You Get What You Pay For: The Effect of Top Executives’ Compensation on Advertising and R&D Spending Decisions and Stock Market Return

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Abstract

Although there is literature on how top executives’ compensation influences general management decisions, relatively little is known about whether and how compensation influences advertising and R&D spending decisions. This study addresses two questions. First, whether there is an incentive effect of long versus short-term compensation on advertising and R&D spending, and second, whether there is a mediation effect of advertising and R&D spending on the relationship between long versus short-term compensation and stock market return. These questions are addressed based on a combination of ExecuComp, Compustat, and CRSP data on 842 firms during 1993-2005. An increase in the equity-to-bonus compensation ratio is found to be positively associated with an increase in advertising and R&D spending as a share of sales. Advertising and R&D spending as a share of sales is also found to mediate the effect of equity-to-bonus ratio on stock market return. The authors discuss implications for top management seeking to mitigate myopic management of resources by employing compensation to incentivize a longer-term orientation for advertising and R&D spending to improve stock return.

Keywords: Top Executives’ Compensation; Advertising and R&D Spending; Stock Market Return
“If you pick the right people and give them the opportunity to spread their wings and put compensation as a carrier behind it you almost don't have to manage them”. Jack Welch

As a result of declining corporate profitability, stagnant share prices in the 1970s, and the emergence of agency theory, there was a rapid movement in the redesign of top executives’ compensation to make it more closely aligned with shareholders’ interests. By 1998, the estimated present value of stock options, which incentivize long-term performance, represented 45% of the median pay package for chief executive officers of public corporations (Copeland, Koller, and Murrin 2000). A new trend, however, emerged in the early 2000s, a shift away from stock options and towards short-term performance based bonuses and restricted stock, so that the proportion of compensation delivered through stock options in 2004 reached its lowest level in the previous seven years (The Economist 2004). Because top executives’ compensation has changed substantially over time it is now timely to ask whether such changes have influenced advertising and R&D decisions.

Value creation, through investments in R&D for new product and process development, in combination with value appropriation, through investments in advertising for building brands and product sales, are two main elements of a firm’s strategy that have been found to be important determinants of firm growth, risk, performance, and value (e.g., Krasnikov and Jayachandran 2008; McAlister, Srinivasan, and Kim 2007; Mizik 2010; see Srinivasan and Hanssens 2009 for a review). However, there has been very little study in the marketing literature of financial drivers of advertising and R&D spending decisions. A couple studies have considered financial pressures on managers from investors, how a seasonal equity offering can affect marketing spending (Mizik and Jacobson 2007) and how investor expectations of stock returns can affect advertising and R&D spending (Chakravarty and Grewal 2011). And Joseph and Richardson (2002) consider the influence of free cash flow and agency costs on advertising spending. We study a different financial variable that potentially drives advertising and R&D spending, top executive compensation.
Although there are studies on the relationship between compensation and general management decisions such as investment in property, plant, and equipment, corporate focus versus diversification, and the use of financial leverage in investment, debt, and firm risk policies (e.g., Coles, Daniel, and Naveen 2006; see Devers et al. 2007 for a review) relatively little is known about the impact of compensation on advertising and R&D spending decisions.

Top executives are ultimately responsible for firm strategy, growth, risk, budgets, and firm performance in the product and capital markets. They hold final responsibility for budgets that affect investments in the value creation (R&D) and value appropriation (marketing) strategy of the firm. Although top executives are not directly involved in the day-to-day operational decisions of the firm, for example, the advertising spending decision, their motivations strongly influence the behavior of lower-level managers (Joseph and Richardson 2002). Such a view is consistent with Fama and Jensen's (1983) observation that lower-level managers initiate and implement spending plans and top executives approve and monitor such plans. In other words, managers who initiate and implement spending plans, learn to submit plans and budgets that have a “convergence-of-interest” with top executives, so that these plans and budgets are approved (Joseph and Richardson 2002). In this way, top executives influence a variety of operational decisions taken by lower-level managers, including the setting of advertising and R&D budgets.

Managers generally expect long-term benefits of R&D spending on new product and process development, and advertising spending on building brands and product sales. However, the Financial Accounting Standards Board’s (FASB) Generally Accepted Accounting Principles (GAAP) based policies in the U.S. require marketing and R&D spending to be almost always completely expensed in the period incurred, which offers tax advantages, however, makes the important assumption that there are no future benefits, resulting in current period expenses that are larger than the tax savings. In addition, managers are often faced with short-term earnings pressures,
declining demand, less than desirable economic conditions, and the prospect of limited tenure in the firm. Furthermore, there may be uncertainty on the long-term benefits of R&D in particular, and advertising as well. Such factors can create powerful short-term disincentives for managers to spend on advertising and R&D, if they believe that the full benefit from current spending will not be observed immediately but at some point in the future, while the costs are realized immediately (Mizik 2010). We are interested in exploring whether top executives’ compensation, if designed to incentivize long versus short-term performance, will motivate advertising and R&D spending, despite the powerful disincentives.

The marketing literature has focused on marketing-based drivers of product development and advertising decisions such as a firm’s marketing goals, outcomes, and the marketing efforts and outcomes of its competitors (e.g., Danaher 2008; Kotler and Keller 2009; Leeflang et al. 2000; Lilien, Kotler and Moorthy 1992). There may be non-marketing drivers of product development and advertising decisions as well. If a non-marketing driver such as top executives’ compensation influences R&D and advertising spending and stock market return and this driver is not considered, our understanding of managerial product development and advertising decisions could be myopic.

Consequently, our first research question is whether top executives’ long versus short-term compensation incentivizes advertising and R&D spending. Second, we are interested in whether advertising and R&D spending mediates the effect of long versus short-term compensation on stock market return. We find that long versus short-term compensation is associated with advertising and R&D spending, and advertising and R&D spending mediates the effect of long versus short-term compensation on stock market return. The contributions of our results are two-fold. First, if value creation and appropriation are important for the firm, compensation committees can employ long versus short-term compensation to incentivize advertising and R&D spending despite the powerful disincentives noted above. This is important, in particular, because the current trend towards short-
term performance based bonuses can hurt long-term value creation and appropriation investments, goals and activities of firms. The decision to employ long versus short-term compensation to incentivize long-term investments and goals is facilitated if such compensation is found to incentivize long-term investments in value creation and appropriation, and if such investments are found to improve stock market returns. Second, the potential mediation of R&D and advertising also provides an explanation for the relationship between compensation and stock market return observed in the compensation literature (Devers et al. 2007) to be reviewed in the next section. Results of agency theory based studies on the role of incentive pay in aligning goals and risk preferences have been mixed (see Devers et al. 2007 for a review), so whether goals will be aligned in the advertising and R&D spending decision remains unclear. Devers et al. (2007) state, “It is clear that there is still much to be learned about executive compensation, thus we believe that cross-discipline integration holds the potential to significantly advance compensation research and practice.” Consequently, by testing whether compensation incentivizes advertising and R&D spending, and whether advertising and R&D spending mediates the relationship between compensation and stock market return, we seek to provide such cross-discipline integration. To the best of our knowledge, establishing the incentive effect of compensation on advertising and R&D spending, and the mediation effect of advertising and R&D spending on the relationship between compensation and stock market return is new, in both marketing and compensation literatures.

The findings have potential to benefit top executives, marketing managers, firms, employees, shareholders, and consumers. By understanding the disincentives to invest in advertising and R&D, and the relationship between compensation and spending on advertising and R&D, and stock market return, corporate compensation committees will be better able to design the compensation packages of top executives so that correct incentives are created (The Economist 2004). Top executives in turn could design better compensation packages for senior managers including senior
marketing managers so that they will be less pressured to employ marketing resources in ways that could be counter-productive to the long-term performance of firms (e.g., Lodish and Mela 2007). Firms with growth opportunities related to value creation and value appropriation would stand to gain if risk-averse managers could be motivated to invest in long-term performance (e.g., Guay 1999). As a result, firms could be financially better off or more stable in the long-term, employees could benefit from company stability, shareholders would receive more long-term value, and consumers could be better off living in an economy enabled by higher long-term firm performance.

