsung where the costs of switching your cell phone manufacturer are substantially lower. As a result companies within industries with higher monopoly power will have relatively similar profits year to year regardless of whether their customers are satisfied with their service or not. As a result the levels of customer satisfaction would appear to be a product of the industry as a whole, rather than a company's individual initiative, or lack thereof to provide customer service. When controlling for variables such as market cap, book to market and momentum, we see that the ACSI score is still statistically insignificant.

$LN(SI\_RATIO_{i,t-1}) = \alpha + \beta1 ACSI_{i,t} + \beta2 LN(BM) + \beta3 LN(MOM) + \beta4 LN(size) + \varepsilon_{i,t-1}$

t-1 Levels Regression with controls					
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	0.90905	0.35037	2.59	0.0096
num_score	1	-0.00367	0.00333	-1.1	0.27
lnsize	1	-0.33202	0.0143	-23.21	<.0001
lnBM	1	-0.13098	0.01702	-7.7	<.0001
lnMOM	1	0.01307	0.01822	0.72	0.4731
obs = 1301					

Using the natural log of size, book to market and momentum helps the distributions of these variables look more normal. It should be mentioned that these models likely suffer from substantial multicollinearity issues (as Size was needed to calculate Book to Market) along with autocorrelation problems through time periods, as a company's starting point is likely related to where the ACSI score is in future time periods causing a violation of the stringent Gauss-Markov assumptions.

$$SI\_RATIO_{i,t+1} = \alpha + \beta ACSI_{i,t} + \varepsilon_{i,t+1}$$

t+1 Levels					
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-3.56563	0.37266	-9.57	<.0001
num_score	1	-0.00146	0.00482	-0.3	0.7614
obs = 972					

LN(SI_RATIO$_{i,t+1}$) = α + β1ACSI$_{i,t}$ + β2LN(BM) + β3LN(MOM) + β4LN(size) + ε$_{i,t+1}$

t+1 Levels with controls					
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	2.06165	0.47291	4.36	<.0001
num_score	1	-0.01073	0.00437	-2.45	0.0144
lnsize	1	-0.36787	0.01757	-20.94	<.0001
lnBM	1	-0.15754	0.02281	-6.91	<.0001
lnMOM	1	0.0581	0.02276	2.55	0.0109
obs = 663					

When looking at the t+1 regression with controls we see that the ACSI score is statistically significant. This result means that short sellers are reacting to the ACSI announcement. The result is intuitive as the level of the ACSI increases by 1 short sellers will decrease their position by about 1%.

Differenced Model

The more interesting question of the study is the effect of the difference in ACSI from year to year. This will partition companies into improving and worsening in terms of customer satisfaction. It is the intention of this study to find out if short sellers predict, react, or simply do not care about the ACSI announcements. I began with the following model:

$$LN(D\_SI\_RATIO_{i,t-1}) = \alpha + \beta Diff\_ACSI_{i,t} + \varepsilon_{i,t-1}$$

t-1 Differences					
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-0.08067	0.00528	-15.26	<.0001
diff_score	1	-0.00293	0.00195	-1.5	0.1334
obs = 1686					

This model looks to see if short sellers can predict an improvement or a decrease in customer satisfaction one month before an announcement. The coefficient on this variable was of interest when looking at how short sellers react to the change in an ACSI score. The negative coefficient implies that a 1 point increase in the difference of customer satisfaction leads to a .293% decrease in short selling, implying that short sellers recognize the change in future profitability and adjust their positions accordingly. The coefficient on the differenced ACSI variable is statistically insignificant however, so no inference can be made. Next, I look to see if short sellers react to a change in a company's ACSI score. The coefficient on this regression would imply that a 1 point improvement in customer satisfaction leads to a decrease in short selling as one might expect. Again the coefficient on the difference in ACSI score is insignificant so no inference can be made, statistically speaking.

