The Satisfaction, Repurchase Intention and Shareholder Value Linkage:

A Longitudinal Examination of Fixed and Firm-Specific Effects

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Abstract

For virtually all firms, the means of generating shareholder value comes by having customers consistently come back. The measurement of customer satisfaction and repurchase intention is therefore critical to managers and researchers. Unfortunately, recent research studying the effect that 1) satisfaction and 2) repurchase intention have on shareholder value demonstrates inconsistent results. Using multi-source data across 137 firms over the 2000-2009 period, this study examines the impact of customer satisfaction and repurchase intention on a comprehensive list of 13 different shareholder value measures using a mixed-effects modeling approach that accounts for time-effects, firm characteristics and unobserved heterogeneity in the linkages. Results indicate that repurchase intention completely mediates the relationship between customer satisfaction and shareholder value for the majority of firms, lending support to the idea that the primary path from satisfaction to business outcomes is through customer purchase behavior, and not through other loyalty-related behaviors often attributed to highly satisfied customers.

KEY WORDS: Repurchase intention, customer satisfaction, firm performance, stock returns, financial models

Introduction

For virtually all firms, the means of generating consistent profits comes by having customers who not only initially buy, but consistently re-buy. Repeat customers are fundamental to the end-goal of every business, i.e. to make a positive, sustainable financial return. As a result, the measurement of customer satisfaction and repurchase intention has become critical to managers and researchers (e.g., Chandon Morwitz, and Reinartz 2004 & 2005; Fitzsimons and Morwitz 1996; Jamieson and Bass 1989; Kalwani and Silk 1982; Lusk, McLaughlin, and Jaeger 2007; Morrison 1979; Morwitz and Fitzsimons 2004; Morwitz, Johnson, and Schmittlein 1993). Both measures have traditionally been used to understand and predict how a customer will behave in the future. Satisfaction, however, is a retrospective metric (Zeithaml et al. 2006), whereas repurchase intention focuses on future consumption behavior.

There is a great deal of research that links customer satisfaction and repurchase intention to outcome variables such as customer retention (Mittal and Kamakura 2001), reduced customer defections (Anderson 1996), share-of wallet (Cooil, Keiningham, Aksoy, and Hsu 2006; Keiningham, Perkins-Munn, and Evans 2003), receptiveness to cross selling efforts (Fornell 1992), reduced complaint rates (Bolton 1998; Fornell 1992) and word-of-mouth (Anderson 1998). For company executives, however, establishing the subsequent effects of these variables on metrics such as profit, share price, firm value, etc., is the most important demonstration of the positive link between customer satisfaction, repurchase intention and firm financial performance.

Unfortunately, the limited research that exists studying the effect that 1) satisfaction and 2) repurchase intention have on shareholder value has thus far revealed some inconsistencies. First, many of the recent studies find conflicting results regarding how the market accounts for customer satisfaction. Fornell et al. (2006), for example, conclude that the market does not respond to ACSI (American Customer Satisfaction Index) scores at their release, but that a trading rule based on the ACSI data can produce substantial long-run returns. Another study by Aksoy et al. (2008) also concludes that the ACSI can be used to earn substantial abnormal long-run stock returns. In contrast, Jacobson and Mizik (2009) find relatively little ability of the ACSI to predict long-run abnormal stock returns (except for a small set of Internet firms).

Furthermore, the very limited research that rigorously examines the relationship between repurchase intention and shareholder value finds that it is either nonexistent, or at best inconsistent (Keiningham et al. 2007b; Morgan and Rego 2006). These studies examine the relationship of repurchase intention (and a number of other common satisfaction and loyalty metrics) on a number of shareholder value outcomes. For example, Morgan and Rego (2006) find that repurchase intention demonstrates no managerial value in predicting net operating cash flows and total shareholder returns. Instead, their

research finds that customer satisfaction is the only metric that demonstrates managerial value across all business outcomes examined (Morgan and Rego 2006, p. 437, Table 4).

Almost all of these existing studies link customer satisfaction and repurchase intention to shareholder value outcomes directly. This is contrary to most consumer behavior models where customer satisfaction is generally *not* directly linked to firm performance. Instead, the marketing literature proposes several chainof-effect models that link customer satisfaction to firm performance *through* repurchase intention. These seminal models include SERVQUAL (Parasuraman, Zeithaml, and Berry 1988; Zeithaml, Berry, and Parasuraman 1996), Return of Quality (Rust, Zahorik, and Keiningham 1995), the Service-Profit Chain (Heskett et al. 1994), and the Satisfaction-Profit Chain (Anderson and Mittal 2000). While differences exist in each of these models, they all presume the following chain of effects: satisfaction → retention → revenue and/or market share. When operationalizing these models for scientific research or for use by managers, repurchase intention is typically used as a proxy for customers' repurchase behavior/retention in an effort to link process or service improvement efforts to business impact measures (market share, revenue, etc.). This use of repurchase intention as a proxy for retention is specifically mentioned by the creators of these models (see Anderson and Mittal 2001; Heskett, Sasser, and Schlesinger 1997; Rust, Zahorik, Keiningham 1994; Zeithaml, Berry, and Parasuraman 1996).

Research across a wide number of studies appears to confirm the indirect links in the above chain of effects. Given that these chain of effects models propose a mediating role of repurchase intention on firm performance, it is not clear whether customer satisfaction has a *direct impact* on shareholder value, has an *indirect* effect on the market *through* repurchase intention as suggested by the various models, or has both a *direct and indirect* impact. Furthermore, the divergent ways in which these constructs are modeled in current research makes it difficult to draw more definitive conclusions regarding the nature of the relationship between satisfaction, repurchase intention, and shareholder value.

This difficulty is in part caused by the use of disparate methodologies and somewhat different outcome variables (many of which are not finance-based measurement approaches to shareholder value) across the various studies. Moreover, most (if not all) of these studies use portfolio approaches that fail to account fully for firm level effects and unobserved heterogeneity that exists in such data. As a result, resolving the conflicting evidence and establishing the underlying nature of these relationships proves challenging.

This research aims to contribute to the literature in three important ways: 1) It tests whether customer satisfaction and repurchase intention have a *direct effect* on shareholder value outcomes and/or whether the effect of customer satisfaction on shareholder value is *mediated* by repurchase intention, or both; 2) It expands the type and nature of the shareholder value outcome variables by including a diverse set of measures frequently used by accountants and financial analysts, and; 3) It employs an econometric

methodology that is better suited to the research question and data, specifically mixed effects models that account for time-effects, firm characteristics, and unobserved heterogeneity allowing each firm to have its own firm-specific effect (i.e. random effects) in the linkages. We use ACSI data (customer satisfaction and repurchase intention measures) across 137 firms and 1043 observations over the 2000-2009 period. A mixed-effects model in a four-step mediation approach suggested by Baron and Kenny (1986) is used to longitudinally examine the impact of customer satisfaction and repurchase intention on 13 different shareholder value measures including Tobin's Q, excess stock return, and variations of the CAPM, Fama-French 3-factor and Carhart 4-factor models. Controlling for industry effects as well as other firm characteristics, our results indicate that across the outcome measures for most firms, repurchase intention completely mediates the relationship between customer satisfaction and shareholder value, implying that there is no direct impact of customer satisfaction on shareholder value outcomes. This research lends support to the primary chain-of-effects in the SERVQUAL, SPC, and ROQ approaches (i.e., the *primary* path from satisfaction to business outcomes is through customer purchase behavior, and not through other loyalty-related behaviors often attributed to highly satisfied customers). For a small proportion of firms the relationships between customer satisfaction, repurchase intentions, and shareholder value were found to deviate from the population pattern.

Theoretical Background

Satisfaction, Repurchase Intention and Shareholder Value

The market value of any firm is based upon its total assets, both tangible and intangible. While the valuation of tangible assets is relatively straightforward, and can be estimated using accounting book values and estimates of replacement costs (Hirschey and Weygandt 1985; Lindenberg and Ross 1981; Simon and Sullivan 1993) the valuation of intangible assets is not as simple. Simon and Sullivan (1993, p. 31) define intangible assets broadly as follows:

> *"Intangible assets are defined as any factors of production or specialized resources that permit the company to earn cash flows in excess of the return on tangible assets. Intangible assets augment the earning power of a firm's physical assets. Patents, trademarks, franchises, R&D, and goodwill are all considered intangible assets; so too is brand equity."*

This definition of intangible assets clearly demonstrates the relevance of marketing. In fact, much of the early research regarding intangible assets focused on marketing, specifically the valuation of advertising (e.g., Hirschey 1982; Hirschey and Weygandt 1985; Reekie and Bhoyrub 1981). Telser (1961, p. 197) summarized the early thought process for recognizing marketing activity as an asset on par with tangible assets: "Consumers tend to forget brands and continuous advertising is needed to maintain a given rate of sales. Thus advertising expenditures can be viewed as a capital good that depreciates over time and needs maintenance and repair."

Marketing scientists today are keenly interested in determining the value of marketing efforts to firm financial performance (Hogan et al. 2002; Kumar, Ramaswami, and Srivastava 2000; Mizik and Jacobson 2007; Srivastava, Shervani, and Fahey 1998, 1999). And in addition to continuing to examine the impact of advertising on firm value (Joshi and Hanssens 2010), these efforts have extended beyond advertising research to examinations of the effect that intangible marketing variables such as brand portfolios (Morgan and Rego 2009), corporate social responsibility (Luo and Bhattacharya 2006), deceptive marketing (Myslinski Tipton, Bharadwaj and Robertson 2009) and customer satisfaction (Luo 2007; Luo and Donthu 2006; See 2006) have on firm value. In fact, the literature has begun to explore methods of determining the return on investment of all marketing activities (i.e., the "return on marketing") (Rust, Lemon, and Zeithaml 2004).

