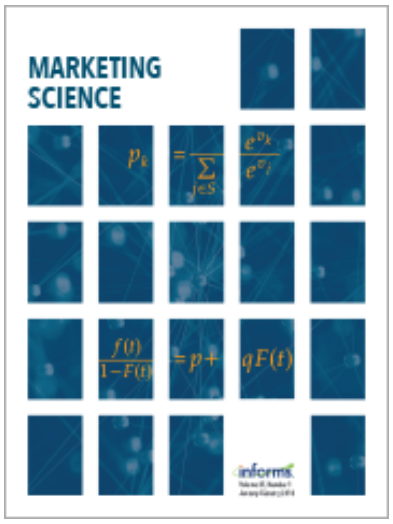

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Practice Prize Paper—BRAN*EQT: A Multicategory Brand Equity Model and Its Application at Allstate

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Practice Prize Paper

BRAN∗EQT: A Multicategory Brand Equity Model and Its Application at Allstate

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We develop a robust model for estimating, tracking, and managing brand equity for multicategory brands based on customer survey and financial measures. This model has two components: (1) offering value (computed from discounted cash flow analysis) and (2) relative brand importance (computed from brand choice models such as multinomial logit, heteroscedastic extreme value, and mixed logit). We apply this model to estimate the brand equity of Allstate—a leading insurance company—and its leading competitor, which compete in multiple categories. The model captures the brand's spillover effects from one category to another. In addition, we identify the dimensions that drive a brand's image, examine the relationships among advertising, brand equity, and shareholder value, and build a decision support simulator for the focal brand. Our model provides reliable estimates of brand equity, and our results show that advertising has a strong long-term positive influence on brand equity, which is significantly positively related to shareholder value. The model, the brand equity estimates, and the decision support simulator are used by key executives across multiple functional areas and have enabled the company to substantially gain by reallocating its advertising resources to improve brand equity and shareholder value, and by offering better guidance to analysts and investors.

Key words: brand equity; intangible assets; brand management; choice model; advertising; shareholder value
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1. Introduction

There is growing recognition that brands are valuable intangible assets. Brand equity has recently been the focus of academic research and managerial practice (Aaker 1996, Ailawadi et al. 2003, Keller 2003, Srinivasan et al. 2005). Brand equity can be defined as the *net present value of the incremental cash flows* attributable to a brand name and to the firm owning that brand relative to an identical product with no brand name or brand-building efforts (Shocker and Weitz 1988).

Brand equity is an important construct to study because it is associated with key benefits for both consumers[1] and firms (Keller and Lehmann 2006). From a consumer viewpoint, it signals credibility, improving customer perceptions about the brand and increasing confidence in brand claims, leading to lower information costs, lower perceived risk, lower costs of thinking, and greater brand utility (Erdem and Swait 1998, Erdem et al. 2006, Shugan 1980). From a firm perspective, it allows a firm to leverage its reputation in one market to alleviate an information asymmetry problem in other markets (Balachander and Ghose 2003, Choi 1998) and permits high-quality brands to extend to other markets (Cabral 2000). For a detailed conceptual review of brand equity, see Swait et al. (1993).

Many approaches have been proposed for estimating brand equity. Table 1 provides a summary of the basic principles, categories of application, and the major limitations of selected approaches, including the approach used in this paper. Ailawadi et al. (2003) and Dubin (1998) compute brand equity as a *revenue premium* over a generic product's revenues. Kamakura and Russell (1993) calculate brand equity as a *volume premium* based on a choice model estimated on scanner panel or survey data. Hjorth-Anderson (1984) and Holbrook (1992) treat brand equity as a *price premium*. Park and Srinivasan (1994), Srinivasan (1979), Srinivasan et al. (2005), and Swait et al. (1993) compute brand equity by estimating *price and volume premiums* from consumer survey data. Simon and Sullivan (1993) estimate brand equity as a *residual effect on market capitalization* after controlling for some known effects. Roberts et al. (2004) estimate brand

[1] For expositional ease, we use the terms consumer and customer interchangeably throughout the paper.

Table 1 Summary of Selected Brand Equity Models

Author(s)	Principle	Categories	Type of data	Main limitations
Ailawadi et al. (2003)	Revenue premium calculated as the incremental difference of brand revenues over private label's revenues	Consumer packaged goods	Weekly sales and price promotion variables data for a grocery chain	Uses contribution margin, not actual cash flow as the financial metric. The premium measure is relative to private label, which is assumed to have no brand equity. Does not isolate the role of brand relative to other drivers of market performance.
CoreBrand Analysis (2004)	Estimation of market capitalization due to brand power operationalized as familiarity and favorability opinions.	Publicly listed firms	Survey of executive opinions on brands and financial data	Judgment or opinion data. Brand power measure limited to familiarity and favorability. Potential multicollinearity problems in regression analysis. Potential endogeneity of variables in the brand power and stock price equations.
Damodaran (2006)	Brand expenditure is amortized over an assumed horizon and the unamortized portion is treated as brand equity. Discounted cash flow (DCF) and excess return differences over generic firm.	Illustration and examples of categories	No empirical data	Measures the expenditures on the brand, not the value of the brand. Generic comparison firms are difficult to obtain. Cannot attribute excess returns to brand name or image.
Dubin (1998)	Economic measure of difference between a brand's profit and a generic product	Breakfast foods	Nielson store audit data, SAMI Burke warehouse withdrawal data	Based on contribution margin. Does not isolate the role of brand relative to other drivers of market demand.
Fischer (2004)	Portion of cash flow attributable to brand relative to marketing mix variables	German automobiles, cosmetics, grocery stores	Consumer survey and financial data	Assumes either single category brand or that brand equity is equal in all product categories. No analysis of relationship between brand equity and advertising/brand-building measures.
Hjorth-Anderson (1984)	Econometric estimation of price premium from hedonic regression function	Broad range of consumer packaged goods	Price data	Volume premium or cash flow not considered.
Holbrook (1992)	Econometric estimation of price premium from hedonic regression function	Consumer electronics	Price data	Volume premium or cash flow not considered.
Interbrand (2006)	Estimation of brand-related share in future brand cash flows predicted by analysts	Broad range of industries	Expert ratings, projected cash flows	Judgment based (driven by expert ratings).
Kamakura and Russell (1993)	Estimation of perceived quality and intangible value index from brand utility function	Laundry detergents	Scanner panel data	Nonfinancial measure of brand equity. Does not partial out the effects of all possible marketing variables. Single-category brand equity measure.
Park and Srinivasan (1994)	Survey-based estimation of attribute and nonattribute components of brand equity in terms of market share and price premiums attributable to brand	Toothpaste and mouthwash	Consumer survey	Nonfinancial measure of brand equity. Only a relative measure of brand equity. Relies on last purchased brand.
Roberts et al. (2004)	Ratio of outcome of brand equity (regressed on sources such as awareness, consideration, and associations) for the focal brand over the sum of outcomes for all brands	1,710 brands in 60 categories	Consumer survey, face-to-face interviews	Consumer-based measure, not translated into financial value ($).

Table 1 (cont'd.)

Author(s)	Principle	Categories	Type of data	Main limitations
Simon and Sullivan (1993)	Regression-based decomposition of a firm's market capitalization due to intangibles such as brand assets	Broad range of industries	Published annual reports	Assumes one brand firm, share price reflects anticipated value of all activities of that brand, and coefficients to be same for all brands in the industry.
Srinivasan (1979)	Estimation of brand-specific effects as component of brand preference in multiattribute model	Health care facilities	Consumer survey	Preference measure of brand equity in terms of premium price.
Srinivasan et al. (2005)	Estimation of price and volume premium from brand utility function	Cell phones	Consumer survey	Uses incremental contribution, not actual cash flow as the financial metric; does not include price promotions; measurement errors due to use of industry experts to judge availability.
Swait et al. (1993)	Estimation of price premium from brand utility function	Deodorants, jeans, athletic shoes	Consumer survey	Volume premium or cash flow not considered.
Young and Rubicam (2006)	Estimation of brand strength and brand stature (two dimensions of brand equity)	Variety of product categories	Consumer survey	Not well connected to financial measures. Single category model.
This paper (2008)	Estimation of incremental cash flow attributable to brand in each category in which the brand competes. Study of relationships between brand equity and advertising and between brand equity and shareholder value.	Insurance industry	Consumer survey data and financial and marketing measures	Analysis of relationship between brand equity and advertising based on limited sample size.

equity as a *ratio of outcome* for the focal brand over the sum of outcomes for all the brands in the category. In their model, outcome (measured by variables such as behavioral intentions) is regressed on sources of brand equity such as awareness, consideration, and association to understand the drivers of brand equity. *CoreBrand* Analysis (2004) estimates brand equity as a *contribution to market capitalization* based on executives' opinions of brand familiarity and favorability. Fischer (2004) computes brand equity as the *portion of cash flow* attributable to brand relative to other marketing-mix variables. *Interbrand* (2006) estimates brand equity as the brand-related *share of future cash flows* as predicted by analysts and judges. Damodaran (2006) suggests *accounting approaches* such as historical, discounted cash flow, and excess returns approaches to measure brand value. The brand asset valuator from Young and Rubicam (2006) computes brand equity from two survey-based dimensions—brand stature and brand strength or energy.

Existing brand equity models are either developed for corporate brands or for firms with a single brand in a single category. In cases where a firm has the same brand in multiple categories, existing models implicitly assume that brand equity is the same in each category. Because most firms have the same brand in multiple categories and the same brand can have different performance outcomes in different categories, these models can provide incorrect estimates of brand equity. For example, the Hewlett Packard (HP) brand is competitively stronger in the printer category, but competitively weaker in the computer server category. Moreover, approaches that assume a single-category brand do not capture the spillover effects of a brand name from one category to another (e.g., Balachander and Ghose 2003, Erdem 1998, Erdem and Sun 2002), resulting in incorrect estimates of its equity.

