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Marketing Expenses, Brand Equity, and a Firm's Financial Value

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Abstract

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This dissertation examines the marketing-finance interface by interpreting strategic activities and brand equity in finance language. The first study focuses on the extent to which central brand equity dimensions (Differentiation, Relevance, Esteem, Knowledge, and Energy) influence downside risk, upside risk, and the differential between upside and downside risk. Results indicate that (i) Esteem has a negative effect on the risk differential, which comes from a more pronounced positive effect on downside risk, (ii) Energy has a positive effect on the risk differential, which comes from a more pronounced positive effect on upside risk, and (iii) Knowledge has a negative effect on both downside and upside risks, and, thus, it has no statistically significant effect on the risk differential. The second study aims at investigating the structural behavior among strategic activities, brand equity, and financial factors and their dynamic interactions in the long term as well as in the short term. Making use of the panel

vector autoregressive model and orthogonalized impulse response analysis, this study provides empirical evidence of a link between strategic investments and brand value generation and finds feedback loops where advertising and research and development (R&D) expenditures and resultant brand equity increase cash flows and lower risk. The improved cash flows increase investments in R&D and advertising, enhancing brand value, which leads to a higher level of future-term cash flows, while the decreased risk induces a higher level of brand equity and as a result, lowers the level of risk. A high level of risk makes a manager invest more in R&D in the short run, which increases brand equity and reduces future-term risk, while an unexpected increase in risk leads to decreases in R&D and advertising expenditures in the long run. It is also found that the effect of a brand equity shock on cash flow and risk reaches a peak immediately and vanishes slowly, whereas the effect of an R&D shock reaches its peak and dies out quickly, and the effect of advertising shock reaches a peak and decays slowly. These findings allow managers to understand the marketing mechanisms and establish a tactical resource allocation.

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Isaac Newton said “To myself I am only a child playing on the beach, while vast oceans of truth lie undiscovered before me.” I want to emulate his humility. As a scholar, I will always stay humble while doing my research.

DEDICATION

To my family

Introduction

To identify what produces profit for a firm and enhances its value is a crucial issue for managing a company. One perspective on the role of new product development and promotion of products is that those strategic activities have a direct impact on a firm's performance, leading to tangible outcomes (e.g. market share, sales). Another perspective, based on market asset theory, is that such strategic activities play a more intermediate role by contributing to the generation and accumulation of a firm's intangible assets. The intangible assets of a firm, in turn, influence the loyalty of customers for its brands and attractiveness of the firm to investors, insulating the stocks from a market downturn. The evaluation of marketing and strategic metrics and intangible assets such as brand equity, allows the financial assessment of the investment in marketing and strategic activities. Accordingly, in this dissertation, we shed light on the relationships among strategic metrics, brand equity, and a firm's financial value, and provide guidelines for resource allocation to managers.

This dissertation is composed of two parts. In the first part, we introduce the dimensions that constitute brand equity and investigate the extent to which the dimensions influence a firm's financial assessment, making use of panel data. In the second part, we examine the dynamic interactions among marketing factors, customer-based brand asset, and a firm's financial position. In particular, we investigate the effect of advertising and research and development (R&D) expenditures on brand equity and a firm's financial assessment, and in reverse way, the role of firm's financial assessment in influencing brand equity and advertising and R&D expenses in the long run as well as short run.

Chapter 1

Brand Equity and Asymmetric Risk

1.1. Introduction

The value of a firm, as depicted by shareholder value for example, depends on the discounted value of the firm's expected future cash flows. As such, value depends not only on cash flows but also on the cost of capital used to discount future-term results. Research in marketing has focused primarily on the effect of marketing activities on factors related to cash flows (e.g., sales). However, marketing strategies can be hypothesized to affect not just the stream of cash flows, but also the firm's risk, and thereby the cost of capital.

Because of the centrality of risk in affecting firm valuation, some recent work, e.g., Singh, Faircloth, and Nejadmalayeri (2005), McAlister, Srinivasan, and Kim (2007), Tuli and Bharadwaj (2009), Rego, Billett, and Morgan (2009), has investigated the role of marketing variables in influencing the firm's "beta," i.e., the extent to which a firm's return covaries with the market-wide return. According to the Capital Asset Pricing Model (CAPM), total risk can be effectively decomposed into systematic (or market-wide) and unsystematic (or firm-specific) risk. Since unsystematic risk can be eliminated through diversification, a risk premium is only attached to systematic risk, i.e., beta. Since investors are sensitive to downside losses, relative to upside gains, and require a premium for holding assets that covary strongly with the market when it declines, marketing variables that decrease beta would enhance firm value separate from their effect on cash flows.

Despite its substantial theoretical appeal, research in finance over the past three decades has highlighted major deficiencies in the CAPM perspective. In particular, empirically estimated betas have shown limited ability to depict future-term expected returns and other metrics (e.g., factors related to size and the Book-to-Market Ratio) have been proposed as additional or alternative risk factors. That is, stocks with high past-period betas have had average returns no higher than stocks with the same size and lower beta and small market capitalization stocks and value stocks have delivered higher returns than their betas can justify.

Because of these empirical limitations, research in finance has sought to extend and modify the CAPM. One stream of research, e.g., Fama and French (1993), has proposed additional risk factors. For example, Carhart (1997) advances a four factor risk model that includes not only the extent to which a firm's stock covaries with the market return (i.e., beta), but also the extent to which the stock covaries with portfolios related to firm size, Book-to-Market Ratio, and momentum. Another line of research, e.g., Lewellen and Nagel (2006), has allowed for time-varying or conditional betas. Rather than assuming beta to be constant over time, beta is allowed to vary both over time and by economic conditions. Yet another line of research, e.g., Ang, Chen and, Xing (2006), has allowed for the possibility of asymmetries in beta. Namely, that a firm's downside beta (i.e., the extent to which a firm's stock covaries with the market in downturns) may be different than the firm's upside beta (i.e., the extent to which a firm's stock covaries with the market in upturns). If in fact asymmetries are present, then a traditionally estimated beta, which aggregates over both upturns and downturns, will not accurately reflect the firm's underlying risk characteristics.

Allowing for asymmetric risk has considerable intuitive appeal in that it closely corresponds to how investors perceive risk and provides a platform for better assessing how

marketing activities might influence risk. Because of the differential effects of upside from downside beta, researchers (e.g., Low 2001; Ang, Chen, and Xing 2006) have argued that a measure that aggregates these different risk characteristics will be inappropriate in the presence of asymmetric risk. Accordingly, rather than using an aggregate measure of risk, it is advantageous to take into account two distinct aspects of risk. First, the more a stock falls in downturns, i.e., the larger the downside risk (β^-), the less desired the stock. So, investors would require a higher return to be compensated for assuming this additional risk. Second, all else equal, (in particular, controlling for β^-), firms that vary more strongly with the market during upturns as opposed to downturns (i.e., firms where the differential between $\beta^+ - \beta^-$ is positive) would be more desired by investors and require a lower return. Looking at downside or upside beta in isolation focuses on only a particular dimension of risk and misses the other half of the picture. As such, a more complete understanding of a firm's risk characteristics requires an assessment of its downside risk (β^-) and the differential between upside and downside risk ($\beta^+ - \beta^-$).

Although several financial research studies emphasize the importance of downside risk (e.g., Hong, Tu, and Zhou 2006; Novy-Marx 2007; Ang, Chen, and Xing 2006), only a few studies have examined the relationship between marketing variables and downside risk (e.g., Tuli and Bharadwaj 2009). Moreover, despite its intuitive appeal, there has been little empirical research studying the properties of the risk differential and the factors that influence it. It would seem that marketing variables may well be among its central influences. A highly desirable feature of a marketing asset, e.g., brand equity, would be to accentuate the firm's return during up markets and mediate its loss during down markets. Rego, Billett, and Morgan (2009), making use of a measure that aggregates brand dimensions from the Harris Interactive EquiTrend database, report that brand equity attenuates downside risk more strongly than upside risk.

However, since they make use of an aggregate brand equity measure, it is unclear the extent to which the different dimensions of brand equity impact risk or the differential between upside and downside risk ($\beta^+ - \beta^-$). Further, some empirical considerations may also impact their findings. In particular, the estimating equations of Rego, Billett, and Morgan (2009), contrary to what is stated in the paper, do not take into account firm-specific effects and so may generate biased coefficient estimates.

According to the brand value chain model (Keller 1998), customer mindset which can be measured by for example, Young and Rubicam (Y&R) Brand Asset Valuator (BAV), is one of the key attributes that determines brand performance and shareholder value. In our study, we make use of the Y&R BAV framework for assessing a firm's brand assets, and seek to investigate the extent to which dimensions of brand equity influence downside risk, upside risk, and the upside minus downside risk differential. Because of the embryonic stage of research in the area (e.g., while past research has presented theoretical considerations linking brand equity to downside risk, little attention has been devoted to explicitly considering the role of brand equity on the differential between upside and downside risk), We develop a set of conjectures based on theoretical considerations and anecdotal evidence. We use these conjectures as a starting point for our analysis. We find that two brand dimensions, i.e., Esteem and Energy, are associated with the risk differential while Esteem and Knowledge are related to downside risk. Interestingly, Energy has a positive effect on the risk differential but Esteem has a negative effect. That is, while Energy has a greater impact on upside beta than downside beta, Esteem has a greater positive effect on downside beta than on upside beta. We find that Knowledge has a negative effect on downside beta. However, it has similar effects on upside beta, and, as such, it

does not have a statistically significant effect on the risk differential. Finally, we do not find statistically significant effects (at the 5% level) for either Relevance or Differentiation.

The rest of this chapter proceeds as follows. First, in the next section, we review systematic risk from the Capital Asset Pricing Model (CAPM) and discuss its asymmetric features. In the third section, we overview some past research assessing the effect of marketing variables on a firm's risk. Then, we offer conjectures about the effect of brand equity on the risks. In the ensuing three sections, data, model and results are presented, respectively. Last, we conclude the paper with a summary of results and discussion.

1.2. Systematic Risk Asymmetry

The standard excess return market model, which encompasses CAPM, can be expressed as:

$$(1) \quad R_{it} - R_{rft} = \alpha_i + \beta_i \cdot (R_{mt} - R_{rft}) + \varepsilon_{it}$$

where R_{it} is the stock return of firm i at time period t , R_{rft} is the risk free rate at time t , R_{mt} is market-wide return at time t , β_i is the systematic risk ("CAPM beta") of firm i , and α_i is the abnormal return ("alpha") of firm i . An implicit assumption underlying Equation 1 is that β_i is the same in up markets as in down markets, i.e., a firm's upside risk is the same as its downside risk. This assumption can be tested by allowing for differential market response depending on whether the market-wide return is positive or negative. That is,

$$(2) \quad R_{it} - R_{rft} = \alpha_i^+ + \alpha_i^- + \beta_i^+ \cdot S \cdot (R_{mt} - R_{rft}) + \beta_i^- \cdot (1 - S) \cdot (R_{mt} - R_{rft}) + \varepsilon_{it}$$

where S is a categorical variable equal to 1 if $R_{mt} > 0$; 0 otherwise. Under the null hypothesis of symmetric market response, $\beta_i^+ = \beta_i^- = \beta_i$ or equivalently $\beta_i^+ - \beta_i^- = 0$. While clearly any

estimated upside versus downside beta differential might be solely attributable to estimation error, studies have provided evidence of substantive asymmetries in beta. In particular, Ang, Chen, and Xing (2006) find that the differential is associated with differences in realized return. They formed five stock portfolios based on $\beta_i^+ - \beta_i^-$ and find a decreasing pattern in average excess abnormal returns with increasing $\beta_i^+ - \beta_i^-$. That is, investors require a lower return the higher the $\beta_i^+ - \beta_i^-$ differential. Ang, Chen, and Xing (2006) report that stocks in the lowest $\beta_i^+ - \beta_i^-$ grouping earned, on the average, 11.4% per annum in excess of the risk-free rate. Conversely, stocks in the highest $\beta_i^+ - \beta_i^-$ grouping earned, on the average, 3.6% per annum in excess of the risk-free rate. Low (2001) finds a similar result, that $\beta_i^+ - \beta_i^-$ has a negative market risk premium.

Analysis based on the traditional market model (which assumes symmetric risk in up and down markets), depicts investors requiring a risk premium for enduring downside risk even with symmetric upside risk because investors are more concerned about downside losses than upside gains (Ang, Chen, and Xing 2006; Rzepczynski 2004; see also Turner and Clelland 2007). An additional risk premium to downside risk would be required to the extent that asymmetric risk is present and the stock varies more substantially during down markets as opposed to up markets.

Post and Vliet (2004) point out that the systematic beta from the CAPM does not explain stock return as well as a framework that considers downside beta separately from regular beta. By allowing asymmetries in beta, in particular, making use of downside risk instead of an aggregate estimate of beta, the fit of a CAPM-based model is increased.

Given these considerations, in this paper we decompose the systematic risk into upside risk and downside risk, and investigate downside beta as well as the upside minus downside risk differential.

1.3. Marketing and Systematic Risk

Brand equity is a measure of a brand's power derived from customers' perceptions of the brand. Since customers' perceptions include various types of mindset such as awareness, quality, and differentiation, brand equity is embodied in multiple dimensions. Because some dimensions reflect different aspects of brand equity that do not move in lockstep, an aggregate measure of brand equity will not fully depict the properties of brand equity. To alleviate this concern, we make use of a multidimensional construct of brand equity and examine the role of each component of brand equity in influencing the firm's downside risk and upside minus downside risk differential.

Some previous research has investigated the effects of strategic activities, such as advertising (Bharadwaj and Menon 1993; Veliyath and Ferris 1997), and research and development (Veliyath and Ferris 1997), on a firm's risk. Bharadwaj and Menon (1993) find positive relationships between advertising and total risk (systematic risk and unsystematic risk). Veliyath and Ferris (1997) suggest that advertising and R&D endow the firm with differentiation, which drives lower systematic risk. Singh, Faircloth, and Nejadmalayeri (2005) report a negative relationship between advertising expenditure and systematic risk among the best performing firms from the Stern-Steward database. McAlister, Srinivasan, and Kim (2007) undertake analysis of the effect of advertising and R&D expenditures on a firm's CAPM beta. Extending the framework of Beaver, Kettler and Scholes (1970), for example, making use of panel data econometric methods to control for firm specific effects, they find that both advertising and R&D intensity are negatively related to a firm's systematic risk.

Past studies commonly assume a link between advertising and R&D expenditures (which, for example, helps to differentiate a firm's products), and brand equity. In turn, brand equity is

posited to decrease risk. For example, brand equity is associated with investors having greater recognition of the firm's stock (Frieder and Subrahmanyam 2005), which results in a broad ownership of such stocks (Grullon, Kanatas, and Weston 2004).

The assumption that dollar expenditures for advertising or R&D can adequately depict firm brand equity is questionable. Research has found that increased dollar expenditures cannot fully explain changes in brand equity (Cobb-Walgren, Ruble, and Donthu 1995) or brand equity effects on firm performance (Eastlack and Rao 1989; Blair 1987; Lodish et al. 1995). This suggests that it would be advantageous to include other measures of brand equity, such as perceptual metrics, in analyses seeking to assess the effect of brand equity on risk.

Rego, Billett, and Morgan (2009) undertake this type of analysis by making use of an aggregate measure of brand equity formed from the Harris Interactive EquiTrend database. They assess the effect of this brand equity metric both on an aggregate measure of systematic risk and on its components of downside and upside risk. They report that brand equity has a statistically significant negative effect on aggregate risk. Further, they note that the negative effect of brand equity on downside risk is greater in magnitude than the downward effect on upside risk. That is, they find that brand equity attenuates downside risk more strongly than upside risk.

Our study has similarities, but differs from Rego, Billett, and Morgan (2009) in a number of key aspects. First, rather than making use of an aggregate measure of brand equity that combines its different dimensions, our analysis investigates differential effects for the different brand equity dimensions. Aaker and Jacobson (1994) report that the Total Research Corporation measures of brand equity (a precursor to the Harris Interactive Metrics) have different associations with stock return. In particular, while changes in quality were found to be associated with abnormal return, changes in familiarity were not. To the extent that brand equity

dimensions have differential associations with risk, analysis based on an aggregate measure will mask these differences. Second, Rego, Billett, and Morgan (2009) model only lagged effects, but not contemporaneous effects, of brand assets on risk. To the extent that current and lagged values are correlated, contemporaneous effects will be reflected in the lagged effects. However, if differences in variables are utilized, within year effects will not be captured if current-term metrics are not included in the analysis. Third, the Rego, Billett, and Morgan (2009) treatment of fixed effects is inconsistent with the panel data literature. In the panel data literature (see, for example, Greene 2003), fixed effects refer to firm-specific, time-invariant factors that influence the dependent variable (e.g., risk). To the extent that these fixed effects are correlated with the explanatory factors, not capturing their influence will generate biased coefficient estimates. Rego, Billett, and Morgan (2009) report that a Hausman test (Hausman 1978) rejects the null hypothesis of no fixed effects. As such, a fixed effects estimator (e.g., taking deviations from the firm mean or first differences) is required to remove the bias from the least squares estimate. However, they do not make use of a fixed effects estimator. Instead, they state that to account for fixed effects “*we estimate our models using industry- and year-specific dummies.*” By putting in industry and yearly dummies they control for industry effects and annual economy-wide effects, but not firm specific effects. It remains to be determined how estimation of a fixed effects model influences the analysis.¹

¹ Other differences in the analysis exist as well. For example, we use beta as our measure of systematic risk. Rego, Billett, and Morgan (2009), making use of the fact that total variance can be decomposed into systematic variance plus unsystematic variance, use the square root of systematic variance, i.e., $\sqrt{\beta^2 \cdot \sigma_m^2}$, where σ_m^2 is the variance of the market-wide return.

1.4. Role of Brand Equity on Risk

The traditional perspective on the role of brand equity is that increases in brand equity will lead to decreases in a firm's risk. The differentiation inherent in brand equity makes a firm's product less substitutable and lowers price sensitivity. Further, brand equity acts as a barrier to competition and increases customer loyalty. These benefits insulate a firm's stock from market downturns and so decrease the covariance between the firm's stock return and the market return (i.e., lower the firm's aggregate beta).

Our study, while nesting implications from this traditional perspective, allows for three primary points of departure. One, we allow for the fact that brand equity is multidimensional and that the different dimensions of brand equity can have differential effects, perhaps positive or negative, on risk. Two, we allow for the fact that brand equity may have differential impacts on upside versus downside risk. The traditional perspective tends to highlight brand equity effects on downside risk without an explicit consideration of upside risk. For example, differentiation may insulate a firm stock from market downturns, but does it similarly insulate a firm's stock from market upturns? Three, we allow for the fact that some effects of brand equity may be occurring within the year and that delayed and carryover effects may exist as well. Unlike previous studies, we consider multiple dimensions of brand equity, and allow each component of brand equity to have differential effects on a firm's upside and downside risks. We also allow for the contemporaneous effects as well as lagged effect.