Inarguably, customer satisfaction is the central intangible asset for any firm. Satisfied customers are on average more likely to come back and re-buy. The research on customer satisfaction has confirmed this relationship by consistently finding a positive relationship between customer satisfaction and customer behaviors believed to have a positive impact on firm performance. More specifically, research has found that customer satisfaction has a measurable impact on reduced customer defections (Anderson 1996) and customer complaints (Bolton 1998; Fornell 1992), increased share-of wallet (Cooil, Keiningham, Aksoy, and Hsu 2006; Keiningham, Perkins-Munn, and Evans 2003), receptiveness to cross selling efforts (Fornell 1992), and word-of-mouth (Anderson 1998).

Furthermore, marketing managers rely on purchase intentions to predict sales in a variety of marketing activities: e.g., new product introductions (Silk and Urban 1978), advertising effectiveness (Bird and Ehrenbert 1966), service management (Pérez et al. 2007), and demand forecasting for existing products. Similarly, academic researchers frequently use purchase intention as a proxy for purchase behavior (Morwitz, Steckel and Gupta 1997 & 2007). And perhaps most importantly, "repurchase intentions are the most widely used indicator of customer loyalty in firms' customer feedback systems" (Morgan and Rego 2006, p. 436).

While these variables are ultimately key to a firm's performance, establishing the subsequent effects on shareholder value metrics such as profit, share price, firm value, etc., themselves is imperative in demonstrating the positive impact that customer satisfaction and repurchase intention have on shareholder value. And although the underlying premise is that both customer satisfaction and repurchase intention measures link to shareholder value, the nature of the relationship has yet to be established clearly.

Inconsistent Findings

There has been some research seeking to link customer satisfaction with accounting and shareholder value indicators such as return on assets, return on equity (Anderson, Fornell, and Mazvancheryl 2004; Fornell et al. 2006), and company value (Fornell et al. 1996). A number of studies in the marketing literature have found direct and positive associations between customer satisfaction and shareholder value creation. Anderson et al (2004) found a positive association between ACSI and such metrics as Tobin's Q (Tobin 1969), the ratio of price-to-book value, and equity prices using ACSI data from 1994 to 1997. Gruca and Rego (2005) used ACSI data and COMPUSTAT data to find that satisfaction creates shareholder value by increasing future cash flow growth and reducing its variability. Fornell et al. (2006) test the ability of customer satisfaction to generate excess returns using ACSI and COMPUSTAT data, finding that firms that are better than their competitors in terms of satisfying customers generate superior returns at lower systematic risk. This is in line with Aksoy et al.'s (2008) findings, which show that high ACSI stock portfolios achieve greater than market returns especially in expansionary economic conditions and customer satisfaction buffers the effect of unfavorable economic conditions. Similarly, Tuli and Bharadwaj (2009, p. 184) find that investments in customer satisfaction (as measured by the ACSI) "insulate a firm's stock returns from market movements (overall and downside systematic risk) and lower the volatility of its stock returns (overall and downside idiosyncratic risk)." Finally, Anderson and Mansi (2009) in a study about satisfaction's impact on performance metrics of importance to the corporate bond markets (also using the ACSI) find that firms with lower customer satisfaction ratings have lower credit ratings and higher debt costs.

On the other hand, one of the earliest studies that explored the link between satisfaction (as measured by the American Customer Satisfaction Index (ACSI)) and a firm's market value by Ittner and Larker (1998) report findings that were mixed and inconclusive, specifically stating (Ittner and Larker 1998, p. 32), "We also find some evidence that firm-level customer satisfaction measures can be economically relevant to the stock market but are not completely reflected in contemporaneous accounting book values." A similar contradictory result was discovered by Jacobson and Mizik (2009). In an investigation into the association between information contained in the American Customer Satisfaction Index (ACSI) metric and future stock market performance, they find relatively little ability of the ACSI to predict long-run abnormal stock returns and that mispricing of customer satisfaction reported in past research appears to stem from abnormal returns achieved by a small group of satisfaction leaders in the computer and Internet sector over the period of study. Other studies have found that the return on satisfaction to shareholder value is dependent upon customer satisfaction heterogeneity. Grewal, Chandashrekaran and Citrin (2010) find that shareholder value decreases by almost 70% in going from

low to high satisfaction heterogeneity while increasing levels of satisfaction heterogeneity serves to reduce the volatility in shareholder value.

The research that examines the relationship of repurchase intention and firm performance also finds that the link is inconsistent and at times nonexistent (Keiningham et al. 2007b; Morgan and Rego 2006). In one of the few studies linking repurchase intention to financial metrics, Keiningham et al. (2007b) examined the correlation between repurchase intention and firm revenue growth as part of an investigation into claims attributed to the loyalty metric Net Promoter (Reichheld 2003 & 2006). Examining five Norwegian industries (using Norwegian Customer Satisfaction Index data), they found widely ranging correlations (with some positive and some negative correlations) between repurchase intention and firm revenue growth rates across industries such as retail, banking, security systems, transportation and home furnishings for a period ranging from 2000-2005.

To date, Morgan and Rego (2006) offer the only comprehensive and comparative view of satisfaction (again using ACSI data) and repurchase intention (in addition to other commonly used loyalty metrics such as customer complaints, a proxy for Net Promoter, and WOM recommendations) on shareholder value measures such as total shareholder returns and net operating cash flows (as well as Tobin's q, annual sales growth, gross margin, and market share). Their research found that of the metrics investigated, only satisfaction provides high managerial value for predicting total shareholder returns and net operating cash flows; the value of other loyalty metrics in this regard was reported as "nil" (p. 437, Table 4). In other words, their findings showed that repurchase intention demonstrated no managerial value in predicting net operating cash flows and total shareholder returns. Instead, they found that customer satisfaction was the only metric that demonstrated managerial value across all business outcomes examined (Morgan and Rego 2006, p. 437, Table 4).

Indirect versus Direct Effects

The issue with many of the studies described to-date is the *direct* link that is proposed from both customer satisfaction and repurchase intention to shareholder value outcomes (Aksoy et al 2008; Anderson, Fornell, and Mazvancheryl 2004; Anderson and Mansi 2009; Gruca and Rego 2005, Ittner and Larker 1998, Johnson and Mizik 2009; Keiningham et al. 2007b, Morgan and Rego 2006, Tuli and Bharadwaj 2009). In most consumer behavior models, however, repurchase intention is considered a mediator between consumers' satisfaction and their actual choice behavior (Warshaw 1980). This is also evident through the implementation within companies of several of the seminal models of service quality measurement and management, such as SERVQUAL (Parasuraman, Zeithaml, and Berry 1988; Zeithaml, Berry, and Parasuraman 1996), Return of Quality (Rust, Zahorik, and Keiningham 1995), and the Service-Profit Chain (Heskett et al. 1994). In these models, repurchase intention is typically used as a

proxy for customers' repurchase likelihood in an effort to link service improvement efforts to business impact measures (market share, revenue, etc.). For example, Rust, Zahorik, and Keiningham (1994, p. 70) state:

> *"Of all the questions on the questionnaire, the one with the most direct link to customer retention concerns the customer's stated likelihood of repurchasing the product or service. If the information is collected in percentage terms (100 percent, 80 percent, etc.) and we accept these percentages at face value, then there is an immediate link to market share and profitability."*

These seminal models in the service marketing literature which attempt to link customer satisfaction to firm performance either explicitly or implicitly presume the following chain of effects: satisfaction → repurchase intention → purchase → market performance (e.g., SERVQUAL (Parasuraman, Zeithaml, and Berry 1988), Return on Quality (ROQ) (Rust, Zahorik, and Keiningham 1995), Service Profit Chain (Heskett, Sasser and Schlesinger 1997), Satisfaction-Profit Chain (Anderson and Mittal 2001)). Similarly, in practice managers typically rely on the following logic to infer such a linkage: satisfaction results in customers desiring to repurchase, this repurchase intention is positively related to actual purchase, customer retention, and/or increased sales which then results in increased profitability. And while this chain of effects may seem intuitive, the evidence in some of the described research suggests that this order of effects may not hold when linking to shareholder value metrics such as total shareholder returns and net operating cash flows (Morgan and Rego 2006). Specifically, Morgan and Rego (2006) reported findings that satisfaction is superior to repurchase intention in predicting stock market performance. If this finding is indeed correct and generalizable, it calls into question the fundamental logic of the basic satisfaction-profit chain models (e.g. Anderson and Mittal 2000; Rust, Zahorik, and Keiningham 1995). In particular, these models either explicitly or implicitly presume the following: satisfaction → repurchase intention → purchase → market performance. The findings of Morgan and Rego (2006) clearly argue against such a chain of effects and instead suggest only a direct relationship between satisfaction and market performance.

Therefore, given that many of the seminal models in marketing presume a chain of effects whereby repurchase intention mediates the relationship between satisfaction and firm performance, yet empirical research appears to challenge this by testing direct effects of both satisfaction and repurchase intention, it is not clear whether the relationship of customer satisfaction on shareholder value is *direct* or *indirect* or both (i.e. fully or partially mediated through repurchase intention) and to which extent this finding is generalizable for *all* companies.