Current models of brand equity do not study the relationship of brand equity to advertising or shareholder value. Marketing executives need to better understand how advertising efforts are related to brand equity so that they can make appropriate decisions on advertising spending. More important, at the senior management and board of director levels, a clear understanding of the relationship of brand equity to shareholder value is critical for making appropriate marketing investment decisions and providing valuable guidance to the investors and analysts about the value of the brand to the stockholder.

In this paper, we develop a model and decision support simulator (*BRAN∗EQT*) for estimating, track-

ing, and managing brand equity for a multicategory brand based on a combination of financial and customer-based measures. In addition, we study the relationships between brand equity and advertising and between brand equity and shareholder value. Our model is a general model with the brand in a category as the unit of analysis. It can be applied to a good or service in a business-to-consumer (B2C) or a business-to-business (B2B) context. We apply our model to measure the brand equity of the flagship brand (hereafter, "the focal brand") of Allstate Corporation, a leading insurance company (hereafter, "the company"), and its closest competitor, each of which offers its brand in multiple categories. We validate this model by comparing the relative brand importance (RBI) and brand equity obtained from a brand choice model to those from a brand perception score method. We examine the relationship between advertising and brand equity and between brand equity and shareholder value for the focal company, using data on multiple brands and categories. We discuss the implications for tracking, building, and managing brand equity based on these results.

We extend prior brand equity models in several ways. First, we extend models that treat brand equity as price or revenue premiums (Ailawadi et al. 2003, Dubin 1998, Hjorth-Anderson 1984, Holbrook 1992) by incorporating cash flows that truly reflect the financial value of the brand. Second, we build on models of volume premiums based on consumer choice models estimated using scanner panel data (Kamakura and Russell 1993) by including cash flows, separating the effects of multiple marketing variables, and including spillover effects across categories. Third, we go beyond models measuring marginal contribution of brands based on consumer surveys (Park and Srinivasan 1994, Srinivasan 1979, Srinivasan et al. 2005, Swait et al. 1993) and those using brand outcomes and sources based on consumer surveys (Roberts et al. 2004) by incorporating cash flows and further isolating the role of brand in total cash flow. Fourth, we extend models based on expert judgments (*CoreBrand* Analysis 2004, *Interbrand* 2006, Young and Rubicam 2006) by using objective financial data and consumer perception data and performing a rigorous analysis of the role of brand in consumer choice. Fifth, we extend models based on market capitalization (*CoreBrand* Analysis 2004, Simon and Sullivan 1993) by rigorously separating the effects of brand from those of other variables and by basing brand equity estimation on cash flows rather than on potentially speculative investor behavior. Sixth, we go beyond single-category accounting approaches that treat investments as a measure of brand value and do not isolate the effect of brand (Damodaran 2006) by using projected cash flows and consumer data and by isolating the relative importance of brand. Seventh, we extend models based on only customer survey (Young and Rubicam 2006) and those that combine consumer choice data and financial measures (Fischer 2004) from single category to multicategory brand equity by including spillover effects of the brand across categories. Our model estimates RBI at the individual level, allowing the firm to segment and target customers based on its ability to leverage the brand's value. We also extend all prior models by investigating the relationship between brand equity and advertising expenditures and between brand equity and shareholder value.

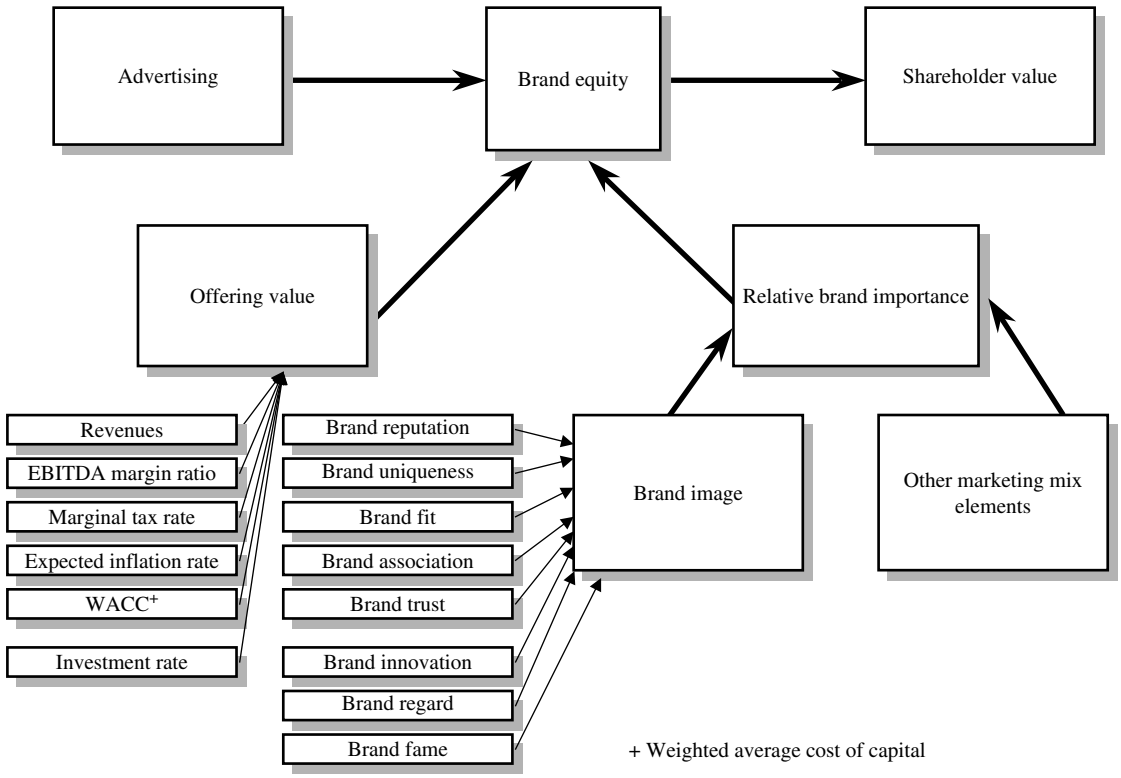
2. A Conceptual Framework and Model for Estimating Multicategory Brand Equity

Figure 1 provides a conceptual framework relating brand equity to its components, drivers, advertising, and shareholder value. In this framework, advertising impacts brand equity, which in turn affects shareholder value. Brand equity has two multiplicative components: offering value and RBI. Offering value is the net present value or financial worth of an offering (a good or service or a bundle of goods and services) carrying a brand name and can be computed based on financial measures such as expected revenues, margin ratio, and tax rate. Relative brand importance is derived from consumer brand choice and is determined by brand image and other marketing-mix elements. Brand image is driven by perceptions of several brand image driver dimensions. We focus on developing a model for estimating brand equity using financial and consumer survey data, identifying the main brand dimension drivers, and relating brand equity to advertising and shareholder value.

A model that estimates brand equity would have to identify and isolate the effect of the brand image on the anticipated cash flow values of the offerings (goods or services or their combinations) carrying the brand name and determine the anticipated cash flows attributable to the brand name. To obtain an isolated effect of brand image, we need a measure that captures the contribution of brand image to consumer utility relative to those of the other attributes that also influence consumer choice of the offering. The RBI measure, explained subsequently, is an appropriate measure of the effect of brand image. For a multicategory brand, brand equity can be defined as the sum of the products of RBI and *offering value* in each category.[2] We decompose brand equity, the

[2] We realize that an alternative way to compute multicategory brand equity is to multiply the number of categories by the value of brand equity in the category with the maximum brand equity. Because this measure reflects the upside potential of the brand rather than its realistic value, we stick to our proposed measure.

Figure 1 Conceptual Framework of Brand Equity



incremental NPV of earnings from a product or service attributable to brand image, into two multiplicative components: the discounted cash flow value that earnings from the product or service offer (offering value), and that part of the offering value attributable to the brand (RBI).

$$\mathrm{BE}_{it} = \sum_{j=1}^{J} \mathrm{OV}_{ijt} \mathrm{RBI}_{ijt}, \tag{1}$$

where BE is brand equity, OV or offering value is the discounted cash flow value, RBI is relative brand importance, i is brand, j is product category, t is time, and J is the total number of product categories carrying brand i's name.

2.1. Offering Value

The offering value of brand i in category j at time t is given by

$$\mathrm{OV}_{ijt} = \int_{t}^{\infty} e^{(f_t - r_{it})t} R_{ijt}(1 - x_{it})(EBITDAMR_{ijt} - v_{it})\,dt, \tag{2}$$

where f is the expected long-term inflation rate, r is the weighted average cost of capital (WACC) for the firm owning the brand, R is the expected or anticipated average periodic revenues from the offering that carries the brand name, x is the marginal tax rate for the firm, *EBITDAMR* is the Earnings Before Interest, Taxes, Depreciation, and Amortization Margin Ratio,[3] v is the firm's investment rate, and the other terms are as defined earlier. We assume that anticipated average periodic revenues can be computed based on past revenues and expected or projected growth rate of revenues.

When the time horizon is infinite, as is the case for a going concern, this offering value expression becomes the following perpetuity formula of financial valuation (Copeland et al. 2000, Copeland and Weston 1988)

$$\mathrm{OV}_{ijt} = \frac{R_{ijt}(1 - x_{it})(EBITDAMR_{ijt} - v_{it})}{r_{it} - f_t}. \tag{3}$$

Table 2 provides a summary of the variables, their definitions, and potential data sources used in our model. Potential data sources and the suggested time periods for their measures are also indicated. The data on most of these variables can be obtained from company internal records and publicly available databases such as Bloomberg, Compustat, Yahoo! Finance, and Thomson Financial.

2.2. Relative Brand Importance

We define RBI as the incremental choice probability of an offering that can be attributed to brand image

[3] EBITDAMR is the ratio of the frequently used accounting measure, EBITDA, to revenues.