Customer mindset, which includes everything about customer cognition and affect regarding brand, is crucial to creating brand value (Keller and Lehmann 2003). As proposed measures of customer mindset, multidimensional structures have been introduced. Aaker (1996) suggests four dimensions (Loyalty, Perceived Quality and Leadership, Association and

Differentiation, Awareness and Market Behavior) motivated by Young and Rubicam's (Y&R) Brand Asset Valuator (BAV) and Keller and Lehmann (2003) suggests five dimensions (Awareness, Associations, Attitudes, Attachment, Activity) based on prior research. Although there is some disagreement about whether such dimensions are components that constitute brand equity or they are brand equity drivers, various studies commonly agree that Y&R BAV is one of the most viable models to value customer mindset. Aaker (1996) states that Y&R BAV is "a major effort to measure brand equity across product classes," Keller (1998) mentions that Y&R BAV is "the most extensive research program on global branding to date," and Keller and Lehmann (2003) advocate Y&R BAV as an approach to measure customer mindset.

The original BAV Model (e.g., Agres and Dubitsky, 1996) was a four dimensional model based on Differentiation, Relevance, Esteem, and Knowledge that was designed to be reflective of a brand's overall health. More recent work (e.g., Fudge 2005; Gerzema, Lebar, and Sussman 2005; Mizik and Jacobson 2008, 2009) has highlighted the advantages of adding an Energy construct to this original set of brand dimensions in order to tap into the future-term capabilities of the brand.² Accordingly, we focus on five brand dimensions of brand equity (i.e. Differentiation, Relevance, Esteem, Knowledge, and Energy) from the updated Y&R BAV database. Table 1 summarizes the BAV dimensions, measurements, and their roles.

² In some applications, BrandAsset Consulting makes use of a measure that combines Differentiation and Energy, which they label as Energized Differentiation (http://www.brandassetconsulting.com/site_pages/brand_health). In other contexts, in particular, when differing relationships are uncovered, BrandAsset Consulting incorporates the approach of Mizik and Jacobson(2008) and makes use of Energy as an additional construct to the original BAV dimensions. In some other applications, BrandAsset Consulting will make use of a two construct model by combining Energized Differentiation and Relevance into a measure they label "Brand Strength" and Esteem and Knowledge into a measure they label "Brand Stature." For our analysis, we make use of the most general model that allows for separate effects for each of the five brand components. As part of sensitivity analysis we also factor analyzed the brand components. Factor analysis was not advantageous in that it combined brand components having differential effects on risk into the same factor.

Table 1 Overview to Brand Dimensions Used in Analyses

BAV Dimension	Metrics	Scale	Measure	Dimension Underpinning
Differentiation	Unique	Yes/No	Average proportion of	The ability to stand apart from its competitors.
	Distinctive	Yes/No	"Yes" over the two	A brand is based on a set of differentiating promises.
Relevance	Personal Relevance	1-7 Scale	Average score	Personal importance and appropriateness, which depicts the extent that the brand stands for something that actually matters in the marketplace and it's "staying power."
Esteem	Personal Regard	1-7 Scale	Average z-score for	The level of respect, deference, and regard a
	Perceived High Quality	Yes/No	each of the four	consumer holds for a brand. Esteem reflects
	Leader	Yes/No		how well consumers respect the brand, as well
	Reliable	Yes/No		as how well the brand fulfills its promises.
Knowledge	Familiarity with the	1-7 Scale	Average score	Familiarity consumer has with a brand, which
	Brand			reflects a customer's intimacy with and deep understanding of a brand.
Energy	Innovative	Yes/No	Average proportion of	The ability to adapt to future-term customer
	Dynamic	Yes/No	"Yes" over the two	needs and changing conditions, which reflects a brand's future-term capabilities.

The first pillar of the Y&R BAV model is Differentiation, which measures the perceived distinctiveness and uniqueness of the brand and shows the ability of a brand to stand apart from its competitors. The respondents in the Y&R survey are asked whether the brand is unique (distinctive) or not. The average proportion of “YES” over two questions (uniqueness and distinctiveness) indicates Differentiation. The second variable is Relevance which shows the personal importance of the brand measured by 1-7 scale. Esteem, the third pillar, represents the level of regard consumers hold for the brand. Young and Rubicam measure this variable by averaging the z-scores for each of four items: (1) the proportion of respondents who indicate that they believe the brand is of high quality, (2) the proportion of respondents who indicate that they believe the brand is a leader, (3) the proportion of respondents who indicate that they believe the brand is reliable, and (4) a rating (on a seven-point scale) that indicates the respondent’s personal regard for the brand. The fourth pillar is Knowledge that shows the familiarity with the brand. Energy, the fifth pillar of brand equity, measures the brand’s innovative and dynamic ability. Similar to Differentiation, the respondents in Y&R survey are asked whether the brand is innovative and/or dynamic. The average proportion of “YES” over the two questions becomes Energy. All the Y&R pillar measures are converted to z-scores. For each attribute of brand equity, we construct the following conjectures (see Figure 1).

1.4.1. Differentiation

Analyses of the relationship between risk and brand equity have highlighted the role of differentiation. McAlister, Srinivasan, and Kim (2007), for example, note that brand equity decreases a firm’s risk since the differentiation of a firm’s products makes them less substitutable (Mela, Gupta, and Lehmann 1997). This phenomenon is conspicuous especially when the market

turns down. In a down market, a brand that stands apart from its competitors will not be faced with the same downward prospects and pressures to lower price as a non-differentiated brand. Similarly, in a growing market, we do not expect a differentiated brand to experience as sharp an increase in growth because of its more insulated position in the marketplace. But, its unique positioning is more stabilizing in downturns than in upturns. Accordingly, we offer the conjecture that Differentiation is likely to reduce expected loss when the market turns down and reduce expected gains, albeit to a smaller extent, when the market turns good. These effects lead to a conjectured positive effect of Differentiation on the gap between upside and downside risk.

C1a: Differentiation has a negative effect on downside risk

C1b: Differentiation has no effect on upside risk

C1c: Differentiation has a positive effect on the gap between upside risk and downside risk

1.4.2. Relevance

Regardless of the market situation, there will be always a certain amount of demand for brands that are very important and necessary to people. This property will make the brand hold a prominent position even when the market turns down and encounter less expected loss compared to brands with less importance. Gerzema, Lebar, and Rivers (2009) show that Relevance, because of its impact on market penetration, is one of the most important attributes in building a firm's sales. Particularly in economic downturns, consumers can be expected to focus on those brands that "strike meaningful chords." When the market turns good, however, that property would not lift the sales of such brands up dramatically. That is, brands with high Relevance will be less sensitive to changes in the market situation. Based on this logic, we develop the

conjectures that Relevance will be related to both downside risk and upside risk negatively. Thus, there will be no relationship between Relevance and the upside minus downside risk differential.

C2a: There is a negative relationship between downside risk and Relevance

C2b: There is a negative relationship between upside risk and Relevance

C2c: There is no relationship between upside and downside risk differential and Relevance

1.4.3. Esteem

Esteem combines consumers' perceived quality, leadership, reliability, and high regard for a brand. At first glance, high quality and regard for the brand would seem to lower a firm's systematic risk. However, further analysis suggests another possible scenario. Under good market circumstances, high regard for a brand should increase potential gains as consumers seek out superior quality products. In contrast, in a market downturn, high perceived quality, especially if accompanied by high price, is less likely to appeal to customers as it may be viewed as an unnecessary extravagance. Customers become more price conscious in downturns (Estelami, Lehmann, and Holden 2001) and turn to lower priced, less esteemed brands. For example, it was reported that the October 2008 retail sales of Neiman Marcus diminished by 26.8%, whereas retail sales of Walmart during the same period increased by 2.4%.

Additional insights into the effect of Esteem on risk can be garnered based on studies involving private-label brands. Lamey et al. (2007) found that the market share for private-label brands increased in economic contractions and decreased in economic expansions. Further, they found that private-label share increased more in downturns than it decreases during expansionary

periods. From this, we infer that the positive effect of Esteem on downside risk will be stronger compared to upside risk. This allows us to conjecture that Esteem influences the difference between upside risk and downside risk negatively. This allows us to conjecture that

C3a: Esteem influences downside risk positively

C3b: Esteem influences upside risk positively

C3c: Esteem influences the difference between upside risk and downside risk negatively

1.4.4. Knowledge

There is substantial empirical evidence that investors tend to “buy what they know.” For example, French and Poterba (1991) document that investors overweight their portfolios with domestic stocks (a “home-country” bias). Grullon, Kanatas, and Weston (2004) show that this same type of bias applies intra-country for more visible brands. Frieder and Subrahmanyam (2005) argue that investors would invest more heavily in stocks of companies with high visibility because information flows about such companies are greater. As such, consumer Knowledge about the brand impacts the ownership base and market liquidity of the firm’s stock, and so the risk of the stock.

This preference of investors for high-Knowledge brands insulates a stock from downturns. Particularly during market downturns, people tend to be conservative and turn to safer purchases. Consumers choose familiar brands rather than unfamiliar ones, resulting in smaller losses for brands with high familiarity. In market upturns, risk aversion attenuates. This tells us that the role of Knowledge will be prominent under bad market conditions while the role will be weakened under good market situations. Accordingly, we expect negative but small effect of

Knowledge on upside risk and negative effect of Knowledge on downside risk. Finally, the net result is a conjectured positive effect on the gap between upside and downside risk.

C4a: Knowledge has a negative relationship with downside risk

C4b: Knowledge has a negative relationship with upside risk

C4c: Knowledge has a positive association with the gap between upside and downside risk

1.4.5. Energy

Innovativeness and brand dynamism create perceptions of product superiority, but also perceptions of enhanced uncertainty and risk. A firm needs to manage the conflict these perceptions create. Innovativeness is commonly viewed as a “strategic option” to be exercised when the time is right (Luehrman 1998; Myers 1984). The time is right tends to be in favorable economic times when consumers are more willing to experiment with more risky products.

Indeed, as high Energy firms particularly excel during period of economic growth, this suggests a positive relationship between Energy and upside risk. Two different schools of thought exist with respect to the association between Energy and risk in down markets. One school of thought is that consumers are less open to innovation during a recession (Quelch 2008). Consumers want the reassurance and comfort of more traditional brands and shun the risk associated with buying more uncertain brands. This suggests that Energy and downside risk will be positively correlated. The other school of thought suggests that consumers are no more risk averse in down economic times. Indeed, the more people carefully reflect about their needs and how they are changing, the more likely they will turn to innovative brands (TNS 2009). This would lead to a negative association between Energy and downside risk. As both schools of thought may have merit and

lead to a diminished effect, this suggests the positive association of Energy with risk in up-markets will dominate a smaller association in down-markets. As a result, we would expect that Energy will have a positive association with the differential between upside and downside beta.

C5a: Energy has a positive relationship with downside risk

C5b: Energy has a positive relationship with upside risk

C5c: Energy may have either a positive or a negative relationship with the difference between upside and downside risk

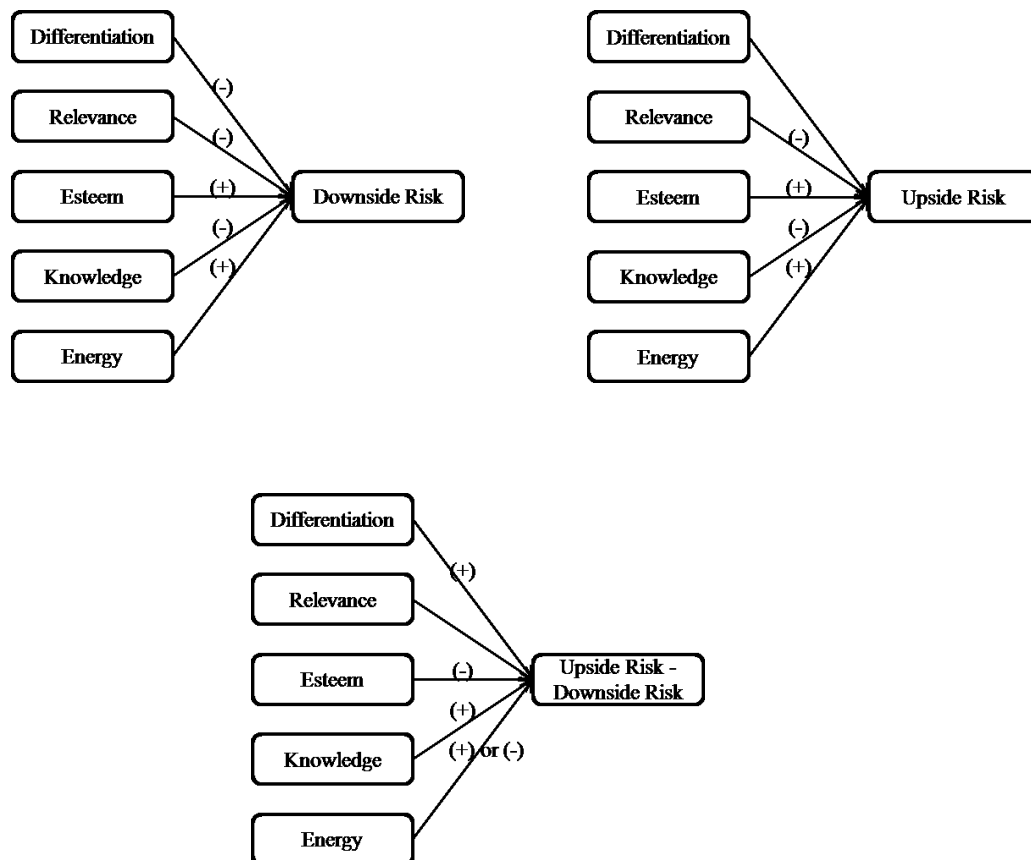


Figure 1 Conjectures Involving the Relationship between Five Dimensions of Brand Equity and Conditional Risks

1.5. Estimation Procedure

The conjectures are tested in a procedure that is composed of two steps: (1) estimation of a firm's systematic risk and (2) estimation of the association of a firm's risk with brand equity variables, a marketing expenditure variable, and financial control measures.

1.5.1. Estimate a Firm's Systematic Risk, Upside Risk, Downside Risk, and Upside minus Downside Risk Differential

Lo and Mackinlay (1990) point out that daily beta, which we estimate in this paper, will not reflect much in the way of small stock covariance with market returns. To alleviate the problem, we include both current and lagged values of excess of returns on market in the regressions, following the suggestion of Dimson (1979) in his paper (see Equations 3, 4, and 5) and define three betas, β as $b1$, β^{II} as $b1+b2$, and β^{III} as $b1+b2+b3$.

$$(3) \quad R_{it} - R_{rft} = \alpha_i + b1_i \cdot (R_{mt} - R_{rft}) + \varepsilon_{it}$$

$$(4) \quad R_{it} - R_{rft} = \alpha_i + b1_i \cdot (R_{mt} - R_{rft}) + b2_i \cdot (R_{mt-1} - R_{rft-1}) + \varepsilon_{it}$$

$$(5) \quad R_{it} - R_{rft} = \alpha_i + b1_i \cdot (R_{mt} - R_{rft}) + b2_i \cdot (R_{mt-1} - R_{rft-1}) \\ + b3_i \cdot \frac{1}{3} \cdot \{(R_{mt-2} - R_{rft-2}) + (R_{mt-3} - R_{rft-3}) + (R_{mt-4} - R_{rft-4})\} + \varepsilon_{it}$$

In order to select the best beta of the three, we investigate the coefficient of lagged betas for stock returns (see Equations 6 and 7).

$$(6) \quad R_y = \delta \cdot Risk_{iy-1} + \eta_{iy}$$

$$(7) \quad R_y = \delta \cdot Risk_{iy-2} + \eta_{iy}$$

where y is year, R_y is R_{iy} , $R_{iy} - R_{my}$, or $R_{iy} - R_{rft}$, and $Risk$ is β , β^{II} , or β^{III} .

The high positive correlation between each pairs of betas (see Table 2) and the relationship between stock return and lagged risk (see Table 3) suggest that no beta outperforms others. Accordingly, we use systematic risk, β , for further analysis.

Table 2 Correlation between Each Pairs of Betas

	β	β^{II}	β^{III}
β	1	.934***	.800***
β^{II}	.934***	1	.875***
β^{III}	.800***	.875***	1

* $p < .1$, ** $p < .05$, *** $p < .01$.

Table 3 Relationship between Betas and Stock Returns

R_y	Risk	$R_y = \delta \cdot Risk_{iy-1} + \eta_{iy}$				$R_y = \delta \cdot Risk_{iy-2} + \eta_{iy}$			
		Est.	Std.	t-stat	p value	Est.	Std.	t-stat	p value
R_{iy}	β	.007***	.003	2.57	.010	.007***	.003	2.77	.006
	β^{II}	.007***	.002	2.93	.004	.008***	.003	3.05	.002
	β^{III}	.007***	.002	3.11	.002	.008***	.002	3.41	.001
$R_{iy} - R_{my}$	β	.008***	.003	3.08	.002	.009***	.003	3.31	.001
	β^{II}	.008***	.002	3.43	.001	.009***	.003	3.59	.000
	β^{III}	.008***	.002	3.58	.000	.009***	.002	3.93	.000
$R_{iy} - R_{rfy}$	β	.007**	.003	2.54	.011	.007***	.003	2.74	.006
	β^{II}	.007***	.002	2.90	.004	.008***	.003	3.02	.003
	β^{III}	.007***	.002	3.08	.002	.008***	.002	3.38	.001

* $p < .1$, ** $p < .05$, *** $p < .01$.

Using the excess return market model, we estimate for each year the firm's systematic risk (β_{iy}), upside risk (β_{iy}^+), and downside risk (β_{iy}^-). These estimates allow us to construct the upside minus downside risk differential (i.e., $\beta_{iy}^+ - \beta_{iy}^-$). Although different from most estimated asset pricing models that use monthly returns, consistent with Lewellen and Nagel (2006) we use daily stock returns to get sufficient data since our separate regressions are estimated over a short period, i.e. a year (see Equations 1 and 2).

1.5.2. Estimate the Association of a Firm's Risk with Brand Equity Variables

In this step, we investigate which variables can predict a firm's risk by regressing the systematic risk that we get from phase one on the brand equity dimensions, while taking into account Selling, General and Administrative (SG&A) expenses scaled by sales and financial control variables.