Methodology

Shareholder Value Outcome Variables

Most of the studies described above regarding customer satisfaction and repurchase intention employ a limited set of firm performance outcomes, both in terms of the number of variables and in terms of their ability to capture shareholder value. For example, Morgan and Rego's (2006) research, while extensive in the number of variables, does not use models commonly used by financial analysts to forecast future firm value. In particular, their study relies on regression models that predict a variety of firm performance outcomes including Tobin's Q, net operating cash flows, shareholder return, annual sales growth, gross margin and market share. While this is a standard approach in the marketing literature, and these metrics are important measures of firm performance, the approach used and the measures themselves have serious limitations (see Srinivasan and Hanssens 2009 for a review). Some of the outcomes employed (considered accounting multiples) do not take into consideration risk factors in the market that have the potential to influence firm value outcomes. Furthermore, results obtained via accounting multiples can conflict with the results obtained using financial models (Aksoy et. al 2008) that capture shareholder value.

Also, the idea of a portfolio strategy approach to utilizing ACSI-based customer satisfaction information is not universally accepted. Recently there has been considerable and passionate debate about the stock market's pricing of customer satisfaction information (Bradlow 2009; Fornell, Mithas, and Morgeson 2009a, 2009b; Ittner, Larcker, and Taylor 2009; Jacobson and Mizik 2009a, 2009b; Lehmann and Stremersch 2009; O'Sullivan, Hutchinson, and O'Connell 2009a, 2009b) and the most appropriate approach to testing. Furthermore, each of the approaches used have particular advantages and disadvantages that need to be considered. Srinivasan and Hanssens (2009) summarize the relative benefits and shortcomings of approaches such as the Carhart model, event studies, and portfolio approaches, among others. For example, it is well known that creating portfolios destroys information by shrinking the dispersion of covariates (explanatory variables) and leads to larger standard errors.

The current study addresses these concerns and contributes to the literature by 1) using a comprehensive list of dependent variables to measure shareholder value that include both accounting and finance focused approaches, and 2) using a modeling approach that controls for systematic risk, time effects and several firm-level controls including industry membership to test the direct and mediating effects of customer satisfaction and repurchase intention on these shareholder value metrics. In our econometric tests, we control for firm-level heterogeneity and report significance specifically accounting for autocorrelation of residuals.

Data

The data for our study come from three main sources. We obtain the customer satisfaction and repurchase intention scores from the American Customer Satisfaction Index (ACSI) and match these to a sample of NYSE, AMEX, and NASDAQ listed U.S. firms. The monthly stock returns are from the Center for Research in Security Prices (CRSP) at the University of Chicago and the accounting measures are obtained from the Annual Merged Compustat data set, also maintained by CRSP. The final data set resulting from the merger of the prior three[1] covers the 115-month period from June 2000 to December 2009 on 137 unique firms, and includes a total of 11,201 firm-month observations.

As explained in more detail below, the measures of shareholder value investigated are Tobin's Q, and raw and risk-adjusted stock returns. We aggregate monthly stock returns by averaging them in a given calendar year, and hence make use of an unbalanced panel data set of 1,036 firm-year observations in our final econometric tests. Table 1 provides summary information on size, profitability and measures of repurchase intention and customer satisfaction scores for the sample of firms included in our study. Panel A suggests that the data set consists mainly of large firms. The median book value of total assets (BA) is $17.9 billion and the median annual sales (SALE) figure is $12.5 billion. The inter-decile range shows that ninety percent of the observations have assets and annual sales of at least 4 billion dollars. The median return on assets (ROA) is 8.11%, with a relatively wide range from 2.32% to 18.77%. The vast majority of the firms included in our analysis are growth oriented with higher market than book value of assets. Only about 10% of the observations have a market to book value of assets (MBA) below one, suggesting that the sample consists of large but growth oriented firms. The median MBA is 1.32, implying that about 24 percent of the asset value of the representative firm is due to growth opportunities. The median customer satisfaction and repurchase intention scores are 76 and 8.07, respectively. For 80% of the observations in our sample, satisfaction ranges from 68 to 83 and repurchase intention varies from 7.22 to about 9 (on a 10-point scale).

INSERT TABLE 1 ABOUT HERE

Table 1, Panel B displays the distribution of the sample of firms across different sectors and industries based on the North American Industry Classification System (NAICS). About a quarter of the observations are from the manufacturing sector and another quarter form the utilities sector. Retail Trade accounts for the third largest group with 18% of the observations, and Finance & Insurance companies account for another 10%. We control for industry effects as well as other firm characteristics when we investigate the association between repurchase intention, customer satisfaction and shareholder value.

[1] Please see Appendix A on the details of merging these data sets.

Measuring Shareholder Value

In a recent article, Srinivasan and Hanssens (2009) review the research on marketing and firm value and examine the ways in which academics have approached the challenge of quantifying marketing impact. They summarize the empirical findings on measuring investor response to marketing actions, the choice of relevant analytical models, compare their advantages as well as their shortcomings, and compile this information into a list. This comprehensive list includes some of the measures employed in this research including Tobin's Q, stock returns and factor models that incorporate systematic risk factors (see Srinivasan and Hanssens, 2009 for a full review).

The value relevance of marketing variables have been traditionally measured by value multiples such as Tobin's Q, defined as the ratio of the market value of a firm's assets to their replacement cost (Tobin, 1969). For example, customer satisfaction has been shown to positively impact Tobin's Q and market to book ratio in earlier studies (Ittner and Larker 1996; Anderson, Fornell, and Mazvancheryl 2004). Prior research in finance and accounting also acknowledges the association between valuation multiples and firm value (Ball 1978; Fama and French 1992). Motivated by this common ground in marketing and finance, Tobin's Q is the first firm performance outcome we use in assessing the link between customer satisfaction, repurchase intention and shareholder value. As standard practice, we use market to book value of assets as a proxy for Tobin's Q.

Since the value created by intangible assets is not capitalized and remains off the balance sheet, the book value of assets is often understated by standard accounting principles. Therefore, a valuation multiple/ratio such as market to book value of assets might be overstated. A measure that is more directly related to shareholder wealth and one that also allows controls for systematic and firm-specific factors is the stock price. The efficient markets hypothesis predicts that the market price at any point in time is an unbiased estimate of the true value of the firm, and that deviations of market price from true value are random. This hypothesis recognizes the random nature of the deviations of stock prices and proposes using stock return measures. We therefore use stock return in excess of the return provided on a risk-less asset as an alternative measure of firm performance.

Factor Pricing Models and Risk-Adjusted Returns

It is well known that the expected stock return is affected by firm-specific as well as market-wide information. A failure to control for the overall market performance and risk leads to accepting high-risk stocks over less risky ones, as the former should make higher returns than the latter, without implying any superior performance overall. Therefore, the focus needs to be on risk-adjusted abnormal returns. Our

starting point for tackling the overall market performance and risk is the capital asset pricing model (CAPM) of Sharpe (1964) and Lintner (1965), which puts forward the idea that the expected return on a security is positively related to its systematic market risk, measured by beta. We estimate the CAPM as follows:

$$R_{i,t} = \alpha_i + \beta_{i,t-1} \cdot R_{m,t} + \varepsilon_{i,t}$$

where $R_{i,t}$ is the excess return (in excess of the risk-free rate) on stock i in month t and $R_{m,t}$ is the excess return on the value weighted market index. α_i and β_i are the alpha and market beta for stock i, respectively, and $\varepsilon_{i,t}$ is the firm-specific return in month t. The risk-adjusted abnormal return for stock i in month t is then given as $AR_{i,t} = \alpha_i + \varepsilon_{i,t}$. Note that we can take beta as constant for stock i (static or unconditional CAPM) or time-varying (conditional CAPM). This is because traditional factor pricing models assume that the factor loadings (i.e., betas) are constant. However, there is overwhelming theoretical and empirical evidence that betas vary substantially over time. To allow for time variation in betas, we utilize several different factor model specifications and follow the framework originally developed by Brennan, Chordia and Subrahmanyam (1998) and later extended by Avramov and Chordia (2006). Factor loading(s) are allowed to vary over time with firm level market capitalization and book to market value of equity as well as with macroeconomic variables. To be specific, we run time-series regressions for every stock in our data set over the full sample of 115 months from June 2000 to December 2009. In order to be included in the analysis, a firm is required to have at least 24 valid monthly stock returns[2]. The average monthly abnormal return for a stock i in a given calendar year is then defined as the final measure of risk-adjusted return for that stock.

Another alternative to measure risk-adjusted abnormal stock return is to estimate a given factor model using time-series data prior to a given month t, and use estimated beta(s) to calculate the expected return in month t. The risk-adjusted return can then be calculated as the difference between the realized return and the model-based expected return. By rolling the beta-estimation period forward one month at a time, one can let risk-factor loadings(s) change without having to specify any conditioning variable.

Although CAPM has long been a basic tenet of finance and has wide spread applications from valuation to performance measurement, a long list of subsequent work suggests that cross-sectional differences in stock returns are not determined solely by market risk but also by firm characteristics such as market capitalization, book to market ratio and past return. The debate on whether the predictive power of these firm characteristics is due to risk or mispricing has not been settled yet. However, support for market efficiency and systematic risk have been provided by Fama and French (1993, 1996), who show

[2] Even though our procedure entails the use of future data in calculating factor loadings and therefore risk-adjusted returns, Fama and French (1992) show that this forward-looking bias does not impact any of the results.

that the impact of firm characteristics on stock returns, with the exception of prior returns, can be explained within a risk-based multifactor asset pricing model.

