

## **Stock Return Response Modeling**

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## Introduction

Financial market efficiency implies that the price of a stock reflects all available information related to the profitability of the firm.<sup>1</sup> That is, the price of a security represents market expectations of the discounted value of the firm's future cash flows. Favorable (unfavorable) developments affecting cash flows result in increases (decreases) in stock prices. This phenomenon provides a mechanism to assess the financial implications associated with a change in a marketing measure. That is, regressing stock return on changes in a measure (i.e., stock return response modeling) provides insights into market expectations of the long-term value prospects reflected in movements in the series.

Stock return response modeling establishes whether information contained in a measure is associated with changes in expectations of future cash flows and, therefore, stock price. An observed correlation is not presumed to be strictly causal as market participants may have access to other more timely information about a firm's cash generating ability. Rather, stock return response modeling is valuable in that it assesses whether information contained in a measure is reflective of the information set that market participants perceive as affecting future cash flows.

This framework for assessing the information content of a measure dates back to Ball and Brown (1968), whose work stimulated literally hundreds of subsequent studies examining the relation between financial statements information and the capital markets.<sup>2</sup> These studies focused on assessing the correlation between an accounting measure (e.g., earnings) and stock returns, both measured over relatively long contemporaneous time periods (e.g., one year).

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<sup>1</sup> While market anomalies inconsistent with efficient markets have been documented, they tend to be infrequent and short-lived. For analysis based on a large number of firms across a long time period, the efficient markets hypothesis is a good approximation for the functioning of the financial markets. Even the critics of the efficient markets, e.g., De Bondt and Thaler (1985), agree that it provides a good starting point.

<sup>2</sup> See, for example, Kothari (2001) for a survey of this literature.

However, current-term accounting measures are limited in their ability to reflect the expected net cash flows from new growth opportunities facing the firm. Stock market participants, being forward-looking, not only react to current-term accounting information but also use other information in an attempt to anticipate future-term outcomes. In fact, the financial markets have shown their ability to impound into current stock price the effects of strategies whose financial impact will not be felt until subsequent periods. Studies (e.g., Beaver et al. 1980, Kothari and Sloan 1992, Jacobson and Aaker 1993) have documented this forward-looking behavior by observing that stock price leads accounting performance measures such as ROI.

These considerations have stimulated interest in investigating the effects of non-financial factors on firm future performance. This new research stream builds on the studies of the capital markets' response to financial statement information and seeks to assess the stock market reactions to non-financial information. Aaker and Jacobson (1994, 2001), Barth et al. (1998), Mizik and Jacobson (2003), for example, have assessed the "incremental information content" or "value relevance" of marketing measures, i.e., the degree to which a series provides added explanatory power to current earnings information in explaining stock price movements. A series having "incremental information content" indicates that investors view the variable as providing additional information to accounting measures about the long-term value of a firm.

In this paper, we provide an overview of the stock return response modeling methodology for assessing the value relevance of marketing measures. We begin with a valuation model showing the linkages between marketing measures and financial market valuation, which provides the foundation for stock return response modeling. We review some guidelines for undertaking this type of analysis and provide an illustrative example. We then discuss the

relation of this approach to some widely used alternative approaches and conclude with directions for future research.

### **Valuation Model: Basic Framework**

Marketing strategy valuation models build on the traditional valuation approaches widely used in accounting and finance, e.g., Miller and Rock (1985) and Kormendi and Lipe (1987).

Consider the standard valuation model:

$$[1] \text{MktCap}_{it} = \sum_{T=t}^{\infty} \left( \frac{1}{1+r_{it}} \right)^{T-t} E(\text{CF}_T),$$

where  $\text{MktCap}_{it}$  is the market capitalization of firm  $i$  at time period  $t$ ,  $\text{CF}_T$  is the net cash flow at period  $T$  and  $r_{it}$  is the discount rate. Under the efficient market hypothesis, stock prices reflect all available information and, as such, react only to unanticipated events. This allows us to re-express Equation [1] in terms of the previous period capitalization, expected rate of return given economy-wide conditions and the risk of the firm, and change in investor expectations of future cash flows:

$$[2] \text{MktCap}_{it} = (1 + \text{Eret}_{it})\text{MktCap}_{it-1} + \sum_{T=t}^{\infty} \left( \frac{1}{1+r_{it}} \right)^{T-t} \Delta E(\text{CF}_{iT}),$$

where  $\text{Eret}_{it}$  is the expected rate of return for security  $i$  at time period  $t$ , and  $\Delta E(\text{CF}_{iT})$  is the change in the expected cash flows at period  $T$ .