Since we use panel data, i.e., data that incorporates both time series and cross-sectional observations, we check for the existence of firm specific effects by comparing the coefficients of a random effect model (Equation 8) to those of a fixed effect model. For both models, we add yearly dummy variables. Controlling for fixed effects through the use of the first difference estimator,³ our estimating equation is as follows (see Equation 9).

$$(8) \quad Risk_{iy} = \alpha_i + \theta_1 \cdot \mathbf{x}_{iy} + \theta_2 \cdot \mathbf{x}_{iy-1} + \gamma \cdot \mathbf{z}_{iy} + \delta \cdot \mathbf{FCV}_{iy-1} + \text{yearly dummies} + \varepsilon_{iy}$$

$$(9) \quad \Delta Risk_{iy} = \theta_1 \cdot \Delta \mathbf{x}_{iy} + \theta_2 \cdot \Delta \mathbf{x}_{iy-1} + \gamma \cdot \Delta \mathbf{z}_{iy} + \delta \cdot \Delta \mathbf{FCV}_{iy-1} + \text{yearly dummies} + \Delta \varepsilon_{iy}$$

³ As the autocorrelations for the risk estimates are in the range of .9, the use of first differences can also be viewed as an autocorrelation correction that defuses the spurious regression phenomenon. The distinction between a fixed effects model and a standard correlation adjustment model is that failure to control for fixed effects results in biased coefficient estimates, while failure to adjust for serial correlation can still allow for unbiased coefficient estimates but the standard errors are invalid. The Hausman specification test results reporting biased coefficients in the levels model indicates that a non-parametric approach for adjusting for serial correlation (e.g., making use of robust standard errors) would be an inappropriate alternative to the taking of first differences.

where y =year, \mathbf{x} =[Differentiation, Relevance, Esteem, Knowledge, Energy], \mathbf{z} = $\log(\text{SG\&A}/\text{Sales})$, \mathbf{FCV} =[$\log(\text{Market Equity})$, $\log(\text{Book-to-Market Ratio})$]. We adopt five dimensions of brand equity as predictor variables, while taking into account two financial control variables (Market Equity and Book-to-Market Ratio) and one marketing variable (SG&A/Sales). Both current and lagged brand equity are included in our model to allow for carryover and delayed effects.

In line with other studies, we use Selling, General and Administrative (SG&A) expense to measure marketing expenditures. Dutta, Narasimhan, and Rajiv (1999) suggest that SG&A expense is “a good proxy for the amount the firm spends on its market research, sales effort, trade expenses, and other related activities.” Boulding and Christen (2008) adopt SG&A expense as a firm’s cost-based performance to set its pioneering strategy in marketing. Narasimhan, Rajiv, and Dutta (2006) use SG&A expenditure to investigate the effect of marketing expenditure and a firm’s absorptive capacity. An additional advantage of SG&A is that it includes R&D expenditures so that it would also capture other expenditures that have been posited to affect firm risk.

1.6. Data

We collected daily stock returns, stock price, and number of shares outstanding from the CRSP database and quarterly accounting variables such as SG&A expenditure and total assets from the COMPUSTAT database. Brand equity dimensions (Differentiation, Esteem, Relevance, Knowledge, and Energy) were obtained from the Young and Rubicam Brand Asset Valuator (Y&R BAV) database (Fudge 2005; Gerzema, Lebar and Sussman 2005; Mizik and Jacobson 2008). We use fourth quarter data from COMPUSTAT and Y&R BAV. The final data set

includes 218 mono-brand firms and a total of 806 observations from 2002 to 2006 with lagged information for 2 years (i.e. 2000 and 2001).

Descriptive statistics for the risk measures are shown in Table 4. Figure 2 depicts the frequency distribution of systematic risks. Consistent with previous findings, the mean for beta is around 1, although the upside minus downside beta differential is slightly positive (.014) (see Table 4, Figure 2). Skewness (Kurtosis) of Beta is .611 (3.775) and that of downside beta is 1.033 (5.074). This means that downside risk is more skewed right and tailed longer than is regular systematic risk (see Figure 2).

Table 4 Descriptive Statistics

Variable	Mean	Std.	10%	90%
Regular beta	1.054	.402	.542	1.552
Downside beta	1.044	.526	.465	1.715
Upside beta	1.057	.469	.490	1.687
Upside-Downside beta	.014	.501	-.555	.549

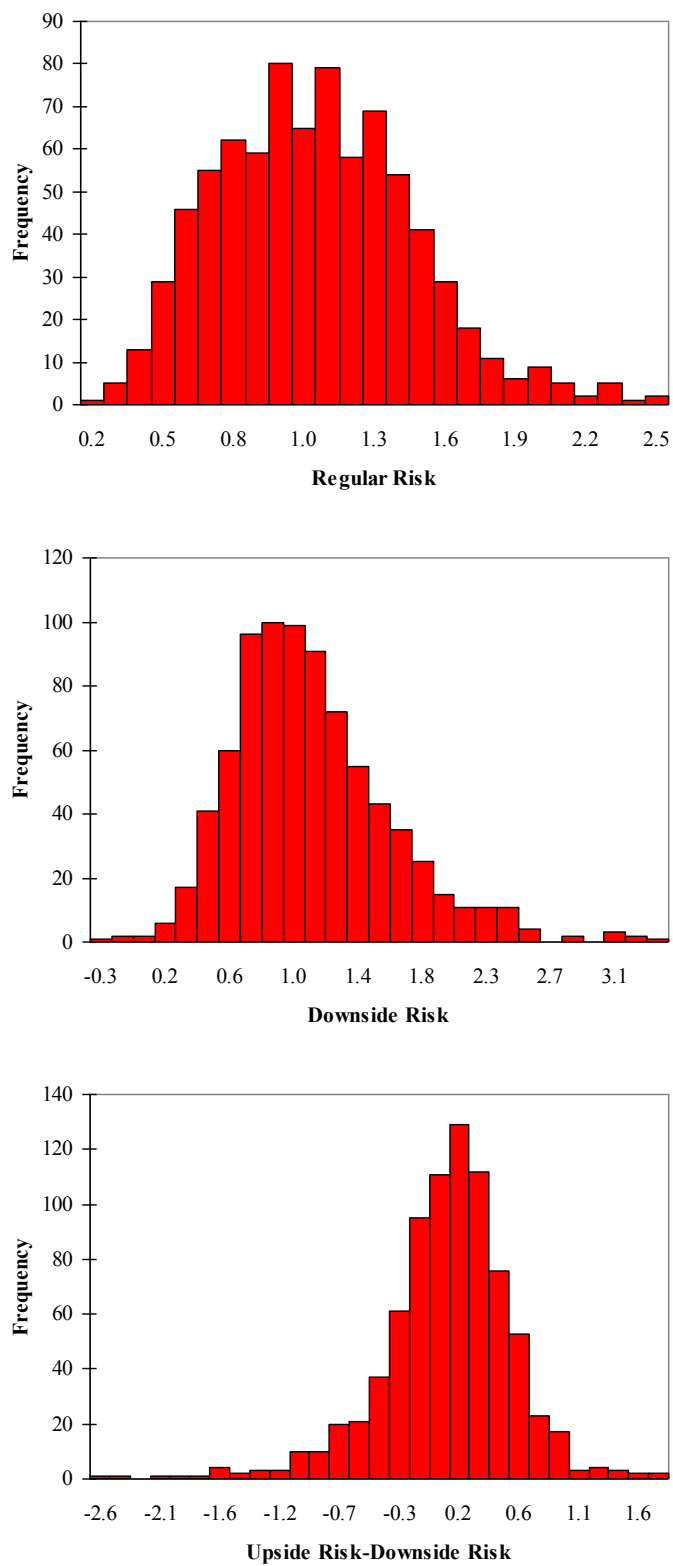


Figure 2 Frequencies of Systematic Risks

The autocorrelation for the risk estimates (β : .967, $p=.000$; β^+ : .896, $p=.000$; β^- : .895, $p=.000$) highlights the substantial stability in the estimates. A firm's risk characteristics do not vary substantially inter-temporally, but rather exhibit considerable persistence that stems from, for example, firm-specific fixed effects. Taking first differences, addresses both these fixed effects and other factors that generate high autocorrelation.

Figure 3 provides a graph of a firm's average upside beta versus its average downside beta. The figure highlights the substantial cross-correlation (.68) between the risk measures. Both measures are reflective of a common risk characteristic. An issue is the extent to which an asymmetry exists and whether an asymmetry may be related to brand equity dimensions. In order to control for the common risk characteristics and isolate the asymmetry, we analyze the differential between upside and downside risk.

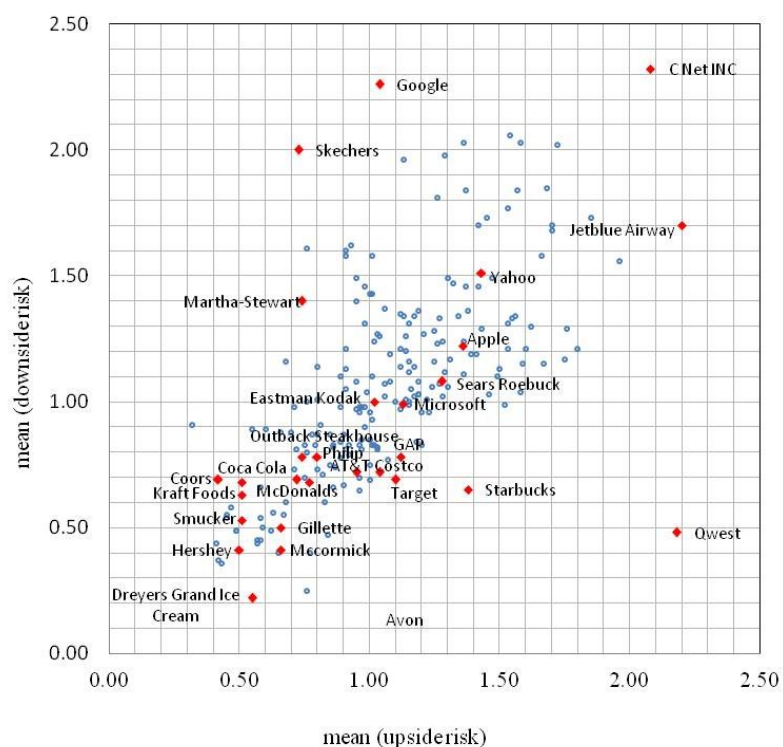


Figure 3 Average Upside Risk vs. Average Downside Risk

For individual firms, we constructed a histogram of the average difference between upside beta and downside beta across seven years (see Figure 4). The distribution is centered around zero, but with firms exhibiting a fair amount of variation (e.g., Starbucks has an average positive differential of .53, while Expedia has a negative average differential of -1.10).

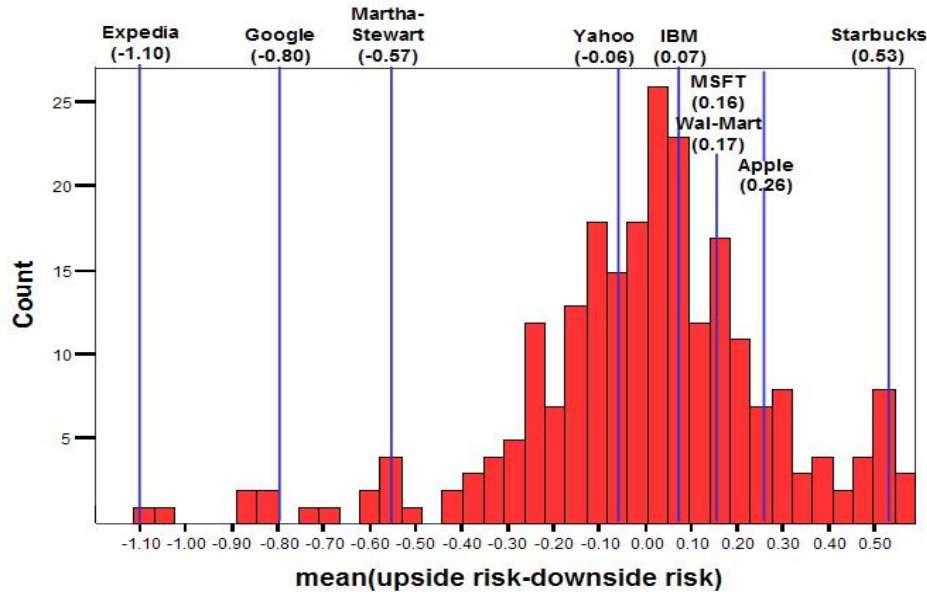


Figure 4 Average Value of Upside Minus Downside Risk across Years

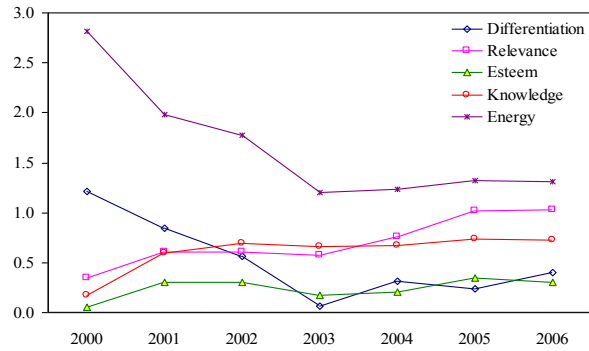
Figure 5 provides examples of the evolution of the five brand dimensions over time. We see variation between brands, between dimensions, and over time. For example, Microsoft ranks highest on Energy compared to its other brand dimensions. However, since 2000 it has experienced a rather substantial drop in its brand Energy rating. Yahoo displays a somewhat similar dynamic pattern for its brand dimensions, but the level of its dimensions are all lower than those of Microsoft. Starbucks is high in Differentiation; Kraft is high in Relevance. Eastman Kodak experienced declines for all its brand dimensions. Sears ranks low in Differentiation and Energy. While its brand Knowledge dimension has remained about the same

over the 7 year period, it has experienced a fall in Esteem. These different behaviors of each variable lead us to use each dimension in our analysis as they may have differential effects on risk.

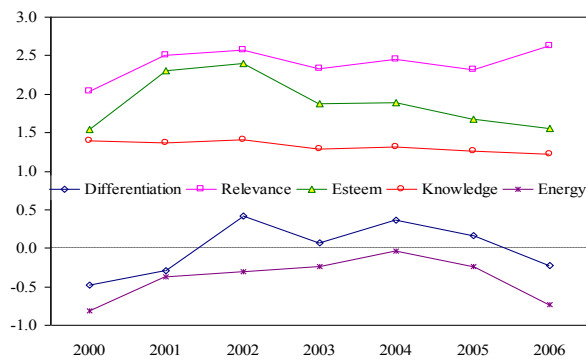
Indeed, as shown in Table 5, the correlations between changes (i.e., first differences) in the brand dimensions are relatively modest. Changes in brand equity do not occur uniformly across brand dimensions. For example, there is little correlation (.04) between changes in Knowledge and changes in Differentiation. The different dimensions are reflecting different components of brand equity. As such, understanding the effect of brand equity on risk would seem to require disaggregate analysis. It is also the case that the growth in SG&A intensity exhibits little correlation with any of the brand equity dimensions. None of the cross-correlations between the growth rate in SG&A intensity and changes in brand equity dimensions is statistically significant. This suggests that changes in brand equity will not be adequately reflected in expenditure measures.



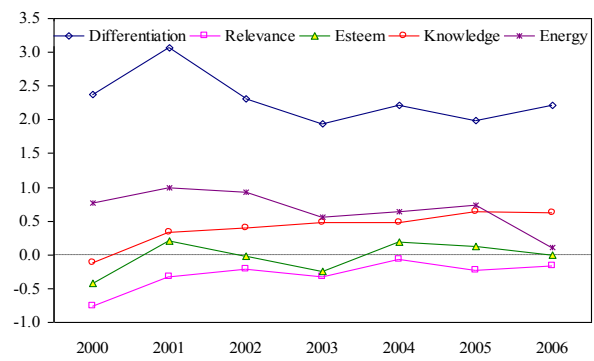
(a) Microsoft



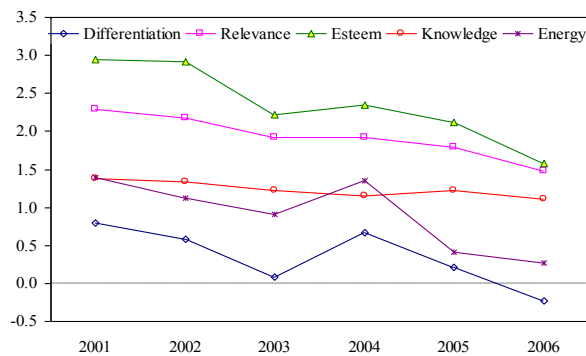
(b) Yahoo



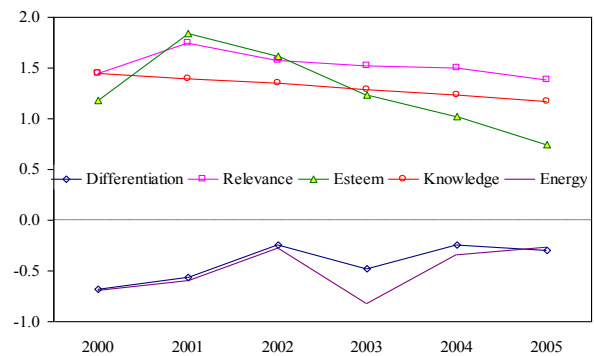
(c) Kraft Foods



(d) Starbucks



(e) Eastman Kodak Co.



(f) Sears Roebuck & Co.

Figure 5 Brand Equity over Time for Selected Brands

Table 5 Mean and Correlation of Independent Variables

	Mean	1	2	3	4	5	6	7	8
1 Δ Differentiation	-.081	1	.185***	.329***	.041	.351***	.016	-.063*	.007
2 Δ Relevance	-.015	.185***	1	.416***	.463***	.061*	.000	.080**	.039
3 Δ Esteem	-.102	.329***	.416***	1	.262***	.223***	-.008	.076**	-.010
4 Δ Knowledge	-.006	.041	.463***	.262***	1	.029	.072**	-.004	.053
5 Δ Energy	-.068	.351***	.061*	.223***	.029	1	.038	-.027	.018
6 Δ log(Book-to-Market)	.000	.016	.000	-.008	.072**	.038	1	-.551***	.099***
7 Δ log(Market Equity)	.078	-.063*	.080	.076**	-.004	-.027	-.551***	1	-.079**
8 Δ log(SG&A/Sales)	.002	.007	.039	-.010	.053	.018	.099***	-.079**	1

* $p < .1$. ** $p < .05$. *** $p < .01$.

1.7. Results

As a point of comparison, we begin our analysis by examining the effect of an aggregate measure of brand equity (formed as the average of the five brand equity dimensions) on regular risk. Column 2 of Table 6 reports the results. We find that changes the aggregate measure of brand equity lagged 1 year are positively related to changes in CAPM beta. The estimated coefficient (.083) is significant at the 5% level.

Disaggregating beta into its upside and downside components allows us to better isolate the primary source of this association. While the effect of the lagged change in brand equity is positively related to both downside and upside beta, the relationship is only statistically significant for upside beta. The coefficient reflecting this effect (.194) is significant at the 1% confidence level. Different from previous studies, we found that brand equity is positively associated with CAPM beta and that this association is primarily driven by the positive effect of brand equity on upside beta.

The Table 6 analysis rests on the assumption that the five dimensions of brand equity each have the same effect on risk. In fact, this assumption is not supportable. In particular, analysis based on disaggregating the brand equity measure into the five separate components (Table 7) produces a set of coefficients different from that reported in Table 6. An F-test assessing whether the disaggregated brand coefficients are the same (and, as such, can be aggregated into the composite measure used in Table 6), rejects the null hypothesis at the 1% level ($F_{(8,788)}=3.918$). Since the assumption of uniform brand dimension effects is rejected, disaggregate analysis is required in order to accurately assess the effects of brand equity dimensions on risk.