**Expectations**

In this section we briefly review background literatures in marketing, accounting, finance and management in order to develop our expectations. Specifically, we do this in three steps. First, we identify different components of top management compensation in order to identify components that incentivize long versus short-term performance. Second, we review studies on how compensation impacts general managerial decisions in order to develop an expectation on the relationship between long versus short-term compensation and advertising and R&D spending decisions. Third, we review studies on (i) the relationship between compensation and stock market return, and (ii) the relationship between advertising and R&D spending and stock market return, in order to develop an expectation on advertising and R&D spending mediating the relationship between compensation and stock market return.

**Components of Top Executive Compensation**

The literature on incentive contracting identifies seven different components of total compensation reported for an executive: cash salary, cash bonus, the ex-ante value of options awarded, restricted stock awards, incentive plan payouts, other annual compensation, and all other compensation (Anderson, Banker, and Ravindran 2000). Salary is a fixed portion of the compensation and not dependent on the performance of executives. Cash bonus is designed to
motivate executives to perform to the best of their abilities and achieve the firms’ financial and other performance objectives in the current year, or short-term.

Restricted common stock, while also performance based, is designed to provide a longer-term incentive to executives. The stock option component is a contract between a firm and employees obligating the company to sell stock to the employee at a predetermined price. Employee stock options are typically designed to be exercised in the long-term, so that this component of compensation can encourage operating the business in a way that is aligned with the maximization of long-term performance. Stock options are a riskier compensation contract than restricted common stock, because stock options only pay out if the share price rises above a certain point, whereas restricted stock is worth something at any level. This is particularly relevant when the market falls because options could be valueless while restricted stock can be sold even at a knock down price (The Economist 2004).

Incentive plan payouts are amounts paid to the executives during a current year and consequently do not rely on firm value in the future. Of the seven components of compensation identified, the value of restricted stock and stock options are based on stock market return in the future and consequently can motivate top executives to exercise strategies which enhance a firm’s long-term performance. In contrast, cash bonus is designed to motivate executives to perform to the best of their abilities and achieve the firms’ financial and other performance objectives in the current year, or short-term. Consequently, we employ the ratio of restricted stock and stock options (long-term based compensation) and cash bonus (short-term based compensation), or equity-to-bonus ratio as our measure of long versus short-term compensation.¹

**Incentive Effect of Compensation on Managerial Decision Making**

In this section hypotheses are developed on the effect of compensation on advertising and R&D spending. We do this in two steps. First, we briefly review theory on myopic management of
resources, in other words, what causes managers to cut advertising and R&D spending in the short-term even though such cuts are not in the long-term interest of the firm. Second, we briefly review theory on equity-based compensation which is designed to incentivize a longer-term orientation and curb myopic management of resources, so that managers make advertising and R&D spending decisions which are in the best long-term interest of the firm.

**Myopic Management of Resources.** Under perfect information and effective compensation-based incentive contracts, managers will make spending and investment decisions based on net present value, in accordance with the best interests of shareholders (e.g., Jensen 1986). In reality, however, managers are often better informed than shareholders about the true state of a firm’s current earnings and future prospects, are often faced with earnings pressures based on analysts’ expectations, and have compensation-based incentives which are not well aligned with the long-term interests of shareholders, which lead to an over-emphasis of short-term goals or myopic management of resources (Mizik 2010). For example, in a theoretical model Stein (1989) shows that introducing asymmetric information in place of perfect information, or when the manager has an advantage over the shareholder in assessing the true state of a firm’s current earnings and future prospects, creates an incentive for the manager to engage in “inter-temporal borrowing” of earnings by cutting intangible assets which are not on the balance sheet (like advertising and R&D), to inflate current earnings and mislead investors into expecting higher future earnings, thus temporarily increasing stock price. Although the temporary increase in stock price may be (negatively) corrected in the long-term, managers who take the market reaction as fixed continue to behave myopically. Myopic management of resources or a short-term opportunistic orientation has been documented in the marketing literature. Managers are found to cut expenditures on marketing and R&D to improve bottom line earnings in the short-term, even if such cuts are found to reduce stock market return in the long-term (e.g., Mizik and Jacobson 2007). Managers also have a
tendency to be risk averse (e.g., Guay 1999). Marketing and R&D spending can have uncertain future payoffs and FASB GAAP based policies require most such spending to be expensed immediately, which exacerbates myopic management of resources. Myopic management of resources is related to earnings management, a number of studies in the accounting and finance literatures demonstrate that managers engage in earnings management to affect stock price (e.g., Baker, Stein, and Wurgler 2003; Coles, Hertzel, and Kalpathy 2005; Gong, Louis, and Sun 2008; McAnally, Srivastava, and Weaver 2008).

**Equity-based Compensation.** Equity-based compensation is a motivational tool which can encourage longer-term orientation, discourage myopic management of resources or short-term opportunism, and encourage risk seeking, because it aligns the interests of managers with the longer-term interests of shareholders. The majority of compensation research and practice is based on agency theory (e.g., Fama 1980) which focuses on a central question – how does one ensure that shareholders’ interests are foremost in the minds of managers when they make spending decisions. Principals (shareholders) delegate duties to an agent (manager), who is expected to move in the best interest of the principal. Agents are self-interested and may extract benefits or perquisites which sacrifice the principal’s wealth. Thus, agency theory raises the possibility of managerial ‘opportunistic behavior’, for example, myopic management, which is referred to as agency cost. Agency scholars have suggested that equity-based compensation reduces agency cost and myopic management because it aligns the interest or goals of managers and shareholders by curbing executive opportunism and discouraging risk aversion. For example, Fama and Jensen (1983) indicate that “Common stock that represents proportionate claims on the payoffs of all future states eliminates these agency problems (costs)...common stock and other forms of residual income also avoid most of the costs of defining and verifying states of the world.” This quote addresses the role
of equity-based compensation in curbing myopic management of resources so that managerial
decisions are made in the best longer-term interest of the firm.

While there is a considerable body of theory developed over the past three decades that
posits that equity-based compensation that includes stock options and restricted stock affects
managerial decision making (e.g., Defusco, Zorn, and Johnson 1991; Hemmer, Kim, and
Verrecchia 1999; Jensen and Meckling 1976), two studies in the accounting and finance literatures,
Rajgopal and Shevlin (2002) and Coles, Daniel, and Naveen (2006) provide empirical evidence that
equity-based compensation reduces agency cost and increases firm value for shareholders in the
equity market. Optimal equity-based compensation contracts provide managers with adequate
incentives to maximize shareholder value. The use of equity-based compensation increases the
sensitivity of managers’ wealth to stock price or stock return volatility. The higher the sensitivity of
managers to stock options or restricted stock, the harder managers work or the more effective they
are in increasing the long-term value of firms because they share the same gains and losses that
shareholders take in the market. Rajgopal and Shevlin (2002) show that managers who receive more
stock option compensation in the oil and gas industry invest more on risky projects such as R&D.
Coles, Daniel, and Naveen (2006) confirm Rajgopal and Shevlin’s result on risk taking based on a
larger sample of Standard and Poor firms and report that managers with higher sensitivity to stock
price invest more on risky projects to increase the long-term value of the firm, such as the usage of
higher leverage in policies related to investment, debt, and firm risk. These managers invest less in
less risky investments such as property, plant, and equipment, and engage in less diversification or
focus on fewer lines of business. A couple other studies also focus on limited sub-samples, special
cases, or specific conditions. For example, Cheng (2004) shows a positive association between CEO
option-based compensation and R&D spending in R&D intensive industries (a) when the CEO
approaches retirement and (b) when the firm experiences an earnings decline or small loss. Wu and
Tu (2007) find a positive association between CEO options and R&D spending in four industries. A couple of other studies do not focus on the effect of compensation but rather the effects of management style, geographic diversification, and CEO turnover, and comment on compensation. Bertrand and Schoar (2003) focus on management style and track top managers across different firms over time to show that they are well compensated and their style explains several organizational practices of the firm, including advertising and R&D spending investments, and firm performance. Kim and Mathur (2008) focus on the effect of geographical diversification on firm performance and find that geographically diversified firms have higher advertising and R&D expenditures and ROA than industrially diversified firms. Firms with high equity-based compensation are found to be associated with higher firm value than firms with low equity-based compensation. Du and Lin (2011) focus on the effects of CEO turnover and show that new CEOs with high options-based compensation following forced turnover and with shorter organizational turnover are associated with higher R&D and advertising investments. Luo, Wieseke, and Homburg (2012) show that change in the proportion of long-term equity-based CEO compensation is associated with change in actions to build firm-customer and firm-employee relations and customer satisfaction, and that customer satisfaction partially mediates the relationship between changes in actions to build firm-customer and firm-employee relations and firm value.