Table 2 Summary of Variable Definitions and Data Sources

Variable	Variable name	Definition	Suggested time period	Potential/suggested data source	Comments
Brand revenues	*R*	Net revenues for the brand in the category of interest	Average of past four years/ quarters	Internal records Annual reports	Longer time period may be considered if the industry is cyclical.
EBITDA margin ratio	*EBITDAMR*	Earnings before interest, taxes, depreciation, and amortization as % of brand revenues	Average of past five years	Internal records, Bloomberg, Compustat, Yahoo finance, Thomson financial	Longer time period may be considered if the industry is cyclical. If catastrophe losses are critical and difficult to predict, then a longer time horizon should be considered.
Investment rate	*N*	Investment rate for replacement expenditures as % of brand revenues	Average of past three years	Bloomberg, Compustat, Yahoo finance, Thomson financial	Longer time period may be considered if the industry is cyclical.
Weighted average cost of capital	*R*	Mixture of cost of private equity and debt according to target capital structure	Current rate	Bloomberg, Thomson financial	May vary significantly across the different players in the industry.
Marginal tax rate	*X*	Effectively paid taxes as % of cash profits	Current rate	Internal records, Bloomberg	Tax rate to be adjusted for differences in subsidiaries' tax rates if different product categories are managed as subsidiaries.
Expected long-term rate of inflation	*F*	Expected long-term rate of inflation	The next 10 years	World Bank, World Market Monitor	Longer time period may be considered if there is longer visibility in the business.
Attribute ratings and brand perception	**X**, **Z**, brand perceptions	Perceived levels of attributes and brand, including its dimensions	Annual	Consumer survey	Multiple items/dimensions of brand perception should be used.

divided by the sum of incremental choice probabilities due to all factors—including brand image and marketing-mix variables—that drive offering choice. As we will show subsequently, RBI can also be viewed as the proportion of consumer utility derived from a brand's image over total utility for that brand. Such a variable, when multiplied by the offering value, captures the relative contribution of brand image toward the offering value estimated in the previous section. To determine RBI, we estimate it at a consumer level using a brand choice model and aggregate it across consumers. Let U_{ijkt} denote the utility of brand i in category j to an individual k at time t. Let U_{ijkt} comprise a deterministic component V_{ijkt} and a stochastic component ε_{ijkt} such that $U_{ijkt} = V_{ijkt} + \varepsilon_{ijkt}$. Furthermore, assume that individuals maximize their utility and that the stochastic component ε_{ijkt} is independently and identically distributed (i.i.d.) according to Gumbel or type I extreme-value distribution. The probability of individual k choosing brand i at time t, $\Pr_{ijkt}$, is given by the ubiquitous multinomial logit model of brand choice (Guadagni and Little 1983, Erdem et al. 1999, McFadden 1974, Roberts and Lilien 1993, Roberts and Nedungadi 1995, Roberts and Urban 1988)

$$\Pr_{ijkt} = \frac{e^{V_{ijkt}}}{\sum_{l=1}^{L} e^{V_{ljkt}}}, \tag{4}$$

where l is brand, L is the total number of brands in a given product category, and the other terms are as defined earlier. The deterministic part of the utility function, V, is given by

$$V_{ijkt} = \boldsymbol{\beta}_{0ij} + \mathbf{X}_{ijkt}\boldsymbol{\beta}_{1j} + \boldsymbol{\beta}_{2j} Y_{ijkt} + Z_{ijkt}\boldsymbol{\beta}_{3j}, \tag{5}$$

where $\mathbf{X}$ is a vector of the offering's attributes/factors/marketing-mix elements, including brand image that influences consumer utility (Dillon et al. 2001, Erdem and Swait 2004); Y is a variable representing past brand choice that captures the effect of state dependence or past choice or longevity of ownership on brand choice, $\mathbf{Z}$ is a vector of brand image scores from other categories that carry the same brand name (to capture the spillover effects of the brand from other categories);[4] and $\boldsymbol{\beta}$ is a vector of coefficients associated with the variables. In the context of the insurance industry, it can be shown that RBI for the individual k is given by the following expression[5]

$$\mathrm{RBI}_{ijkt} = \frac{V_{Bijkt}}{V_{Bijkt} + V_{Qijkt} + V_{Pijkt} + V_{Dijkt} + V_{Cijkt} + V_{Sijkt}}, \tag{6}$$

[4] If time-series data are available for the same consumer, brand image scores from the previous period could be used.

[5] Details of derivation are available in a technical appendix available from the authors.

where V_B is the utility due to brand image, V_Q is the utility due to product quality, and so on. B = brand, Q = quality, P = price, D = distribution, C = communication, and S = sales force are the key marketing-mix elements; that is, $\{B, Q, P, D, C, S\} \in \mathbf{X}$. The choice of the $\mathbf{X}$ variables is consistent with the brand choice literature, which formulates utility primarily in terms of marketing-mix elements (e.g., Guadagni and Little 1983, Erdem et al. 1999, Roberts and Lilien 1993). Furthermore, by including the marketing-mix decision variables, we can better separate the role of the brand in consumer choice. Equation (6) can be further written as

$$\mathrm{RBI}_{ijkt} = \frac{\beta_{Bj} X_{Bijkt}}{\left\{ \begin{array}{l} \beta_{Bj} X_{Bijkt} + \beta_{Qj} X_{Qijkt} + \beta_{Pj} X_{Pijkt} \\ \quad + \beta_{Dj} X_{Dijkt} + \beta_{Cj} X_{Cijkt} + \beta_{Sj} X_{Sijkt} \end{array} \right\}}. \quad (7)$$

We aggregate RBI over consumers to get the RBI. In aggregating over consumers, each consumer's RBI needs to be weighted by the quantity of purchases made by the consumer. Further adjustments can be made to this expression of brand importance, if necessary, with the availability of additional relevant data or data on other relevant variables.[6] For each product category, we use a multinomial logit, mixed-logit, or heteroscedastic extreme value model of brand choice after determining the appropriate model through suitable tests.

Our model satisfies the considerations for valuing brand assets from an accounting perspective (Barth and Clinch 1998, Barth et al. 2001, Damodaran 2006, Kallapur and Kwan 2004). Some firms, notably European companies such as Celemi and Skandia, have used supplementary statements valuing intangible assets (*Celemi* 2003). Our model meets many of the considerations of accounting research for valuing intangible assets, and importantly in the United States, the Generally Accepted Accounting Practices' (GAAP) and Financial Accounting Standards Board's (FASB 2001a, b) accounting criteria of relevance, reliability, comparability, understandability, and cost-effectiveness. The model also reflects future orientation, completeness, and verifiability, which are also important characteristics of intangible assets from an accounting standpoint.

3. Company Background

The company is the largest publicly held personal insurance company in the United States, with approximately $156 billion in assets under management and approximately $37 billion in market capitalization. It sells about $29 billion worth of auto, property (home), and life insurance products and financial services to approximately 17 million households through 14,000 exclusive agencies, finance professionals and other channels, including online. About one out of every nine autos and one out of every eight homes in the United States are insured by the company. It has a huge advertising budget (several hundreds of million dollars) and was one of the official sponsors of the 2006 Winter Olympics.

Our work has important implications for the realization of the value of marketing within the company. We began this brand equity project when the company was in the throes of a marketing transformation. A new chief marketing officer was hired by the company to enable the following transformations. The view of marketing, which was equated to advertising, needed to be changed to one that encompassed the entire marketing mix. The view of the brand needed to be changed from that of brand as a symbol of an advertising slogan to that of an asset with measurable equity. Advertising needed to be treated as an investment rather than as an expense. The company wanted to fully use its position as a multicategory insurance company and not be centered on the automobile category. To enable these changes, brand equity quickly emerged as the central issue in understanding the value of marketing.

Our brand equity project is particularly important to the company not only from the perspective of enhancing the value of the company's flagship brand and making strategic decisions on advertising, but also in tangibly linking brand equity to its advertising efforts and its shareholder value. Because the insurance industry and the company's earnings are vulnerable to catastrophes such as hurricanes (e.g., Katrina) and earthquakes, from the standpoint of guiding managers, investors, and Wall Street analysts, senior management needs a tool to estimate and communicate the company's brand equity (which is more reflective of the core value of the firm than are catastrophe-dependent earnings).

4. Data and Model Estimation

4.1. Basic Data

The data needed to estimate our brand equity model have two major components—financial data and consumer survey data from the insurance industry. The financial data include cash flows of the brand broken out by product category (e.g., auto, property, and life insurance categories) and data on the variables summarized in Table 2. The consumer survey data are collected from a random sample of customers in each category. These data cover brand choice, perceptions of attributes that influence choice—including brand

[6] RBI can be adjusted for brand awareness, preference, and availability where necessary and when data are available. RBI can also be determined using a conjoint analysis study.

image (variables contained in **X** and **Z**) and items reflecting brand dimensions.[7]

In addition, advertising expenditures are available for the focal brand of insurance during the period from 1998 to 2005. These data are particularly useful in analyzing the relationship between brand equity and advertising expenditures. The results of such an analysis can provide important guidelines for tracking, building, and managing brand equity.[8]

4.2. Model Estimation

To determine RBI for a brand in each category, we estimate three possible choice models: a multinomial logit model, a mixed-logit model, and a heteroscedastic extreme-value model, consistent with Fischer (2004). We select the appropriate model based on fit and interpretation of results. We first estimate the standard multinomial logit model, consistent with Guadagni and Little (1983). Next, we test for heterogeneity among consumers through fixed and random effects using the Hausman (1978) test. If the test result suggests the need for controlling for heterogeneity, then we use a mixed-logit model (Hensher and Greene 2003). We also test for the independence of irrelevant alternatives (IIA) assumption using the Hausman-McFadden test (Greene 2000). If the IIA assumption is violated, we estimate the model using the heteroscedastic extreme-value model (Train 2003). We use the likelihood ratio statistics to determine if individual brand-specific constants need to be included.