Dividing through by previous market capitalization and rearranging terms gives us:

$$[3] \text{StkRet}_{it} = \text{Eret}_{it} + \sum_{T=t}^{\infty} \left( \frac{1}{1+r_{it}} \right)^{T-t} \frac{\Delta E(\text{CF}_{iT})}{\text{MktCap}_{it-1}},$$

where  $StkRet_{it}$  is defined as the percent change in market value, i.e.,  $\frac{MktCap_{it} - MktCap_{it-1}}{MktCap_{it-1}}$ ,

Equation 3 expresses stock return as a linear combination of expected return ( $Eret_{it}$ ) and excess (or “abnormal”) return. Expected return reflects the return on the stock that can be accounted for by economy-wide conditions (e.g., the risk-free rate of return) and the risk characteristics of the firm. Abnormal return is the difference between stock return and this expected return. It stems from the change in the expected discounted future size-adjusted cash flows brought about by unexpected events occurring between time periods (t-1) and t.

Work in accounting has established that unanticipated changes in accounting measures are associated with abnormal stock return, i.e., changes in investors’ expectations of the future size-adjusted cash flows. Depending on the specific accounting performance measure used (e.g., return on equity, size-adjusted cash flows, sales growth, etc.), a “transfer rate” links the accounting measure to size-adjusted contemporaneous cash flows. Accounting measures, however, are limited in their ability to forecast future performance. Other factors (e.g., the marketing strategy of the firm) will affect future cash flows and, as such, investor expectations of them. Marketing assets have not only current-term effects, but long-term effects as well (Srivastava, Tasadduq and Fahey, 1998). The effect of a change in marketing assets on a firm’s cash flows is unlikely to be completely captured in current-term accounting measures and, in fact, may be coming at their expense. Stock-market participants appreciate this relationship between marketing strategy and future-term cash flows and will impound the effect into the price of the stock.<sup>3</sup> As such, we can expect:

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<sup>3</sup> Another means for marketing strategy to have value relevance is by improving the information content (quality) of current-term accounting measures. That is, due to deficiencies in accounting measures (e.g., earnings management practices), marketing strategy may supply incremental

$$[4] \sum_{T=t}^{\infty} \left( \frac{1}{1+r_{it}} \right)^{T-t} \frac{\Delta E(CF_{iT})}{MktCap_{it-1}} = f(\gamma U\Delta AccP_{it}, U\Delta Marketing Strategy_{it}).$$

where  $U\Delta AccP_{it}$  is the unanticipated change in accounting performance,  $\gamma$  is “transfer rate” that links the accounting measure to size-adjusted contemporaneous cash flows, and  $U\Delta Marketing Strategy_{it}$  is the unanticipated change in a marketing strategy.

More formally modeling the role a marketing strategy metric plays in firm valuation requires modeling the inter-temporal dynamics of the marketing strategy and the accounting performance measures, i.e., addressing how unanticipated shocks to marketing strategy and accounting performance influence future performance. Different models can be used to assess the dynamic properties of a marketing strategy. For illustrative purpose, let’s make the following simplifying assumptions:

i) the univariate time series behavior of marketing strategy approximates a random walk, i.e.,

$$[5] Marketing Strategy_{it+1} = Marketing Strategy_{it} + \eta_{2it+1};$$

ii) the following bivariate time series model approximates the dynamic behavior of market expectations of future accounting performance:

$$[6] \Delta E(AccP_{it+1|t}) = \phi U\Delta AccP_{it} + \lambda U\Delta Marketing Strategy_{it} + \eta_{3it+1};$$

When a shock to accounting performance or marketing strategy occurs in period  $t$ , it induces a shock to expected future performance as well, as depicted by the parameters  $\phi$  and  $\lambda$ , respectively.<sup>4</sup> Changes in marketing strategy are not immediately reflected in changes in accounting performance, but rather can also have an additional impact (above and beyond the

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information about current-term cash flows. This context leads to marketing strategy having an effect analogous to accounting information in standard valuation models.