Table 6 Effect of Aggregated Brand Equity, Marketing Variable, and Other Control Variables on CAPM, Upside, Downside, and Upside Minus Downside Risk

$$\Delta Risk_{iy} = \theta_1 \cdot \Delta ABE_{iy} + \theta_2 \cdot \Delta ABE_{iy-1} + \gamma \cdot \Delta Z_{iy} + \delta \cdot \Delta FCV_{iy-1} + \text{yearly dummies} + \Delta \varepsilon_{iy}$$

where $ABE = \frac{1}{5} \cdot (\text{Differentiation} + \text{Relevance} + \text{Esteem} + \text{Knowledge} + \text{Energy})$

Variable	Risk = $\Delta \beta^{CAPM}$		Risk = $\Delta \beta^{down}$		Risk = $\Delta \beta^{up}$		Risk = $\Delta \beta^{up} - \Delta \beta^{down}$	
	Est.	(p value)	Est.	(p value)	Est.	(p value)	Est.	(p value)
$\Delta \log(BM)_{iy-1}$	-.032	(.292)	-.101*	(.072)	-.038	(.466)	.064	(.326)
$\Delta \log(ME)_{iy-1}$	.047	(.200)	.009	(.899)	-.004	(.955)	-.012	(.877)
$\Delta \log(SG\&A/Sales)_{iy}$	-.094	(.111)	.047	(.662)	-.064	(.517)	-.111	(.372)
ΔABE_{iy}	.047	(.311)	.137	(.106)	.088	(.259)	-.049	(.614)
ΔABE_{iy-1}	.083**	(.047)	.077	(.313)	.194***	(.006)	.117	(.186)
d2002	.011	(.696)	-.081	(.103)	.024	(.600)	.105*	(.067)
d2003	.105***	(.000)	.130***	(.003)	.121***	(.003)	-.010	(.849)
d2004	.039	(.125)	.062	(.176)	.056	(.187)	-.007	(.901)
d2005	-.036	(.129)	.078*	(.073)	-.080**	(.046)	-.158***	(.002)
d2006	-.029	(.314)	-.127**	(.015)	.011	(.824)	.138**	(.023)

* $p < .1$. ** $p < .05$. *** $p < .01$. BM is Book-to-Market Ratio, ME is Market Equity.

Table 7 presents the results from the analyses disaggregating brand equity into its five components. The disaggregate analyses show different associations than those found based on the use of an aggregate brand equity metric. Knowledge has a contemporaneous and significant negative effect on CAPM beta. This result suggests that the more people are aware of a brand, the lower the brand's risk. This finding is very consistent with the traditional perspective that brand equity lowers risk. However, in contrast, we find that current and lagged Energy has statistically significant and positive effects on the beta. As such, not only does brand Energy increase a firm's risk (as measured by beta), but this effect goes beyond the current year and carries over into the future. Both current and lagged Esteem shows a positive effect on a firm's risk, but both coefficients are significant at just below the 10% level. Finally, Differentiation and Relevance do not show any statistically significant relationship with regular risk.

While interesting, these results may not tell the full story about how brand equity influences firm risk. To the extent that CAPM beta is an aggregate of upside and downside risk and brand equity dimensions may affect upside and downside risk differentially, Table 7 results may not fully reflect how brand variables influence risk.

Table 8 shows the results of the empirical analysis of the expanded model that allows for asymmetry in beta. In this estimation, we consider three different dependent variables, downside risk, upside risk, and the difference between upside and downside risk. Although we see some evidence for a possible lagged positive effect of Relevance on upside risk, we do not find substantive support for the conjectures regarding Differentiation and Relevance. We do, however, find support for a number of our conjectures regarding Esteem, Knowledge, and Energy.

Esteem shows a significant and positive contemporaneous effect on downside risk. This result supports the reasoning that, under bad market conditions, a brand with high perceived quality may be considered overly luxurious for customers' budgets, and not necessary. Further, as the effect on upside risk is estimated to be smaller, the net effect is an estimated negative relationship between Esteem and a firm's upside minus downside risk differential. Lagged Esteem also shows a positive relationship with downside risk, although the effect is smaller in magnitude than the contemporaneous effect.

Knowledge shows significant and negative contemporaneous associations with both upside and downside risk. These findings are consistent with familiarity stabilizing a firm's risk by smoothing the fluctuation of potential gains as well as expected losses. These two negative effects are similar in magnitude and so result in a statistically insignificant effect on the upside minus downside risk differential.

Energy has positive current and lagged effects on upside risk. In up markets, high energy firms see more dramatic gains than low energy firms. Further, the estimated coefficients for the effect of Energy on upside risk are larger than the estimated effects on downside risk. While both current and lagged Energy are positively related to the upside minus downside risk differential, only the lagged effect is statistically significant.

Table 7 Effect of Brand Equity, Marketing Variable, and Other Control Variables on CAPM Risk

$$\Delta Risk_{iy} = \theta_1 \cdot \Delta \mathbf{x}_{iy} + \theta_2 \cdot \Delta \mathbf{x}_{iy-1} + \gamma \cdot \Delta \mathbf{z}_{iy} + \delta \cdot \Delta \mathbf{FCV}_{iy-1} + \text{yearly dummies} + \Delta \varepsilon_{iy}$$

Variable	Risk = $\Delta \beta^{CAPM}$	
	Est. (<i>p</i> value)	
$\Delta \log(\text{BM})_{iy-1}$	-.036	(.244)
$\Delta \log(\text{ME})_{iy-1}$	.047	(.205)
$\Delta \log(\text{SG\&A/Sales})_{iy}$	-.079	(.173)
$\Delta \text{Differentiation}_{iy}$	-.025	(.233)
$\Delta \text{Relevance}_{iy}$	-.059	(.232)
$\Delta \text{Esteem}_{iy}$	.066	(.120)
$\Delta \text{Knowledge}_{iy}$	-.204 ^{***}	(.005)
$\Delta \text{Energy}_{iy}$	.086 ^{***}	(.000)
$\Delta \text{Differentiation}_{iy-1}$	-.015	(.454)
$\Delta \text{Relevance}_{iy-1}$	-.024	(.598)
$\Delta \text{Esteem}_{iy-1}$	.067	(.103)
$\Delta \text{Knowledge}_{iy-1}$	.002	(.978)
$\Delta \text{Energy}_{iy-1}$	.050 ^{**}	(.028)
d2002	.026	(.351)
d2003	.124 ^{***}	(.000)
d2004	.044 [*]	(.087)
d2005	-.034	(.149)
d2006	-.028	(.322)

* $p < .1$. ** $p < .05$. *** $p < .01$.

BM is Book-to-Market Ratio, ME is Market Equity.

Table 8 Effect of Brand Equity, Marketing Variable, and Other Control Variables on Upside, Downside, and Upside Minus Downside Risk

$$\Delta Risk_{iy} = \theta_1 \cdot \Delta \mathbf{x}_{iy} + \theta_2 \cdot \Delta \mathbf{x}_{iy-1} + \gamma \cdot \Delta \mathbf{z}_{iy} + \delta \cdot \Delta \mathbf{FCV}_{iy-1} + \text{yearly dummies} + \Delta \varepsilon_{iy}$$

Variable	Risk = $\Delta \beta^{\text{down}}$		Risk = $\Delta \beta^{\text{up}}$		Risk = $\Delta \beta^{\text{up}} - \Delta \beta^{\text{down}}$	
	Est. (<i>p</i> value)		Est. (<i>p</i> value)		Est. (<i>p</i> value)	
$\Delta \log(\text{BM})_{iy-1}$	-.130**	(.019)	-.049	(.336)	.082	(.207)
$\Delta \log(\text{ME})_{iy-1}$	-.019	(.775)	-.014	(.818)	.005	(.952)
$\Delta \log(\text{SG\&A/Sales})_{iy}$	.054	(.596)	-.062	(.501)	-.113	(.340)
$\Delta \text{Differentiation}_{iy}$	-.035	(.345)	-.041	(.221)	-.006	(.889)
$\Delta \text{Relevance}_{iy}$	-.041	(.640)	-.007	(.932)	.031	(.760)
$\Delta \text{Esteem}_{iy}$	.252***	(.001)	.054	(.420)	-.198**	(.021)
$\Delta \text{Knowledge}_{iy}$	-.298**	(.019)	-.213*	(.066)	.088	(.552)
$\Delta \text{Energy}_{iy}$	.062	(.129)	.117***	(.002)	.055	(.245)
$\Delta \text{Differentiation}_{iy-1}$	-.026	(.457)	-.037	(.246)	-.011	(.791)
$\Delta \text{Relevance}_{iy-1}$	.018	(.825)	.138*	(.059)	.120	(.201)
$\Delta \text{Esteem}_{iy-1}$	.133*	(.063)	.075	(.247)	-.058	(.487)
$\Delta \text{Knowledge}_{iy-1}$	.004	(.973)	-.068	(.520)	-.072	(.595)
$\Delta \text{Energy}_{iy-1}$	-.004	(.917)	.087**	(.016)	.092**	(.047)
d2002	-.054	(.282)	.033	(.468)	.087	(.137)
d2003	.174***	(.000)	.135***	(.001)	-.038	(.477)
d2004	.078*	(.092)	.055	(.188)	-.022	(.681)
d2005	.090**	(.034)	-.074*	(.057)	-.165***	(.001)
d2006	-.113**	(.028)	-.004	(.941)	.112*	(.062)

* $p < .1$. ** $p < .05$. *** $p < .01$.

BM is Book-to-Market Ratio, ME is Market Equity.

1.8. Discussion

Our analysis highlights the importance of disaggregate analyses both in terms of brand equity and risk. Analysis aggregating brand equity dimensions into a single measure (e.g., Table 6), masks differential effects among the brand dimensions. For example, Knowledge displays different effects than Energy and aggregating them into a single construct overlooks their differential effects on risk.

Not only is disaggregate analysis of brand equity required, but also disaggregate analysis of risk. Analysis with the decomposed risk components discloses the hidden story in the aggregate estimate of beta, which combines upside and downside risk. Although both analyses (the first using regular risk and the second asymmetric risk) capture the effect of Knowledge, analysis allowing for asymmetric risk provides both additional and different insights with respect to Esteem and Energy. The disaggregate analysis basically confirms what the aggregate analysis reports. Namely, Knowledge is estimated to lower upside gains as well as downside losses. A plausible explanation is that Knowledge insulates the firm from the impact of market situation and stabilizes the firm's risk regardless of market upturns or downturns.

However, analysis on aggregate beta fails to document the substantial effect Esteem has on downside risk. Our findings show that a brand with high perceived quality increases a firm's risk during a bad market situation whereas it does not influence a firm's upside risk by the same amount.

A second observation is that it is noticeable that the analysis for the effect of Energy allowing asymmetry in beta leads to a different conclusion than that from the analysis using the regular beta. Noting the estimated positive effect of Energy on regular beta, one would conclude that innovativeness and dynamism increases a firm's risk overall. However, the analysis of

upside and downside beta tells us that, rather, Energy increases a firm's upside gains more than it increases a firm's downside losses and thereby, high Energy is beneficial to a firm.

It is interesting to note that the other metrics included in our model as “control” measures did not have widespread statistically significant effects. While the change in the Book-to-Market Value ratio was significantly related to downside risk, both growth in SG&A intensity and growth in Market Equity were insignificant across all risk models. A key explanation for these insignificant effects is our use of a fixed effects model. That is, it is firm-specific fixed effects rather than the control factors that drive risk. So, once we control for firm-specific effects by utilizing the first difference estimator, the role of other factors correlated with these fixed effects (such as size) is reduced. Since these factors showed little correlation with the brand dimensions, their inclusion or exclusion from our models has little impact on the estimated brand coefficients regardless of their effect on risk. A direction for future research is determining whether there exist factors that are both correlated with the brand dimensions and that influence risk and so might alter the estimated brand effects.

1.9. Conclusion

Past research suggests that brand equity reduces a firm's systematic risk. Our analysis, taking into account possible upside risk versus downside risk asymmetries in beta and allowing for potential differential effects of brand equity components, provides additional insights into the relationships between brand equity and systematic risk. Aggregation of both risk and brand equity masks and distorts associations that can be seen in the disaggregate analysis.

Our results show that Differentiation and Relevance do not influence downside risk or the gap between upside and downside risk significantly. Knowledge is shown to lower both

downside and upside risk. We observe a positive relationship between downside risk and Esteem, which supports our reasoning that a brand with high perceived quality may be overly luxurious to consumers when a market declines. The results also show a negative effect on the difference between upside and downside risk. This negative relationship stems from the fact that Esteem has a larger positive effect on downside risk than upside risk. Although Energy shows an estimated positive effect on an aggregate estimate of risk, this aggregate effect fails to highlight the source of the association. Energy has a greater effect on upside risk than downside risk. From this, we can conclude that Energy's effect on risk is actually beneficial to a firm.

An asset with a positive risk differential is more attractive than an asset with a negative risk differential. In this context, our analysis encourages managers to consider both risk characteristics, upside and downside, and to appreciate the differential effects of the multiple dimensions of brand equity on these risk characteristics. By doing so, managers can better appreciate the effect of their brand strategies on firm value.

Chapter 2

Long-Term and Short-Term Dynamic Interactions among Advertising and R&D Expenditures, Brand Equity, Cash Flows, and a Firm's Risk

2.1. Introduction

According to *The Independent* (2009), the brand value of Coca-Cola converted to dollar terms in 2009 reached about fifty percent of its market capitalization. Although this intangible asset is not reported in Coca-Cola's financial statement, recent studies indicate that intangible assets such as brand equity have shown a pronounced influence on a firm's financial assessment (e.g. see Chan, Lakonishok, and Sougiannis 2001; Ha, Jacobson, and Erickson 2012). Assuming some metrics such as advertising and research and development (R&D) as the primary means of building a brand equity, and the presumed sequential relationship among such factors (i.e. advertising and R&D create an intangible asset, brand equity, which, in turn, influences firm's performance), some extant literature has focused on the extent to which intangible marketing assets are related to a firm's financial performance.

However, these traditional perspectives have been faced with some challenges. First, it is required to identify the extent to which metrics are related to brand equity. Despite existing literature that suggests advertising and R&D create and intensify market-based intangible assets, few studies have paid attention to showing empirical evidence of that relationship. Second, the sequential relationship among advertising, R&D, resultant brand equity, and firm's financial position is questionable. The key idea beyond this is that those factors would have dynamic interactions such that the firm's enhanced cash flow and reduced risk can in a reverse manner

trigger investment in marketing expenditures, enhance brand equity, and as a result, influence the firm's performance and risk recursively. In order to capture this dynamic relationship, we make use of a vector autoregressive (VAR) model and deal with issues in panel data with unit roots in applying the VAR approach.

Another issue in marketing is to investigate the extent to which a shock of temporal strategic activities, not supported by marketing structure, influences firm's financial assessment in the long run as well as in the short run. Several extant studies undertake this type of analysis, examining the impact of unexpected changes in advertising and R&D on sales or return. However, their implicit assumption that dollar expenditures for marketing activities can adequately depict firm brand equity is questionable. Some empirical studies show that increased dollar expenditures cannot fully explain changes in brand equity (Cobb-Walgren, Ruble, and Donthu 1995) or brand equity effects on firm performance (Eastlack and Rao 1989; Blair 1987; Lodish et al. 1995). Thus, it would be advantageous to include other measures of brand equity, such as perceptual metrics, in analyses seeking to assess the effect of brand equity on firm's financial performance and its risk. In addition, the approach that some studies take, using the unexpected changes of all variables rather than that of one variable, is not able to disentangle the source of shock that leads to changes in a specific variable. In this paper, we are able to investigate the long-run and short-run effects of a shock in one variable of interest in isolation by undertaking an orthogonalized impulse response analysis.

According to the efficient markets hypothesis, current period stock return is not related to lagged values. Because capturing carry-over effects as well as contemporaneous and feedback effects is essential in VAR analysis, we adopt two facets of firm's financial assessment, firm performance, i.e. cash flow and cost of capital, i.e. risk. In particular, we focus on systematic

risk as a measure for firm's risk because it is difficult to avoid systematic risk whereas unsystematic risk can be diversified away and thus, a risk premium is only attached to systematic risk. Making use of those two metrics and customer based brand equity, we find the underlying structure of interactions that advertising and R&D expenditures increase current and future brand equity as well as the increases in brand equity that lower a firm's risk and raise its cash flow. Our findings also show feedback loops where risk influences future R&D expenditure positively and future brand equity negatively, and where cash flow influences future advertising and R&D expenditures and brand equity positively. Orthogonalized impulse response analysis shows that a shock of marketing expenditures has a negative cumulative long-run effect on risk and positive long-term effect on brand equity and cash flow. Brand equity shows a positive cumulative long-run effect on cash flow whereas it shows a negative cumulative long-run effect on risk. We also observe long-term feedback effects such that an unexpected increase in cash flows and an unexpected decrease in risk enhance brand value, and greater increases in brand equity and cash flows and greater decrease in risk than usual lead to increases in R&D and advertising expenditure in the long run.

The rest of this chapter proceeds as follows. First, in the next section, we hypothesize about the interactions among firm's expenses, brand equity, cash flow, and systematic risk based on past research assessing relationships among those factors. In the third section, we introduce the VAR model with panel data and its essentials. In the ensuing two sections, the data and estimation results are presented, respectively. Then, we conclude the paper with a summary of results and discussion.

2.2. Dynamic Interactions Involving Advertising, R&D, Brand Equity, Cash Flow, and Risk

2.2.1. Contemporaneous, Carry-Over, and Long-Run Effects⁴

In recent years, research in marketing has begun to study which factors influence a firm's financial performance. Some studies find that expenditures on strategic activities, such as advertising (Beaver, Kettler and Scholes 1970; Bharadwaj and Menon 1993; Veliyath and Ferris 1997; Singh, Faircloth, and Nejadmalayeri 2005; McAlister, Srinivasan, and Kim 2007) and R&D (Veliyath and Ferris 1997; McAlister, Srinivasan, and Kim 2007), lower a firm's risk, and other studies find that such factors increase a firm's market value (Chauvin and Hirschey 1993), stock return (Erickson and Jacobson 1992; Joshi and Hanssens 2010) and the stock market valuation (Chan, Lakonishok, and Sougiannis 2001).

Brand equity also has shown a major role in influencing firm's financial metrics. For example, brand equity is associated with investors having greater recognition of the firm's stock (Frieder and Subrahmanyam 2005), which results in broad ownership of such stocks (Grullon, Kanatas, and Weston 2004), whereas "damaged brand equity" over time will lead to lower cash flow and higher cost of capital in the future (Gruca and Rego 2005; Pauwels et al. 2004; Srivastava, Shervani, Fahey 1998; Luo and Bhattacharya 2006; Luo 2009). Some empirical studies have considered the relationship between firm value and variables related to brand such as brand extensions (Lane and Jacobson 1995) and changes in a firm's name (Horsky and Swyngedouw 1987), perceived quality (Aaker and Jacobson 1994), and brand attitude (Aaker

⁴ A contemporaneous effect indicates the effect on current (same-year) variable and a carry-over effect means the effect on future (one-year-following) variable in our structural VAR model (see §2.3.2). A short-run effect includes both immediate (same-year) and one-year-following (first-order-autoregressive) effects and a long-run effect denotes cumulative (higher-order-autoregressive) effects in the impulse response function (see §2.3.3).

and Jacobson 2001; see also Srinivasan and Hanssens 2009). Recently, Rego, Billett, and Morgan (2009) find that brand equity has a negative effect on risk. Correcting methodological problems in the Rego, Billet, and Morgan (2009) study and using more precise measures for brand equity, Ha, Jacobson, and Erickson (2012) undertake analysis of the effect of multidimensional brand equity on firm's asymmetric risks.