In summary, a variety of drivers including asymmetric information, earnings pressures, poor economic conditions or firm performance, and the prospect of limited tenure in the firm can drive managers to be myopic and cut advertising and R&D spending to improve the firm’s bottom line earnings and stock price in the short-term even if such actions are likely to negatively affect the bottom line and stock price in the long-term. Managers display risk aversion in cutting advertising and R&D spending because future benefits can be uncertain while costs are realized immediately. Equity-based compensation is a motivational tool designed to discourage myopic cutting of
advertising and R&D spending because it attempts to align the interests of managers with the longer-term interests of shareholders. Managers are less likely to be risk-averse and hence more likely to make investments which have uncertain future payoffs, even though costs are realized immediately. Consequently, we expect:

\[ H1: \text{An increase in the equity-to-bonus compensation ratio will be associated with an increase in the allocation to advertising as a percentage of sales.} \]

\[ H2: \text{An increase in the equity-to-bonus compensation ratio will be associated with an increase in the allocation to R&D as a percentage of sales.} \]

We consider spending as a share of sales to enable comparison between firms of different sizes. In the model section, we describe additional controls employed to test H1 and H2. The possibility that a change in the equity-to-bonus ratio of compensation is not associated with a change in advertising or R&D spending as a share of sales, in other words, the possibility that H1 and H2 are not supported, is consistent with comments in the press and academic work that equity-based compensation is a politically expedient way for top executives to pay themselves with little or no relation between compensation and managerial decision making or ex-post performance (Yermack 1995). In addition, many scholarly studies on compensation in accounting, finance, and management literatures offer empirical evidence that stock options do not lead to behavior that consistently conforms to rational finance-economic predictions based on agency theory, but rather conforms to the behavioral agency model (BAM) (Wiseman and Gomez-Mejia 1998). However, few such studies have investigated advertising and R&D spending decisions (Wu and Tu 2007). In contrast, these studies have looked at early exercising of options and shown that stock price movements result in risk aversion (e.g., Bettis, Bizjak, and Lemmon 2005; Heath, Huddart, and Lang 1999) and not risk seeking as assumed in the agency theory model. In other words, the results of agency theory based studies on the role of incentive pay in aligning goals and risk preferences
have been mixed (see Devers et al. 2007 for a review), so whether goals will be aligned in the advertising and R&D spending decision remains unclear. Devers et al. (2007) state, “It is clear that there is still much to be learned about executive compensation, thus we believe that cross-discipline integration holds the potential to significantly advance compensation research and practice.” Consequently, by testing H1 and H2 in the context of advertising and R&D spending decisions we provide cross-discipline integration in order to make a contribution to the marketing literature and the compensation literatures in accounting, finance, and management.

**Mediation Effect of Advertising and R&D Spending on Relationship between Compensation and Stock Market Return**

In order to hypothesize a mediation effect of advertising and R&D spending on the relationship between compensation and stock market return, we briefly review the literature on two effects, (i) the effect of compensation on performance, and (ii) the effect of advertising and R&D spending on stock market return. The effect of compensation on advertising and R&D spending has been reviewed in the preceding section.

**Effect of Compensation on Performance.** Compensation research in accounting, finance, and management literatures has evolved significantly over time. Earlier compensation research focused on the direct but coarse and distal pay-performance relationship, by examining the influence of total pay or aggregate pay measures on firm outcomes. However, considerable literature suggests that firm performance is not just a function of managerial decisions but also factors outside managers’ control (McGahan and Porter 1997; Yermack 1997). Consequently, it is no surprise that results of early research examining the effect of aggregate or total pay on performance were mixed (Tosi et al. 2000). Consequently, later research examined the effect of pay plan proposals, adoption, and individual pay elements (e.g., stock options) on performance. For example, Morgan and Poulsen (2001) demonstrate that pay plan proposals are significantly
associated with shareholder wealth, in the year before and after proposals, and proposing firms increase earnings and stock market performance over non-proposing firms. Core and Larker (2002) show that following pay plan adoption, executive equity ownership and stock returns increase significantly relative to prior pay plan adoption. Hogan and Lewis (2005) show that anticipated economic profit plan (EPPs reward managers when earnings exceed the cost of capital) adopters managed assets more efficiently, had higher profits and shareholder value than comparable firms predicted to adopt EPPs, but instead did not adopt EPPs. Certo et al. (2003) find support for the relationship between stock options and equity ownership, on valuation for IPOs. Hanlon, Rajgopal and Shevlin (2003) find that top management team stock option grants positively influence firm performance. Kato et al. (2005) demonstrate higher returns for Japanese firms adopting stock-option compensation following a regulation change in 1997 that permitted their use. Bhagat and Bolton (2008) focus on corporate governance, however they find correlations between stock ownership and firm performance. As a result, there is a clear body of research that demonstrates a positive relationship between compensation and stock return.

**Effect of Advertising and R&D Spending on Stock Market Return.** The literature on the effect of advertising and R&D spending on stock return has been recently reviewed in the marketing literature (see Srinivasan and Hanssens 2009 for an excellent review), so our coverage will be brief to focus on theoretical linkages. In a recent study, Joshi and Hanssens (2010) demonstrate a positive relationship between advertising and firm value for 5 of 9 firms in 2 product categories. They suggest two theoretical effects, spillover and signaling, as potential links between advertising and firm value. First, the increased level of advertising will spillover to the demand for stocks of companies due to a higher level of brand awareness and perceived brand quality in a product market. Research in finance and behavioral decision theory supports the spillover effect (Frieder and Subrahmanyam 2005; Heath and Tversky 1990; Huberman 2001). Second, the
increased level of advertising gives investors a signal of financial well-being or competitive viability of a firm. Research in accounting, finance, and marketing supports the signaling effect (Chauvin and Hirschey 1993; Gifford 1997; Mathur, Mathur, and Rangan 1997; Mathur and Mathur 2000; Simpson 2008). Luo and de Jong (2010) use a large dataset of 1,052 firms over 20 years to show that reduction in advertising is associated with reduction of stock return, and that analysts’ activities, which serve as external validation of the logic underlying advertising spending, mediate the impact of advertising on firm return and risk. In addition, there are a few studies which are suggestive of the relationship between advertising and stock market return because they link on the one hand, brand values (Barth et al. 1998), brand strategy (Rao, Agarwal and Dahlof 2004), customer satisfaction (Fornell et al. 2006; Luo, Homburg, and Wieseke 2010) and marketing communications productivity (Luo and Donthu 2006) to financial market outcomes, and on the other hand, advertising effort to systematic market risk (McAlister, Srinivasan, and Kim 2007)\textsuperscript{3,4}.