<sup>4</sup> The assumption of a one-period lagged effect for  $U\Delta Marketing Strategy$  is a modeling simplification. The implications of the model are unchanged by allowing for delayed as well as higher-order carryover effects.

indirect effect that arises from any contemporaneous association) on future-term financial performance as well. The market appreciates this relationship and revises its expectations of future cash flows based on changes in marketing strategy.

Substituting Equations [5] and [6] into Equation [4], making use of the chain rule of forecasting, and taking expectations, allows us to express Equation 3 as:

$$[7] \text{StkRet}_{it} = \text{Eret}_{it} + \sum_{T=t}^{\infty} \left( \frac{\phi}{1+r_{it}} \right)^{T-t} \gamma U\Delta\text{AccP}_{it} + \sum_{T=t}^{\infty} \left( \frac{\phi}{1+r_{it}} \right)^{T-t} \frac{1}{1+r_{it}} \gamma\lambda U\Delta\text{Marketing Strategy}_{it},$$

or equivalently,

$$[8] \text{StkRet}_{it} = \text{Eret}_{it} + \frac{1}{1 - \frac{\phi}{1+r_{it}}} \gamma U\Delta\text{AccP}_{it} + \frac{1}{1+r_{it} - \phi} \gamma\lambda U\Delta\text{Marketing Strategy}_{it}.$$

As depicted by Equation [8], the marketing strategy response coefficient (i.e., the effect of changes in marketing strategy on stock return) depends on four components. It depends on i) the effect of change in marketing strategy on the future period's accounting performance ( $\lambda$ ); ii) the extent to which accounting performance persists into the future (i.e., the autocorrelation parameter  $\phi$ ); iii) the extent to which the accounting performance measure is related to size-adjusted cash flows (i.e., the "transfer rate"  $\gamma$ ); and iv) the discount rate  $r_{it}$ .<sup>5</sup>

### **Estimating the Value Relevance of Marketing: Implementing the Valuation Methodology**

To assess the value relevance of marketing strategy, Equation [8] can be estimated by running the regression:

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<sup>5</sup> Equation [8] nests the standard earnings response model, which is extensively discussed in the accounting literature, e.g., Collins and Kothari (1989). The standard earnings response model assumes  $\lambda=0.00$ ,  $\gamma=1.00$ , and  $\phi=1.00$ . Under these restrictions, Equation [8] simplifies to the traditional result:  $\text{StkRet}_{it} = \left( 1 + \frac{1}{r_{it}} \right) U\Delta\text{AccP}_{it}$ .

$$[9] \text{ StkRet}_{it} = \text{Eret}_{it} + \beta_1 \text{U}\Delta\text{AccP}_{it} + \beta_2 \text{U}\Delta\text{Marketing Strategy}_{it} + \varepsilon_{it}$$

The null hypothesis is that  $\beta_2=0$ , which would imply that the marketing metric has no “incremental” value relevance.<sup>6</sup> That is, the financial markets perceive the measure to provide no information about future earnings beyond that reflected in current-term earnings. The alternate hypothesis is that  $\beta_2 \neq 0$ , which implies that stock-market participants perceive the change in the marketing strategy to contain information (incremental to that reflected in current-term term accounting performance) about future cash flows.

Before estimation can be undertaken, three primary issues need to be addressed:

- (i) determining the appropriate measures of accounting performance and marketing strategy;
- (ii) computing or estimating the unanticipated components of accounting financial performance ( $\text{U}\Delta\text{AccP}_{it}$ ) and marketing strategy ( $\text{U}\Delta\text{Marketing Strategy}_{it}$ );
- (iii) incorporating measures capable of capturing expected return into the model;

### **Selecting Appropriate Accounting Performance and Marketing Measures**

The accounting literature has devoted much attention to investigating the properties of different accounting measures of financial performance and their relation to stock market valuation. Different measures, e.g., earnings, cash flow, operating income, etc., have both some overlapping and some dis-similar components. No one measure seems to dominate across all firms and all time periods. It has been shown, however, that extraordinary items (i.e., transitory expenses or income from one-time operations, such as mergers and acquisitions or large capital