The logic behind those studies is that investments in marketing activities such as advertising and R&D (which, for example, helps to differentiate a firm's products) create brand equity, which then, affects customer's response in the marketplace, and ultimately leads to shareholder value, i.e. increases cash flow and decreases risk (Keller 1998). Joshi and Hanssens (2010) suggest that advertising is posited to influence future-term firm value through brand equity as well as it increases firm value directly.

Based on those theoretical and empirical foundations, we hypothesize that advertising and R&D expenditures will increase brand equity, and advertising, R&D, and brand equity will increase cash flow and decrease a firm's risk. In the same line, we expect that the response of cash flows to a shock of advertising expenditure, R&D expenditure, or brand equity will be positive whereas that of risk to such a shock will be negative in the long-run.

H1: Advertising and R&D expenditures increase brand equity both in the short-run and in the long-run.

H2: Advertising and R&D expenditures and brand equity increase the level of cash flows both in the short-run and in the long run.

H3: Advertising and R&D expenditures and brand equity decrease firm's systematic risk both in the short-run and in the long run.

2.2.2. Feedback Effects

Since Bass (1969) raised the endogeneity problem in advertising spending (i.e. both current and past sales influence advertising expenditure), several studies have paid attention to the feedback effects of a firm's performance and value such as sales (Dekimpe and Hanssens 1995; Dekimpe and Hanssens 1999; Bai 2000; Dekimpe and Hanssens 2000; Franses, Srinivasan, and Bpswijk 2001; Slotegraaf and Pauwels 2008) and stock return (Joshi and Hanssens 2010) on marketing expenditures and promotion. In particular, Slotegraaf and Pauwels (2008) estimate the long-term effect of a promotion shock on sales and examine how brand equity is related to promotion effectiveness. Recently, Smith, Gradojevic, and Irwin (2007) found that not only advertising and R&D expenditures but also gross profit are positively related to brand equity.

Those findings are noticeable in that the result implies that advertising, R&D, brand equity, and a firm's financial performance have dynamic interactions rather than a sequential relationship. That is, advertising, R&D, and brand equity would be the factors that determine, and at the same time, are determined by, a firm's financial performance. According to theories and empirical studies in marketing, a lowered level of cash flows reduce advertising and R&D expenditures (Minton and Schrand 1999), and change marketing strategies in developing new products, advertising, and establishing brand equity (Markovitch, Steckel, and Yeung 2005; Benner 2007; see also Luo 2009). Recently, Luo (2009) suggests that shortfalls in cash flows and a high level of stock volatility lead to a lower level of customer support programs, which is likely to damage brand equity. Accordingly, we expect that cash flows have positive feedback effects on advertising and R&D expenditures and brand equity.

H4a: High level of cash flows increases advertising and R&D expenditures

H4b: High level of cash flows increases brand equity.

Based on Luo (2009), we expect that increased risk has a negative feedback effect on brand equity. However, while Luo (2009) presumes that assets with large stock price volatility may reduce investments in marketing activities, few studies investigate the effect of risk on marketing activities explicitly. Accordingly, we conjecture two different scenarios regarding the effect of risk on advertising and R&D expenditures. One is that there may exist a negative feedback cycle where increase in risk gives a negative signal to investors and customers about the brand, forcing managers into making less investments in marketing activities, and as a result, leads to lower brand equity and higher risk. Another possibility is that a high level of risk urges managers to invest more in marketing programs to escape a vicious cycle, so as to not give up on their brand. Thus, risk may be associated with advertising and R&D expenditures either positively or negatively.

H5a: Firm's systematic risk may influence advertising and R&D expenditures either positively or negatively.

H5b: Firm's systematic risk influences brand equity negatively.

2.3. Model

The estimation of the dynamic interactions is composed of two steps: (1) estimation of a firm's systematic risk and (2) estimation of the dynamic interactions among marketing expenditures, brand equity, firm value, including financial control variables. Based on the panel VAR estimates, the orthogonalized impulse response function is obtained.

2.3.1. Systematic Risk

Although research in finance over the past three decades has highlighted empirical limitations in the CAPM perspective, systematic risk from CAPM is still an important factor in measuring “stock vulnerability to market downturns” and constructing “investment portfolios” (McAlister, Srinivasan, and Kim 2007). Thus, making use of standard excess return market model which encompasses CAPM and daily stock returns, we estimate the firm’s systematic risk for each year t , i.e. β_{it} (see Equation 10).

$$(10) \quad R_{id} - R_{rfd} = \alpha_i + \beta_i \cdot (R_{md} - R_{rfd}) + \varepsilon_{id} \quad \text{for } \forall t$$

where R_{id} is the stock return of firm i at day d , R_{rfd} is the risk free rate at day d , R_{md} is market-wide return at day d , β_i is the systematic risk (“CAPM beta”) of firm i , and α_i is the abnormal return (“alpha”) of firm i . we adopt β_{it} as a measure for risk of firm i at year t .

2.3.2. Panel Vector Autoregressive (VAR) Model

The hypothesized dynamic interactions can be tested using panel VAR model because VAR model is flexible in that it allows for contemporaneous, carry-over, and feedback effect. Our panel VAR model of order one can be represented by a reduced form model (Equation 11).

$$(11) \quad \mathbf{y}_{it} = \mathbf{u}_i + \Phi \cdot \mathbf{y}_{it-1} + \Pi \cdot \mathbf{z}_{it-1} + \mathbf{v}_{it}, \quad \mathbf{v}_{it} \sim (\mathbf{0}, \Omega)$$

i.e.

$$\begin{bmatrix} AD_{it} \\ RD_{it} \\ BE_{it} \\ CF_{it} \\ Risk_{it} \end{bmatrix} = \begin{bmatrix} u_{1i} \\ u_{2i} \\ u_{3i} \\ u_{4i} \\ u_{5i} \end{bmatrix} + \begin{bmatrix} \varphi_{11} & \varphi_{12} & \varphi_{13} & \varphi_{14} & \varphi_{15} \\ \varphi_{21} & \varphi_{22} & \varphi_{23} & \varphi_{24} & \varphi_{25} \\ \varphi_{31} & \varphi_{32} & \varphi_{33} & \varphi_{34} & \varphi_{35} \\ \varphi_{41} & \varphi_{42} & \varphi_{43} & \varphi_{44} & \varphi_{45} \\ \varphi_{51} & \varphi_{52} & \varphi_{53} & \varphi_{54} & \varphi_{55} \end{bmatrix} \cdot \begin{bmatrix} AD_{it-1} \\ RD_{it-1} \\ BE_{it-1} \\ CF_{it-1} \\ Risk_{it-1} \end{bmatrix} + \begin{bmatrix} \pi_{11} & \pi_{12} \\ \pi_{21} & \pi_{22} \\ \pi_{31} & \pi_{32} \\ \pi_{41} & \pi_{42} \\ \pi_{51} & \pi_{52} \end{bmatrix} \cdot \begin{bmatrix} ME_{it-1} \\ BM_{it-1} \end{bmatrix} + \begin{bmatrix} v_{1it} \\ v_{2it} \\ v_{3it} \\ v_{4it} \\ v_{5it} \end{bmatrix}$$

where \mathbf{u}_i is a vector of fixed effects, AD is log (advertising expenditure scaled by asset), RD is log (R&D expenditure scaled by asset), BE is brand equity, CF is log (cash flows scaled by asset), Risk is firm's systematic risk, ME is log (market equity), and BM is log (book-to-market ratio). However, parameters in a reduced form model would not be of marketing interest because Φ can be used only for predicting future value (\mathbf{y}_{it}) given past observations (\mathbf{y}_{it-1} and \mathbf{z}_{it-1}) but cannot be used for explaining the phenomena in terms of marketing principles (Greene 2003; Hamilton 1994). In order to reveal the substantive marketing structure beyond the observable relationship between variables, which is more crucial to marketer, we should estimate structural parameters, \mathbf{B} and Γ , instead (see Equation 12).

$$(12) \quad \mathbf{B} \cdot \mathbf{y}_{it} = \mathbf{a}_i + \Gamma \cdot \mathbf{y}_{it-1} + \Psi \cdot \mathbf{z}_{it-1} + \boldsymbol{\varepsilon}_{it}, \quad \boldsymbol{\varepsilon}_{it} \sim (\mathbf{0}, \Sigma)$$

i.e.

$$\begin{bmatrix} b_{11} & b_{12} & b_{13} & b_{14} & b_{15} \\ b_{21} & b_{22} & b_{23} & b_{24} & b_{25} \\ b_{31} & b_{32} & b_{33} & b_{34} & b_{35} \\ b_{41} & b_{42} & b_{43} & b_{44} & b_{45} \\ b_{51} & b_{52} & b_{53} & b_{54} & b_{55} \end{bmatrix} \cdot \begin{bmatrix} AD_{it} \\ RD_{it} \\ BE_{it} \\ CF_{it} \\ Risk_{it} \end{bmatrix} = \begin{bmatrix} a_{1i} \\ a_{2i} \\ a_{3i} \\ a_{4i} \\ a_{5i} \end{bmatrix} + \begin{bmatrix} \gamma_{11} & \gamma_{12} & \gamma_{13} & \gamma_{14} & \gamma_{15} \\ \gamma_{21} & \gamma_{22} & \gamma_{23} & \gamma_{24} & \gamma_{25} \\ \gamma_{31} & \gamma_{32} & \gamma_{33} & \gamma_{34} & \gamma_{35} \\ \gamma_{41} & \gamma_{42} & \gamma_{43} & \gamma_{44} & \gamma_{45} \\ \gamma_{51} & \gamma_{52} & \gamma_{53} & \gamma_{54} & \gamma_{55} \end{bmatrix} \cdot \begin{bmatrix} AD_{it-1} \\ RD_{it-1} \\ BE_{it-1} \\ CF_{it-1} \\ Risk_{it-1} \end{bmatrix} + \begin{bmatrix} \psi_{11} & \psi_{12} \\ \psi_{21} & \psi_{22} \\ \psi_{31} & \psi_{32} \\ \psi_{41} & \psi_{42} \\ \psi_{51} & \psi_{52} \end{bmatrix} \cdot \begin{bmatrix} ME_{it-1} \\ BM_{it-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1it} \\ \varepsilon_{2it} \\ \varepsilon_{3it} \\ \varepsilon_{4it} \\ \varepsilon_{5it} \end{bmatrix}$$

where $\mathbf{B}^{-1} \cdot \mathbf{a}_i = \mathbf{u}_i$, $\mathbf{B}^{-1} \cdot \Gamma = \Phi$, $\mathbf{B}^{-1} \cdot \Psi = \Pi$, and $\mathbf{B}^{-1} \cdot \boldsymbol{\varepsilon}_{it} = \mathbf{v}_{it}$.

According to the brand value chain model (Keller and Lehmann 2003), investment in a marketing program generates customer mindset related to brand and such mindset, in turn, influences brand performance (e.g. price premium, market share) and shareholder value (e.g. stock price, market capitalization). Based on logical inference from the brand value chain model, we are able to assign causal priority. That is, among the variables, advertising and R&D expenditures are the most exogenous, while cash flows and risk are the most endogenous. As such, we preclude the contemporaneous effects of cash flows and risk on advertising and R&D

expenditures and brand equity as well as those of brand equity on advertising and R&D expenditures. We also assume that advertising expenditure and R&D expenditure have no contemporaneous relationship with each other and so do cash flows and risk. Imposing those restrictions on \mathbf{B} , we obtain a fully recursive system of structural model, which allows us to estimate each structural equation separately (see Equation 13).

$$(13) \quad \mathbf{B} \cdot \mathbf{y}_{it} = \mathbf{a}_i + \mathbf{\Gamma} \cdot \mathbf{y}_{it-1} + \mathbf{\Psi} \cdot \mathbf{z}_{it-1} + \boldsymbol{\varepsilon}_{it}, \quad \boldsymbol{\varepsilon}_{it} \sim (\mathbf{0}, \boldsymbol{\Sigma})$$

s.t. $b_{ik} = 0$ when $i < k$, $b_{ik} = 1$ when $i = k$, and $b_{21}=b_{54}=0$

i.e.

$$\begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ b_{31} & b_{32} & 1 & 0 & 0 \\ b_{41} & b_{42} & b_{43} & 1 & 0 \\ b_{51} & b_{52} & b_{53} & 0 & 1 \end{bmatrix} \cdot \begin{bmatrix} AD_{it} \\ RD_{it} \\ BE_{it} \\ CF_{it} \\ Risk_{it} \end{bmatrix} = \begin{bmatrix} a_{1i} \\ a_{2i} \\ a_{3i} \\ a_{4i} \\ a_{5i} \end{bmatrix} + \begin{bmatrix} \gamma_{11} & \gamma_{12} & \gamma_{13} & \gamma_{14} & \gamma_{15} \\ \gamma_{21} & \gamma_{22} & \gamma_{23} & \gamma_{24} & \gamma_{25} \\ \gamma_{31} & \gamma_{32} & \gamma_{33} & \gamma_{34} & \gamma_{35} \\ \gamma_{41} & \gamma_{42} & \gamma_{43} & \gamma_{44} & \gamma_{45} \\ \gamma_{51} & \gamma_{52} & \gamma_{53} & \gamma_{54} & \gamma_{55} \end{bmatrix} \cdot \begin{bmatrix} AD_{it-1} \\ RD_{it-1} \\ BE_{it-1} \\ CF_{it-1} \\ Risk_{it-1} \end{bmatrix} + \begin{bmatrix} \psi_{11} & \psi_{12} \\ \psi_{21} & \psi_{22} \\ \psi_{31} & \psi_{32} \\ \psi_{41} & \psi_{42} \\ \psi_{51} & \psi_{52} \end{bmatrix} \cdot \begin{bmatrix} ME_{it-1} \\ BM_{it-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1it} \\ \varepsilon_{2it} \\ \varepsilon_{3it} \\ \varepsilon_{4it} \\ \varepsilon_{5it} \end{bmatrix}$$

where b_{ik} is i^{th} row and k^{th} column component of \mathbf{B} .

Since our panel data incorporates both time series and cross-sectional observations, we take the first differences and include time dummies. Making use of the first differencing operation is advantageous in that it can control for both unit roots in data and firm-specific fixed effect simultaneously (Binder, Hsiao, and Pesaran 2005). Then, the j^{th} equation of structural model after normalization can be written as

$$(14) \quad \Delta y_{jit} = -\mathbf{B}_j \cdot \Delta \mathbf{Y}_{jit} + \mathbf{\Gamma}_j \cdot \Delta \mathbf{y}_{it-1} + \mathbf{\Psi}_j \cdot \Delta \mathbf{z}_{it-1} + \eta_t + \Delta \varepsilon_{jit}$$

i.e.

$$\begin{bmatrix} \Delta AD_{it} \\ \Delta RD_{it} \\ \Delta BE_{it} \\ \Delta CF_{it} \\ \Delta Risk_{it} \end{bmatrix} = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ -b_{31}-b_{32} & 0 & 0 & 0 & 0 \\ -b_{41}-b_{42}-b_{43} & 0 & 0 & 0 & 0 \\ -b_{51}-b_{52}-b_{53} & 0 & 0 & 0 & 0 \end{bmatrix} \cdot \begin{bmatrix} \Delta AD_{it} \\ \Delta RD_{it} \\ \Delta BE_{it} \\ \Delta CF_{it} \\ \Delta Risk_{it} \end{bmatrix} + \begin{bmatrix} \gamma_{11} & \gamma_{12} & \gamma_{13} & \gamma_{14} & \gamma_{15} \\ \gamma_{21} & \gamma_{22} & \gamma_{23} & \gamma_{24} & \gamma_{25} \\ \gamma_{31} & \gamma_{32} & \gamma_{33} & \gamma_{34} & \gamma_{35} \\ \gamma_{41} & \gamma_{42} & \gamma_{43} & \gamma_{44} & \gamma_{45} \\ \gamma_{51} & \gamma_{52} & \gamma_{53} & \gamma_{54} & \gamma_{55} \end{bmatrix} \cdot \begin{bmatrix} \Delta AD_{it-1} \\ \Delta RD_{it-1} \\ \Delta BE_{it-1} \\ \Delta CF_{it-1} \\ \Delta Risk_{it-1} \end{bmatrix} + \begin{bmatrix} \psi_{11} & \psi_{12} \\ \psi_{21} & \psi_{22} \\ \psi_{31} & \psi_{32} \\ \psi_{41} & \psi_{42} \\ \psi_{51} & \psi_{52} \end{bmatrix} \cdot \begin{bmatrix} \Delta ME_{it-1} \\ \Delta BM_{it-1} \end{bmatrix} + \eta_t + \begin{bmatrix} \Delta \varepsilon_{1it} \\ \Delta \varepsilon_{2it} \\ \Delta \varepsilon_{3it} \\ \Delta \varepsilon_{4it} \\ \Delta \varepsilon_{5it} \end{bmatrix}$$

where \mathbf{Y}_{jit} is \mathbf{y}_{it} excluding j^{th} component, y_{jit} , η_t is a vector of time dummies, and \mathbf{B}_j , $\mathbf{\Gamma}_j$, and $\mathbf{\Psi}_j$ are the coefficients of the j^{th} equation. Equation 14 still contains a few problems: (1) $\Delta \mathbf{Y}_{jit}$ and Δy_{jit-1} in $\Delta \mathbf{y}_{it-1}$ are correlated with $\Delta \varepsilon_{jit}$, i.e. endogenous, (2) the lagged dependent variable, y_{jit-1} , causes autocorrelation. In order to deal with those econometric problems, the literature in economics has developed several methods. Among them, General Moment of Method (GMM) is one of the most widely used approaches. However, the lagged variables as instruments will be weak if the underlying time series contains highly persistent marginal processes in panel VAR (Binder, Hsiao, and Pesaran 2005). To alleviate this issue, we make use of extended GMM developed by Arellano and Bover (1995) and completed by Blundell and Bond (1998).

2.3.3. Orthogonalized Impulse Response Analysis

The behavior of each component can be inferred from the relationship with other components obtained through the coefficients of VAR model. However, this analysis cannot tell us the consequence of unexpected movement of one component for the other components. In order to identify the extent to which a variable innovation influences the other components, we need to use impulse response analysis and rewrite the reduced form model in the Wold representation (Equation 15).

$$(15) \quad \Delta \mathbf{y}_t = \boldsymbol{\lambda} + \Delta \mathbf{v}_t + \boldsymbol{\Phi} \cdot \Delta \mathbf{v}_{t-1} + \dots + \boldsymbol{\Phi}^j \cdot \Delta \mathbf{v}_{t-j} + \dots$$

where $\boldsymbol{\lambda}$ is a function of the parameters of the model. The deficiency in this representation is that it is not able to disentangle the source of shock because the errors are correlated with each other.