As an alternative firm performance measure, we extend the single-factor CAPM to the 3-factor model of Fama-French by including two more systematic risk factors:

$$R_{i,t} = \alpha_i + \beta_{i,m,t-1} \cdot MKT_t + \beta_{i,s,t-1} \cdot SMB_t + \beta_{i,h,t-1} \cdot HML_t + \varepsilon_{i,t}$$

where MKT_t is the excess return on the value weighted market index in month t, SMB_t is the size factor defined as the return differential between portfolios of small and large market capitalization stocks and HML_t is the value factor and equals the return difference between portfolios of stocks with high and low book-to-market ratios. The betas are the corresponding risk-factor loadings. As before, $\alpha_i+\varepsilon_{i,t}$ can be interpreted as the risk-adjusted abnormal return for stock i relative to the Fama-French three-factor model. Similar to the case in CAPM, all three factor loadings (betas) are modeled as constant or time varying.

In addition to the CAPM and the Fama-French 3-factor model, we also consider the Carhart 4-factor model. Carhart (1997) extends the analysis by including a momentum factor accounting for the observed empirical irregularity of return continuation in the stock market. Momentum (Jegadeesh and Titman, 1993) captures the notion that a stock that has performed well in the recent past continues to do so, and vice versa. Specifically, the extended Carhart 4-factor conditional and unconditional model for stock returns is estimated as follows:

$$R_{i,t} = \alpha_i + \beta_{i,m,t-1} \cdot MKT_t + \beta_{i,s,t-1} \cdot SMB_t + \beta_{i,h,t-1} \cdot HML_t + \beta_{i,u,t-1} \cdot UMD_t + \varepsilon_{i,t}$$

where UMD is the momentum factor and equals the return difference between recent winners (a portfolio of stocks with high returns) and recent losers (a portfolio of stocks with low returns), and other factors are as defined earlier.

In summary we use 13 different firm performance measures in our empirical analysis: Tobin's Q, excess stock return and a series of alternative risk-adjusted abnormal returns using unconditional and conditional versions of CAPM, the 3-factor Fama-French model and the Carhart 4-factor model.[3]

Mixed Effects Modeling Approach

To assess the interrelationships between customer satisfaction, repurchase intention and the 13 shareholder value dependents described above, we analyze a series of mixed effects models (Fitzmaurice, Laird, and Ware 2004) based on a four-step procedure to test for mediation (Baron and Kenny 1986) to examine whether the effects of satisfaction on shareholder value is mediated through repurchase intention.

[3] Please see Appendix B on the details of factor model specifications.

Figure 1 depicts all potential direct and indirect links of both customer satisfaction and repurchase intention on shareholder value outcomes.

INSERT FIGURE 1 ABOUT HERE

To test for mediation effects, we estimate the following equations:

Step 1) Impact of customer satisfaction on shareholder value measured by the firm performance dependent (FP) variables:

$$FP_{it} = \beta_1 + \beta_{2\rightarrow 10}\, time\_effects_i + \beta_{11\rightarrow 14}\, covariates_i + \beta_{15}\, SAT_{it} + b_{1i} + \varepsilon_{it}$$

Step 2) Regress customer satisfaction on repurchase intention:

$$RI_{it} = \beta_1 + \beta_{2\rightarrow 10}\, time\_effects_i + \beta_{11\rightarrow 14}\, covariates_i + \beta_{15}\, SAT_{it} + b_{1i} + \varepsilon_{it}$$

Step 3) Estimate whether the proposed mediator (i.e. repurchase intention) has a significant influence on firm performance dependent variables:

$$FP_{it} = \beta_1 + \beta_{2\rightarrow 10}\, time\_effects_i + \beta_{11\rightarrow 14}\, covariates_i + \beta_{16}\, RI_{it} + b_{1i} + \varepsilon_{it}$$

Step 4) Assess the influence of the proposed mediator (i.e. repurchase intention) with customer satisfaction on firm performance dependent variables.

$$FP_{it} = \beta_1 + \beta_{2\rightarrow 10}\, time\_effects_i + \beta_{11\rightarrow 14}\, covariates_i + \beta_{15}\, SAT_{it} + \beta_{16}\, RI_{it} + b_{1i} + \varepsilon_{it}$$

A mixed effect modeling approach is used to estimate the equations (Fitzmaurice, Laird, and Ware 2004). The dependent variable (DV) in each equation (i.e., DV= FP_{it} in Step 1, 3, and 4 and DV = RI_{it} in Step 2) is modeled as a combination of population characteristics (β) (i.e. fixed effects) and firm-specific effects (b_i) that are unique to a particular firm (i.e. random effects). FP_{it} represents the firm performance dependent variables (measuring shareholder value) under investigation for firm i (with i= 1, …, 137) at time t (with t= 0, …, 9; representing the 10 years of observation in the observed period 2000-2009) in Step 1, 3 and 4. In a similar vein, RI_{it} is the dependent variable under investigation in Step 2 and represents the repurchase intention for firm i in a specific year t. In this study, we examine a total of 13 different firm performance outcomes (FP_{it}) as indicators of shareholder value, including: Tobin's Q (TobinsQ), unadjusted stock return in excess of the risk-free rate (Xret), and risk-adjusted return using various forms of factor model specifications. We make use of unconditional CAPM (CAPM_0) andFama-French3-factor Model (FF_0), three versions of conditional CAPM (CAPM_1, CAPM_2, CAPM_3) andFama-French 3-factorModel (FF_1, FF_2, FF_3), and an alternative specification of conditional factor models using rolling window regressions for CAPM, the 3-factor Modeland Carhart's 4 Factor Model (RW_CAPM, RW_3FF, and RW_4F, respectively).

The β's represent estimates of the population parameters that are assumed to be shared by all firms. β_1 is the parameter estimate for the intercept. $\beta_{2\to10}$ represent the parameter estimates for the time-effects (capturing nine year dummy variables), and$\beta_{3\to14}$ represent parameter estimates for the firm characteristics that serve as covariates in our models. Four covariates are included: purchase horizon, good-services classification, durable-nondurable classification, and industry classification (NAICS). We expect significant effects of firm characteristics on firm performance outcomes. Industry classification (e.g., Anderson, Fornell and Mazvancheryl 2004), goods versus services (e.g., Anderson, Fornell, and Rust 1997), continuous buying patterns (e.g., Li, Xu, and Li 2005), and durable versus nondurable products/services (e.g., Larivière and Van den Poel 2004) have all been found to impact shareholder value outcomes. β_{15} and β_{16} are parameter estimates of customer satisfaction and repurchase intention respectively.

Note that ε_{it} represents the within-subject error term (Fitzmaurice, Laird, and Ware 2004) and allows the response at any occasion to vary randomly above and below the firm-specific trajectories. The underlying premise of mixed effects models is that some subset of regression parameters may vary randomly from one subject to another, thereby accounting for sources of natural heterogeneity in the population. The former four equations include a random intercepts (b_{1i}) effect. More precisely, the estimate of b_{1i} accounts for the unobserved between-subject heterogeneity, and allows each firm to have its own intercept.

Since this study uses a longitudinal data set, autocorrelation becomes a concern. Hence it is important to model the covariance or time dependencies among the repeated measures obtained on the same firm since it cannot be assumed that these repeated measures are independent. For this data set, we examine different covariance pattern models including Compound Symmetry, Unstructured, Toeplitz, Autoregressive, Exponential and Gaussian covariance structures. Across the different firm performance dependents and estimated fixed effects models, the Autoregressive model for covariance provided the best fit to our data (lowest AIC values). The autoregressive covariance structure assumes that correlations decline over time as the time between pairs of repeated measures increases. In this study, we use the autoregressive covariance structure, and we additionally specify the asymptotically consistent estimator described in Huber (1967), White (1980), Liang and Zeger (1986), and Diggle, Liang, and Zeger (1994) – known as the "sandwich" estimator. The estimator's virtue is that it provides consistent, valid estimates of the covariance matrix for parameter estimates even when the fitted parametric model fails to hold or is not even specified (Kauermann and Carroll 2001).

Robustness Check: Testing for Firm-Specific Effects

One of the main drawbacks of the studies to date examining customer satisfaction, repurchase intention and firm performance is the failure to account for firm specific effects in model estimation procedures. Given the inconsistencies in results across these studies, it is plausible that the results are driven by the fact that for some firms, patterns other than the group-averages occur. We relax the assumption that each firm in a sample or population follows the estimated group patterns, and allow firm-specific effects in our models by including randomly varying regression coefficients using the mixed effects model. As such, this additional investigation offers a robustness check and provides insight into the extent to which the fixed, population-averaged solution of interrelationships between customer satisfaction, repurchase intention and firm performance holds for each individual firm in our sample.

To capture firm specific effects, regression parameters for the focal variables (customer satisfaction and repurchase intention) are assumed to be random. Therefore, we introduce random coefficients for both customer satisfaction (b_{2i}) and repurchase intention (b_{3i}) in the four-step series of mixed effects models. More precisely, a randomly varying regression coefficient for customer satisfaction (b_{2i}) is added to Steps 1, 2 and 4. Similarly, a randomly varying regression coefficient for repurchase intention (b_{3i}) is appended to the equations of Steps 3 and 4 to capture the firm specific effects of repurchase intention on the firm performance dependents. The estimation of these enriched models allows us to diagnose the interrelationships between customer satisfaction, repurchase intention and firm performance for each firm individually (cf. Figure 1), and to determine how many firms in our sample deviate from the population-averaged solution (i.e., robustness check).