5. Results

Table 3 provides the parameter estimates from the final brand choice model for each category for data collected in 2004. The best-fitting models for auto, property, and life insurance were heteroscedastic extreme value, multinomial logit, and multinomial logit model, respectively, based on the Bayesian information and likelihood ratio criteria, so we report the results for these models in Table 3. The model fits are fairly good with McFadden LRIs of 0.66, 0.56, and 0.46 for auto, property, and life, respectively. The model fit is lower for the life category than for the auto and property categories mainly because the sample size is lower for life than it is for auto or property (158 for life versus 443 for auto and 441 for property). The relative importance of a particular brand in a product category can be determined once the coefficients of all the variables in the model are estimated. The coefficients for the other covariates are in the expected directions. As outlined earlier, the overall RBI of each brand in each category is computed by determining the predicted RBI for each respondent and aggregating it over all the respondents for each brand in each category.

Table 3 Results of Choice Model Estimation for the Focal Brand

	Parameter estimate (standard error)		
Attribute	Auto	Property	Life
Brand image	0.18 (0.05)***	0.15 (0.07)*	0.11 (0.03)**
Insurance coverage/quality	1.14 (0.24)***	0.09 (0.23)	0.05 (0.02)*
Customer service	−0.04 (0.16)	0.11 (0.21)	0.11 (0.26)
Rates/price/premiums	0.55 (0.12)***	0.63 (0.17)***	0.32 (0.14)*
Convenience	0.62 (0.17)***	1.17 (0.23)***	0.26 (0.22)
Communication	0.11 (0.18)	0.35 (0.25)	0.37 (0.26)
Sales force	0.44 (0.18)**	0.39 (0.20)*	0.40 (0.24)
Spillover from auto	Na	0.06 (0.02)***	0.04 (0.02)*
Spillover from property	0.03 (0.01)***	Na	0.03 (0.09)
Spillover from life	0.02 (0.05)	0.01 (0.11)	Na
Final choice model used	HEV#	Multinominal logit	Multinomial logit
Sample size	443	441	158
Log likelihood ratio	−225.92	−186.26	−127.37
McFadden's LRI	0.66	0.55	0.46

Note. Na—Not applicable; $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$. #—Hierarchical Extreme Value Model.

The spillover effects of the brand from other categories to the focal category also appear in Table 3. The spillover effects of auto on property and life categories, and of property on the auto category, are positive and significant ($p < 0.05$ or better). However, the spillover effects of life on the other two categories are not significant ($p > 0.10$). Furthermore, the spillover effects of the auto brand on the other two categories are higher than the other spillover effects. The results on spillover effects suggest that sustaining and enhancing the brand is more critical in the auto category than in the other two categories.

The parameter estimates associated with state dependence (inertia) and outside good preference variables were not significant ($p > 0.05$), so we do not report them, consistent with all insignificant effects. Inertia is likely to be high among most insurance consumers with little variance, so the inclusion of inertia or past choice in the choice model does not account for much variance in insurance brand choice across consumers. Because insurance services are almost necessary or mandatory (e.g., auto and property), outside good preference is also not significant. Thus, state dependence and outside good preference do not influence brand equity in the context of the data.

From the offering value (computed from financial data) and the RBI estimate, we calculated the estimates of brand equity for the focal brand and its

[7] Although the perceptions are measured on an interval scale, for analysis purposes they are treated as ratio scaled, consistent with several survey-based studies.

[8] The data are disguised to preserve confidentiality of the information owned by the company.

Table 4 Brand Equity of the Focal Brand and Its Leading Competitor by Category

Brand	Company	Category	Estimated offering value ($M)	Estimated relative brand importance (%)	Estimated brand equity ($M)
Focal brand	"The company"	Auto	37,276.75	4.43	1,651.36
		Property	19,633.81	4.17	818.73
		Life	8,657.66	5.29	457.99
Focal brand		Multicategory	65,568.22		2,928.08
State farm	State farm	Auto	64,616.96	4.60	2,972.38
		Property	14,688.10	4.37	641.87
		Life	6,884.12	5.29	364.17
State farm		Multicategory	86,189.18		3,978.42

closest competitor, the overall market leader. These estimates are shown in Table 4. The focal brand has a multicategory brand equity of $2.928 billion, but lags behind the overall market leader which has a multicategory brand equity of $3.978 billion. The market leader has a huge lead over the focal brand in the auto category and its auto brand equity is higher than the focal brand's by about $1.32 billion. In the property and life insurance categories, however, the focal brand's equities are higher than those of the overall market leader. In the property insurance category, although the focal brand is ahead of the market leader in estimated offering value, it is behind the market leader in estimated RBI. The estimated offering value is lower for the market leader mainly because of lower cash flows due to catastrophic damages. In the life insurance category, both the market leader and the focal brand have almost the same estimated RBI, but because the focal brand has a higher offering value (due to superior cash flows) than that of the market leader, it has greater estimated brand equity as well.

The contributions of spillover effects of the auto brand to the equities of the property and life brands are about 23% and 21%, respectively, while that of the property brand on the auto brand is about 12%. These differences underscore the importance of estimating brand equity by category and across categories so that the true picture of the brand's health can be seen. Moreover, the significant differences in RBI across fairly similar product categories suggests that such differences are likely to be higher for a brand present in multiple dissimilar categories, highlighting multicategory brand equity.

We also collected data on brand perception scores for each brand on a set of 24 items on a five-point scale that extends previous research (Aaker 1996, Fischer 2004, Keller 2003, Young and Rubicam 2006). Based on a factor analysis of the survey data, we identified eight key brand dimensions or factors.[9] These are: brand reputation, brand regard, brand uniqueness, brand fame, brand trust, brand fit, brand association, and brand innovation. The correlations among the dimensions are low (0.07 to 0.22), suggesting that they measure different facets of brand image.

We carefully checked the brand dimension constructs for convergent validity (reliability) and discriminant validity, consistent with Lam et al. (2004). We calculated the average variance extracted by the constructs and the variance shared between the constructs. The reliability of items within each construct is very high (Cronbach's Alpha ranging from 0.71 to 0.90). The discriminant validity of the measures for the constructs is also high because the variance shared between the constructs is smaller than the average variance extracted by the constructs. For example, brand trust and brand reputation are different constructs because different measurement items load on different constructs. Items f, p, and q load on brand trust, whereas items a, j, and m load on brand reputation.

Our dimensions of brand perception extend Fischer's (2004) proposed dimensions to include brand fit, brand association, and brand innovation components. The dimensions of uniqueness, innovation, fit, regard, and reputation can be viewed as equivalent to the dimensions of differentiation, adrenaline, relevance, esteem, and knowledge, respectively, advanced by Young and Rubicam (2006). We also identify three additional dimensions—trust, fame, and association—offering a comprehensive set of drivers of brand image. The five-point brand perception scale is more formative than reflective.

6. Brand Equity Model Validation and Robustness Checks

6.1. Model Validation

To validate our brand equity model, we performed several additional analyses. First, we compared the brand equity estimate from our model with that from the brand perception method—an alternative method based on self-explicated brand importance and brand perceptions obtained from the survey data. We chose

[9] We could also use constrained component analysis (CCA) proposed by Dillon et al. (2001) to disentangle ratings on general brand impressions from those on offering attributes. However, in our case, because the product attributes are already captured in the choice model, a factor analysis is more appropriate.

Table 5 RBI from Brand Perception Score Method

	General brand importance in the category (%)	Brand perception dimensions							
		Brand reputation	Brand regard	Brand uniqueness	Brand fit	Brand fame	Brand trust	Brand association	Brand innovation
Auto	4.45								
Focal brand		3.54	3.28	3.34	3.13	3.58	3.32	3.25	3.15
GEICO		3.47	3.22	3.49	3.16	3.48	3.17	3.17	3.48
Progressive		3.37	3.18	3.28	3.11	3.36	3.21	3.17	3.35
State farm		3.64	3.42	3.42	3.29	3.66	3.42	3.37	3.23
Property	4.13								
Focal brand		3.57	3.36	3.42	3.20	3.62	3.40	3.28	3.23
Farmer's		3.42	3.26	3.15	3.11	3.29	3.27	3.20	3.10
Nationwide		3.43	3.29	3.25	3.11	3.38	3.24	3.15	3.14
State farm		3.73	3.53	3.55	3.36	3.75	3.58	3.47	3.33
Life	5.49								
Focal brand		3.54	3.29	3.36	3.19	3.48	3.36	3.28	3.23
Metlife		3.58	3.48	3.38	3.33	3.52	3.48	3.39	3.33
NY Life		3.83	3.65	3.61	3.42	3.79	3.66	3.55	3.43
Northwestern		3.70	3.56	3.51	3.38	3.69	3.56	3.51	3.38

Note. The brand perception scores are measured on a five-point scale.

the brand perception method as a benchmark over other complex methods such as conjoint experiments because self-explicated brand perception scores do a reasonably good job of eliciting consumer preference structures and are easy to administer (Srinivasan and Park 1997). In this method, we first determined the general relative importance of brand in each category through a self-explicated brand importance measure. To obtain the RBI for the focal brand, we adjusted the category-level brand importance by the overall image of the focal brand relative to other brands based on the brand image scores for each brand in each category. Although we can use the overall brand image scores for each brand, one could argue that this measure is potentially endogenous. To surmount this criticism, we use a predicted brand image score obtained by regressing the self-explicated brand image score on the brand perception dimensions.[10]

Table 5 shows the relative importance of the brand in the category and the means of the brand perception dimensions. The general importance of brand is highest in the life category (5.49%) and lowest in the property category (4.13%). Table 6 shows the results of the regression of brand image score on brand perception components.[11] The goodness of fit (adjusted R^2) for each category is high given that the data are purely cross-sectional (Hanssens et al. 2001).