R&D expenditures (e.g., Chan, Lakonishok, and Sougiannis 2001), and related constructs such as innovation (e.g., Pauwels et al. 2004; Srinivasan et al. 2009), new product announcements (Chaney, Devinney and Winer 1991), brand extensions (Lane and Jacobson 1995), and product quality (Aaker and Jacobson 1994; Mizik and Jacobson 2004) are also found to be associated with stock return. In summary, compensation research finds a positive relationship between equity-based compensation and stock market return. Equity-based compensation is expected to encourage advertising and R&D spending under H1 and H2. In addition, advertising and R&D spending is found to be positively associated with stock market return\textsuperscript{5}. Based on these expectations and findings we hypothesize:

\textit{H3: Advertising and R&D spending as a percentage of sales will at least partially mediate the effect of equity-to-bonus compensation on stock return.}
Our perspective is that compensation affects advertising and R&D spending which in turn affects stock return. An alternative perspective is that advertising and R&D spending will affect firm performance which will influence compensation. The difference in perspectives is that the alternative perspective focuses on the actual amount of compensation (the number of dollars) a manager receives at the end of the period while our perspective focuses on the compensation package (equity-to-bonus ratio) that will motivate the manager’s behavior in the coming period. One example of a part of the second perspective is O’Connell and O’Sullivan (2011) who show a relationship between firm performance on a customer satisfaction metric and the total cash the CEO receives at the end of the period. However, the second perspective assumes that compensation is based on spending, which could be judged to be counter-intuitive.

H3 does not suggest full mediation because of two reasons. First, as reviewed earlier, considerable literature suggests that firm performance is not just a function of managerial decisions but also factors outside managers’ control, e.g., the economy and actions of competitors. Second, there could be long-term strategic managerial decisions, other than advertising and R&D, which managers with higher equity to bonus compensation ratios could pursue and which could also drive stock returns, e.g., mergers and acquisitions. H3 is interesting to test because on the one hand it could be argued that advertising and R&D clearly creates value, and therefore, based on the established theory of capital markets, top executives will invest in advertising and R&D spending which will increase stock market return so that H3 will be supported. On the other hand, Kimbrough and McAlister (2009) state, “Although the well-established theory of capital markets predicts that actions that create value will be appropriately reflected in observed market values on a timely basis, the degree to which this prediction holds empirically is not obvious, given ample evidence of the existence of frictions that may delay investors’ efficient processing of value-relevant information. In the case of intangible investments such as marketing, these frictions include the long-time
horizon for the benefits of value-creating activities to be realized and the inherent riskiness of such activities, both of which complicate the task of forecasting the future implications of current marketing actions.” If frictions prevent investors from incorporating this information in the stock value we would expect no mediation effect so that H3 would not be supported. Consequently, it is interesting to test whether advertising and R&D decisions mediate the relationship between equity-based compensation and stock return, and the extent to which such mediation occurs. To the best of our knowledge, such mediation has not been tested in the marketing literature, or the compensation literature in accounting, finance, and management.

**Model**

In this section we formally state the models for hypotheses testing.

**Advertising Share of Sales**

The advertising spending decision as a share of sales is modeled as a function of the equity-to-bonus ratio of compensation, control variables related to performance in the previous period, and year and firm fixed effects. We use two performance measures for controls, one from the product market (ROI) and one from the capital market (Stock Return), because firms could increase spending due to the affordability effect from the product market (higher ROI, more cash, less financial constraints) and reinforcing effect from the capital market (higher stock return, firm value). We employ a one period lag for each performance measure because those are the product and capital market outcomes which are observed at the time spending decisions are made (e.g., Srinivasan and Hanssens 2009; Markovitch, Steckel and Yeung 2005; Rappaport 1987). Firm fixed effects control for firm level changes that affect the advertising spending decision, such as the marketing literature based variables noted in the introduction section of this paper and unobserved in ExecuComp and Compustat data. Firm fixed effects are also important because there could be unobserved heterogeneity across firms which affects the equity-to-bonus ratio and advertising
spending as a share of sales (Himmelberg, Hubbard, and Palia 1999). Time-based (year) fixed effects control for dynamics during the time period studied including effects of the economy.

The dependent variable is advertising spending as a share of sales, values of which range between 0 and 1, as a result we have a limited dependent variable. To avoid problems associated with directly using a limited dependent variable in a regression (e.g., there may be a number of proportions of advertising spending as a share of sales which may be close to 0 or 1 so that the variable is not normally distributed, and the regression equation could generate incorrect predictions of advertising spending as a share of sales which are outside the 0-1 range) a traditional solution is to perform a logit transformation on the limited dependent variable. The logit transformation will (a) “stretch out” proportions close to 0 and 1 and “compress” proportions close to 0.5 so that the resulting dependent variable is more likely normally distributed and (b) correctly restrict predictions of advertising spending as a share of sales to the 0-1 range. Therefore, the model that describes the advertising share of sales for firm i at time t (ADVSHARE_{it}) is as follows

\[
\text{ADVSHARE}_{it} = \frac{1}{1 + e^{-XB}}
\]

where,

\[
\text{ADVSHARE}_{it} = \frac{\text{Advertising Spending}_{it}}{\text{Revenue}_{i(t-1)}}
\]

X is the matrix of independent variables including the equity-to-bonus ratio of compensation (EQTY/BONUS_{it}), and control variables such as the ROI and stock holding return (HDR) from the previous period, and firm and time-based dummy variables. B is the coefficient matrix. After performing the logit transformation equation (1) can we written as

\[
\ln \left( \frac{\text{ADVSHARE}_{it}}{1 - \text{ADVSHARE}_{it}} \right) = \beta_{10} + \beta_{11}\text{EQTY/BONUS}_{it} + \beta_{12}\text{ROI}_{i(t-1)} + \beta_{13}\text{HDR}_{i(t-1)}
\]

\[+ \sum_{t=1994}^{T} \beta_{14} \text{YearDummy}_{i} + \sum_{i=1}^{I} \beta_{15} \text{FirmDummy}_{i} + \varepsilon_{1it}
\]

(2)
EQTY/BONUS\(_{it}\) = \((\text{Stock Options}_{it} + \text{Restricted Stock Granted}_{it}) / \text{Bonus}_{it}\)

\(\text{ROI}_{it}\) = Return on investment of firm i at the end of period t

\(\text{HDR}_{it}\) = 1 year stock holding return of firm i at the end of period t

Advertising sales ratio (and R&D sales ratio described next) at time t is backward-looking or based on the previous period ROI and stock return which are observed at the time spending (budgetary) decisions are made for the current period. Stock Return is calculated using \(\prod_{i=1}^{12} (1 + i_t) - 1\), where \(i_t\) is the stock return for month t (t=1 indicates the beginning month of the period and t=12 indicates the last month of the period. The level-based equation (2) is transformed into a change-based specification:

\[
\begin{align*}
\ln\left(\frac{\text{ADVSHARE}_{it}}{1 - \text{ADVSHARE}_{it}}\right) - \ln\left(\frac{\text{ADVSHARE}_{i(t-1)}}{1 - \text{ADVSHARE}_{i(t-1)}}\right) &= \gamma_{10} + \gamma_{11}(\text{EQTY/BONUS}_{it} - \text{EQTY/BONUS}_{i(t-1)}) + \gamma_{12}(\text{ROI}_{i(t-1)} - \text{ROI}_{i(t-2)}) + \gamma_{13}(\text{HDR}_{i(t-1)} - \\
&= \gamma_{10} + \gamma_{11}(\text{EQTY/BONUS}_{it} - \text{EQTY/BONUS}_{i(t-1)}) + \gamma_{12}(\text{ROI}_{i(t-1)} - \text{ROI}_{i(t-2)}) + \gamma_{13}(\text{HDR}_{i(t-1)} - \\
&+ \sum_{t=1995}^{T} \gamma_{14t} \text{YearDummy}_{1t} + \mu_{it}
\end{align*}
\]

Transforming the level-based equation (2) into a change-based specification equation (3) attempts to address the correlated omitted variables problem in level-based regressions under the assumption that correlated omitted variables are stationary from period to period (Kimbrough and McAlister 2009). A potential concern for taking first differences is that the effects of measurement error may be exacerbated (Griliches and Hausman 1986) and hence the signal to noise ratio will be lower for the differenced data than for the levels data. However, when the analysis is focused on assessing the information content of a specific metric (such as whether changes in the metric are reflected in changes in an outcome variable) measurement error becomes less of an issue (Mizik and Jacobson 2009). A lower signal to noise ratio allows a conservative test of the relationship. Both Kimbrough and McAlister (2009) and Mizik and Jacobson (2009) advocate difference models over level models.
The time period in the difference model begins with 1995 since the data set begins with 1993 and two period lags are included in the difference model specification. The year dummy variables in the difference equation (3) have a superscript d for difference equation since their specification is different from that of their counterparts in equation (2). H1 requires $\gamma_{11}$ be positive and significant. Note, if there is error in the compensation variable we will fail to see a significant effect of compensation on advertising share of sales.