Findings

Table 2 presents the key findings of population-averaged (i.e., fixed effects) estimates obtained from the mixed effects models that account for time-effects (year dummies), covariates (firm-characteristics) and unobserved heterogeneity (random intercepts). To conclude mediation, several sets of relationships must be present (Baron and Kenny 1986). First, there must be a direct effect of repurchase intentions on firm performance (Step 3). Second, there must be a direct effect of customer satisfaction on repurchase intentions (Step 2). Third, there must be a direct effect of customer satisfaction on firm performance (Step 1) that is attenuated by inclusion of the repurchase intention variable (Step 4). As depicted in Figure 1, the literature distinguishes between two types of mediation: complete mediation and partial mediation. Complete mediation occurs when the inclusion of the selected mediator variable (repurchase intentions) eliminates any significant influence of the antecedent predictor (customer satisfaction) on the dependent variable. Partial mediation occurs when the inclusion of a mediator variable reduces the significance of the influence of the antecedent predictor (Baron and Kenny 1986). To

determine a reduction of the influence of the antecedent predictor we examined changes in the beta coefficients and p-values (e.g., Meuter et al 2005).

INSERT TABLE 2 ABOUT HERE

Panel A includes Step 2 of the Baron and Kenny (1986) procedure and shows a significant, direct effect of customer satisfaction on repurchase intention ($p < .001$; Step 2). Panel B reports the findings for the remaining three steps for each of the 13 firm performance dependents used in this study, showing the key comparisons between Step 1 and Step 4 to determine the type of influence of customer satisfaction: direct or indirect. Panel B reveals that repurchase intention has a significant impact on all 13 firms dependents (p-values range from <.001 to 0.022; Step 3). For nine of the 13 firm dependents, we observe a significant effect of customer satisfaction (p-values range from <.001 to 0.034; Step 1); an effect that is eliminated when the mediating variable is included (p-values range from .356 to .933; Step 4). For the remaining four outcomes (FF_0, CAPM_3, FF_2, and FF_3) only marginal significance in Step 1 of the Baron and Kenny (1986) approach is observed (where customer satisfaction is linked directly to firm performance). These effects disappear when repurchase intention is appended to the models (p-values range from .407 to .967; Step 4).

This means that, *on average* for the 137 firms in our dataset, the fundamental logic of the chain of effects models that link customer satisfaction to firm performance through repurchase intention (e.g. SERVQUAL, Return on Quality, the Service-Profit Chain, and the Satisfaction-Profit Chain) is empirically supported and proven to outperform models that only consider direct effects. We find that repurchase intention mediates the relationship between customer satisfaction and firm performance outcomes, implying that there is an indirect impact of customer satisfaction through repurchase intention. Note that one cannot make such inferences about the interplay between customer satisfaction and repurchase intention if the analysis approach does not consider Step 2 and Step 4 of the Baron and Kenny Method (1986). For instance, Morgan and Rego (2006) only investigated the direct impact of customer satisfaction on firm performance dependent variables (Step 1 in our analysis approach), and the direct impact of repurchase intention on firm performance outcomes (Step 3 in our analysis approach); solely comparing Step 1 and 3 is less powerful and does not allow to test for indirect influences (i.e., mediation). In Appendix B, we supplement the key findings of our mediation analyses with the fixed effects parameter estimates for the nine year dummies, and the observed covariates (firm-characteristics). Given the empirical evidence we find for complete mediation in the customer satisfaction, repurchase intention and firm performance triad, we report the detailed findings for Steps 2 and 3 only. The mixed effects equation of Step 2 relates customer satisfaction, time effects and firm characteristics to repurchase

intention as dependent variable, while Step 3 presents the impact of repurchase intention, time effects and the covariates on the 13 firm performance dependents. Results indicate that 37% of the year dummies (47 of the 126) reveal a significant impact, and in line with prior literature, firm characteristics also influence shareholder value.

Finally, Figure 2 summarizes the results of the robustness check analyses. In this additional four-step mixed effects regression approach, we allow each firm to have its own effects on the 13 firm performance outcomes, and to deviate from the fixed, or population-averaged solution that resulted in complete mediation.

INSERT FIGURE 2 ABOUT HERE

Figure 2 reveals that only a small proportion (that is, 3% to 13% of our sample) of firms deviate from the population mean with respect to the nature of the relationship between customer satisfaction, repurchase intention and firm performance dependents; for 4 (for outcome FF_0) to 18 (for outcome Tobin's Q) firms the relationships differ from the population average. This additional robustness analysis provides further support for our main finding that, *overall* customer satisfaction links to firm performance indirectly (through the mediation of repurchase intention) rather than directly. Nevertheless, some firms deviate from complete mediation and either have a direct link from customer satisfaction to firm performance (i.e., partial mediation), or exhibit a direct link from both customer satisfaction and repurchase intention on firm performance. Other firms have share a direct link between either customer satisfaction or repurchase intention and firm performance, or show no significant relationship between customer satisfaction, repurchase intention and firm performance.

Conclusions, Managerial Implications, and Limitations

This research lends strong support to the idea that the primary chain of effects from satisfaction to business outcomes is through the repeat purchasing behaviors of existing customers. This is in line with some of the seminal models in this area e.g., SERVQUAL (Parasuraman, Zeithaml, and Berry 1988), Service Profit Chain (Heskett et al. 1994), Return on Quality (Rust, Zahorik, and Keiningham 1995), and Satisfaction Profit Chain (Anderson and Mittal 2000). As repurchase intention mediated the effect of satisfaction on stock performance for the overwhelming majority of firms regardless of the measure of performance used, this finding appears to be robust. Furthermore, an analysis of the very small number of firms for which complete mediation was not the case did not reveal any common factor or factors that

would account for their uniqueness in this regard, therefore we do not believe their difference to result from generalizable unaccounted variables.

While the finding of the satisfaction → repurchase intention → stock performance relationship is expected, we remind the reader that this is not what is reported in the current scientific literature. In fact, the most comprehensive analysis to date reports that satisfaction alone is found to be the best predictor of stock performance, and repurchase intention was found to demonstrate no managerial value in predicting net operating cash flows and total shareholder returns (Morgan and Rego 2006).

As a result, perhaps the most important managerial implication of confirming the satisfaction → repurchase intention → stock performance relationship is that it supports the idea that economic value of customers to firms is largely the result of repurchase, and the strong linkage between customer satisfaction and repurchase. Today there is a great deal of emphasis in the literature on the value of customers to firms outside of actual purchase behavior such as word-of-mouth, co-innovation and network effects (van Doorn et al. 2010; Gupta and Mela 2008; Hogan, Lemon, and Libai, 2003; Kumar et al. 2010). While these non-revenue sources of customer value may indeed positively impact a company's financial outcomes, our research suggests that managers should not lose sight of the imperative of facilitating customer repurchase through customer satisfaction in their quest to capture these other sources of customer value.

It is important to note that these findings should not be taken by managers or academics as a denigration of customer satisfaction in favor of measuring and managing repurchase intention. Rather, we believe that these findings confirm the central importance of satisfaction in determining repurchase intentions, and through repurchase intention to business results and financial performance. In other words, our study seems to confirm the underpinnings of the satisfaction → repurchase intention → purchase → market performance models long dominant in marketing research. Furthermore, we believe that managing "repurchase intentions" is not a viable objective for most firms. As Oliver (1999, p. 33) notes, "loyalty cannot be achieved or pursued as a reasonable goal for many providers… For some firms, satisfaction is the only feasible goal for which they should strive; thus satisfaction remains a worthy pursuit among the consumer marketing community."

We also contribute to the body of research that examines the link between satisfaction and measures of shareholder value. As noted earlier, researchers have reported inconsistent findings regarding the relationship between data reported by the ACSI and business performance. Our findings indicate that when controlling for systematic risk, time effects and several firm-level controls including industry membership, satisfaction and repurchase intention have a significant positive effect on shareholder value (across a wide variety of accounting and finance focused approaches). More specifically, overall, repurchase intention mediated the effect of satisfaction on stock performance.

As with all research, however, there are limitations which should be noted. One limitation is the reliance on the publicly available ACSI data, which tend to include only larger firms. As a result, it is not clear if the relationships documented in this study would be similar for non-ACSI companies. While the ACSI reports an "All Others" score for every industry investigated, however, individual company scores cannot be derived without additional data collection.

Additionally, while we could find no clear common factors that explained why repurchase intention did not mediate the effect of satisfaction on stock performance for a small number of firms in our sample, a thorough investigation into possible cause may represent an important opportunity for future research.

Nonetheless, we believe that these results present compelling evidence of the importance of intangible assets—in particular, customer satisfaction and repurchase intention—to the market valuation of firms. Furthermore, our results indicate a need to incorporate these variables into financial models designed to guide investment strategies.

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Appendix A

A. Data set construction

The National Quality Research Center (NQRC) collects and publishes data on an annual basis, but the data set is updated quarterly, with results for a different set of sectors in each calendar quarter replacing data collected the prior year. The quarterly updates of the NQRC data are released with a lag. Typically, results are made publicly available on the third Tuesday of February (4th quarter results from the previous calendar year), May (1st quarter results), August (2nd quarter results) and November (3rd quarter results). We take special care in aligning annual repurchase intention and satisfaction scores with monthly stock returns. To demonstrate, the Coca-Cola Company year 2006, quarter 3 scores which are released in November 2006 are matched with monthly stock returns from December 2006 to November 2007. In this way, we make sure that the NQRC scores are publicly known in any given month. In the same spirit, we lag the annual accounting data by two months. Continuing with the Coca-Cola company example, accounting data for the fiscal-year ending in December 2006 (Note that fiscal-years do not always have to end in calendar-year ends; i.e., December) are matched with monthly stock returns from March 2007 to February 2008.