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<sup>6</sup> The marketing strategy could still impact financial performance to the extent it impacts current-period earnings. In this case, the marketing metric would have a significant bivariate association with stock return, but not a multivariate association. That is, the total effect of a change in marketing strategy on firm value will depend both on the direct effect  $\beta_2$  and the indirect effect arising from the impact of the strategy on current-term accounting performance.

investments), if present in the measure of performance, reduce its information content. Extraordinary items have different dynamic properties than cash flows from operations. Specifically, they are unlikely to persist in the future. The market realizes that extraordinary items are transitory and values them at a different rate than cash flows (i.e., since they are less persistent, they have a smaller effect on future cash flows). As such, in stock return response models it is preferable to use those performance measures that exclude extraordinary and transitory items or to allow extraordinary items to have a separate effect from other accounting performance components.

Another important issue is the size-adjustment of accounting performance measures. As Equation [3] shows, the stock return response modeling framework links stock return to size-adjusted cash flows. Typically, a measure of lagged market value of the firm, current assets, or lagged assets is used to scale accounting performance.

Marketing measures, in order to be suitable for use in the valuation context, should satisfy several requirements. First, the measure should seek to reflect marketing assets that have long-term effects on performance (e.g., brand quality perceptions, customer loyalty, customer defection rates, etc.). The effect of marketing strategies having only current-term effects will likely be captured in the current-term accounting performance measure. Second, since the stock market reacts to public information only, the marketing measure has to reflect information that is available to market participants even if the measures are derived from private sources (e.g., interviews with firm management). Finally, the measure should be sensitive to timely reflect the inter-temporal variation in the underlying assets. Marketing assets that do not vary over time are unlikely to influence stock return as their effects will already be incorporated in the previous period's stock price.

### *Obtaining Estimates of Unanticipated Components*

Since the stock market reacts to new and unexpected information only, the independent variables in a stock return response model should represent only the unexpected (i.e., surprise) portion of the accounting performance and marketing measures. The expected portion (i.e., the part that the market participants could foresee), if left in the measures, essentially acts as a measurement error and leads to a bias towards zero in the estimated coefficient. Two basic methods have been developed to estimate the unanticipated components of earnings. One utilizes survey data of market expectations. Under this approach, the consensus of financial analysts' forecasts is used as the measure of expected earnings. The unanticipated component of earnings is defined as a difference between the analysts' consensus forecast and the realized value of earnings.

The other method utilizes time series forecasts as a proxy for market expectations. Time series models provide a reduced form representation of the underlying structural model for a series. As such, forecasts from these time series models can provide a reasonable approximation for market expectations. The difference between the actual and the predicted values (i.e., the residuals from the time series models) serve as the estimate of the unexpected component of the series. For example, a first order autoregressive model has been widely used to depict the time series properties of accounting performance, i.e.,

$$[10] \text{AccP}_{it} = \varphi_0 + \varphi_1 \text{AccP}_{it-1} + \eta_{it}$$

The expected portion of  $\text{AccP}_{it}$  is  $(\varphi_0 + \varphi_1 \text{AccP}_{it-1})$ ;  $\eta_{it}$  is a measure of the unanticipated component in  $\text{AccP}_{it}$  (i.e., it is  $U\Delta \text{AccP}_{it}$ ). It is this unanticipated component that is used as the explanatory variable in the estimation of the stock return response model (Equation [9]).<sup>7</sup>

Some disagreement exists as to which method provides better estimates of earnings expectations. Some researchers have argued that the analysts should be able to provide superior estimates of earnings expectations as they can utilize a broader information set than a simple time-series model. Empirical evidence, however, suggests that both methods perform equally well in that the predictive ability of analysts' forecasts is about the same as forecasts generated from a time series model, Fried and Givoly (1982), Cheng, Hopwood and McKeown (1992).

The means for obtaining an estimate of the unanticipated component of a marketing metric tends to be limited. Rarely are analyst forecasts available for marketing measures. As such, the residual from a time series model is usually the only available option for obtaining an estimate of the unanticipated component of a marketing metric.