**R&D Share of Sales**

The model specification for R&D spending as a share of sales is similar to equation (2), except that the dependent variable is R&D share of sales. R&D share of sales is a function of equity-to-bonus compensation ratio, and control variables related to previous period outcomes in the product market (ROI) which makes spending affordable and outcomes in the capital market (Stock Return) which reinforces spending decisions, and time-based and firm fixed effects. Similar to advertising share of sales, R&D share of sales ranges between 0 and 1 and consequently we perform a logit transformation as in equation (1). The level-based equation like equation (2) is transformed into a change-based specification like equation (3):

$$
\ln \left( \frac{\text{RDSHARE}_{it}}{1 - \text{RDSHARE}_{it}} \right) - \ln \left( \frac{\text{RDSHARE}_{i(t-1)}}{1 - \text{RDSHARE}_{i(t-1)}} \right)
= \gamma_{20} + \gamma_{21}(\text{EQTY/BONUS}_{it} - \text{EQTY/BONUS}_{i(t-1)}) + \gamma_{22}(\text{ROI}_{i(t-1)} - \text{ROI}_{i(t-2)}) + \gamma_{23}(\text{HDR}_{i(t-1)} - \\
\text{HDR}_{i(t-2)}) + \sum_{t=1995}^{T} \gamma_{24} \text{YearDummy}_{t}^{d} + \mu_{2it}
$$

H2 requires $\gamma_{21}$ be positive and significant. Note, as in the advertising share of sales model, if there is error in the compensation variable we will fail to see a significant effect of compensation on R&D share of sales. The two equations (3) and (4) are estimated independently. Since the independent variables are the same in both equations, the parameter estimates from independent estimation will be the same as those using joint estimation as in seemingly unrelated regressions.
Using sales-ratios, product and capital market outcome based control variables, and time-based fixed effects, and taking first differences in equations (3) and (4) attempts to remove systematic sources of cross-sectional differences across firms due to omitted variables, such as the marketing literature based variables noted in the introduction section of this paper and financial variables, such as recorded net assets, and risk factors in the four factor Carhart model (Fama and French 1992, 1996) related to size, market to book value, the market, and momentum. Taking first differences also permits investigation of whether investors are reacting to “new information” in contrast to studies that have linked stock prices directly to levels of marketing spending.

Mediation Effect of Advertising and R&D Spending on Relationship between Compensation and Stock Market Return

To test the mediation effect of advertising and R&D spending on the relationship between compensation and stock market return, we follow the convention in the marketing literature and conduct the Sobel mediation test (Baron and Kenny 1986). Following Baron and Kenny (1986), we estimate two separate regression analyses; (1) the logit transformed advertising and R&D spending to sales ratio is the dependent variable and the equity-to-bonus compensation ratio is an independent variable and (2) the 1 year stock holding return is the dependent variable and the advertising and R&D spending to sales ratio and the equity-to-bonus compensation ratio are independent variables. The z-statistic from the two regressions (see Baron and Kenney for details) is used to test H3, the mediation of advertising and R&D spending as a share of sales on the relationship between equity-to-bonus compensation ratio and stock market return. For our setting, the Sobel test is chosen over the Preacher and Hayes (2004) test described by Zhao, Lynch and Chen (2010) for two reasons. First, it allows flexibility in the specification of the mediating variable in the regressions models, in model (1) the mediating variable advertising and R&D spending as a share of sales is logit transformed to avoid the usual problems with a limited dependent variables noted earlier, while in
model (2) we follow the convention in the marketing literature by specifying it in its raw form. Second, the Sobel test is a more conservative test because “the 95% confidence interval will often include zero” (Zhao, Lynch and Chen 2010, bottom of p. 202), so that if a Sobel test supports mediation the result is a conservative one.

**Empirical Test**

**Data**

To test the three hypotheses, we constructed a data set of 842 companies during the period 1993-2005. All variables, equity-to-bonus compensation ratio, advertising and R&D sales ratios, ROI and stock return are defined based on the same time period, i.e., the fiscal year. The executive compensation information is collected from the ExecuComp database. The ExecuComp database covers current, historic and total compensation data on top five executives of more than 2,600 companies in the S&P 500, S&P 400 mid-cap, and S&P 600 small-cap indices in the United States. ExecuComp provides *yearly* data on the compensation of only the top 5 executives. The rationale is that top 5 executives are usually part of a senior management team ultimately responsible for firm strategy, spending and resource allocation decisions, and product and capital market outcomes. We employ a simple equal weighting model to aggregate the compensation data on top five executives, which has been found to offer robust predictions, even when weights across variables vary, in marketing research (Srinivasan 1977), and other settings (e.g., Dawes and Corrigan 1974). If there is error in our compensation variable we will fail to see an incentive effect of compensation on marketing (H1) and R&D (H2) spending decisions, and a mediation effect of marketing and R&D spending decisions on the relationship between compensation and stock market return (H3). The ExecuComp database only includes firms from the three major S&P indices and ExecuComp firms comprise approximately 25% of the domestic firms in the Compustat database. For firms to be included in the Standard & Poor’s major indices, firms need to meet a number of criteria, such as
financial viability and stock liquidity. Therefore, on average, the ExecuComp firms tend to be firms that are relatively large and profitable and have stable cash flows and liquid shares (Cadman, Klasa, and Matsunaga 2010). To allow for two period lagged variables in the analysis, the first time period for analysis will be 1995 although our data set begins with 1993. We end with 2005 to avoid any compounding effects due to change in accounting policy by the FASB revised Statement of Financial Accounting Standards 123 for the reporting of employee stock options for the period ending after June 15, 2005. According to the new statement, all firms are required to expense employee stock options on the financial statements. Before the statement was issued, firms were not required to expense stock options on the financial statements. They only reported the information in footnotes, which did not affect their earnings.

Data on sales, advertising and R&D spending, and ROI are collected from the Compustat database. There are 22,198 firms included in the Compustat database. According to FASB’s GAAP based policies, the advertising expense reporting is required when the amount is material. Materiality is based on a manager’s subjective judgment. Thus the firms included in our study are those who have material or larger advertising expenses. We employ yearly advertising and R&D data so that there is a match in the unit of analysis between the ExecuComp and Compustat data. While data at disaggregated units of analyses are generally preferred over data at more aggregate levels of analyses the advantage of using ExecuComp and Compustat databases is that we can study a large number of firms over a significant period of time, in this case 842 firms over 11 years. In addition, if we do not have the correct level of disaggregation or measurement error in the advertising or R&D spending variables we are less likely to find support H1, H2, and H3. Data on stock return are collected from the Center for Research in Security Prices (CRSP) database.

The time series panel data offers several benefits, such as increased heterogeneity of observations, which alleviates multicollinearity concerns and provides the ability to study dynamic
phenomena (Wooldridge 2002). Since this database has a larger cross-section (842 companies) and fewer time periods (maximum of 9) it is not the traditional setting for the use of VARX models (Srinivasan and Hanssens 2009, Table 1 notes under Persistence Modeling).