$$LN(D\_SI\_RATIO_{i,t-1}) = \alpha + \beta Diff\_ACSI_{i,t} + \varepsilon_{i,t-1}$$

t+1 Differences					
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	0.00995	0.00828	1.2	0.23
diff_score	1	-0.0065	0.00308	-2.11	0.0352
obs = 939					

When adding control variables to the regression the story remains the same. Short sellers neither

react nor predict changes in ACSI. Both coefficients on the reactionary and the protectionary

regressions are statistically insignificant.

$$LN(SI\_RATIO_{i,t-1}) = \alpha + \beta1 Diff\_ACSI_{i,t} + \beta2 LN(BM) + \beta3 LN(MOM) + \beta4 LN(size) + \varepsilon_{i,t-1}$$

t-1 Differences with controls					
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-0.19719	0.07323	-2.69	0.0072
diff_score	1	-0.00139	0.00228	-0.61	0.543
lnsize	1	-0.00246	0.0045	-0.55	0.5851
lnBM	1	-0.01777	0.00542	-3.28	0.0011
lnMOM	1	-0.00665	0.00571	-1.16	0.2443
obs = 1233					

$$LN(SI\_RATIO_{i,t+1}) = \alpha + \beta1 Diff\_ACSI_{i,t} + \beta2 LN(BM) + \beta3 LN(MOM) + \beta4 LN(size) + \varepsilon_{i,t+1}$$

t+1 Differences with controls					
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-0.24914	0.12409	-2.01	0.0451
diff_score	1	-0.00495	0.00351	-1.41	0.1594
lnsize	1	0.002	0.00688	0.29	0.7709
lnBM	1	-0.02966	0.00898	-3.3	0.001
lnMOM	1	0.00814	0.0088	0.93	0.3553
obs = 663					

Conclusion:

Given the statistical analysis above it is safe to say that short sellers are reacting to the level of

the ACSI announcement, and customer satisfaction actually influences short sellers within

financial markets. It goes without question that customer satisfaction is difficult to interpret

from a financial perspective. Many things come to mind, such as a competent management group

or a quality product, when thinking about customer satisfaction, but how does an investor quantify these things in terms of future profitability? This type of information can be described as "soft information" because of its difficulty to interpret. As discussed before however, short sellers are perceived as the most informed investors within financial markets and have been shown to interpret soft information more fully than other investors (Blau, Delisle, Price 2015). When interpreting the short sellers reaction in this study there are 2 outcomes that come to mind:

1. Short sellers recognize that the release of the customer satisfaction score is material in the underlying valuation of the firm and adjust their positions accordingly.

2. Short sellers recognize the "soft information" provided by the ACSI results and adjust their positions as investors with differing interpretations enter the market.

In the first case a company that scores highly on the year in customer satisfaction has also improved their valuation and so the price is likely to increase, forcing some short sellers to close out their positions. The second case provides a more interesting narrative, as fundamental value of the asset may not change, but unsophisticated investors cause the price to rise. In this scenario the high ACSI score causes investors to jump into the market because they think the price will increase. The increased demand causes the price to increase and forces some short sellers to close out their position. It is beyond the scope of this study but if this is truly the case we would expect to see short sellers piling on later to drive the price back to its fundamental value. This begs the question what news is meaningful in asset pricing. Most people accept a semi-strong form of the efficient markets hypothesis where all public information is captured and reflected in the asset price. "All relevant public information" surely is a strong claim. How, as investors do we discern between the relevant and the irrelevant? What information will swing the price and what has little effect? In the tangled interconnected web that is the world economy if we pull one

string no one can say with certainty which bells will ring on the other side when it comes to asset pricing. Markets are alive, in the most vivid way imaginable and through their sentience, the most efficient outcomes for buyers and sellers is possible. But the ACSI and the findings of this paper raise an interesting question. What does the irrelevant information that does not pertain to the fundamental value of the stock do to the asset price? Does it muddy the waters, or does it champion the case for allowing short sellers in the market to ride in and save the day while taking advantage of a price that is driven from its fundamental value. It may be the work of future academics to pin down the ambiguous interpretations of customer satisfaction, but that is not the goal of this paper.

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