### **Modeling Expected Returns**

Stock return is influenced not only by firm-specific conditions but also economy-wide factors. These effects need to be controlled so as to both reduce potential omitted variable bias and increase power in the analysis. Including time-period specific (e.g., annual) dummy variables or a market-wide measure in the analysis (e.g., the return on the S&P 500) provides a rudimentary means of accounting for expected return. Expected return, however, will depend not only on economy-wide conditions but also on the risk of the firm. That is, riskier firms earn

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<sup>7</sup> The appropriate autoregressive model will, of course, depend on the specific dynamic properties of the measure. For instance, higher order autoregressive models or a fixed effect autoregressive model (i.e., a model of the form  $\text{AccP}_{it} = \varphi_i + \varphi_1 \text{AccP}_{it-1} + \eta_{it}$ ) are also commonly used to characterize the dynamic behavior of a series.

higher returns. At issue is determining which types of risk influence return and how best to accurately measure their presence.

The Capital Asset Pricing Model (CAPM) is the most widely used approach for modeling the effects of risk on stock return, Sharp (1964). Under CAPM, expected returns among firms differ depending on their systematic risk. That is,

$$[13] Eret_{it} = Ret_{risk\ free} + \beta_{i} * (Ret_{mt} - Ret_{risk\ free}), \text{ where}$$

$Ret_{risk\ free}$  is the risk free rate of return,  $Ret_{mt}$  is the market rate of return,  $\beta_{i}$  is Beta estimate for security  $i$  estimated as  $cov(Ret_{it}, Ret_{mt})/var(Ret_{mt})$ .

The effect of systematic risk on expected return can be captured by including an estimate of beta in the model.

However, despite its widespread use, recent work has challenged the empirical reliability of CAPM. In particular, Fama and French (1992) found that beta did a poor job in explaining differences in stock return among firms. For example, after controlling for time period specific effects, beta was not significantly related to stock return. Further, they found that lagged Size (as modeled by  $\log(\text{Market Value}_{it-1})$ ) and lagged Book-to-Market Equity (as modeled by the  $\log(\text{Book Value}_{it-1}/\text{Market Value}_{it-1})$ ) did explain differences in firm return. This has led to analysis, e.g., Fama and French (1993, 1996), that proposes a 3-factor model to explain expected return that takes into account beta, size, and the market-to-book ratio.

The debate as to how best to model expected return is ongoing (e.g., research is assessing the effect of time varying beta's or other risk factors). The CAPM is theoretically appealing. The multi-factor model, however, outperforms the single-factor model in most empirical applications.

### **Example: Assessing the Value Relevance of Product Quality**

To provide an illustrative example of stock return response modeling, we undertook analysis that expanded the study of Aaker and Jacobson (1994) to include additional years of data. In particular, Aaker and Jacobson (1994) assess the value relevance of the EquiTrend product quality measure for the period 1989-1992; we do so for the period 1989-1997. After allowing for lags and missing observations, our analysis involved approximately 3 times the number of observations as that utilized by Aaker and Jacobson (1994), i.e., 300 versus 102 pooled time series, cross-sectional observations.

The EquiTrend product quality measure is based on telephone surveys involving interviews of a nationally representative population sample of consumers 15 years of age and older in 1000 U.S. households in 1989 and then for 2000 households for subsequent waves of the survey. Consumers were asked to evaluate the quality of brands on an 11 point scale from outstanding (10) to poor (0). We matched the EquiTrend data with firm stock return and accounting data reported in the CRSP and the S&P Compustat data bases. This matching resulted in a pooled time series, cross-sectional sample involving 39 firms who reported for all or parts of the period 1989-1997. Table 1 provides a listing of the firms in the sample.

The first phase of the analysis involved estimating univariate time series models for quality and accounting performance, which we operationalize as  $ROI_{it} = \text{Operating Income before Depreciation}_{it} / \text{Assets}_{it-1}$ . The residuals from these models provide us with estimates of the unanticipated components of the series. Equations 1.1 and 1.2 of Table 1 report these time series models. We find that ROI is approximated by a first order autoregressive model with an estimated parameter of .91. Additional tests indicate that this coefficient estimate differs significantly from 1.00, i.e., the series does not have a unit root. We find, however, that the time

series behavior of quality is well approximated by a random walk. Not only can we not reject the hypothesis of a unit root, but the estimated coefficient from an AR(1) model of .98 is indistinguishable from 1.00.