Insert Table 1 about here

Descriptive statistics on the mean sales, mean percentage of equity-based compensation, mean percentage of bonus-based compensation, mean advertising and R&D share of sales, the number of firms reporting advertising and R&D spending, mean ROI and 1 year stock holding return, and the number of firms reporting ROI and for which stock holding returns are available for each year between 1995 and 2005 are presented in Table 1. We observe that the mean percentage of equity-based compensation increases and then decreases during the time period, the mean percentage of bonus-based compensation decreases and then increases during the time period, the mean advertising share of sales spending is at a higher level during the first half of the time period after which it is at a lower level, and the mean R&D share of sales spending increases and then decreases during the period.

Results

Insert Table 2 about here

The correlation matrix is presented in Table 2. Controls such as ROI and stock return from the previous period are not found to be correlated with the equity-to-bonus compensation ratio in the current period so that there are no concerns about multicollinearity between independent variables in the advertising and R&D share of sales models. Note that the correlation between advertising and R&D spending as a share of sales is highly positive (0.98) indicating that as one type of spending increases the other type of spending increases as well, as a result it is unlikely
there is a fixed budget for these two types of spending. If there were a fixed budget for these two
types of spending the correlation between advertising and R&D spending as a share of sales would
be negative.

The results of model estimations are presented in Tables 3 and 4. We begin with the
advertising share of sales model (Table 3). Because year effects can “soak-up” considerable
variation we report two estimated versions of the model with and without such effects. Our first
main result is that the effect of equity-to-bonus compensation ratio on advertising spending as a
share of sales is positive (p<.01) across both estimated versions of the model. Consequently, H1 is
supported. This positive effect suggests that an increase in the equity-to-bonus compensation ratio
which is designed to incentivize longer-term decision making results in an increase in advertising
spending as a share of sales. The coefficients of the ROI and stock return control variables from the
previous period are positive and largely significant (p<.05, for 3 of 4 cases), indicating affordability
and reinforcing effects. Improvements in product market outcomes (ROI) make advertising
spending more affordable and improvements in capital market outcomes (stock return) reinforce
such spending.

We now turn to the results of the R&D share of sales model (Table 4). Our second main
result is that the effect of equity-to-bonus compensation ratio on R&D spending as a share of sales
is also positive (p<.01) across both estimated versions of the model. Consequently, H2 is supported.
This positive effect suggests that an increase in the equity-to-bonus compensation ratio which is
designed to incentivize longer-term decision making results in an increase in R&D spending as a
share of sales. The coefficient of the stock return control variable is positive and significant (p<.01) also indicating a reinforcement effect, as stock market return in the previous period increases investments in R&D spending as share of sales increase. ROI in the previous period, which is used for control purposes is found to be occasionally significant (1 of 2 cases p<.05) in the advertising share of sales model but not found to be significant in the R&D share of sales model. One potential explanation is that R&D efforts are more long-term in nature and ROI from the previous period is a short-term performance indicator.

We conducted analyses on potential outliers. Because the measure of long versus short-term compensation is equity divided by bonus, if bonus is zero, or very small this can lead to very high values of equity-to-bonus ratio which could distort the results. Bonus values of zero when combined with non-zero values of equity were automatically dropped from the analyses reported above. Bonus values of 0 when present with equity values of 0 are indicative of long and short-term compensation which is equal and hence defined as 1. To investigate if very high values of equity-to-bonus distort the results we dropped about the top 5% of equity-to-bonus cases, similar to winsorizing, which equate to dropping cases in which the equity-to-bonus ratio was greater than 17.82, and found that both the signs and significance levels of the results reported on testing H1 and H2 above remained the same.

Finally, we describe the results on whether advertising and R&D spending as share of sales mediates the relationship between equity-to-bonus compensation ratio and stock return. Following the convention in the marketing literature we conducted a Sobel mediation test, which resulted in a z-statistic of 2.44 (p<.05), indicating that advertising and R&D spending as share of sales partially mediates the relationship between equity-to-bonus compensation ratio and stock market return. Consequently, H3 is supported. When the top 5% of equity-to-bonus cases were dropped as in the outlier analysis described in the previous paragraph, the results of the Sobel mediation test were
even stronger with a z-statistic of 4.09 (p<.01). In addition, while the mediation tests reported above are for advertising and R&D spending considered in combination as a share of sales, we conducted separate Sobel mediation tests for advertising spending as a share of sales followed by R&D spending as a share of sales. The z-values were 1.96 (p<.05) and 2.46 (p<.05) respectively.

Additional Analyses

We conducted two additional types of analyses for each dependent variable, change in advertising, and R&D spending as a share of sales, to investigate whether the effects of change in compensation (equity-to-bonus) were nonlinear (Morck, Shleifer, and Vishny 1988). For the first analysis we considered two main independent variables, change in compensation (equity-to-bonus), and change in compensation squared, in addition to the usual controls. In the second analysis, we segmented the compensation region based on the median, 33 percentiles, and quartiles, in addition to the usual controls. For advertising, the compensation term is positive and statistically significant (p<.01) as hypothesized, however, the compensation squared term is not significant indicating a lack of a turning point. When the compensation region was segmented based on the median, 33 percentiles, and quartiles we found that the effect of compensation on advertising comes from higher levels of compensation, above the median (p<.05); the top 33 percentile (p<.01) and between 34 and 66 percentile (p<.05); and the top quartile (p<.05). For R&D we do observe that the compensation squared term is marginally significant (p<.05), indicating a turning point, however at a very large equity-to-bonus compensation ratio. When the compensation region was segmented based on the median, 33 percentiles, and quartiles we found that the effect of compensation on R&D comes from higher levels of compensation, above the median (p<.01); the top 33 percentile (p<.01); and the top quartile (p<.01).

Next we investigated whether the effect of equity-to-bonus compensation on advertising and R&D spending was moderated by firm size. For the effect of equity-to-bonus compensation on
advertising spending as a share of sales we found that the effect is stronger (p<.01) for smaller companies. Smaller firms which have sales lower than the median spend much less on advertising in absolute terms ($16.7m versus $439.77m for larger firms), are less well known, and consequently may expect that increases in advertising spending will provide returns which are larger than those of larger firms because smaller firms more likely operate in the increasing returns portion of the s-shaped advertising-sales response function relative to large firms which more likely operate in the non-increasing returns portion of the response function\(^7\). For the effect of equity-to-bonus compensation on R&D spending as a share of sales we found that the effect is weaker (p<.01) for larger firms which are between the median and the 75th percentile in sales\(^8\). The R&D spending of such firms is between 2 and 4 times (in absolute terms) that of firms which are in the lower and lowest sales quartiles, respectively, consequently, such firms may see less potential for returns from R&D spending. In other words small firms, in the lowest and second to lowest sales quartiles spend much less on R&D, between \(\frac{1}{4}\) and \(\frac{1}{2}\) that of larger firms in the 50th to 75th percentile, and often compete on R&D, so that they may expect larger returns from R&D spending which results in a stronger effect of compensation on R&D spending.

We also conducted an analysis to determine if the effect of the equity-to-bonus compensation ratio on (a) advertising and (b) R&D spending varied across industries. For advertising spending as a share of sales, we found that the effect of the equity-to-bonus compensation ratio has a greater effect in the automotive dealers industry (p<0.01) and a marginally greater effect in the electronics industry (p<.056). For R&D spending as a share of sales, we found that the effect of the equity-to-bonus compensation ratio has a greater effect in the instruments and related products, and engineering and management industries (both p<.01), and a marginally lower effect in the security and commodity broker industry (p<.05). Overall the industry differences appear to be minimal and
the aggregate effect of equity-to-bonus compensation ratio on advertising and R&D spending as a share of sales identified earlier (H1 and H2) is found to be robust to industry variation.