B. Factor Pricing Models and Risk-Adjusted Returns

A given factor pricing model postulates that an asset's expected excess return should be zero after controlling for that asset's systematic factor exposure. In order to control for the contribution of systematic risk, we assume that the excess return on a stock i is driven by a set of common factor(s) and firm specific return. To demonstrate, the one factor CAPM is estimated as follows:

$$R_{i,t} = \alpha_i + \beta_{i,t-1} \cdot R_{m,t} + \varepsilon_{i,t}$$

We let factor loading(s) vary over time with firm level market capitalization (Size) and book to market value of equity (BM) as well as with macroeconomic variables. The Chicago Federal Reserve Bank National Activity Index (CFNAI) is our choice for the macroeconomic variable.[4] Let's re-write the CAPM expression simultaneously modeling the time-variation in beta:

$$\begin{aligned} R_{i,t} &= \alpha_i + \beta_{i,t-1} \cdot R_{m,t} + \varepsilon_{i,t} \\ \beta_{i,t-1} &= \delta_{i,1} + \delta_{i,2} \cdot z_{t-1} + \left(\delta_{i,3} + \delta_{i,4} \cdot z_{t-1}\right) \cdot Size_{i,t-1} + \left(\delta_{i,5} + \delta_{i,6} \cdot z_{t-1}\right) \cdot BM_{i,t-1} \end{aligned}$$

[4] Please visit the web page of the Federal Reserve Bank of Chicago to get more information on the National Activity Index, http://www.chicagofed.org/economic_research_and_data/cfnai.cfm

Combining the above two, we can express CAPM with time-varying beta as:

$$R_{i,t} = \alpha_i + \left[\delta_{i,1} + \delta_{i,2} \cdot z_{t-1} + \left(\delta_{i,3} + \delta_{i,4} \cdot z_{t-1}\right) \cdot Size_{i,t-1} + \left(\delta_{i,5} + \delta_{i,6} \cdot z_{t-1}\right) \cdot BM_{i,t-1}\right] \cdot R_{m,t} + \varepsilon_{i,t}$$

where Size is the logarithm of market capitalization, BM is the logarithm of the Book-to-Market value of equity, and z is the three-month moving average CFNAI index. Notice that the firm characteristics Size and BM and the macroeconomic indicator z are all lagged by one month relative to the excess stock and market returns. The risk-adjusted abnormal return for stock i in month t is then given as $AR_{i,t} = \alpha_i + \varepsilon_{i,t}$.

In our empirical examinations, beta is modeled under four specifications for a given factor model. For example, using CAPM, the first is the unconditional (static) version with the assumption that beta is constant throughout the entire sample. All the delta's in the beta model above with the exception of $\delta_{i,1}$ are zero. The other three are conditional (dynamic) versions with beta modeled as a function of firm specific variables Size and BM only ($\delta_{i,1}$ $\delta_{i,3}$ and $\delta_{i,5}$ are non-zero), macroeconomic factor z only ($\delta_{i,1}$and $\delta_{i,2}$ are non-zero) or beta modeled as a function of all the conditioning variables (all δ's are non-zero). To illustrate:

$$\text{Model } 0: \beta_{i,t-1} = \delta_{i,1}$$
$$\text{Model } 1: \beta_{i,t-1} = \delta_{i,1} + \delta_{i,3} \cdot Size_{i,t-1} + \delta_{i,5} \cdot BM_{i,t-1}$$
$$\text{Model } 2: \beta_{i,t-1} = \delta_{i,1} + \delta_{i,2} \cdot z_{t-1}$$
$$\text{Model } 3: \beta_{i,t-1} = \delta_{i,1} + \delta_{i,2} \cdot z_{t-1} + \left(\delta_{i,3} + \delta_{i,4} \cdot z_{t-1}\right) \cdot Size_{i,t-1} + \left(\delta_{i,5} + \delta_{i,6} \cdot z_{t-1}\right) \cdot BM_{i,t-1}$$

Figure 3 demonstrates the potential variation in risk factor-loadings (betas).

INSERT FIGURE 3 ABOUT HERE

As an example, we plot the market beta calculated under the unconditional CAPM (Model 0 above) and the conditional CAPM using the full-conditioning version (Model 3) for the Coca-Cola Company over time. The market beta calculated using the unconditional CAPM (beta_0) is 0.51. On the other hand, the conditional beta (beta_3), while averaging 0.51, varies from 0.26 to 0.74 over time.

As an alternative firm performance measure, we use the 3-factor model of Fama-French by including two more systematic risk factors:

$$R_{i,t} = \alpha_i + \beta_{i,m,t-1} \cdot MKT_t + \beta_{i,s,t-1} \cdot SMB_t + \beta_{i,h,t-1} \cdot HML_t + \varepsilon_{i,t}$$

Similar to the case in CAPM, all three factor loadings (betas) are modeled under four specifications to allow variation over time.

In addition to the CAPM and the Fama-French 3-factor model, we also consider the Carhart 4-factor model:

$$R_{i,t} = \alpha_i + \beta_{i,m,t-1} \cdot MKT_t + \beta_{i,s,t-1} \cdot SMB_t + \beta_{i,h,t-1} \cdot HML_t + \beta_{i,u,t-1} \cdot UMD_t + \varepsilon_{i,t}$$

Conditional versions of the 4-factor model can be estimated easily in the way described so far. However, since there are 4 risk-factors, this would require a longer time-series than the minimum 24-month restriction we employ, especially for the full blown version of Model 3. Using a stricter filter (longer minimum time-series requirement per firm) would reduce the number of available firms in the sample. Rather than lowering the number of observations in the cross-section, we choose to control for the 4-factor model using the rolling window regression technique,[5] along with rolling window regressions for the other two factor models. This alternative method also serves as a robustness check for our time-varying beta specifications.

Specifically, for every month t from July 2000 to December 2009, we estimate CAPM, Fama-French 3-factor and the Carhart 4-factor model over the prior 60-month period for the firms in our sample. Using the estimated betas from this 1st pass time-series regression, we form model-based expected returns in month t. For example, having estimated the 4-factor model betas for stock returns, we can write month t expected return and the risk-adjusted abnormal return as:

$$E\left(R_{i,t}\right) = \hat{\beta}_{i,m,t-1} \cdot MKT_t + \hat{\beta}_{i,s,t-1} \cdot SMB_t + \hat{\beta}_{i,h,t-1} \cdot HML_t + \hat{\beta}_{i,u,t-1} \cdot UMD_t$$
$$AR_{i,t} = R_{i,t} - E\left(R_{i,t}\right)$$

where MKT_t, SMB_t, HML_t and UMD_t are realized factor excess returns in month t, and $\hat{\beta}$'s are risk-factor estimates from the 1st pass regression – the time t-1 subscript denotes that betas are estimated over the prior 60-month period. We can then define $AR_{i,t}$ as the abnormal return for stock i in month t.

[5] Using risk-adjusted returns from the unconditional and three versions of the conditional 4-factor model does not change our conclusions. These results are available from the authors upon request.

Appendix B

Fixed Effects Estimates	Step 2 of Baron and Kenny (1986): The Drivers of Repurchase Intentions (RI)	Step 3 of Baron and Kenny (1986): the Drivers of Firm Performance Dependents					
		Category 3: Adjusted Firm Outcomes Using Conditional Models					
		Conditional CAPM: Using CAPM 1 Model (CAPM_1)	Conditional CAPM: Using CAPM 2 Model (CAPM_2)	Conditional CAPM: Using CAPM 3 Model (CAPM_3)	Conditional 3-factor Fama-French 1 Model (FF_1)	Conditional 3-factor Fama-French 2 Model (FF_2)	Conditional 3-factor Fama-French 3 Model (FF_3)
Intercept (β_1)	2.1094 (<0.001)***	-0.0538 (0.006)**	-0.0469 (0.011)*	n.s.	-0.0580 (0.007)**	-0.0450 (0.015)*	-0.0386 (0.034)*
Customer Satisfaction (β_{15})	0.07606(<0.001)***	-	-	-	-	-	-
Repurchase Intentions (β_{16})	-	0.0068 (0.003)**	0.0056 (0.008)**	0.0053 (0.022)*	0.0070 (0.005)**	0.0052(0.016)*	0.0050(0.019)*
Time_effects							
year 2000 (β_2)	n.s.	0.0320 (<0.001)***	0.0341 (<0.001)***	0.0329 (<0.001)***	0.0132 (0.005)**	0.0139 (0.005)**	0.0176 (<0.001)***
year 2001 (β_3)	n.s.	n.s.	0.0112 (0.028)*	n.s.	n.s.	n.s.	n.s.
year 2002 (β_4)	n.s.	n.s.	n.s.	0.0096 (0.043)*	n.s.	n.s.	n.s.
year 2003 (β_5)	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
year 2004 (β_6)	n.s.	0.0108 (0.016)*	0.0123 (0.008)**	0.0117 (0.008)**	0.0092 (0.012)*	n.s.	0.0086 (0.004)**
year 2005 (β_7)	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
year 2006 (β_8)	n.s.	0.0106 (0.016)*	0.0113 (0.014)*	0.0108 (0.013)*	0.0084 (0.019)*	n.s.	0.0076 (0.009)**
year 2007 (β_9)	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
year 2008 (β_{10})	n.s.	0.0098 (0.030)*	0.0097 (0.040)*	0.0102 (0.021)*	n.s.	n.s.	n.s.
year 2009 (reference category)	.	.	.	.	.	.	.
Covariates (Firm Characteristics)							
Industry Classification (β_{11})							
Utilities (NAICS 22)	0.7691 (0.008)**	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Manufacturing (NAICS 31-33)	n.s.	n.s.	n.s.	-0.0153 (0.041)*	n.s.	n.s.	n.s.
Retail Trade (NAICS 44-45)	0.8514 (<0.001)***	-0.0166(0.022)*	n.s.	-0.0202 (0.008)**	n.s.	n.s.	n.s.
Transportation and Warehousing (NAICS 48-49)	0.8633 (<0.001)***	-0.0428(<0.001)***	-0.0386 (<0.001)***	-0.0457 (<0.001)***	-0.0480 (<0.001)***	-0.0417 (<0.001)***	-0.0445 (<0.001)***
Information (NAICS 51)	0.9766 (<0.001)***	-0.0291(0.002)**	-0.0253(0.004)**	-0.0305 (0.002)**	n.s.	-0.0188 (0.040)*	-0.0205 (0.039)*
Finance and Insurance (NAICS 52)	0.9157 (<0.001)***	-0.0257(0.017)*	n.s.	-0.0257 (0.022)*	-0.0286 (0.025)*	n.s.	-0.0325 (0.003)**
Accommodation and Food Services (NAICS 72) (reference category)	.	.	.	.	.	.	.
Goods versus services (β_{12})							
services	-0.4883 (0.017)*	n.s.	n.s.	n.s.	0.0189 (0.033)*	0.0194 (0.007)**	0.0187 (0.015)*
goods (reference category)	.	.	.	.	.	.	.
Durable versus nondurable (β_{13})							
durable	-0.4037 (<0.001)***	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
nondurable (reference category)	.	.	.	.	.	.	.
Purchase Horizon (β_{14})							
continuous	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
short	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
long (reference category)	.	.	.	.	.	.	.