In order to assess the value relevance of quality we regress stock return on unanticipated ROI and unanticipated product quality, controlling for expected return via annual dummy variables. Equation 1.3 Table 1 reports the results of this estimation.

The significant estimated coefficient for unanticipated ROI (2.90) indicates that the financial markets react favorably to information contained in the measure. In other words, a 1% unexpected change in ROI is associated with a 2.90% change in the expected value of the firm. This positive effect is consistent with an extensive literature in accounting that has documented the information content of size-adjusted earnings measures. Further, the point estimate is in close correspondence with estimates of the earnings response coefficient reported in previous research. When a shock to ROI occurs, investors view it as containing information not only about changes in current-term results but also about future-term prospects as well. The information contained in a ROI shock induces stock market participants to update their expectations about the firm's discounted future cash flows and revise stock price accordingly.

The estimated coefficient for unanticipated quality (.37) is also statistically significant at the 1% level. In other words, a 1% unexpected change in quality is associated with a .37% change in the expected value of the firm. This indicates that market participants view information contained in the measure as providing useful, non-overlapping information to unanticipated ROI about the future term prospects of the firm. That is, the Equitrend quality measure has value relevance. In terms of relative explanatory power, the standardized regression coefficient for unanticipated quality (.17) is about half that of unanticipated ROI (.37). This

positive effect of the change in quality on stock return is consistent with Aaker and Jacobson (1994), although the estimate effect is smaller in magnitude than what they observe (.69 versus .37). This difference, however, is statistically insignificant. This reflects the fact that changes in quality are associated with stock return throughout the entire period of observation.

### **Prior Research Using Stock Return Response Modeling to Assess the Value Relevance of Marketing Metrics**

Table 2 provides a list of some past research making use of the stock return response modeling to investigate the value relevance of marketing metrics. This listing is somewhat deceiving as an indicator of the usage of the methodology in past research in that a considerable number of studies have utilized the approach to assess the information content of accounting financial measures. One limiting factor to the use of stock return response modeling in marketing is the lack of marketing measures at the corporate level, i.e., marketing data is more often collected at the brand or SBU-level. This issue is exacerbated by the lack of time series information on marketing metrics, which is required in order to estimate an autoregressive model that then generates a measure of the unanticipated component of the marketing metric. Attempts to link stock return to levels of a metric (i.e., a differentiation is not made between the anticipated versus the unanticipated component of a series), which has sometimes been done in past research when time series data on the marketing metric is unavailable, suffer from both theoretical and econometric short-comings.

## Stock Return Response Modeling and Related Approaches

### Other Market-based Dependent Variables

Rather than working with stock return as the dependent variable, a number of studies have made use of related stock market-based measures, e.g., Tobin's Q, stock market value, the market-to-book value ratio. While these measures rely on a similar theoretical perspective of financial market behavior, they exhibit distinct dynamic properties and call for careful modeling of firm-specific effects and autocorrelation. Unfortunately, all too often past research has failed to do so. As such, econometric concerns limit the conclusions drawn from these studies. In particular, many studies making use of Tobin's Q, market value, or market-to-book value have ignored the dynamic properties of the dependent measure and implicitly assumed the absence of serial correlation. Yet, both theory and statistical evidence contradict this assumption. For example, stock market value is widely acknowledged to follow a random walk (i.e., have a unit root). While stock market value and assets appear to be co-integrating, Tobin's Q and the market-to-book value ratio still exhibit substantial autocorrelation. Fixed effects autoregressive models (e.g. Griliches, 1981) indicate autoregressive estimates in the range of .5 to .6. An analysis ignoring both the fixed effect and the autocorrelation present in Tobin's Q overlooks residual serial correlation of around .85.