Since the errors are a linear combination of the true structural disturbances $\boldsymbol{\varepsilon}_t$, the representation can be rewritten as

$$(16) \quad \Delta \mathbf{y}_t = \boldsymbol{\mu} + \boldsymbol{\theta}_0 \cdot \Delta \boldsymbol{\varepsilon}_t + \boldsymbol{\theta}_1 \cdot \Delta \boldsymbol{\varepsilon}_{t-1} + \dots + \boldsymbol{\theta}_s \cdot \Delta \boldsymbol{\varepsilon}_{t-s} + \dots = \boldsymbol{\mu} + \boldsymbol{\theta}(L) \cdot \Delta \boldsymbol{\varepsilon}_t$$

where $\boldsymbol{\mu}$ is a function of the parameters of the model, $\boldsymbol{\theta}_s = \boldsymbol{\Phi}^s \cdot \mathbf{B}^{-1}$, $\boldsymbol{\theta}(L) = (\boldsymbol{\theta}_0 + \boldsymbol{\theta}_1 L + \boldsymbol{\theta}_2 L^2 + \dots +$

$\boldsymbol{\theta}_s L^s + \dots)$. Then, the Orthogonalized Impulse Response Function (OIRF), $\frac{\partial \Delta y_{it+s}}{\partial \Delta \varepsilon_{jt}} = \theta_{ij,s}$,

indicates the effect of the j^{th} variable innovation at time $t+s$ on the i^{th} variable and the cumulative

impulse response function, $\sum_{s=0}^{\infty} \theta_{ij,s} = \theta_{ij}(1)$, indicates the cumulative long-term effect of unusual

changes in the j^{th} component on the i^{th} component, where $\theta_{ij,s}$ is i^{th} row and j^{th} column component

of $\boldsymbol{\theta}_s$ (see Hamilton, 1994). With this, we can investigate the amount and duration of the impact

of strategic activity shocks on brand equity and firm value. Some previous studies in marketing

have followed the generalized impulse response analysis by Pesaran and Shin (1998). Although

this approach is useful when the causal priorities are not clear among variables, it is required to

be cautious about using the Generalized Impulse Response Function (GIRF). Kim (2009) states

that “The GIRF yields a set of response functions that are based on extreme identifying

assumptions that contradict each other, unless the covariance matrix is diagonal” and “may yield

quite misleading economic inferences.” Accordingly, we make use of OIRF to investigate the

responses of cash flows and risk to a shock of advertising expenditure, R&D expenditure, and

brand equity respectively and the response of brand equity to innovation in advertising and R&D

expenditures, based on our causal priorities in section 2.2. We undertake Monte Carlo

simulations to obtain standard errors of impulse response functions and confidence intervals.

2.4. Data

Our data are collected from three different sources. We obtain brand equity by averaging five brand dimensions, namely, Differentiation, Relevance, Esteem, Knowledge, and Energy, from a variant of updated Young and Rubicam (Y&R) Brand Asset Valuator (BAV) database. The original BAV Model (e.g., Agres and Dubitsky, 1996) includes four dimensions, Differentiation, Relevance, Esteem, and Knowledge which assesses a brand's overall health. More recent work (e.g., Fudge 2005; Gerzema, Lebar, and Sussman 2005; Mizik and Jacobson 2008, 2009) has highlighted the advantages of adding an Energy construct to this original set of brand dimensions in order to consider the future-term capabilities of the brand. The Y&R BAV model is one of the leading industry approaches to measuring brand equity. Traditional brand equity models (e.g. Aaker 1996; Keller 1998; Keller and Lehmann 2003) advocate Y&R BAV as a measure for customer mindset. Different dimensions of the variant of updated Y&R BAV model reflect different components of brand equity. Differentiation represents the ability of a brand to stand apart from its competitors, Relevance reflects the personal importance of the brand, Esteem gauges the level of regard consumers hold for the brand, Knowledge shows the extent of the customer familiarity with the brand, and Energy measures the brand's innovative and dynamic ability. We transform the five dimensions of Y&R BAV to z-scores. Our measure for brand equity encompasses those five core components of customer mindset. The BAV data that we utilize are obtained from surveys undertaken in the 4th quarters from 2000 to 2006.

For stock market data, daily stock returns for estimation of a firm's risk, and stock price, and number of shares outstanding for calculation of market equity, come from the CRSP database. The accounting data that we use involves advertising expenditures, R&D expenditures, total asset measures, cash flows, and book values from COMPUSTAT data files. We calculate

the book value of a firm following the definition that Fama and French (1993) utilize in their paper. In line with other studies (e.g. Minton and Schrand 1999; Gruca and Rego 2005), we use net cash flow from operations from COMPUSTAT as a measure for cash flows. We make use of the last quarter of the calendar year for accounting data and combine it with annual measures for income statement items. Advertising and R&D expenditures, cash flows and financial control variables are scaled by assets. Except for brand equity and risk, natural logarithms are taken for all variables. The final data set includes 109 mono-brand firms from 2000 to 2006.

The panel unit root test developed by Maddala and Wu (1999), shows that not all panels in our data include evolving variables ($p > \chi^2 = 0.000$ for all variables). When we investigate each panel, some of them do have unit roots in advertising and R&D expenditures. Because the first differencing operation is able to correct for firm specific effects and unit roots in variables simultaneously, we do not need to take an extra differencing.

2.5. Results

2.5.1. Dynamic Interactions

The estimated coefficients of the structural model show dynamic interactions among variables (see Table 9, Figure 6). From the results, we find feedback cycles among strategic expenditures, brand equity, cash flows, and risk and complementary feedback cycles among R&D expenditures, brand equity, and risk. As a part of robustness analysis, we adopt return on assets (ROA) and beta from Fama-French four factor model as measures for a firm's performance and its risk respectively. The results are consistent with the study using cash flows and systematic risk and so, we do not find changes in substantive conclusions of the current model (see Table 10).

Table 9 Coefficients of Structural Model with Restriction (CF, Beta)^a

	Dependent Variable				
	RD _t	AD _t	BE _t	CF _t	Beta _t
RD _t			-.038 (.150)	.198 (.266)	-.056 (.472)
AD _t			.095*** (.000)	.097 (.395)	.067 (.199)
BE _t				.309** (.034)	-.114* (.069)
RD _{t-1}	.648*** (.000)	-.133 (.245)	.068** (.016)	-.060 (.733)	.054 (.487)
AD _{t-1}	-.014 (.864)	.819*** (.000)	-.003 (.787)	-.093 (.402)	-.082 (.111)
BE _{t-1}	.343** (.047)	.109* (.075)	.780*** (.000)	-.167 (.216)	.095 (.110)
CF _{t-1}	.097** (.011)	.318*** (.000)	.015*** (.006)	.338*** (.000)	-.023 (.255)
Beta _{t-1}	.316** (.013)	-.155 (.309)	-.058*** (.000)	-.157 (.164)	.603*** (.000)

^a *p* values in parentheses.* *p* < .1. ** *p* < .05. *** *p* < .01. (2-tailed).

RD is ln (R&D expenditure/asset), AD is ln (advertising expenditure/asset),

BE is brand equity, CF is ln (cash flow/asset), and Beta is systematic risk.

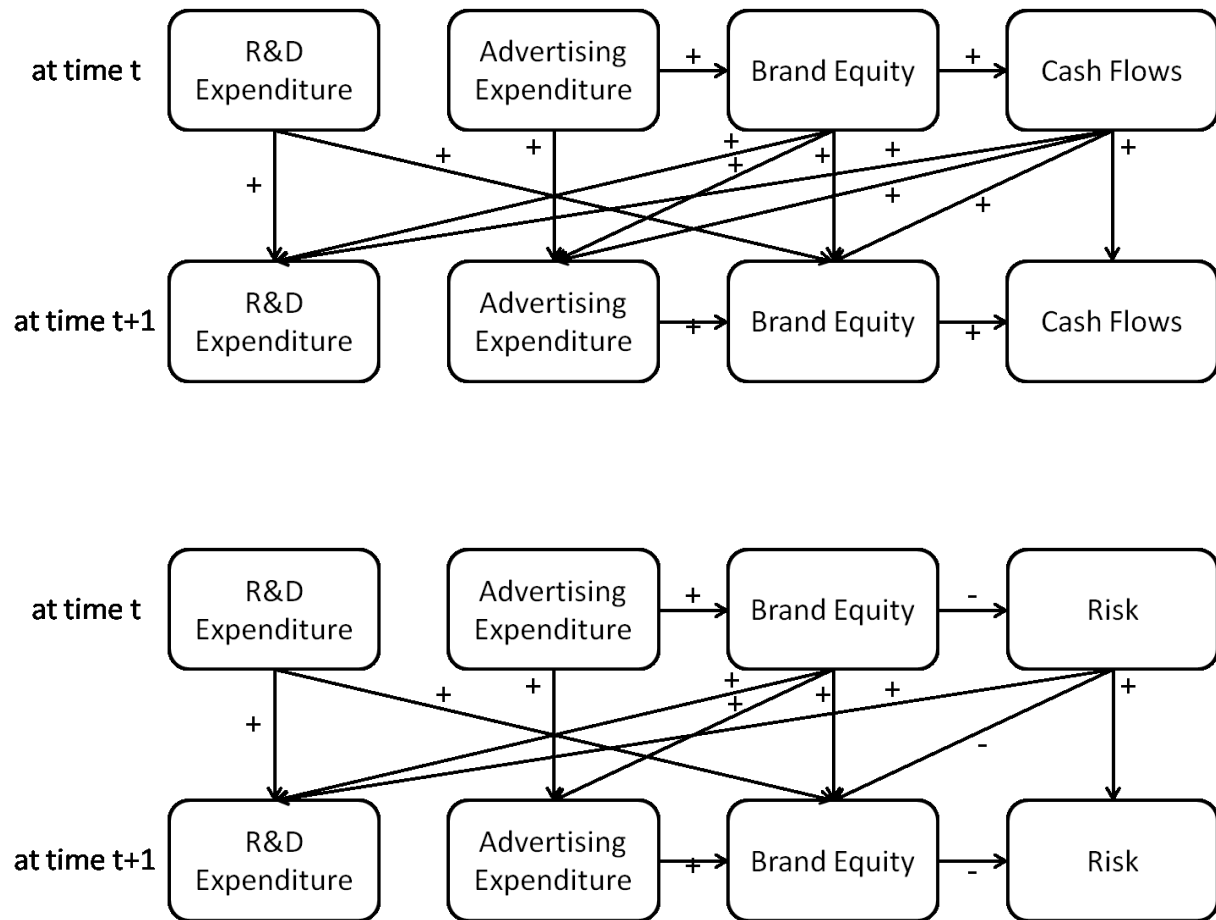


Figure 6 Dynamic Interactions among Advertising and R&D Expenditures, Brand Equity, Cash Flows, and Risk

Table 10 Coefficients of Structural Model with Restriction (ROA, FF_Beta)^a

	Dependent Variable				
	RD _t	AD _t	BE _t	ROA _t	FF_Beta _t
RD _t			-.025 (.111)	-.128 (.597)	-.073 (.466)
AD _t			.085*** (.000)	.032 (.841)	.103 (.133)
BE _t				.361** (.050)	-.140** (.042)
RD _{t-1}	.854*** (.000)	.042 (.516)	.031** (.050)	.338 (.164)	.115 (.245)
AD _{t-1}	.015 (.803)	.890*** (.000)	-.013 (.132)	.046 (.760)	-.143** (.038)
BE _{t-1}	.317*** (.004)	.485*** (.000)	.824*** (.000)	-.091 (.602)	.099 (.131)
ROA _{t-1}	.101*** (.010)	.134** (.050)	.040*** (.000)	.193*** (.010)	.027 (.277)
FF_Beta _{t-1}	.624** (.014)	-.053 (.683)	-.062*** (.000)	-.071 (.751)	.405*** (.000)

^a *p* values in parentheses.

* *p* < .1. ** *p* < .05. *** *p* < .01. (2-tailed).

RD is ln (R&D expenditure/asset), AD is ln (advertising expenditure/asset), BE is brand equity, ROA is return on assets, and FF_Beta is beta from Fama-French four factor model.

2.5.1.1. Feedback Cycle

The results indicate that current advertising and lagged R&D expenditure growths influence brand equity positively and then, the strengthened brand equity increases cash flows. An abundance of cash flows and strengthened brand equity, in a reverse manner, encourages investments in advertising and R&D, holding its brand equity up in the next time period, which leads to increases in cash flows recursively (see Figure 7). These results, on the other hand, imply that weak brand value causes a vicious feedback cycle where cash flow shortfalls attributed to weak brand value allow for only limited amount of investments in marketing activities. Then, a lowered level of marketing expenditures decreases brand equity and as a result, leads to more cash flow shortfalls in the future.

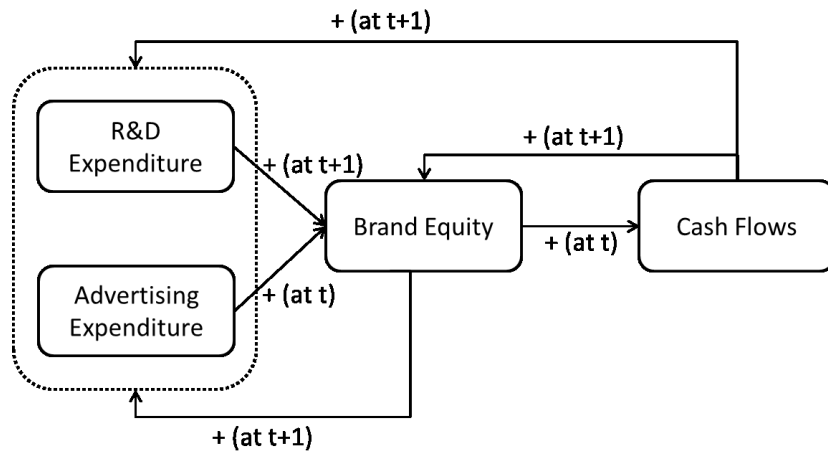


Figure 7 Feedback Cycle among Advertising and R&D expenditures, Brand Equity, and Cash Flows

We also find that brand equity increased by current advertising and lagged R&D expenditure growth shows negative relationship with risk and changes in risk lagged one year are negatively associated with changes in brand equity. Accordingly, as in the case of cash flows, a feedback loop is observed in the relationship between brand equity and a firm's risk (see Figure

8). That is, strong brand equity built by a high level of expenditures on strategic activities decreases a firm's risk. Then, the lowered risk increases future-term brand equity, resulting in decreases in future risk.

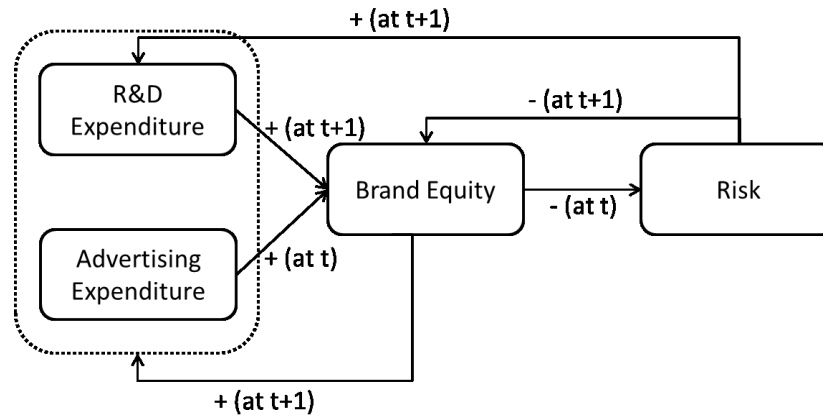


Figure 8 Feedback Cycle between Brand Equity and Risk, and Complementary Feedback Cycle among R&D expenditures, Brand Equity, and Risk

2.5.1.2. Complementary Feedback Cycle

Our results also report the higher level of systematic risk, the more R&D expenditure in the next period, which leads to the greater increase in brand equity and decrease in risk (see figure 8). In the CAPM perspective, systematic risk indicates the extent to which a firm's stock return is correlated with market return. Although investors cannot eliminate this type of risk by diversification, our findings suggest that managers are able to reduce the vulnerability of their firms to market-wide risk by building up strong brand assets through the increments in expenses for product innovation. A firm's risk, however, does not influence future-term advertising expenditure significantly (see Figure 8). According to Srinivasan and Lilien (2010), the outputs of R&D such as innovative technologies and new products create a firm's potential value and "advertising leverages those outputs of R&D programs, creating awareness of products,

increasing sales, building brand equity and inducing customer loyalty.” As such, firms seek to advertise their new products from R&D programs in order to increase firm value. Keller (1998) notes that the market share of Schwinn in U.S. plummeted from 25% in the 1960s to 10% in the early 1990s because they did not invest in R&D for a long time and as a result, there was nothing to sell or advertise but their name. In particular, because the CAPM beta we utilize is the risk from the collapse of the macroeconomic system and entire market, marketing actions without innovation in developing future products have a limited ability to reduce a firm’s risk. For example, a firm whose products are highly dependent on oil would not be able to dramatically lower the level of the volatility related to market return through advertising programs per se, when an oil crisis occurs. In order to achieve the stability of risk by being independent of such macroeconomic factors, the firm must want to invest in R&D programs and develop innovative products or technologies which use new materials and energy rather than oil. Accordingly, when a firm faces increased risk, it pays more attention to fostering new products and technologies through R&D. Once innovative products are developed, however, the tactics of subsequent periods would be changed. It is interesting to note that the effect of R&D expenditure carries over into the future in creating brand value, whereas advertising expenditure has a contemporaneous effect on brand equity (see Figure 7 and Figure 8). These relationships imply that there is a time delay in achieving substantive brand value through brand innovation and R&D investment while advertising influences customer cognition and affect regarding brand directly and instantaneously. As such, managers are expected to assess the achievement of investment in R&D based on future rather than current brand value because the effect of R&D expenditure would not be evident during the same period.

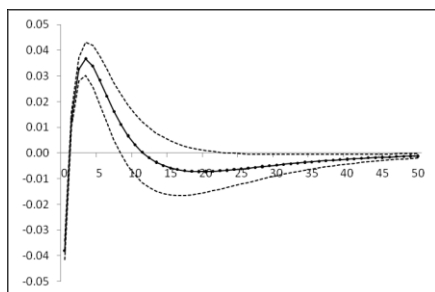
2.5.2. Short-Run and Long-Run Effects

While the estimated parameters of the structural model provide insights about how the variables (advertising expenditure, R&D expenditure, brand equity, cash flows, risk) are related to each other, this type of analysis has a limited ability to depict the dynamic consequences of an unexpected change in a component in our system for the other variables of interest. In order to identify the effect of the temporary shock of a component, we conduct an OIRF analysis. This analysis is helpful for interpreting the impacts of a variable over time, especially when the signs of effects of a variable captured from the structural model contradict each other (e.g. positive current and negative lagged effects of one variable on another variable). Figures 9 and 10 show the responses of future values of y (i.e. advertising and R&D expenditures, brand equity, cash flows, risk) to the shock of each element of this vector. In Figures 9 and 10, solid lines denote orthogonalized impulse of one standard deviation and dashed lines correspond to the 95% confidence intervals. Table 11 summarizes short-run and long-run effects of such a shock on another variable of interest.