Notes: The numbers shown are the fixed effects parameter estimates, and p-values (two-sided)are shown in parentheses. All nonsignificant (n.s.) relationships indicate a p-value greater; *** significant at <.001, ** significant at 0.01, * significant at 0.05, numbers printed in bold are marginally significant than 0.05.

Appendix B

Fixed Effects Estimates	Step 3 of Baron and Kenny (1986): the Drivers of Firm Performance Dependents						
	Category 1: Unadjusted Firm Outcomes		Category 2: Adjusted Firm Outcomes Using Static Models		Category 4: Adjusted Firm Outcomes Using Rolling Window Regressions		
	Unadjusted stock return in excess of the risk-free rate (Xret)	Tobin's Q (TobinsQ)	Static CAPM (CAPM_0)	Static 3-factor Fama-French Model (FF_0)	Rolling Window Regression for CAPM (RW_CAPM)	Rolling Window Regression for the 3-factor Fama-French Model (RW_3FF)	Rolling window Regression for Carhart' 4 Factor Model (RW_4F)
Intercept (β_1)	-0.0521 (0.010)**	n.s.	-0.0532 (0.006)**	-0.0449 (0.022)*	-0.0661 (<0.001)***	-0.0600 (<0.001)***	-0.0930 (<0.001)***
Customer Satisfaction (β_{15})	-	-	-	-	-	-	-
Repurchase Intentions (β_{16})	0.0080 (<0.001)***	0.1909 (0.008)**	0.0069 (0.002)**	0.0065 (0.004)**	0.0080 (<0.001)***	0.0080(<0.001)***	0.0096(<0.001)***
Time_effects							
year 2000 (β_2)	n.s.	0.7450 (<0.001)***	0.0294 (<0.001)***	n.s	0.0266 (<0.001)***	n.s.	0.0292 (<0.001)***
year 2001 (β_3)	-0.0129 (0.033)*	0.7170 (<0.001)***	n.s.	n.s	n.s.	n.s.	0.0184 (<0.001)***
year 2002 (β_4)	-0.0226 (<0.001)***	0.5882 (<0.001)***	n.s.	n.s	n.s.	n.s.	0.0200 (<0.001)***
year 2003 (β_5)	n.s.	0.4025 (<0.001)***	n.s.	n.s	n.s.	n.s.	0.0133 (0.014)*
year 2004 (β_6)	n.s.	0.4067 (<0.001)***	n.s.	n.s	0.0133 (0.006)**	n.s.	0.0209 (<0.001)***
year 2005 (β_7)	n.s.	0.4707 (<0.001)***	n.s.	n.s	n.s.	n.s.	0.0164 (<0.001)***
year 2006 (β_8)	n.s.	0.3929 (<0.001)***	n.s.	n.s	0.0097 (0.044)*	n.s.	0.0190 (<0.001)***
year 2007 (β_9)	-0.0169(<0.001)***	0.3528 (<0.001)***	n.s.	n.s	n.s.	n.s.	0.0164 (<0.001)***
year 2008 (β_{10})	-0.0430 (<0.001)***	0.3125 (<0.001)***	n.s.	n.s	n.s.	n.s.	0.0216 (<0.001)***
year 2009 (reference category)	.	.	.	.	.	.	.
Covariates (Firm Characteristics)							
Industry Classification (β_{11})							
Utilities (NAICS 22)	n.s.	n.s.	n.s.	n.s.	-0.0339 (0.019)*	-0.0305 (0.024)*	n.s.
Manufacturing (NAICS 31-33)	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Retail Trade (NAICS 44-45)	n.s.	n.s.	n.s.	n.s.	-0.0187 (0.011)*	-0.0192 (0.006)**	n.s.
Transportation and Warehousing (NAICS 48-49)	-0.0412 (<0.001)***	n.s.	-0.0380(<0.001)***	-0.0399 (<0.001)***	-0.0465 (<0.001)***	-0.0474 (<0.001)***	-0.0531 (<0.001)***
Information (NAICS 51)	-0.0229 (0.016)*	n.s.	-0.0261(0.005)**	-0.0214 (0.025)*	-0.0301 (0.002)**	-0.0244 (0.006)**	-0.0227 (0.022)*
Finance and Insurance (NAICS 52)	n.s.	n.s.	-0.0265(0.011)*	-0.0274 (0.011)*	-0.0322 (0.003)**	-0.0276 (0.007)**	-0.0286 (0.012)*
Accommodation and Food Services (NAICS 72) (reference category)	.	.	.	.	.	.	.
Goods versus services (β_{12})							
services	n.s.	n.s.	n.s.	0.0159 (0.035)*	n.s.	0.0140 (0.049)*	0.0190 (0.016)*
goods (reference category)	.	.	.	.	.	.	.
Durable versus nondurable (β_{13})							
durable	n.s.	-1.2774 (0.005)**	n.s.	n.s.	0.0140 (0.023)*	n.s.	n.s.
nondurable (reference category)	.	.	.	.	.	.	.
Purchase Horizon (β_{14})							
continuous	n.s.	-1.125 (0.030)*	n.s.	n.s.	n.s.	n.s.	n.s.
short	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
long (reference category)	.	.	.	.	.	.	.

Notes: The numbers shown are the fixed effects parameter estimates, and p-values (two-sided)are shown in parentheses. All nonsignificant (n.s.) relationships indicate a p-value greater; *** significant at <.001, ** significant at 0.01, * significant at 0.05, numbers printed in bold are marginally significant than 0.05.

Figure 1: Potential Direct and/or Indirect Links of Customer Satisfaction (SAT) and Repurchase Intention (RI) on Firm Performance Outcomes (FP)

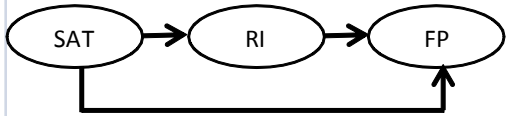
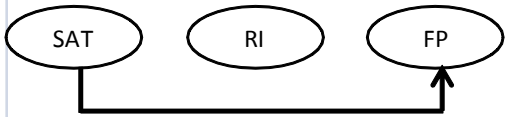
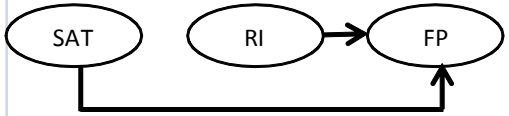
Possible Relationships	**Graphical Presentation**
1. Complete Mediation	
2. P artial Mediation	
3. No Mediation (only direct impact of SAT)	
4. No Mediation (only direct impact of RI)	
5. No Mediation (direct impact of both SAT and RI)	
6. No Mediation (no impact of SAT and RI)	

Figure 2: Robustness Check: Firm-Specific Effects versus Fixed, Population-Averaged Effects (n=137 firms)