We also assessed an alternative model on the percentage growth of spending, and dropped ROI so that we have only one and not two performance measures in the model. We did this for (a) advertising and (b) R&D spending using the log-log specification of differenced variables. Both the effects of equity-to-bonus on advertising spending and R&D spending were statistically significant (p<.01 and p<0.01, respectively). Therefore, the results of the alternative model are consistent with the results from the proposed models.

**Discussion**

Our compensation results have strategic implications for compensation committees and top executives regarding marketing and R&D investments and capital market returns. If a firm has strategic interests in value creation, through continuous investments in R&D for new product and process development, and value appropriation, through continuous investments in advertising for building brands and sales, there should be a clear recognition among members of the compensation committee that top executives have a powerful short-term disincentive to spend on advertising and R&D. The disincentive is due to the fact that such spending is expected to have longer-term benefits while FASB GAAP based policies require costs associated with such benefits to be completely expensed in the current period, so that such spending, although it has tax advantages, has a negative effect on current year profit. The disincentives are further exacerbated when top executives are under earnings pressure due to analysts’ expectations of performance, declining sales, less than desirable economic conditions, and face the prospect of limited tenure in the firm. Such disincentives can result in myopic management of resources towards value creation and appropriation through cuts in R&D and advertising spending which have been documented in the marketing literature.
One way to deal with such a powerful disincentive is to increase the equity-to-bonus compensation ratio by granting more stock options and restricted stock. Our first and second main results are that an increase in the equity-to-bonus compensation ratio is associated with an increase in advertising and R&D spending as a share of sales (H1 and H2). The increase in equity-to-bonus compensation ratio incentivizes top executives to have a longer-term orientation on value creation and appropriation and increase advertising and R&D spending as a share of sales, even though there may be uncertainty on the future benefits of such spending and costs are realized immediately. In the absence of such an incentive or when such incentives are being reduced, as the current market trend suggests, it is likely that top executives will engage in myopic management of resources. Downstream marketing and R&D managers who initiate and implement spending plans learn to initiate and implement spending plans that have a convergence-of-interest with top executives because top executives approve and monitor such plans (Joseph and Richardson 2002; Fama and Jensen 1983). As a result the tendency of top executives to myopically manage resources will result in downstream marketing and R&D managers being pressured to employ product and process development and advertising resources in ways that are productive to the short-term performance of the firm (e.g., reducing advertising and R&D spending to improve current year profits) but counter-productive to long-term performance of the firm (e.g., Lodish and Mela 2007). In other words, it is likely that firms with long-term growth opportunities could fail to capitalize on their potential because risk-averse managers are not motivated to invest in long-term performance such as developing new products and processes and building brands and sales because of uncertainty in the future payoffs of these activities (e.g., Guay 1999).

The effect of the compensation incentives on advertising and R&D spending are larger in smaller firms, as a result, if a larger firm wants to incentivize advertising and R&D spending, higher levels of equity-to-bonus compensation ratio will be required relative to smaller firms. Larger firms
spend more on advertising and R&D and hence may benefit less, however, if the success of the firm is driven by R&D, innovation, new products, and using advertising to inform its current and potential customers about such new products, then such additional spending may be warranted, in particular when the environment becomes more competitive. In summary, the first and second main results of this study are important because they build confidence among compensation committees and top executives that the equity-to-bonus compensation ratio can be employed to ensure that correct incentives are in place for managers to curb myopic management of resources and make investments in long-term goals related to value creation, or R&D to develop products and processes, and value appropriation, or advertising to build brands and sales.

Our third main result is that advertising and R&D spending as a share of sales mediates the relationship between equity-to-bonus ratio and stock market return (H3). This result is important because it can build confidence among compensation committee members and top executives that the equity-based incentives are not just achieving desired long-term goals for investments in advertising and R&D, but stock market return as well. In other words, the decision to increase the equity-to-bonus compensation by granting stock options and restricted stock will be additionally facilitated by improvements in stock market return. Corporate compensation committees and top executives committees are accustomed to paying for performance. As a result, once there is recognition that compensation-based incentives do not just curb myopic management of resources and incentivize long-term investing in R&D for new product and process development and advertising to build brands and sales, but that these investments in advertising and R&D payoff in stock market return as well, there should be a greater willingness and confidence on the part of compensation committees and top management to employ compensation so that the correct incentives are in place not just for long-term investments but stock returns as well. The greater willingness and confidence should apply not just to designing equity-to-bonus compensation ratios
for top executives but downstream marketing and R&D managers as well, so that the correct incentives are in place throughout the decision making ranks in the organization for long-term value creation and appropriation, and stock return.

To the best of our knowledge the findings on the incentive effect of equity-to-bonus compensation on advertising and R&D spending as a share of sales (H1 and H2) and the mediation effect of advertising and R&D spending as a share of sales on the relationship between equity-to-bonus compensation ratio and stock market return (H3) are new in the marketing literature and the compensation literature in accounting, finance and management. Results of agency theory based studies on the role of incentive pay in aligning the goals and risk preferences of managers have been mixed (Devers et al. 2007), so whether the goals will be aligned in managerial advertising and R&D spending decisions was unclear. As a result the findings make an important contribution to the marketing literature and the compensation literatures in management, accounting and finance.

This study is not without limitations. The maturing of incentive compensation given to top executives in the past can affect spending decisions. Change in the makeup or turnover of top executives can also result in changes in compensation and a change in strategic focus of the company. For example, a change in CEO, from one with a finance orientation to one with a marketing orientation could affect the advertising and R&D spending of the firm. Further, clearly top executive compensation is not the only non-marketing driver of advertising and R&D spending. For example, earnings pressures could also affect advertising and R&D spending. In addition, advertising and R&D are not the only managerial decisions that are potentially impacted by top executive compensation. For example, it is also conceivable that pricing, temporary price promotion and distribution decisions could be affected as well since these decisions involve tradeoffs between the short- and the long-term (Jedidi, Mela and Gupta 1999). Furthermore, stock market return is not the only metric to justify advertising and R&D spending and not all advertising and R&D spending
has long-term orientation (Farris, Bendle, Pfeifer and Reibstein 2010). Future research can consider maturing of incentive compensation, other non-marketing drivers of marketing decisions, other marketing decisions, and other metrics to judge the efficacy of marketing decisions. Moreover, future research could consider antecedents of executive compensation, such as changes in the makeup of the top executive team which may impact changes in compensation. For practicality reasons the effect of such an antecedent variable could be investigated for a smaller sample of firms than that in this study.

Several questions remain for future research. One question is whether process measures such as attention, prioritization of goals, etc., can explain how top executive compensation results in greater advertising and R&D spending to sales ratios. A second question is whether the effects of top executive compensation on the advertising and R&D spending to sales ratios, and the mediation of advertising and R&D spending on the effect of equity-to-bonus compensation ratio on stock market return is based on characteristics of the firm other than size, and characteristics of managers. Because this is the first paper on the effect of compensation on marketing and R&D spending decisions we have focused on establishing the main effects, leaving process measure based studies and interaction effects other than firm size and industry effects for future research. Process measure based studies could provide useful insights into how top executive compensation results in higher advertising and R&D spending to sales ratios and interaction effects could provide useful insights into conditions under which top executive compensation affects the advertising and R&D spending decisions to a greater or lesser extent and the conditions under which the mediation of advertising and R&D spending on the effect of compensation on stock market return is stronger or weaker. We hope our work will inspire the future research efforts identified.
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Footnotes