As such, results from studies failing to model the time series properties of stock market-based measures fall into question. Kothari (2001) comments that while levels regressions can yield economically plausible values, "severe econometric problems make their use less attractive." The same well-known concerns of neglecting serial correlation in time-series data (Granger & Newbold, 1974) are present in panel data as well (Li & Hsiao, 1998). Namely, failure to account for serial correlation induces inefficient coefficient estimates, biased standard

errors, and most importantly, to the extent that the omitted variables causing the serial correlation are correlated with the included explanatory factors, biased coefficient estimates.

The problem is not with the alternative financial market-based measures, but rather in the failure to model the dynamic properties of the series. Indeed, commonly used transformations highlight the similarities in the measures. Taking logarithms and first differences of the data (e.g., to incorporate a unit root or a fixed effect) generates a dependent variable in the case of market value or the numerator in the dependent variable for the case of Tobin's Q and the market-to book ratio that will closely approximate stock return.

### **Relation to Event Studies**

Event studies are theoretically and methodologically closely related to stock return response modeling. Both approaches assess the stock market reaction to unanticipated events and use stock return as a dependent variable. Both are built on the market valuation framework and rely on the efficient markets hypothesis. In the absence of efficient markets, the approaches assess the effect of a change in marketing strategy on investor expectations of future cash flows.<sup>8</sup> With efficient markets, this effect would also be an unbiased estimate of the effect marketing strategy has on actual future cash flows as well. That is, under efficient markets, investors have unbiased expectations. Despite the fundamental similarities, there are also significant differences between the two approaches.

The most significant distinction is that an event study assesses the market reaction to a specific event (or announcement) occurring on a given day. The event may be recurring (such as earnings announcements) or it may be isolated and unique (e.g., a product recall). Stock return

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<sup>8</sup> While critics of the efficient market hypothesis are numerous, few have successfully exploited the profit implications that would arise if their criticisms were legitimate. See, for example, Fama (1998) for a critique of criticisms of the efficient markets hypothesis.

response modeling assesses the market reaction to a dynamic process occurring over a longer period of time. Event study analysis requires a specific event date; stock return response modeling looks at changes in a series over a longer time frame.

As a result of this distinction, differences in the research approaches exist. In an event study, a researcher will typically track stock return following the event for a relatively short period of time, i.e., 1 day, 5 day, or 30 day event windows. The length of the event window is determined empirically and reflects the time it takes for the new information to disseminate and be impounded into the stock price. In stock return response modeling, the periodicity of the stock return measure will follow from the periodicity of the marketing strategy data, e.g., monthly, quarterly, yearly.

These differences lead to the very distinct interpretations of the results. Event studies, by design, assess how the market reacts to a given announcement. They are designed as controlled experiments. As such, the analysis is causal in nature. Although, despite the causal structure of the test, alternative, non-causal interpretations are also possible. For example, a firm announces significant increase in its next-year advertising spending and the stock price jumps up. The observed increase in the market value of the firm can have a causal interpretation: increased advertising will positively affect future profits of the firm. It can also have non-causal interpretation: the market uses the information about advertising increase as a signal that the firm has an improved financial situation that allows it to spend more on advertising (e.g., advertising budgets are affected by the availability of funds) and adjusts the valuation of the firm.

In contrast, stock return response modeling does not assume that an observed association is strictly causal. The market may have reacted to more timely information. Rather, a significant

finding indicates that the measure contains information that is associated with information that the financial market uses to determine firm valuation.

### **Concluding Remarks**

A number of potential research directions arise from stock return response modeling of marketing metrics. There exists a host of marketing metrics whose long-run value implications have been theorized but not empirically established. As such, one direction for future research would be to obtain measures of these strategies and empirically assess their value relevance. While past research in marketing has focused on the effect of marketing activities on total returns, another way that marketing activities can affect financial performance is through an impact on risk. This too is an area in need of additional research. Then, in addition to establishing which marketing metrics have value relevance, it is important to establish which metrics do not. Failure to observe a significant association can stem from measurement error in the metric, the financial markets not appreciating the value implications of the strategy, or the absence of a long-term effect of the strategy. This lack of significance can lead to steps to improve marketing metric measurement, enhanced efforts to communicate the importance of a metric to the financial community as part of an information disclosure strategy, and/or shifts in managerial attention away from metrics not found to have value relevance.