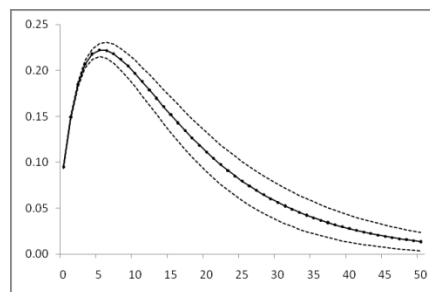
Table 11 Short-Run and Long-Run Effects

	Shock									
	RD					AD				
	Short-Run		Long-Run			Short-Run		Long-Run		
	Immediate	First Year	Cumulative	Long-Run		Immediate	First Year	Cumulative	Long-Run	
BE	-.038	.013	.011	.095	.149	4.774				
CF	.186	.141	.636	.127	.065	2.125	.309	.290	3.948	
Beta	-.052	-.027	-.011	.056	-.004	-.736	-.114	-.076	-.952	

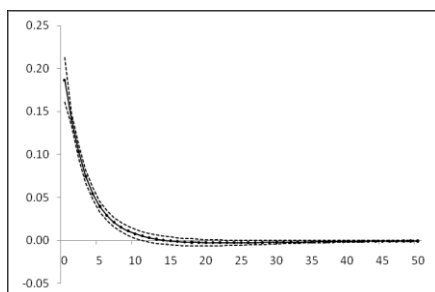
	Shock									
	BE					CF				
	Short-Run		Long-Run			Short-Run		Long-Run		
	Immediate	First Year	Cumulative	Long-Run		Immediate	First Year	Cumulative	Long-Run	
RD	.000	.336	8.497	.000	.097	2.630	.000	.316	-1.370	
AD	.000	.225	6.671	.000	.318	4.825	.000	-.155	-7.440	
BE				.000	.041	2.615	.000	-.085	-4.129	



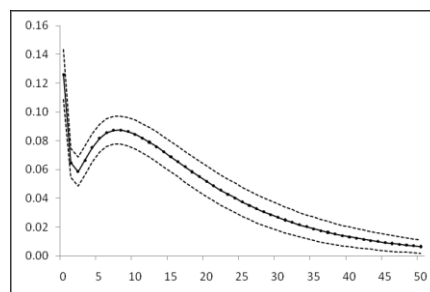
(a) Response of BE to RD Shock



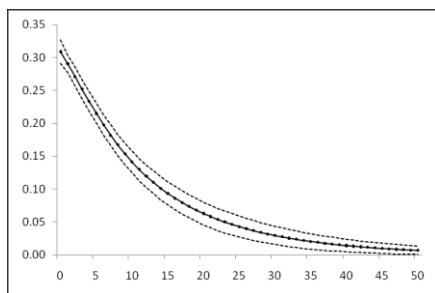
(b) Response of BE to AD Shock



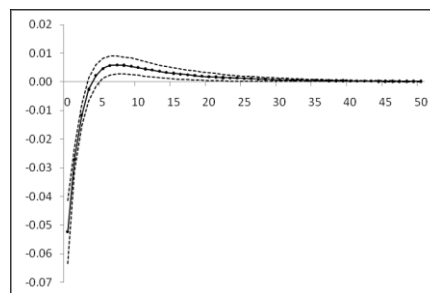
(c) Response of CF to RD Shock



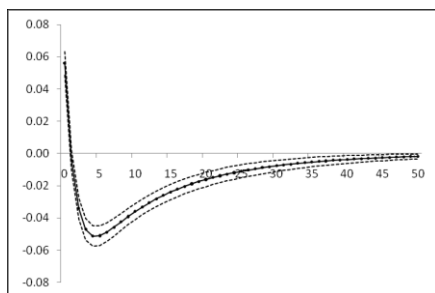
(d) Response of CF to AD Shock



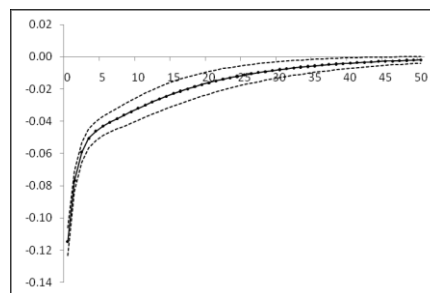
(e) Response of CF to BE Shock



(f) Response of Beta to RD Shock

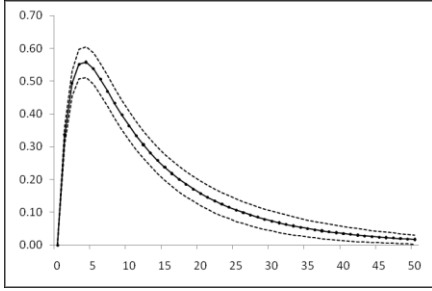


(g) Response of Beta to AD Shock

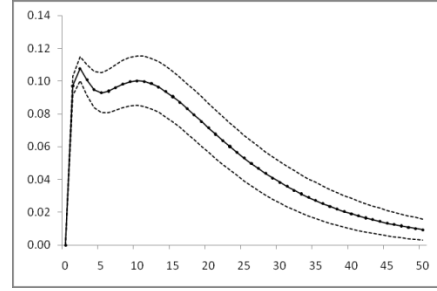


(h) Response of Beta to BE Shock

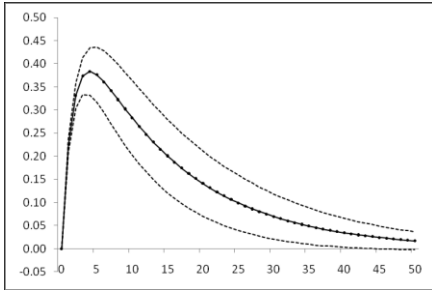
Figure 9 Impulse Response Analysis (Direct Effects)



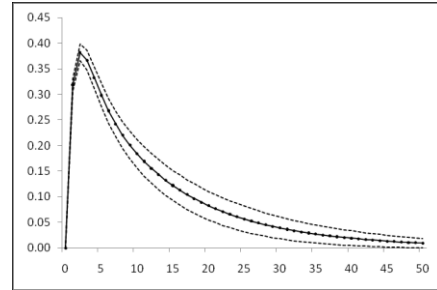
(a) Response of RD to BE Shock



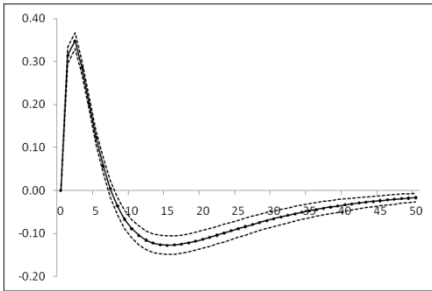
(b) Response of RD to CF Shock



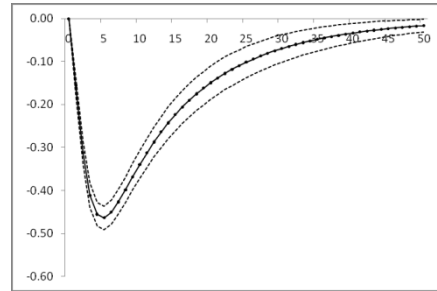
(c) Response of AD to BE Shock



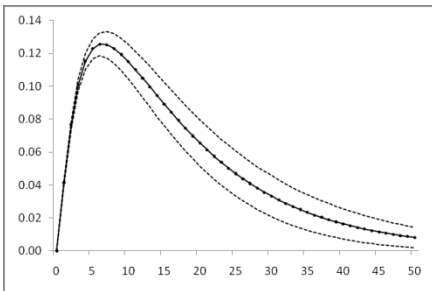
(d) Response of AD to CF Shock



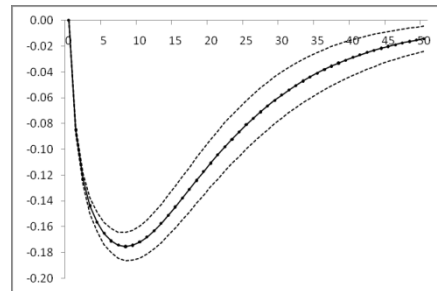
(e) Response of RD to Beta Shock



(f) Response of AD to Beta Shock



(g) Response of BE to CF Shock



(h) Response of BE to Beta Shock

Figure 10 Impulse response Analysis (Feedback Effects)

2.5.2.1. Direct Effects of Shocks on Strategic Expenditures and Brand Equity

A one standard deviation unexpected shock in R&D expenditure of a firm decreases brand equity immediately (-.038). This negative effect is converted into a positive one in a year and the positive effect is sustained in the long run. Table 11 and Figure 9 (a) report that a R&D shock decreases brand equity in the short run (.013), and increases brand equity in the long run (.011). This result suggests that eventually, investment in R&D is beneficial to a firm in creating brand value, although temporarily, it may seem to be harmful to the firm, accompanied by uncertainty about the success of its brand.

A shock to advertising expenditure shows different effects on brand equity compared to a shock to R&D expenditure. In Figure 9(b), an unexpected change in advertising expenditure is observed to always influence brand equity positively (same-year effect=.095, one-year-following effect=.149, long-run effect=4.744). Further, the effects are greater in magnitude than those of a shock on R&D expenditure growth both in the long run and in the short run.

As expected, the responses of cash flows to shocks on R&D expenditure, advertising expenditure, and brand equity each exhibit positive and decreasing patterns over time (see Figure 9 (c), (d), and (e)). That is, all three marketing metrics play a role in insulating a firm from the strain on its cash flows by creating greater and stronger cash-flow improvements. In particular, an unexpected change in brand equity shows the largest effects in magnitude on cash flows in the long run as well as short run, while an R&D expenditure shock has a greater short-run but a smaller long-run effect on cash flows than an advertising expenditure shock does.

Figure 9 (f) and (h) indicate that a higher level of R&D expenditure and brand equity than usual, induces a lower level of a firm's risk not only in the short run but also in the long run. On the other hand, a positive contemporaneous response of risk to an unexpected increment in

advertising expenditure is observed from Figure 9 (g). This positive effect, however, is attenuated and turns to a negative effect in a year. Further, a shock in advertising expenditure lowers risk in the long run. A shock on brand equity delivers the greatest negative effects on risk both in the long run and in the short run. An unexpected change in advertising expenditure shows greater long-run but smaller short-run effects on risk than a shock to R&D expenditure.

2.5.2.2. Feedback Effects of Shocks on Brand Equity, Cash Flows, and a Firm's Risk

Figure 10 shows the feedback effects of shocks on brand equity, cash flows, and risk in the short run and in the long run. From Figure 10 (a), (b), (c) and (d), unexpected increases in brand equity and cash flows each are observed to increase R&D and advertising expenditures both in the long run and in the short run. In contrast, a high level of risk shock lowers the level of R&D and advertising investments in the long run. These results are consistent with the traditional perspective that a high level of cash flows and a low level of cost of capital lead to increases in future marketing expenditures. In the short run, however, unexpectedly increased risk encourages investment in R&D but not advertising (see Figure 10 (e) and (f)), which means that when a firm faces a higher level of risk than usual, the managers make efforts to increase investment in R&D to some extent in order to revive the firm, while they decrease such efforts over the long run. Figure 10 (g) and (h) show that brand equity responds to a shock on cash flows positively and to that on risk negatively both in the short run and in the long run. These results indicate that cash flow shortfalls and a high level of risk damage brand value in the long run as well as in the short run.

2.5.3. Wear-in and Wear-Out Effects

For a full and accurate assessment of the effectiveness of marketing activities, it is important to identify how long it takes for advertising and R&D to have their maximum influence on brand equity, how long it takes for such expenditures and brand equity to maximally influence firm value, and how long the effects last before they die out. In this spirit, several studies in marketing have highlighted “wear-in” and “wear-out” effects or similar concepts to those effects (e.g. Little 1979; Bronnenberg, Mahajan, and Vanhonacker 2000; Nijs et al. 2001; Pauwels, Hanssens, and Siddarth 2002; Pauwels 2004; Godes and Mayzlin 2004; Luo 2009). According to Pauwels (2004), wear-in is the time duration before an effect of a variable reaches its peak and wear-out is the time duration before such an effect vanishes. Making use of Pauwels’ definition, we undertake wear-in and wear-out analyses. We calculate wear-out as the time when coefficients of impulse response function are stabilized i.e., the difference between current and previous effects is less than .001.

Table 12 summarizes the results of wear-in and wear-out effect for each marketing factor. We observe difference between the wear-in and wear-out effect patterns of advertising and R&D (see Figure 10(a) and (b)). The impacts of an R&D expenditure shock reach their peaks quickly but decay quickly as well, while those of a shock in advertising expenditure reach a peak more slowly but also come down more slowly. R&D influence on brand equity shows a wear-in effect of three years and a wear-out effect of fourteen years, while advertising has a wear-in of five years and wear-out of forty-five years. The results indicate that product innovation through investment in R&D would be an efficient way to build up brand equity initially. Advertising can be used to cultivate longer lasting brand equity.

The peak effects of R&D expenditure on cash flow and risk are immediate, but the effects die out quickly compared to advertising expenditure (see Figure 10(c) and (f)). Although advertising expenditure is observed to have an immediate wear-in effect on cash flow, it takes eight years to reach the second peak⁵ and forty years to wear-out (see Figure 10(d)). It takes four years before advertising expenditure reduces risk to the lowest level and twenty-three years before the negative effects of advertising expenditure on risk vanish (see Figure 10(g)). These results indicate that firm value enhancement comes earlier from R&D investment, while it is investment in advertising programs that have a more sustaining impact on firm value.

Brand equity effects on cash flow and risk both peak immediately and die out slowly (see Figure 10(e) and (h)). As such, brand equity is powerful influence on firm value, both positively and negatively. Once a firm establishes a strong and healthy brand image, the effect of this good brand image on firm value is sustained for a long time. On the other hand, damaged brand equity also is long lasting, which would make it difficult for a firm to recover from impaired brand equity.

Table 12 Wear-In and Wear-Out Effects

Shock	Response of	Wear-In	Wear-Out
RD	BE	3	14
	CF	0	14
	Risk	0	6
AD	BE	5	45
	CF	0/8	40
	Risk	4	23
BE	CF	0	41
	Risk	0	23

⁵ Regarding wear-in, Luo (2009) excludes contemporaneous (same-period) effects and counts from the first period from an occurrence of a shock. By Luo's definition, the second peak of the level of cash flows is the upper limit to calculate wear-in.

2.6. Discussion and Conclusion

Taking into account the two central components of firm value, firm performance, i.e. cash flow and cost of capital, i.e. risk, this study provides empirical evidence about the marketing-finance mechanisms underlying the observable relationships among strategic, marketing, and financial factors. The study also sheds light on the longevity of marketing and strategic efforts in influencing a firm's financial assessment. The estimated dynamic interactions among advertising and R&D expenditures, brand equity, cash flows, and risk show feedback cycles. A high level of expenditures on marketing activities creates brand equity and the resultant brand equity increases cash flow and decreases risk. The improved cash flow leads to increased investments in R&D and advertising, enhancing brand value, which leads to a higher level of future-term cash flows. The decreased risk induces a higher level of brand equity and as a result, lowers the level of risk in the future.

We also find a complementary feedback loop where a high level of risk makes a manager invest more in R&D rather than advertising expenditure, which increases brand equity and reduces risk in the future. This result highlights the key role of R&D in turning the tables under a high risk situation from a market collapse. That is, when a firm faces increased market-wide risk, managers pay more attention to developing new technologies and innovative products from R&D to build up immunity to the entire system crisis and achieve stability of firm returns in the future. While R&D programs are useful to initiate a program of brand reform, larger and longer-lasting positive effects of advertising expenditure shock versus R&D expenditure shock on brand equity, observed from orthogonalized impulse response analysis, indicate that advertising programs are central for cultivating brand equity by exposing products to consumers, raising customer awareness, and providing information about the brand.

The OIRF analyses show that unexpected changes in advertising and R&D expenditures increase brand equity and shocks on advertising and R&D expenditures and brand equity increase cash flows and decrease risk both in the long run and in the short run. In particular, a brand equity shock exhibits not only the greatest long-run and short-run effects in magnitude but also shorter wear-in and longer wear-out effects on firm value, i.e. increase cash flows and decrease risk, compared to R&D and advertising expenditures, whereas an R&D expenditure shock shows greater short-run but smaller long-run effects and shorter wear-in and wear-out effects on firm value than an advertising expenditure shock. These results suggest a tactical resource allocation such that managers should focus more on the marketing strategies related to strong brand creation because the intangible asset, brand equity, shows the most powerful impacts on firm value and the effects reach a peak quickly and die out slowly. In addition, we observe long-run and short-run feedback effects such that one standard deviation shocks in brand equity and cash flow influence R&D and advertising expenditures positively, and an unexpected increase in cash flows strengthen brand equity both in the short run and in the long run. A one standard deviation shock to risk, on the other hand, lowers brand equity and advertising expenditure in the long run as well as in the short run, while it decreases R&D expenditure in the long run but increases the expenditure in the short run.

The main contributions of this research are: (1) to interpret the marketing-finance interface in a structural behavior perspective whereas most previous studies in marketing have been focusing on forecasting a firm's future performance; (2) to provide empirical evidence of relationships among strategic programs, brand equity, and a firm's financial assessments; and (3) to find out dynamic consequences of temporal changes in strategic activities and marketing factors for a firm's financial performance and risk. Not only does our study give insights into

structural behavior and long-run and short-run dynamic interactions among strategic, marketing, and financial factors, and their managerial implications, but also it provides methodological contributions. We provide a guideline for how to deal with econometric problems in panel data in applying the VAR model, and resolve the potential unit root problem in underlying time-series and cross-sectional observations utilizing extended GMM. Also, by making use of OIRF, we are able to disentangle the effect of a shock that leads to change in a specific variable and investigate the dynamic consequences of such a shock in isolation from other components.

Chapter 3

Conclusion and Future Research

In recent years, marketing researchers have recognized the importance of the marketing-finance interface from both conceptual and empirical perspectives. For example, Aaker (1996) and Keller (1998) have established value-chain models that explain how marketing efforts and resultant market based intangible asset, i.e., brand equity, generate firm's financial value and several subsequent studies have examined the link between marketing variables and a firm's financial performance. Based on the theoretical and empirical developments, the studies in this dissertation seek to shed light on the dynamic interactions among marketing programs, brand equity, and firm's financial value.

As a first step, we investigate the relationship between brand equity and a firm's risk, adopting the CAPM beta as a measure for financial assessment. By allowing for the multidimensional structure of brand equity and asymmetries in beta, this study unveils the differential effects of brand equity components (Differentiation, Relevance, Esteem, Knowledge, Energy) on upside risk, downside risk, and the gap between upside and downside risk. The results show that Esteem has a negative effect on the risk differential, which comes from a more pronounced positive effect on downside risk, Energy has a positive effect on the risk differential, which comes from a more pronounced positive effect on upside risk, and Knowledge has a negative effect on downside risk as well as upside risk, and, thus, it does not have a statistically significant effect on the risk differential. The results provide a precise nature of each dimension

of brand equity in assessing a firm's risk and help managers make more sophisticated strategic decisions accordingly.