1 We thank a reviewer for suggesting this measure.
2 Very few studies in this literature focus on marketing or R&D decisions. In contrast, the studies focus on developing agency theory based arguments related to goal alignment and misalignment (e.g., Lie 2005), informational disclosures by executives on their strategic choices (e.g., Nagar, Nanda and Wysocki 2003), individual choices (e.g., Rynes, Gerhart, and Parks 2005), risk preference alignment (e.g., Desai and Dharampala 2006), and contextual influences (e.g., Cadenillas, Cvitanic and Zapatero 2004).
3 There are also a couple of early studies in the accounting literature that show a relationship between advertising and R&D spending on financial market outcomes (Hirschey 1982: Hirschey and Weygandt 1985). The main focus of these studies was capitalization and amortization of intangibles.
4 In addition, the marketing literature theorizes that advertising has the potential to develop a comparative advantage because it can enhance brand name recognition and equity (Aaker 1996; Keller 1998), increase differentiation (Kirmani and Zeithaml 1993), reduce product substitutability (Mela, Gupta, and Lehmann 1997), increase the price premium (Ailawadi, Neslin and Lehmann 2003), lower price sensitivity (Kaul and Wittink 1995; Sethuraman and Tellis 1991) and protect a brand from competitive sales promotions of lower equity brands (Blattberg, Briesch, and Fox 1995). In addition, brand equity can improve loyalty and receptiveness of consumers and distributors to new product introductions in existing markets (Kaufman, Jayachandran, and Rose 2006), help up-sell and cross-sell existing customers (Kamakura et al. 2003), and help the firm when it enters new markets (Srivastava, Shervani, and Fahey 1998). Advertising can also create barriers to entry and increase bargaining power over distributors.
5 One exception is Joshi and Hanssens (2009) who find that movies with above average pre-launch advertising have lower post-launch stock returns possibly due to high performance expectations built up prior to launch. Another is Erickson and Jacobson (1992) who find substantially lower (or no) accounting and stock market measure returns to advertising and R&D, for 99 firms during 1972-1986, than indicated in previous research (Connolly and Hirschey 1984; Salinger 1984).
6 We thank the AE for suggesting this explanation for the differences in perspectives.
7 A 2-segment model was found to have an AIC value which was better than that of 1 or 3-segment models.
8 A 4-segment model was found to have an AIC value which was better than that of 1, 2, 3, and 5-segment models.
<table>
<thead>
<tr>
<th>Year</th>
<th>Mean Sales ($ mil)</th>
<th>Mean equity-based compensation (%)</th>
<th>Mean bonus-based compensation (%)</th>
<th>Advertising Mean</th>
<th>Number of firms available</th>
<th>R&amp;D Mean</th>
<th>Number of firms available</th>
<th>ROI Mean</th>
<th>Number of firms available</th>
<th>Stock Return Mean</th>
<th>Number of firms available</th>
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<td>1995</td>
<td>2,918</td>
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<td>816</td>
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<td>877</td>
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<td>2026</td>
<td>30.07</td>
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<td>1998</td>
<td>3,251</td>
<td>39.34</td>
<td>17.82</td>
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<td>504</td>
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<td>2.38</td>
<td>2061</td>
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<td>3,758</td>
<td>42.75</td>
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<td>995</td>
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<td>17.46</td>
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<td>549</td>
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<td>1835</td>
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<td>928</td>
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<td>1840</td>
<td>19.71</td>
<td>1466</td>
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<tr>
<td>2002</td>
<td>4,252</td>
<td>40.75</td>
<td>18.41</td>
<td>2.91</td>
<td>661</td>
<td>10.01</td>
<td>978</td>
<td>-5.27</td>
<td>1878</td>
<td>-9.56</td>
<td>1534</td>
</tr>
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<td>2003</td>
<td>4,464</td>
<td>38.48</td>
<td>19.73</td>
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<td>1929</td>
<td>54.71</td>
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<tr>
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<td>40.64</td>
<td>21.37</td>
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<td>780</td>
<td>10.02</td>
<td>1014</td>
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<td>1872</td>
<td>20.35</td>
<td>1606</td>
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<tr>
<td>2005</td>
<td>5,828</td>
<td>40.12</td>
<td>21.29</td>
<td>3.22</td>
<td>743</td>
<td>8.57</td>
<td>962</td>
<td>3.42</td>
<td>1756</td>
<td>9.15</td>
<td>1545</td>
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# TABLE 2
## CORRELATION MATRIX

<table>
<thead>
<tr>
<th></th>
<th>Equity-to-bonus compensation ratio</th>
<th>Advertising Share of Sales</th>
<th>R&amp;D Share of Sales</th>
<th>ROI&lt;sub&gt;t-1&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equity-to-bonus compensation ratio</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Advertising Share of Sales</td>
<td>.006</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>R&amp;D Share of Sales</td>
<td>.008</td>
<td>.986</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>ROI&lt;sub&gt;t-1&lt;/sub&gt;</td>
<td>-.072</td>
<td>-.220</td>
<td>-.240</td>
<td>-</td>
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<tr>
<td>Stock Return&lt;sub&gt;t-1&lt;/sub&gt;</td>
<td>-.005</td>
<td>.004</td>
<td>.005</td>
<td>.110</td>
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### TABLE 3
RESULTS OF CHANGE IN COMPENSATION ON ADVERTISING SHARE OF SALES SPENDING

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-.0393 (.008)**</td>
<td>-.0518 (.019)**</td>
</tr>
<tr>
<td>D(EQTY/BONUS$_t$)</td>
<td>.0002 (.000)**</td>
<td>.0002 (.000)**</td>
</tr>
<tr>
<td>D(ROI$_{t-1}$)</td>
<td>.1212 (.060)</td>
<td>.078 (.060)</td>
</tr>
<tr>
<td>D(HDR$_{t-1}$)</td>
<td>.0453 (.008)**</td>
<td>.0451 (.009)**</td>
</tr>
<tr>
<td>Year Dummies</td>
<td>Not included</td>
<td>Included</td>
</tr>
<tr>
<td>R$^2$</td>
<td>.0135</td>
<td>.0353</td>
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<tr>
<td>Log-likelihood</td>
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<td>-2007.233</td>
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<tr>
<td>AIC</td>
<td>1.212</td>
<td>1.195</td>
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<td>Number of observations</td>
<td>3382</td>
<td>3382</td>
</tr>
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<td>Number of Firms Included</td>
<td>745</td>
<td>745</td>
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</table>

Notes: Change in Advertising Share of Sales is the change between the current and previous period. D( ) is the difference between the current period and the previous period. The greater the log-likelihood (lower negative values) the better the fit, fit is not adjusted for the number of parameters. AIC is the Akaike Information Criterion = -2(Log-likelihood/Number of observations) +2(Number of parameters/Number of observations), which adjusts for the number of model parameters, so that a lower value denotes a better model. *p<.05; **p<.01
TABLE 4
RESULTS OF CHANGE IN COMPENSATION ON R&D SHARE OF SALES SPENDING

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-.0207 (.007)**</td>
<td>-.0902 (.020)**</td>
</tr>
<tr>
<td>D(EQTY/BONUS, t)</td>
<td>.00007 (.000)**</td>
<td>.00007 (.000)**</td>
</tr>
<tr>
<td>D(ROI, t-1)</td>
<td>.0383 (.044)</td>
<td>.0407 (.045)</td>
</tr>
<tr>
<td>D(HDR, t-1)</td>
<td>.0237 (.006)**</td>
<td>.0221 (.006)**</td>
</tr>
<tr>
<td>Year Dummies</td>
<td>Not included</td>
<td>Included</td>
</tr>
<tr>
<td>R²</td>
<td>.008</td>
<td>.017</td>
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<tr>
<td>Log-likelihood</td>
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<td>-3226.837</td>
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<tr>
<td>AIC</td>
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<tr>
<td>Number of observations</td>
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<td>5017</td>
</tr>
<tr>
<td>Number of Firms Included</td>
<td>842</td>
<td>842</td>
</tr>
</tbody>
</table>

Notes: Change in R&D Share of Sales is the change between the current and previous period. D( ) is the difference between the current period and the previous period. The greater the log-likelihood (lower negative values) the better the fit, fit is not adjusted for the number of parameters. AIC is the Akaike Information Criterion, AIC is the Akaike Information Criterion = -2(Log likelihood/Number of observations) +2(Number of parameters/Number of observations), which adjusts for the number of model parameters, so that a lower value denotes a better model. **p<.01