[10] We also estimated RBI through the brand perception method using the actual brand image scores, and the results were substantively similar to those obtained by using the predicted brand image scores.

[11] The correlations among the brand dimensions were not very high. The variance inflation factors (VIFs) were between 1.3 and 2.7, suggesting that multicollinearity is not a problem in our data.

Table 7 provides a comparison of the results for RBI between the choice model and the brand perception score method. The RBI values obtained from these two methods are not very different, suggesting strong face validity of our proposed approach. From a theoretical standpoint, the proposed choice modeling approach explicitly considers the role of brand relative to other attributes (such as quality, service, and salesperson influence). From an empirical perspective, because both the proposed choice modeling approach and the brand perception score method provide similar estimates of RBI for the focal brand, we evaluated the predictive validity of the choice model by comparing the results from its estimation to those derived from the brand perception score method. The proposed method based on choice model outperforms the brand perception score method in each category. Therefore, we retain the proposed approach for estimating brand equity.

Second, we compare the relative positions of the focal brand and the overall market leader based on estimates of brand equity from our model and estimates of price premiums that consumers are willing to pay to stay with the chosen brand. Price premium has been used as a measure of brand equity by prior studies (e.g., Hjorth-Anderson 1984, Holbrook 1992). Table 8 shows the average switching price premiums for the different brands in the three categories. These data are obtained directly from the consumers through a specific question in the survey that asks the respondent to report the percentage price decrease needed for the respondent to switch from her or his current brand of insurance. The price premiums are directionally consistent with the estimated brand equities, suggesting face validity for our brand equity

Table 6 Results of Model of Brand Image on Its Drivers (Brand Dimensions)

	Dependent variable: Brand image score		
	Auto	Property	Life
Intercept	0.86 (0.08)***	0.31 (0.05)***	0.66 (0.08)***
Brand reputation	0.06 (0.05)	0.03 (0.05)	0.01 (0.05)
Brand regard	0.14 (0.06)**	0.05 (0.03)	0.12 (0.05)*
Brand uniqueness	0.26 (0.04)***	0.28 (0.03)***	0.21 (0.05)***
Brand fit	0.45 (0.04)***	0.41 (0.03)***	0.36 (0.05)***
Brand fame	0.10 (0.04)**	0.04 (0.03)	−0.02 (0.04)
Brand trust	−0.07 (0.05)	0.02 (0.03)	0.01 (0.05)
Brand association	0.02 (0.05)	0.05 (0.03)	0.13 (0.05)**
Brand innovation	0.08 (0.04)*	0.05 (0.02)*	0.04 (0.04)
Sample size	1,716	1,466	716
Adjusted R^2	0.74	0.70	0.71

Note. Standard errors in parentheses. $^*p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

approach. We recognize, however, that price premium may be one component of brand equity, so this is not a strong validation test.

Third, we compare the relative positions of the focal brand and the market leader based on brand equity estimates from our model and measures of loyalty toward the chosen brand, intention to repurchase the brand and intention to recommend the brand to others, consistent with Lam et al. (2004). These brand loyalty items are measured on a five-point scale. Table 9 shows the average estimates of brand loyalty, which are consistent with the estimates of brand equity for different brands in Table 8. The correlations of brand equity with the repeat buy and recommend measures of loyalty are positive and significantly high ($p < 0.01$) at 0.73 and 0.92, respectively. We note that, like the price premium measure, the loyalty measures are only indicative of the directional consistency of our brand equity measure.

6.2. Robustness Checks

We performed several robustness checks for the proposed choice model. First, because there could be marketing-mix interaction effects (Naik et al. 2006), we tested for interactions between brand image and each attribute or marketing-mix element in the choice of a brand. The likelihood ratio tests did not reject the null hypothesis of no interactions ($p > 0.10$) in each of the three categories. Second, we compared a multiplicative attraction model with log-transformed variables to our choice model using nonnested model tests and found that our proposed choice model offers a better fit than alternative models ($p < 0.05$) (Davidson and MacKinnon 1981, Pollack and Wales 1991). Third, we included demographic variables as additional covariates and tested for model differences using LRTs. The tests rejected the additional demographic covariate model for auto and property categories ($p < 0.10$). For the life category, the test was rejected at a marginal level ($p < 0.12$), so we do not view the inclusion of demographic variables as necessary. In sum, the robustness checks showed that the proposed choice model can be used to estimate RBI fairly well for all three categories.

Table 7 Comparison of the Focal Brand's RBI from Choice Model and Brand Perception Score Method

	Estimated RBI in %		
Category	Choice model	Brand perception score	Difference statistically significant? ($p < 0.05$)
Auto	4.43	4.39	No
Property	4.17	4.18	No
Life	5.29	5.35	No

Table 8 Model Validation: Average Switching Price Premiums

	Auto	Property	Life
Focal brand	41.19%	35.35%	41.35%
State farm	40.50%	43.32%	Na
GEICO	39.83%	Na	Na
Progressive	37.80%	Na	Na
Farmer's	Na	36.23%	Na
Nationwide	Na	43.28%	Na
Metlife	Na	Na	48.57%
NY Life	Na	Na	40.14%
Northwestern mutual life	Na	Na	54.13%
No. of observations	443	441	158

Note. Na—Not applicable or the brand not a big player in the category.

7. Brand Equity Driver Dimension Diagnostics

In addition to estimating brand equity, managers need to understand its driver dimensions to use them for diagnostic purposes. For example, if the focal brand equity is different from that of the main competitor brand, its managers would be interested in knowing the dimensions in which the focal brand is stronger or weaker than its rival brands. Analyses of the brand dimension scores and of the regression of brand image on brand dimensions provide such diagnostic information to managers.

The perception scores in Table 5 vary by dimension and brand. In the auto category, the focal brand's perception scores are the highest on the brand fame (3.58) and brand reputation (3.54) dimensions and lowest on the brand fit (3.13) and brand innovation dimensions (3.15). The market leader also has high and low scores on the same dimensions. However, the market leader's average scores on these dimensions are higher than the corresponding scores of the focal brand. For example, the market leader's brand fame score is 3.66 and brand innovation score is 3.23. The patterns in the property and life categories are similar to those in the auto category; only the average

Table 9 Model Validation: Average Loyalty Scores

	Auto		Property		Life	
	Repeat buy	Recommend	Repeat buy	Recommend	Repeat buy	Recommend
Focal brand	4.67	4.36	4.53	4.18	4.65	4.21
State farm	4.73	4.40	4.61	4.21	Na	Na
GEICO	4.73	4.58	Na	Na	Na	Na
Progressive	4.48	4.18	Na	Na	Na	Na
Farmer's	Na	Na	4.68	4.34	Na	Na
Nationwide	Na	Na	4.50	4.06	Na	Na
Metlife	Na	Na	Na	Na	4.68	4.15
NY Life	Na	Na	Na	Na	4.60	4.26
Northwestern mutual life	Na	Na	Na	Na	4.78	4.55
No. of observations	443		441		158	

Note. Na—Not applicable or the brand not a big player in the category. The loyalty scores are on a five-point scale.

scores in the property and life categories are higher than those in the auto category.

From Table 5, brand uniqueness and brand fit are significant determinants of brand image in each category ($p < 0.001$). For the auto and property categories, brand innovation is a significant driver of brand image ($p < 0.05$). Brand association is significantly related to brand image for the life category ($p < 0.01$), unlike its relationship to brand image for the auto and property categories.

8. Relating Brand Equity to Advertising and Shareholder Value

A firm's advertising efforts lower its systematic risk and may be related to its shareholder value (McAlister et al. 2007). Advertising can preserve and enhance brand equity and shareholder value (Keller 1993, Joshi and Hanssens 2004). One way in which advertising could be related to shareholder value is through brand equity. To explore this link, we investigate the relationships between brand equity and advertising and between brand equity and shareholder value.

8.1. Relating Brand Equity to Advertising Spending

To examine the role of advertising spending in creating brand equity, we estimate a model relating brand equity and advertising stock using advertising spending data over multiple time periods. Following Broadbent (1979) and Rizzo (1999), we first develop the advertising stock variable using a Koyck form that captures the distributed lag structure of advertising's effect as follows

$$\mathrm{ADS}_{it} = (1-\lambda)A_{it} + \lambda \mathrm{ADS}_{i(t-1)}, \tag{8}$$

where ADS is advertising stock in dollars, A is advertising spending in dollars, λ is the periodic advertising carryover or decay rate, and t is the time period.[12] For the focal brand's advertising spending data, this formulation produced a decay rate of 0.20.

We then formulate a brand equity equation, which is given by

$$\mathrm{BE}_{it} = \theta_0 + \theta_1 \mathrm{ADS}_{it} + \theta_2 \mathrm{RMS}_{i(t-1)} + \varsigma_{it}, \tag{9}$$

where RMS is the relative market share (relative to the market share leader); ς is an error term; θ_0, θ_1, and θ_2 are parameters; and the other terms are as defined before. For a general brand that is not a market leader, in addition to its advertising stock, its past period market share relative to the market leader may influence its equity. A greater relative market share will likely be associated with a greater role for the brand in brand choice and an enhanced ability to contribute to the cash flow. For the market leader, its relative market share could be computed with respect to the brand with the next-highest market share. We do not have a theoretical basis to expect relative market share to have any direct effect on advertising stock, so it is reasonable that relative market share is a potential exogenous determinant of brand equity.

Advertising stock could be endogenous, so we tested for its endogeneity using the Hausman (1978) test. Indeed, the χ^2 test of exogeneity was rejected ($p > 0.10$). Because advertising is endogenous, advertising stock could also be driven by brand equity. Therefore, consistent with Barth et al. (1998), we specify a model in which advertising stock is determined by brand equity and sales growth

$$\mathrm{ADS}_{it} = \rho_0 + \rho_1 \mathrm{BE}_{it} + \rho_2 SG_{i(t-1)} + \omega_{it}, \tag{10}$$

where SG is the percentage growth rate in sales revenues; ω is an error term; ρ_0, ρ_1, and ρ_2 are parameters; and the other terms are as defined earlier.