In the second study, we extend our model by adding advertising and R&D expenditures which have been posited to create brand equity, to the model and taking into account two facets of firm value, i.e., cash flows and risk. We include both direct and feedback effects of each component in our panel VAR model and examine their interrelationships in the long run as well as in the short run. The dynamic structural framework of the expanded model, an elaborately designed model resolving econometric and unit root problems in panel data, draws whole picture of interactions among advertising and R&D expenditures, brand equity, cash flows, and risk and gives insight into their behaviors in marketing-finance system. In order to separate the shock to a component of interest from those to the other components, we use orthogonalized impulse response analysis and thus, are able to identify the consequences of an innovation of advertising expenditure, R&D expenditure, and brand equity each in isolation for brand equity, cash flows, and risk. Not only do the results of the expanded model advocate the traditional market asset theory (i.e. investments in marketing create brand equity and the increased brand equity influence firm value) but also they show that firm value, in a reverse manner, affects marketing activities and brand value. Also, the analyses of wear-in and wear-out effects suggest the nuanced roles of brand equity, advertising program, and R&D program in influencing firm value. That is, brand equity is the most powerful and central metric to increase cash flows and decrease risk both in the short term and long term, while R&D program builds the foundation for brand and firm value creation and advertising program sustains brand and firm value over time.

Despite the academic and managerial accomplishments of the studies, this research is still in need of some improvements. For example, although we are able to generalize our results by

including a large number of mono-brand firms from several industries, this dissertation has a limitation in that most mono-brand firms that we utilize have high advertising expenditures. According to Kim and McAlister (2011), for firms that spend more in advertising, unexpected increases in advertising are positively associated with firm value, while for firms that spend less in advertising, advertising shocks influence firm value negatively. Thus, the effect of a shock on strategic expenditures on firm value for low advertising firms should be examined in the future.

Also, as several previous studies have pointed out as well, using just the dollar volume of advertising and R&D is not sufficient to clarify the role of marketing activities in influencing brand and firm value (e.g. Eastlack and Rao 1989; Blair 1987; Lodish et al. 1995). In particular, Cobb-Walgren, Ruble, and Donthu (1995) suggest that not only the dollar expenditure of advertising but also the quality of advertising should be considered in investigating the relationship between advertising and brand equity. Accordingly, devising measures for the quality of marketing activities and adding them to a marketing structure system should be pursued in the future.

Another issue in brand value creation is the possible existence of a third factor besides marketing expenditure, which generates brand value and influences firm performance. For example, the tactical and strategic marketing activities of competitors are candidates for factors that affect brand equity and firm value. In line with this, some studies (e.g. Chen 1996; Dekimpe and Hanssens 1995; Jedidi, Mela, and Gupta 1999; Pauwels 2004) have introduced competitors' actions in examining the long-term effect of marketing profitability and effectiveness. Thus, it will be interesting to investigate competitors' actions in influencing customer mindset and firm financial performance and in reducing the role of marketing program expenditures.

REFERENCES

Aaker, David A. (1996), *Building Strong Brands*. New York: The Free Press.

——— and Robert Jacobson (1994), “The Financial Information Content of Perceived Quality,” *Journal of Marketing Research*, 31 (May), 191-201.

——— and ——— (2001), “The Value Relevance of Brand Attitude in High-Technology Markets,” *Journal of Marketing Research*, 38 (November), 485-493.

Agres, Stuart J. and Tony M. Dubitsky (1996), “Changing Needs for Brands,” *Journal of Advertising Research*, 36 (Jan/Feb), 21-30.

Ang, Andrew, Joseph Chen, and Yuhang Xing (2006), “Downside Risk,” *Review of Financial Studies*, 2 (March), 1191-1239.

Arellano, Manuel and Olympia Bover (1995), “Another Look at the Instrumental Variable Estimation of Error-Components Models,” *Journal of econometrics*, 68, 29-51.

Bai, Jushan (2000), “Vector Autoregressive Models with Structural Changes in Regression Coefficients and Variance–Covariance Matrices,” *Annals of Economics and Finance*, 1, 303–339.

Bass, Frank M. (1969), "A Simultaneous Equation Regression Study of Advertising and Sales of cigarettes," *Journal of Marketing Research*, 6 (August), 291-300.

Beaver, William, Paul Kettler, and Myron Scholes (1970), "The Association Between Market-Determined and Accounting-Determined Risk Measures," *Accounting Review*, 45(3), 654-682.

Benner, Marry J. (2007), "The incumbent discount: Stock market categories and response to radical technological change," *Academy of Management Review*, 32 (3), 703-720.

Bharadwaj, Sundar G. and Anil Menon (1993), "Determinants of Success in Service-Based Industries: A PIMS-Based Empirical Investigation," *Journal of Services Marketing*, 7(4), 19-40.

Binder, Michael, Cheng Hsiao, and M. Hashem Pesaran (2005), "Estimation and Inference in Short Panel Vector Autoregressions with Unit Roots and Cointegration," *Econometric Theory*, 21 (4), 795-837.

Blair, Margaret (1987), "An Empirical Investigation of Advertising Wearin and Wearout," *Journal of Advertising Research*, 27(6), 45-50.

Blundell, Richard and Stephen Bond (1998), "Initial Conditions and Moment Restrictions in Dynamic Panel Data Models," *Journal of Econometrics*, 87 (1), 115-143.

Boulding, William and Markus Christen (2008), "Disentangling Pioneering Cost Advantages and Disadvantages," *Marketing Science*, 27, 699 - 716.

BrandAsset Consulting Young & Rubicam Brands. [available at
http://www.brandassetconsulting.com/site_pages/brand_health]

Bronnenberg, Bart J., Vijay Mahajan, and Wilfred Vanhonacker (2000), "The emergence of market structure in new repeat-purchase categories: A dynamic approach and an empirical application," *Journal of Marketing Research*, 37 (1), 16-31.

Carhart, Mark M. (1997), "On persistence in mutual fund performance," *Journal of Finance*, 52, 57-82.

Chan, Louis K.C., Josef Lakonishok, and Theodore Sougiannis (2001), "The Stock Market Valuation of Research and Development Expenditure," *Journal of Finance*, 56 (6), 2431-2456.

Chauvin, Keith W. and Mark Hirschey (1993), "Advertising, R&D Expenditures and the Market Value of the Firm," *Financial Management*, 22(4), 128-140.

Cobb-Walgren, Cathy J., Cynthia A. Ruble, and Naveen Donthu (1995), "Brand Equity, Brand Preference, and Purchase Intent," *Journal of Advertising*, 24(3), 25-40.

Dekimpe, Marnik G. and Dominique M. Hanssens (1995), "The Persistence of Marketing Effects on Sales," *Marketing Science*, 14 (3), 1-21.

——— and ——— (1999). “Sustained Spending and Persistent Response: A New look at Long-Term Marketing Profitability,” *Journal of Marketing Research*, 23 (November), 397-412.

——— and ——— (2000), “Time-Series Models in Marketing: Past, Present and Future,” *International Journal of Research in Marketing*, 17 (2-3), 183-193.

Dimson, Elroy (1979), “Risk measurement when shares are subject to infrequent trading,” *Journal of Financial Economics*, 7, 197-226.

Dutta, Shantanu, Om Narasimhan, and Surendra Rajiv (1999), “Success in High-Technology Markets: Is Marketing Capability Critical?,” *Marketing Science*, 18 (Fall), 547 - 568.

Eastlack, Joseph O. Jr. and Ambar G. Rao (1989), “Advertising Experiments at Campbell Soup Company,” *Marketing Science*, 8 (Winter), 57-71.

Erickson, Gary and Robert Jacobson (1992), “Gaining Competitive Advantage Through discretionary Expenditures: The Returns to R&D and Advertising,” *Management Science*, 38 (9), 1264-1279.

Estelami, Hooman, Donald R. Lehmann, and Alfred C. Holden (2001), “Macro-economic Determinants of Consumer Price Knowledge: A Meta-analysis of Four Decades of Research,” *International Journal of Research in Marketing*, 18 (5), 341-355.

Fama, Eugene F., and Kenneth R. French (1993), “Common Risk Factors in the Returns on Stocks and Bonds,” *Journal of Financial Economics*, 33 (1), 3-56.

Franses, Philip-Hans, Shuba Srinivasan, and Peter Boswijk (2001), “Testing for Unit Roots in Market Shares,” *Marketing Letters*, 12 (4), 351–64.

French, Kenneth R. and James M. Poterba (1991), “Investor Diversification and International Equity Markets,” *The American Economic Review*, 81 (2), 222-226.

Frieder, Laura and Avanidhar Subrahmanyam (2005), “Brand Perceptions and the Market for Common Stock,” *Journal of Financial and Quantitative Analysis*, 40 (1), 65–85.

Fudge, Ann (2005), “Brand Energy: A Compass for Navigating Troubled Waters,” paper presented at Marketing Science Institute Conference on Connecting with Customers in a Complex World, Chicago (November), 3–4.

Gerzema, John, Ed Lebar, and Anne Rivers (2009), “Measuring the Contributions of Brand to Shareholder Value,” *Journal of Applied Corporate Finance*, 21 (4), 79-88.

———, ———, and Michael Sussman (2005), “Brand Energy: Quantifying the Value of Brand Momentum,” Y&R white paper.

Godes, David and Dina Mayzlin (2004), "Using Online Conversations to Study Word-of-Mouth Communication, *Marketing Science*, 23 (4), 545-560.

Greene, William H. (2003), *Econometric Analysis* 5th ed. Upper Saddle River, NJ: Prentice Hall, 283-293.

Gruca, Thomas S. and Lopo L. Rego (2005), "Customer Satisfaction, Cash Flow, and Shareholder Value," *Journal of Marketing*, 69 (July), 115-130.

Grullon, Gustavo, George Kanatas, and James P. Weston (2004), "Advertising, Breadth of Ownership, and Liquidity," *Review of Financial Studies*, 17 (Spring), 439-461.

Ha, Kyoung N., Robert Jacobson, and Gary Erickson (2011), "Brand Equity and Asymmetric Risk," working paper, University of Washington.

Hamilton, James D. (1994), *Time Series Analysis*. Princeton: Princeton University Press.

Hausman, Jerry A. (1978), "Specification Tests in Econometrics." *Econometrica*, 46 (6), 1251-1271.

Hong, Yongmiao, Jun Tu, and Guofu Zhou (2006), "Asymmetries in Stock Returns: Statistical Tests and Economic Evaluation," *Review of Financial Studies*, 23 (September), 1547-1581.

Horsky, Dan and Patrick Swyngedouw (1987), “Does It Pay to change Your Company Name? A stock Market Perspective,” *Marketing Science*, 6 (4), 320-325.

Joshi, Amit and Dominique M. Hanssens (2010), “The Direct and Indirect Effects of Advertising Spending on Firm Value,” *Journal of Marketing*, 74 (January), 20-33.

Keller, Kevin Lane (1998), *Strategic Brand Management*. New York: McGraw-Hill.

——— and Donald R. Lehmann (2003), “How Do Brands Create Value?” *Marketing Management*, 12 (3), 26-31.

Kim, Hyeongwoo (2009), “Generalized Impulse Response Analysis: General of Extreme?”
MPRA Working Paper No.17014

Kim, MinChung and Leigh McAlister (2011), “Stock Market Reaction to Unexpected Growth in Marketing Expenditure: Negative for Salesforce, Contingent on Spending Level for Advertising,” *Journal of Marketing*, 75 (July), 68-85.

Lamey, Lien, Barbara Deleersnyder, Marnil G. Dekimpe, and Jan-Benedict E.M. Steenkamp (2007). How Business Cycles Contribute to Private-Label Success: Evidence from the United States and Europe. *Journal of Marketing*, 71 (January), 1-15.

Lane, Vicki and Robert Jacobson (1995), "Stock Market reactions to Brand Extension Announcements: The Effects of Brand Attitude and Familiarity," *Journal of Marketing*, 59 (January), 63-77.

Lewellen, Jonathan and Stefan Nagel (2006), "The Conditional CAPM Does Not Explain Asset-Pricing Anomalies," *Journal of Financial Economics*, 82(2) 289-314.

Little, John D.C. (1979), "Aggregate Advertising Models: The State of the Art," *Operation Research*, 27 (July-August), 629-667.

Lo, Andrew W. and A. Craig MacKinlay (1990), "Data-snooping biases in tests of financial asset pricing models," *Review of Financial Studies*, 3, 431-468.

Lodish, Leonard M., Magid M. Abraham, Jeanne Livelsberger, Beth Lugetkin, Bruce Richardson, and Mary Ellen Stevens (1995), "A Summary of Fifty-Five In-Market Experimental Estimates of the Long-Term Effect of TV Advertising," *Marketing Science*, 14 (3), G133-G140.

Low, Cheekiat (2001), "Semidimensional Risks in the Cross Section of Stock Returns," working paper, Yale University and National University of Singapore.

Luehrman, Timothy A. (1998), "Investment Opportunities as Real Options: Getting Started on the Numbers," *Harvard Business Review*, July-August, 51-67.

Luo, Xueming (2009), "Quantifying the Long-Term Impact of Negative Word of Mouth on Cash Flows and Stock Prices," *Marketing Science*, 28 (1), 148-165.

——— and C.B. Bhattacharya (2006), "Corporate Social Responsibility, Customer Satisfaction, and Market Value," *Journal of Marketing*, 70 (October), 1-18.

Maddala, G.S. and Wu, Shaowen (1999), "A Comparative Study of Unit Root Tests With Panel Data and A New Simple Test," *Oxford Bulletin of Economics and Statistics* 61 (4), 631-652.

Markovitch, Dmitri G., Joel H. Steckel, Bernard Yeung (2005), "Using capital markets as Market Intelligence: Evidence from the Pharmaceutical Industry," *Management Science*, 51 (10), 1467-1480.

McAlister, Leigh, Raji Srinivasan, and MinChung Kim (2007), "Advertising, Research and Development, and Systematic Risk of the Firm," *Journal of Marketing*, 71 (January), 35-48.

Mela, Carl F., Sunil Gupta, and Donald R. Lehmann (1997), "The long-term impact of promotion and advertising on consumer brand choice," *Journal of Marketing Research*, 34 (2), 248-261.

Minton, Bernadette A. and Catherine Schrand (1999) "The Impact of Cash Flow Volatility on Discretionary Investment and the Costs of Debt and Equity financing," *Journal of Financial Economics*, 54 (3), 423-460.

Mizik, Natalie and Robert Jacobson (2008), "The Financial Value Impact of Perceptual Brand Attributes," *Journal of Marketing Research*, 45 (1), 15-32.

——— and ——— (2009), "Valuing Branded Businesses," *Journal of Marketing*, 73 (Nov), 137-153.

Myers, Stewart C. (1984), "Finance Theory and Financial Strategy," *Interfaces*, 14 (1), 126-137.

Narasimhan, Om, Surendra Rajiv, and Shantanu Dutta (2006), "Absorptive Capacity in High-Technology Markets: The Competitive Advantage of the Haves," *Marketing Science*, 25, 510 - 524.

Nijs, Vincent R., Marnik G. Dekimpe, Jan-Benedict E.M. Steenkamp, and Dominique M. Hanssens (2001), "The Category-Demand Effects of Price Promotions," *Marketing Science*, 20 (1), 1-22.

Novy-Marx, Robert (2007), "An Equilibrium Model of Investment under Uncertainty," *Review of Financial Studies*, 20(5), 1461-1502.

Pauwels, Koen (2004), "How Dynamic Consumer Response, Competitor Response, Company Support, and company Inertia Shape Long-Term Marketing Effectiveness," *Marketing Science*, 23 (4), 596-610.

———, Dominique M. Hanssens, and Sivaramakrishnan Siddarth (2002), “The Long-Term Effects of Price Promotions on Category Incidence, Brand Choice and Purchase Quantity,” *Journal of Marketing Research*, 39 (4), 421-439.

———, Jorge Silva-Risso, Shuba Srinivasan, and Dominique M. Hanssens (2004), “New Products, Sales Promotions and Firm Value, with Application to the Automobile Industry,” *Journal of Marketing*, 68 (4), 142-156.

Pesaran, M. Hashem and Yongcheol Shin (1998), “Generalized Impulse Response Analysis in Linear Multivariate Models,” *Economics Letters*, 58, 17-29.

Post, Thierry and Pim Van Vliet (2004), “Conditional Downside Risk and the CAPM,” *ERIM Report Series Research in Management*, June, 1-30.

Quelch, John (2008). Marketing Your Way Through a Recession. [available at <http://hbswk.hbs.edu/item/5878.html>]

Rego, Lopo L., Matthew T. Billett, and Neil A. Morgan (2009), “Consumer-Based Brand Equity and Firm Risk,” *Journal of Marketing*, 73 (November), 47-60.

Rzepczynski, Mark S. (2004), “Looking Under the Hood of Variance,” *JWH Journal*, 1(6), 1-6.

Singh, Manohar, Sheri Faircloth, and Ali Nejadmalayeri (2005), "Capital Market Impact of Product Marketing Strategy: Evidence from the Relationship between Advertising Expenses and Cost of Capital," *Journal of the Academy of Marketing Science*, 33(4), 432-444.

Slotegraaf, Rebecca J. and Koen Pauwels (2008), "The Impact of Brand Equity and Innovation on the Long-Term Effectiveness of Promotions," *Journal of Marketing Research*, 45(June), 293-306.

Smith, David J., Nikola Gradojevic, and W. Sean Irwin (2007), "An Analysis of Brand Equity Determinants: Gross Profit, Advertising, Research and Development," *Journal of Business & Economics Research*, 5(11), 103-116.

Srivastava, Rajendra K., Tasadduq A. Shervani, and Liam Fahey (1998), "Market-Based Assets and Shareholder Value: A Framework for Analysis," *Journal of Marketing*, 62 (1), 2-18/

Srinivasan, Raji and Gary L. Lilien (2010), "R&D, Advertising and Firm Performance in Recession," *Australasian Marketing Journal*, 18, 181-182.

Srinivasan, Shuba and Dominique M. Hanssens (2009), "Marketing and Firm Value: Metrics, Methods, Findings, and Future Directions," *Journal of Marketing Research*, 46 (3), 293-312.

The Independent, "Recession hits finance firms' brand value," (accessed September 18, 2009), [available at <http://www.independent.co.uk/news/business/news/recession-hits-finance-firms-brand-value-1789527.html>].

TNS (2009). Innovation in a Recession. [available at http://www.tns-us.com/files/white_papers/innovation_in_a_recession-8.pdf]

Tuli, Kapil R. and Sundar G. Bharadwaj (2009), "Customer Satisfaction and Returns Risk," *Journal of Marketing*, 73 (November), 184-197.

Turner, Craig A., and Iain Clelland (2007), "Routes to Risk: The Influence of Capability Development on Downside Risk and Upside Volatility," *Business Renaissance Quarterly*, 2(3), 43-65.

Veliyath, Rajaram, and Stephen P. Ferris (1997), "Agency Influences on Risk Reduction and Operating Performance: An Empirical Investigation Among Strategic Groups," *Journal of Business Research*, 39(3), 219-227.

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