Rappaport (1987) noted that firms constantly interact with the stock market through mutual signaling and monitoring. A firm supplies information to investors via required and voluntary information disclosures. The investors also receive information about the firm indirectly, as they are able to observe, for example, some of the firm interactions with its customers and competitors. The financial market uses all the available information to form

expectations of the firm future performance and incorporates its view of the company's future prospects into its stock price. The stock price serves as the signal to the company about the level of accomplishment expected for shareholders to earn their required rate of return. Rappaport comments that managers who ignore the signals from stock price do so at their peril. Stock return response modeling provides a mechanism to help managers understand what signals are being set by the financial markets as they react to marketing information.

**Table 1**  
**Assessing the Value Relevance of Quality**

**Firms in the Analysis**

American Airlines	American Express	American Greetings	Apple
AT&T	Avon	BIC	Campbell
Chrysler	Coca-Cola	Compaq	Eastman-Kodak
Ford	GTE	Gillette	Goodyear
Hershey	Hilton	IBM	K-Mart
Kellogg	Mattel	McDonalds	MCI
Merrill-Lynch	Nike	Pepsico	Polaroid
Reebok	Rubbermaid	Sears	Sony
Sprint	Texaco	United Airlines	VF Corp
Volvo	Wal-Mart	Wendy's	

**Estimating the Unanticipated Components\***

$$[1.1] \text{ROI}_{it} = .91 * \text{ROI}_{it-1} + \varepsilon_{1,it}$$

(.02)  
[38.33]

$$[1.2] \Delta \text{Quality}_{it} = \varepsilon_{2,it}$$

**Stock Return Response Model\*\***

$$[1.3] \text{StkRet}_{it} = 2.90 * \text{roi}_{it} + .37 * \text{qual}_{it} + \varepsilon_{3,it}$$

(.36)            (.11)  
[8.08]            [3.38]

**Legend**

$\text{ROI}_{it}$  = Operating Income before Depreciation<sub>it</sub> / Assets<sub>it-1</sub>

$\Delta \text{Quality}_{it}$  = Quality<sub>it</sub> - Quality<sub>it-1</sub>

Stock Return<sub>it</sub> = (Market Value<sub>it</sub> + Dividends<sub>it</sub> - Market Value<sub>it-1</sub>) / Market Value<sub>it-1</sub>

roi<sub>it</sub> = unanticipated ROI<sub>it</sub>, i.e., residual ( $\varepsilon_{1,it}$ ) from Equation 1.1

qual<sub>it</sub> = unanticipated Quality<sub>it</sub>, i.e., residual ( $\varepsilon_{2,it}$ ) from Equation 1.2

time period: 1990-1997;

#obs=300

standard errors in parentheses; t-statistics in brackets

\*Equations also includes annual dummy variables to capture annual, economy-wide differences.

\*\* Equation also includes i) annual dummy variables so as to capture the effects of economy-wide factors, and ii) annual effects for  $\log(\text{Market Value}_{it-1})$  and  $\log(\text{Book Value}/\text{Market Value})_{it-1}$  to capture firm-specific risk factors, i.e., the risk factors are allowed to have effects that vary by year.

**Table 2**  
**Past Research Using Stock Return Response Modeling to Assess the Value Relevance of Marketing Metrics**

<b>Author(s)</b>	<b>Year</b>	<b>Journal</b>	<b>Title</b>	<b>Findings</b>
Aaker, D. & R. Jacobson	1994	Journal of Marketing Research	Financial Information Content of Perceived Quality	Perceived quality exhibits value relevance, salience does not
Aaker, D. & R. Jacobson	2001	Journal of Marketing Research	The Value Relevance of Brand Attitude in High-Technology Markets	Changes in brand attitude are associated with changes in firm value for High-tech firms
Barth, M. et al.	1998	Review of Accounting Studies	Brand Values and Capital Market Valuation	Changes in Financial World's brand equity measure provides information incremental to net earnings in explaining firm valuation
Mizik, N. & R. Jacobson	2003	Journal of Marketing Research	Trading-Off between Value Creation and Value Appropriation: The Financial Implications of Shifts in Strategic Emphasis	Market valuation depends on the emphasis a firm places on value appropriation relative to value creation activities. Financial market reaction to shifts in emphasis varies systematically with firm and industry characteristics

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