[12] We deflated a period's nominal advertising spending dollars using the consumer price index (CPI) for all items during the corresponding period.

Table 10 2SLS Results of Simultaneous Equation Model of Brand Equity and Advertising Stock

Variable	Estimate (standard error)
Brand equity equation	
Intercept	0.2336 (0.0457)***
Advertising stock	0.0025 (0.0001)***
Relative market share	0.6170 (0.2922)*
Advertising stock equation	
Intercept	−266.9412 (112.1342)*
Brand equity	370.4714 (191.0345)*
Sales growth	0.8864 (0.2544)**
Sample size	7
System wide R^2	0.81

Note. ***$p < 0.001$.

A brand's advertising stock is built through sustained advertising spending. Typically, advertising spending increases or decreases with momentum in sales. The sales growth rate variable in the past period captures this momentum well. Moreover, it does not have a significant effect on brand equity (Barth et al. 1998). Therefore, it is reasonable to include it as an exogenous variable in the advertising stock equation.

Equations (9) and (10) form a system of simultaneous equations that are just identified. Table 10 shows the two-stage least-squares estimation (2SLS) results of the brand equity-advertising simultaneous equation model for the focal brand. Although the sample size is small, the model has a high degree of fit (system wide $R^2 = 0.81$). More important, advertising stock is significantly positively related to brand equity ($p < 0.001$) in the brand equity equation.

8.2. Relating Brand Equity to Shareholder Value

To examine the relationship between brand equity and shareholder value, we compute the correlation between the net present value (NPV) of abnormal stock market returns for the company and its brand equity. Consistent with prior event studies in finance (Fama and French 1993) and in marketing (Gupta and Zeithaml 2006, Kalaignanam et al. 2007, Sorescu et al. 2007), we use abnormal returns as a measure of stock market performance. Following Fama and French (1993), we compute the monthly abnormal returns for the company owning the brand using the following three-factor model[13]

$$R_{pt} - R_{ft} = \alpha_p + \beta_p(R_{mt} - R_{ft}) + \gamma_p SMB_t + \delta_p HML_t + \varepsilon_{pt}, \quad (11)$$

where R_{pt} is the rate of return of the firm p owning the brand during month t, and R_{ft} is the rate of return on a U.S. Treasury bond f during the same period. R_{mt} is the average rate of return of all stocks trading on the U.S. stock market, SMB_t is the difference between the rate of returns of small and big firm stocks (small minus big), and HML_t is the difference in returns between high and low book-to-market stocks (high minus low), all during month t. ε_{pt} is an error term, α is the model intercept, and β, γ, and δ are parameters associated with the three factors used in the model. We multiply the monthly abnormal returns by 12 and the market capitalization of the firm at the end of the year to obtain the change in NPV or aggregate abnormal returns for the firm in the year.

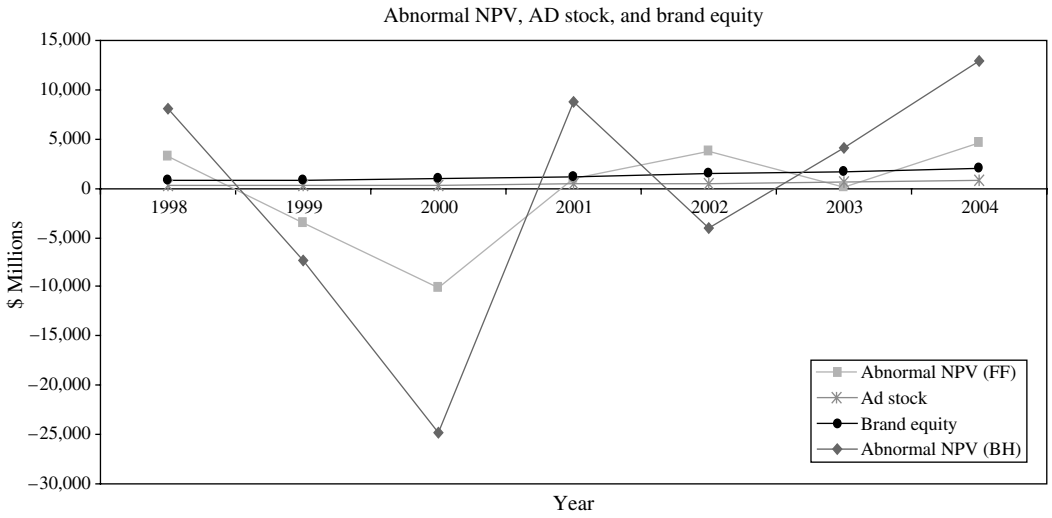
We examine the correlation between the change in the firm's NPV and its brand equity predicted from the brand equity-advertising stock model. This approach is consistent with Barth et al. (1998), who analyze the relationship between share price and brand equity as reported by *Interbrand*. The correlation turns out to be significant (0.44, $p < 0.05$) in our data, indicating that brand equity has a positive and significant relationship with shareholder value. It could be argued that abnormal returns could also be associated with changes in brand equity. To examine this possible relationship, we computed the correlation between annual abnormal returns and changes in brand equity from the end of the previous year until the end of the current year. This correlation is also positive and significant (0.47, $p < 0.05$).

We also computed the abnormal returns using the buy-and-hold abnormal returns (BHAR) method. The BHAR method measures the difference between the compounded actual abnormal returns and the compounded predicted abnormal returns. An advantage of this method is that it better captures the compounding effect of a construct or variable change or event than many alternative approaches. A drawback of the BHAR method, however, is that it can compound errors in short-term abnormal returns and can lead to right-skewed abnormal returns (Kothari and Warner 2005). Nevertheless, the results from the BHAR method for our data were similar to those from the three-factor model. Our results are consistent with the finding that corporate branding strategy (the use of the firm name across categories) is positively associated with firm performance as measured by Tobin's q (Rao et al. 2004).

Figure 2 shows a time plot of the focal brand's equity, advertising stock, and abnormal returns from the three-factor model and buy-and-hold method. At higher levels of advertising stock and brand equity, the abnormal returns are less volatile. Therefore, we conclude that advertising efforts are positively linked to brand equity, which in turn is positively correlated with shareholder value.

[13] We also estimated a four-factor model that includes the momentum factor (Carhart 1997), but the substantive results did not change, so we retain the three-factor model.

Figure 2 Brand Equity, Advertising, and Abnormal Returns Over Time



9. Tracking and Managing Multicategory Brand Equity

Brand equity is dynamic and needs to be measured, tracked, and managed through suitable marketing initiatives, including advertising campaigns. To track brand equity and to generate answers to "what if" scenarios, counterfactuals, or policy experiments, we developed a brand equity simulator. The simulator is based on an Excel spreadsheet and takes as inputs the financial variables such as long-term inflation rate, the firm's WACC, marginal tax rate, investment rate, and EBITDA margin ratio with and without catastrophes for each product category. In addition, an executive can input the quarterly or annual projected revenues and operating costs for the brand by category. The simulator provides the upper and lower bounds of brand equity for the company's brand and the corresponding advertising spending for that period that would maintain the particular value of brand equity. Conversely, for given financial rates and ratios and a target value of brand equity, one can determine the operating profits or the advertising spending needed to achieve the targeted brand equity.

The simulator offers useful managerial guidelines. First, managers can use the simulator to estimate the equity of their brands, particularly in situations where their brands are in multiple categories. Second, they can perform sensitivity analyses by exploring the impacts of financial measures such as cash flows, investment rate, and discount rate, and of survey measures such as attribute ratings. They can better estimate the return on improving specific brand equity dimensions through "what-if" sensitivity or simulation analyses of the effect on brand equity together with cost estimates of such improvements. Third, an executive can track the levels of brand equity by category over time and take suitable actions based on the changes to the equity. He or she can drill down into the components of brand equity to assess the relative effects of changes in the components. Fourth, by analyzing the relationship between advertising and brand equity and shareholder value, managers can better estimate the impact of advertising and change their advertising expenditures appropriately for desired results.

10. Organizational Impact

Our work has had significant organizational impact along several dimensions—methodological, strategic, financial, portability, business practice, and cultural.

10.1. Methodological Impact: Use of Marketing Science Methodology

Our model and the simulator have brought innovative and rigorous applications of marketing science (economic and econometric) models to the largest publicly listed company in one of the most important industries, consistent with Lilien and Rangaswamy (2002). Although the company could have chosen an approach from a large number of alternative brand equity models, it chose our model because of its value over the other models (see Table 1 and the next section).

The most innovative aspects of our approach relate to how we developed a model for estimating the equity of a brand that cuts across multiple product categories and how we implemented it. First, our brand equity model combines financial data with marketing data, and secondary data with primary data in a way that is both economically and econometrically sound. Second, our analysis goes beyond estimation of brand equity to determination of the relationships between brand equity and advertising spending and between brand equity and shareholder

value. Analysis of these relationships provides managers with the diagnostics and insights into formulating effective advertising budgets. Third, our model satisfies many of the considerations of accounting research for valuing intangible assets, namely, the U.S. GAAP and FASB criteria of relevance, reliability, comparability, understandability, and cost-effectiveness. Furthermore, the model has a future orientation and is complete and verifiable, which are also important from an accounting viewpoint. Fourth, the model captures the spillover effects of the brand from one category to another. Fifth, it enables the brand managers to identify the key dimensions that drive brand equity and take suitable actions to improve the brand's position. Sixth, in addition to being a rigorous model, it is easy to implement through the brand equity simulator. Finally, a unique feature of our model is that it accounts for the impact of catastrophes, which is critical in the insurance industry.