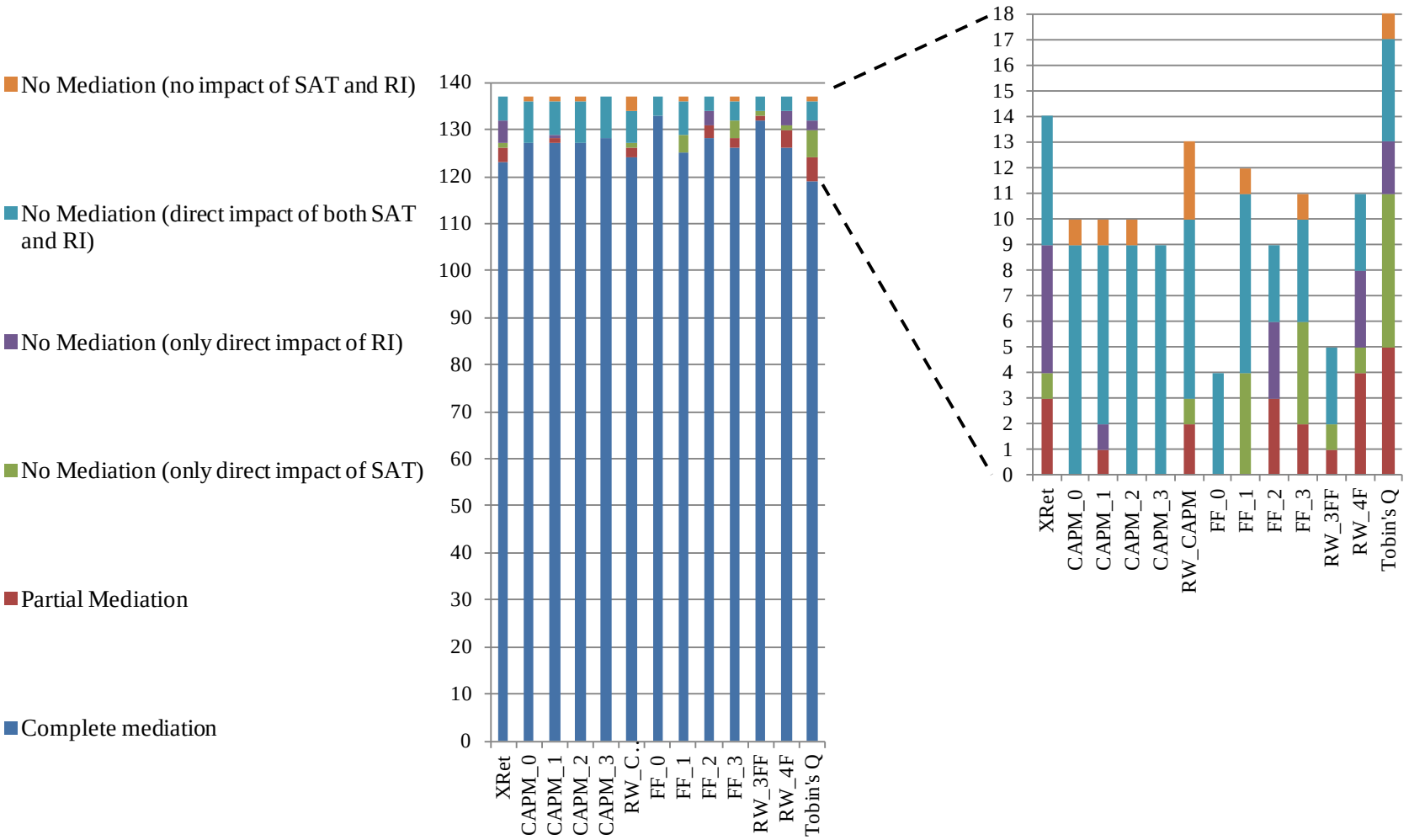
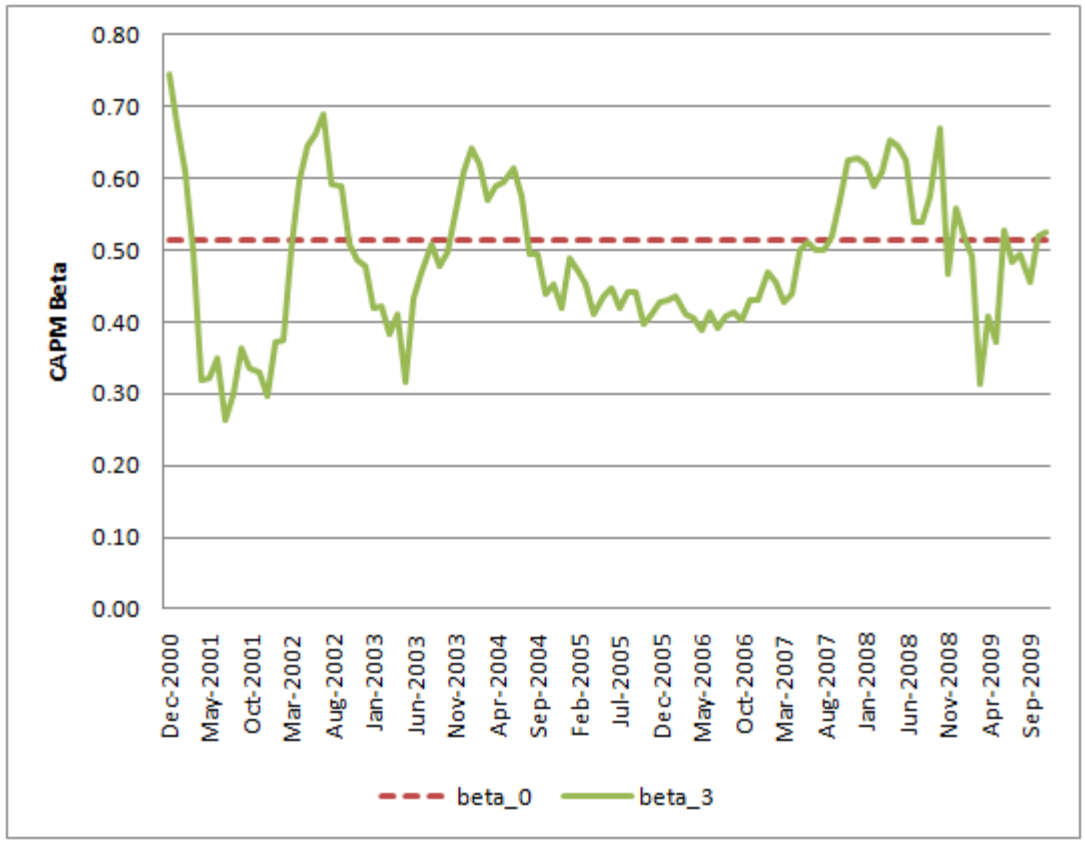


Figure 3: Unconditional and Conditional Market Beta for the Coca-Cola Company



Note: The figure plots the unconditional (beta_0) and one version of the conditional (beta_3) CAPM beta for the Coca-Cola Company over time.

Table 1: Sample Characteristics

Panel A: Summary Statistics

	# of obs.	Mean	Median	Std Dev	10%	90%
Book Value of Assets (BA)	1036	70.46	17.9	209.74	4.07	122.48
Annual Sales (SALE)	1036	27	12.48	40.36	4	61.1
Return on Assets (ROA)	1036	9.45	8.11	6.46	2.32	18.77
Market to Book Value of Assets (MBA)	1036	1.78	1.32	1.26	0.97	3.17
Satisfaction (SAT)	1036	75.52	76	6.09	68	83
Repurchase Intention (RI)	1036	8.09	8.07	0.68	7.22	8.98

Panel B: NAICS classification of sectors and industries

NAICS	Sector Definition	No of Obs.	Percent
22	Utilities	253	24.42
31-33	Manufacturing	293	28.28
44-45	Retail Trade	186	17.95
48-49	Transportation and Warehousing	58	5.60
51	Information	90	8.69
52	Finance and Insurance	94	9.07
72	Accommodation and Food Services	62	5.98
		1036	100.00

Table 2: Mixed Effects Models Test for Mediation

PANEL A: Step 2

Proposed Mediating Variable	Significance of Customer Satisfaction (Independent Variable) on Mediating Variable: **Step 2**
Repurchase Intention	0.07606 (<0.001)***

PANEL B: Step 1, 3, and 4

Firm Performance Outcomes		Significance of Repurchase Intention (Mediator): **Step 3**	Change in Effects of Customer Satisfaction (Independent Variable) Between Steps 1 and 4	
Categories	Dependent Variables (DV)		**Step 1**	**Step 4**
Category 1: Unadjusted Firm Performance Outcomes	Unadjusted stock return in excess of the risk-free rate (Xret)	0.008001 (<0.001)***	0.000725 (0.004)*	0.000115 (0.781)
	Tobin's Q (TobinsQ)	0.1909 (0.008)**	0.01527 (0.034)*	0.002933 (0.781)
Category 2: Adjusted Firm Performance Outcomes Using Static Models	Static CAPM (CAPM_0)	0.006860 (0.002)**	0.000573 (0.017)*	-0.00003 (0.933)
	Static 3-factor Fama-French Model (FF_0)	0.006484 (0.004)**	**0.000436 (0.076)**	-0.00033 (0.407)
Category 3: Adjusted Firm Performance Outcomes Using Conditional Models	Conditional CAPM: Using CAPM 1 Model (CAPM_1)	0.006793 (0.003)**	0.000619 (0.010)*	0.000109 (0.788)
	Conditional CAPM: Using CAPM 2 Model (CAPM_2)	0.005588 (0.008)**	0.000540 (0.017)*	0.000181 (0.632)
	Conditional CAPM: Using CAPM 3 Model (CAPM_3)	0.005321 (0.022)*	**0.000446 (0.074)**	-0.00002 (0.967)
	Conditional 3-factor Fama-French 1 Model (FF_1)	0.006993 (0.005)**	0.000613 (0.021)*	0.000058 (0.895)
	Conditional 3-factor Fama-French 2 Model (FF_2)	0.005165 (0.016)*	**0.000449 (0.051)**	0.000034 (0.929)

	Conditional 3-factor Fama-French 3 Model (FF_3)	0.004983 (0.019)*	0.000340 (0.133)	-0.00021 (0.571)
Category 4: Adjusted Firm Performance Outcomes Using Rolling Window Regressions	Rolling Window Regression for CAPM (RW_CAPM)	0.008012 (<0.001)***	0.000818 (<0.001)***	0.000375 (0.356)
	Rolling Window Regression for the 3-factor Fama-French Model (RW_3FF)	0.007995 (<0.001)***	0.000808 (<0.001)***	0.000354 (0.356)
	Rolling window Regression for Carhart' 4 Factor Model (RW_4F)	0.009624 (<0.001)***	0.000938 (<0.001)***	0.000312 (0.465)

Notes: The numbers shown are the fixed effects parameter estimates, and p-values (two-sided) are shown in parentheses.
*** significant at <.001
** significant at 0.01
* significant at 0.05
Numbers printed in bold are marginally significant