10.2. Strategic Impact

The estimation of brand equity from a consumer perspective—particularly, the RBI—quantified the trade-offs involved in spending on brand building, price reductions, and customer experience enhancements. Furthermore, the relative importance of the brand dimensions provided useful directions in setting brand communication objectives. In addition, the model and simulator enabled the company to determine the areas in which the company was stronger and weaker than its competitors and plan appropriate strategic actions. It has also helped the company better understand how its brand equity is derived from the auto, property, and life insurance businesses and how changes in its product mix across these categories could impact brand equity.

10.3. Financial Impact

The financial impact of *BRAN∗EQT* is hard to estimate because many of its benefits will likely be realized in the long term.[14] However, one estimate of the return on investment (ROI) for the development and implementation of *BRAN∗EQT* is more than 2,500%. This estimate is partly based on a short-term net savings of about $10 million, resulting from a reallocation of advertising budget to improve the value of the company's offerings and brand equity, after accounting for the cost of building the model and the simulator. The model supported an increase in advertising allocation of 70% for one of the categories. As a result of the reallocated advertising efforts, brand awareness increased by 18% in the first year after reallocation, although the share of advertising in the product market did not significantly increase.

[14] We are constrained in reporting the full financial impact due to confidentiality of company information.

The spillover effects enabled the company to redirect advertising efforts more toward the auto category than it had in the past. Furthermore, by understanding the key drivers of brand equity, the company could determine ways to improve its brand equity by about 5% and its contribution to market capitalization by 11%. The model and the simulator helped senior management reallocate fixed marketing expenses among different product categories (brand tax). An insightful financial result is that the benefits experienced by the life insurance product category or business from the company's focal brand were disproportionately greater than the marketing resource allocation it received. The long-term benefits of the model and simulator are expected to be substantial.

10.4. Portability or Cross-Functional/Knowledge Management Impact

The *BRAN∗EQT* simulator is truly cross-functional in that it can be used by executives from marketing, finance, accounting, and strategy. It is also portable in that the learning and best practice derived from *BRAN∗EQT* can be leveraged to measure the equities of other brands owned by the company and outside brands that could be potential acquisitions. The model is broad, that is, it can be used for both goods and services and in both B2C and B2B contexts. Importantly, it represents a rare case of the marketing function taking the leadership and owning a strategic initiative that is scientifically and tangibly linked to the fundamental goal of the enterprise, namely, the maximization of shareholder value in the largest publicly traded insurance company. In this regard, it has the backing of the senior management team, including the senior vice president and chief marketing officer.

10.5. Cultural Impact

Culturally, our model and simulator have changed the way senior management looks at the value of the company's flagship brand in four ways. First, prior to our work, the value of the brand within the company had always been fuzzy (e.g., statements such as "We have a valuable asset" or "Our brand has national or international recognition or appeal" were the common ways in which the value of the brand was articulated). Not much effort had gone toward determining the equity of this brand and how top management could use this measure to track the health of the company and improve its return on its advertising efforts and shareholder value and guide investors. Our modeling approach brought about a fundamental change in the mindset and culture of the company with regard to branding and advertising. The mindset has changed from a view of these activities as warm and fuzzy to one that considers branding and advertising as a scientific way to

leverage a key marketing asset for improving shareholder value. Second, the model has convinced nonmarketing functional executives of the value of brand and marketing in general. Third, our approach has brought accountability to senior managers because it enables them to focus on brand equity and on ways to improve it. Finally, there is a change in top managers' view of marketing as an expense to marketing as an investment.

In summary, our brand equity model and project served as a turning point for the company to rediscover the value of marketing. The model's strategic, financial, operational, and cultural impacts have been significant, and the company's marketing team is now perceived as leading the industry.

11. Some Practical Issues and Managerial Learning

We had to cross several implementation hurdles to successfully design and implement our model, leading to valuable managerial lessons. The first hurdle relates to data collection. Although the financial data for the company appear to be easiest to collect because they are internal in nature, data on variables such as EBITDAMR at a category level turned out to be challenging because it needed accurate measures of all costs, involving inputs from finance and accounting departments at different business units. Moreover, financial data for some competitors proved elusive. For example, GEICO, a competitor, is a subsidiary of Berkshire Hathaway, so its detailed financials are not available by category. Furthermore, the market leader is a mutual company, so its category-level financials are not publicly available. We learned to be prepared to triangulate from different sources to arrive at reasonable and reliable estimates.

The second problem concerns forecasting catastrophes and estimating their potential costs that go into the future earnings estimates. Although we could use past incidences of catastrophes and their financial consequences as a guide, an accurate assessment of the incidence and severity of catastrophe is difficult because even the best meteorologists' predictions are unreliable. To overcome this problem, we computed earnings estimates for different scenarios to determine the upper and lower bounds of equity.

The third problem relates to linking brand equity to advertising in an intuitive and user-friendly manner so that executives can make decisions on reallocation of advertising expenditures. Our model estimates an advertising stock and relates it to brand equity over time. The principle guiding the computation of advertising stock was not readily understood by nonmarketing executive users of the *BRAN∗EQT* simulator tool. The simulator had to be redesigned in such a way that it provided a step-by-step account of how a change in advertising spending affected brand equity. We learned that when it comes to a decision support simulator, ease of understanding, not just ease of use, is important.

The fourth issue relates to setting up a system to track brand equity. To update brand equity estimates, the company needs to collect consumer survey data periodically. However, some team members who are involved in the data collection might get promoted or transferred to different positions in the company during the course of the year. To ensure that data collection and estimation are consistent, the company needs to follow a standard procedure. We learned that documentation of survey data collection procedure is critical to successful adoption of a brand equity model.

The fifth challenge concerns revisions to financial estimates. The simulator allows users to revise the inputs, including projected revenues and interest rates as and when they get more accurate estimates of these variables. These revised inputs may lead to changes in the levels of effective advertising expenditures. If decisions on advertising allocations and media-buying have already been made, it is not practical to change the budget. To limit this problem, the company needs to plan for flexibility in the advertising budget and media-buying decisions. The company has already moved in this direction. For the 2006 TV season, out of a total TV network advertising budget of about $100 million, the company slashed its upfront spending to $10 million from $70 million two years before (Angwin and Vranica 2006). Thus, keeping the model and simulator flexible to receive new or revised input data is important to the success of a brand equity model and simulator.

The sixth challenge was to disentangle the cash flows attributable to the offerings carrying the focal brand name during the data period when the company acquired another small brand. With the help of the company's finance department executives, we followed a careful and systematic process of separating the cash flows by the brand based on the original accounting data. However, the cash flows associated with the acquired brand were relatively very small, so the removal of the cash flows related to this brand did not result in a significant change in the estimate of the focal brand's equity. Our key takeaway in this regard is that although the composition of cash flows needs to be scrutinized, the time spent on such an effort should be commensurate with the anticipated gains in improving the quality of the brand equity estimate to justify such an onerous task.

12. Limitations, Future Research, and Summary

Our approach has certain limitations that could be addressed by future research. First, our consumer survey data may contain measurement errors. Second, although the assumptions on the financial variables such as cost of capital and investment rate are fairly accurate for the company, we may not have reliable private information on these variables for the competitor firms. Third, the empirical analyses of the relationships between brand equity and advertising spending, and between brand equity and shareholder value, are based on limited sample size, so the results need to be treated with caution. Fourth, survey data were available only for a limited number of periods, so the estimates of brand equity in some periods are based partly on imputations. Fifth, the logit models did not account for error correlations across the product categories because they were low. A multivariate probit model that takes into account error correlations would be more appropriate in a general context. Sixth, the spillover effects across the categories could be based on the sequence of category purchases that may depend on customer life-cycle stage. Addressing these issues in future research may lead to a better estimate of brand equity and the discovery of more interesting relationships between brand equity and firm value.

In conclusion, we have developed a robust model and decision support simulator for estimating, tracking, and managing brand equity for multicategory brands based on a combination of customer survey and financial measures. To our knowledge, this is the first model to rigorously and reliably estimate the equity of a multicategory brand, capture spillover effects across categories, identify brand image drivers, and relate brand equity to advertising and shareholder value. The results of our model applied at the company show that advertising has a strong long-term positive influence on brand equity for the company. The model and the simulator are used by key executives in the company from multiple functional areas such as marketing, strategy, accounting, and finance. They have enabled the company to substantially gain by realizing the value of marketing, reallocating its advertising resources to improve brand equity and shareholder value, and offering better strategic guidance and insights to managers, investors, and analysts.

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References

Aaker, D. A. 1996. *Building Strong Brands*. The Free Press, New York.

Ailawadi, K. L., D. R. Lehmann, S. A. Neslin. 2003. Revenue premium as an outcome measure of brand equity. *J. Marketing* **67**(4) 1–17.

Angwin, J., S. Vranica. 2006. Marketer's tactic signals big shift in a TV ad ritual. *Wall Street J.* (January 4) A1.

Balachander, S., S. Ghose. 2003. Reciprocal spillover effects: A strategic benefit of brand extensions. *J. Marketing* **67**(1) 4–13.

Barth, M. A., G. Clinch. 1998. Revalued financial, tangible, and intangible assets: Associations with share prices and non-market-based value estimates. *J. Accounting Res.* **30**(3) (Supplement) 199–233.

Barth, M. A., R. Krasznik, M. F. McNichols. 2001. Analyst coverage and intangible assets. *J. Accounting Res.* **39**(1) 1–35.

Barth, M. A., M. Clement, G. Foster, R. Krasznik. 1998. Brand values and capital market valuation. *Rev. Accounting Stud.* **3**(1–2) 41–68.

Broadbent, S. 1979. One way TV advertisements work. *J. Market Res. Soc.* **21**(3) 139–165.

Cabral, L. M. B. 2000. Stretching firm and brand reputation. *RAND J. Econom.* **31**(4) 658–673.

Carhart, M. 1997. On persistence in mutual fund performance. *J. Finance* **52**(1) 57–82.

Celemi. 2003. Annual Report 2002 Celemi Group. Celemi Group, Malmo, Sweden.

Choi, J. P. 1998. Brand extension as informational leverage. *Rev. Econom. Stud.* **65**(4) 655–669.

Copeland, T. K., T. Koller, J. Murrin. 2000. *Valuation*: *Measuring and Managing the Value of Companies*, 3rd ed. John Wiley & Sons, New York.

Copeland, T. E., J. F. Weston. 1988. *Financial Theory and Corporate Policy*, 3rd ed. Addison-Wesley, Reading, PA.

CoreBrand Analysis. 2004. Modeling the corporate brand's financial impacts. Presentation, Corporate Branding, LLC, Stamford, CT.

Damodaran, A. 2006. Dealing with intangibles: Valuing brand names, flexibility and patents. Working paper, New York University, New York.

Davidson, R., J. G. MacKinnon. 1981. Several tests for model specification in the presence of alternative hypotheses. *Econometrica* **49**(3) 781–793.

Dillon, W. R., T. J. Madden, A. Kirmani, S. Mukherjee. 2001. Understanding what's in a brand rating: A model for assessing brand and attribute effects and their relationship to brand equity. *J. Marketing Res.* **38**(4) 415–429.

Dubin, J. A. 1998. The demand for branded and unbranded products: An econometric method for valuing intangible assets. *Studies in Consumer Demand: Econometric Methods Applied to Market Data*, Chapter 4. Kluwer Academic Publishers, Norwell, MA, 77–127.

Erdem, T. 1998. An empirical analysis of umbrella branding. *J. Marketing Res.* **35**(3) 339–351.

Erdem, T., B. Sun. 2002. An empirical investigation of spillover effects of advertising and sales promotion in umbrella branding. *J. Marketing Res.* **39**(4) 408–420.

Erdem, T., J. Swait. 1998. Brand equity as a signaling phenomenon. *J. Consumer Pysch.* **7**(2) 131–157.

Erdem, T., J. Swait. 2004. Brand credibility and its role in brand choice and consideration. *J. Consumer Res.* **31**(1) 191–199.

Erdem, T., J. Swait, A. Valenzuela. 2006. Brands as signals: A cross-country validation study. *J. Marketing* **70**(1) 34–49.

Erdem, T., J. Swait, S. Broniarczyk, D. Chakravarti, J.-N. Kapferer, M. Keane, J. Roberts, J.-B. E. M. Steenkamp, F. Zettelmeyer. 1999. Brand equity, consumer learning and choice. *Marketing Lett.* **10**(3) 301–318.

Fama, E., K. French. 1993. Common risk factors in returns on stocks and bonds. *J. Financial Econom.* **33**(1) 3–56.

Financial Accounting Standards Board (FASB). 2001a. *Statement of Financial Accounting Standards No. 142: Goodwill and Other Intangible Assets*. FASB, Stamford, CT.

Financial Accounting Standards Board (FASB). 2001b. *Proposal for a New Agenda Project: Disclosure of Information About Intangible Assets Not Recognized in Financial Statements*. FASB, Stamford, CT.

Fischer, M. 2004. Valuing brand assets in financial reports: A model proposition. Working paper, University of Kiel, Kiel, Germany.

Greene, W. H. 2000. *Econometric Analysis*, 4th ed. Upper Saddle River, Prentice Hall, NJ.

Guadagni, P. M., J. D. C. Little. 1983. A logit model of brand choice calibrated on scanner data. *Marketing Sci.* **2**(3) 203–238.

Gupta, S., V. Zeithaml. 2006. Customer metrics and their impact on financial performance. *Marketing Sci.* **25**(6) 718–739.

Hanssens, D. M., L. J. Parsons, R. L. Schultz. 2001. *Market Response Models, Econometric and Time Series Analysis*, 2nd ed. Kluwer Academic Publishers, Boston, MA.

Hausman, J. A. 1978. Specification tests in econometrics. *Econometrica* **46**(6) 1251–1271.

Hensher, D. A., W. H. Greene. 2003. The mixed logit model: The state of the practice. *Transportation* **30**(May) 133–176.

Hjorth-Anderson, C. 1984. The concept of quality and the efficiency of markets for consumer products. *J. Consumer Res.* **11**(3) 719–727.

Holbrook, M. B. 1992. Product quality, attributes, and brand name as determinants of price: The case of consumer electronics. *Marketing Lett.* **3**(1) 71–83.

Interbrand. 2006. Best global brands. 2006. Accessed October 5 2006, www.interbrand.com.

Joshi, A., D. M. Hanssens. 2004. Advertising spending and market capitalization. MSI Report 04-110. Marketing Science Institute, Cambridge, MA.

Kalaignanam, K., V. Shankar, R. P. Varadarajan. 2007. Asymmetric new product development alliance: Win-win or win-lose partnership? *Management Sci.* **53**(3) 357–374.

Kallapur, S., S. Y. S. Kwan. 2004. The value relevance and reliability of brand assets recognized by U.K. firms. *Accounting Rev.* **79**(1) 151–172.

Kamakura, W. A., G. J. Russell. 1993. Measuring brand value with scanner data. *Internat. J. Res. Marketing* **10**(1) 9–22.

Keller, K. L. 1993. Conceptualizing, measuring, and managing customer-based brand equity. *J. Marketing* **57**(1) 1–22.

Keller, K. L. 2003. *Strategic Brand Management: Building, Measuring, and Managing Brand Equity*, 2nd ed. Prentice Hall, Upper Saddle River, NJ.

Keller, K. L., D. R. Lehmann. 2006. Brands and branding: Research findings and future priorities. *Marketing Sci.* **25**(6) 740–759.

Kothari, S. P., G. Warner. 2005. The econometrics of event studies. B. E. Echo, ed. *Handbook in Empirical Corporate Finance*, Chapter 1. Elsevier-North Holland, Amsterdam, The Netherlands.

Lam, S. Y., V. Shankar, M. K. Erramilli, B. Murthy. 2004. Customer value, satisfaction, loyalty, and switching costs: An illustration from a business-business service context. *J. Acad. Marketing Sci.* **32**(3) 293–311.

Lilien, G. L., A. Rangaswamy. 2002. *Marketing Engineering*, 2nd ed. Prentice Hall, Upper Saddle River, NJ.

McAlister, L., R. Srinivasan, M. Kim. 2007. Advertising, research and development of systematic risk of the firm. *J. Marketing* **71**(1) 35–48.

McFadden, D. 1974. Conditional logit analysis of qualitative choice behavior. P. Zarembka, ed. *Frontiers in Econometrics*. Academic Press, New York, 105–142.

Naik, P. A., K. Raman, R. S. Winer. 2006. Planning marketing-mix strategies in the presence of interaction effects. *Marketing Sci.* **24**(1) 25–34.

Park, C. S., V. Srinivasan. 1994. A survey-based method for measuring and understanding brand equity and its extendibility. *J. Marketing Res.* **31**(2) 271–288.

Pollack, R. A., T. J. Wales. 1991. The likelihood dominance criterion: A new approach to model selection. *J. Econometrics* **47**(2–3) 227–242.

Proprietary Report. 2006. Brand asset valuator. Young and Rubicam, New York.

Rao, V., M. K. Agarwal, D. Dahloff. 2004. How is manifest branding strategy related to the intangible value of a corporation? *J. Marketing* **68**(4) 126–141.

Rizzo, J. 1999. Advertising and competition in the ethical pharmaceutical industry: The case of antihypertensive drugs. *J. Law Econom.* **42**(1) 89–116.

Roberts, J. H., G. L. Lilien. 1993. Explanatory and predictive models of consumer behavior. J. Eliashberg, G. L. Lilien, eds. *Handbooks in Operations Research and Management Science: Marketing*. Elsevier, Amsterdam, The Netherlands, 27–82.

Roberts, J. H., P. Nedungadi. 1995. Studying consideration in the consumer decision process: Progress and challenges. *Internat. J. Res. Marketing* **12**(1) 3–7.

Roberts, J. H., G. L. Urban. 1988. Modelling multiattribute utility, risk, and belief dynamics for new consumer durable brand choice. *Management Sci.* **34**(2) 167–185.

Roberts, J. H., P. Morrison, M. Chandrasekharan, A. Gordon. 2004. Measuring sources and outcomes of brand equity. *Marketing Accountabilities and Responsibilities: Conf. Proc.*, Victoria University of Wellington, New Zealand, ANZMAC.

Shocker, A., B. Weitz. 1988. A perspective on brand equity: Principles and issue. L. Leuthesser, ed. *Defining, Measuring, and Managing Brand Equity: Conf. Summary*, MSI Report 88-104, 2. Marketing Science Institute, Cambridge, MA.

Shugan, S. M. 1980. The cost of thinking. *J. Consumer Res.* **7**(4) 99–111.

Simon, C. J., M. W. Sullivan. 1993. The measurement and determination of brand equity: A financial approach. *Marketing Sci.* **12**(1) 28–52.

Sorescu, A. B., V. Shankar, T. L. Kushwaha. 2007. New product preannouncement and shareholder value: Don't make promises you can't keep. *J. Marketing Res.* **44**(3) 468–489.

Srinivasan, V. 1979. Network models for estimating brand-specific effects in multi-attribute marketing models. *Management Sci.* **25**(1) 11–21.

Srinivasan, V., C. S. Park. 1997. Surprising robustness of the self-explicated approach of customer preference structure measurement. *J. Marketing Res.* **34**(2) 286–291.

Srinivasan, V., C. S. Park, D. R. Chang. 2005. An approach to the measurement, analysis, and prediction of brand equity and its sources. *Management Sci.* **51**(9) 1433–1448.

Swait, J., T. Erdem, J. Louvière, C. Dubelaar. 1993. The equalization price: A measure of consumer-perceived brand equity. *Internat. J. Res. Marketing* **10**(1) 23–45.

Train, K. 2003. *Discrete Choice Methods with Simulation*. Cambridge University Press, New York.