THE MEASUREMENT AND DETERMINANTS OF BRAND EQUITY: A FINANCIAL APPROACH

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This paper presents a technique for estimating a firm's brand equity that is based on the financial market value of the firm. Brand equity is defined as the incremental cash flows which accrue to branded products over unbranded products. The estimation technique extracts the value of brand equity from the value of the firm's other assets.

This technique is useful for two purposes. First, the *macro approach* assigns an objective value to a company's brands and relates this value to the determinants of brand equity. Second, the *micro approach* isolates changes in brand equity at the individual brand level by measuring the response of brand equity to major marketing decisions.

Empirically, we estimate brand equity using the macro approach for a sample of industries and companies. Then we use the micro approach to trace the brand equity of Coca-Cola and Pepsi over three major events in the soft drink industry from 1982 to 1986.

(Brand Equity; Finance-based Estimation Technique; Brand Management; Advertising Policy)

1. Introduction

It has long been recognized that brand names are valuable to companies, but only recently have serious attempts been made to estimate their value (Farquhar 1989, Lipman 1989). The current interest in brand valuation stems from the escalating costs of developing new brands, which has led to prevalent use of brand extension and international expansion (*Economist* 1990, Tauber 1988). While brands are becoming more valuable, there is a widespread sentiment that they are being mismanaged (Aaker 1991, Barwise et al. 1989). Marketing managers believe that too much emphasis is being placed on short-term performance. This misdirected focus could be reducing the long-run value of brand assets (Leuthesser 1988). For example, promotions may be justified by the basis of short-run cost recovery (Barwise et al. 1989), but the total benefits arising from marketing activities are not captured by *short-run* sales and profits alone. A major obstacle in abandoning a short-term outlook is the difficulty of measuring the impact of brand investments on the *long-term* performance of the brand. Brand equity, correctly and objectively measured, is the appropriate metric for evaluating the long-run impact of marketing decisions.

This paper presents a new technique for estimating a firm's brand equity, derived from financial market estimates of brand-related profits. Numerous alternative methods are currently in use, but there little agreement as to their relative strengths and weaknesses (Lipman 1989). In the remainder of this section, we discuss the major techniques that have been proposed for estimating brand equity. We begin with an overview of the

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method developed in this paper, motivating the features of a financial-market based estimate of brand equity. We then briefly review five of the alternative techniques to motivate important differences in our approach.[1]

Our technique uses the financial market value of the firm as a basis for valuing brand equity. Our methodology is useful for two purposes. First, the *macro* approach assigns an objective value to a company's brands and relates this value to the determinants of brand equity. Second, the *micro* approach isolates changes in brand equity at the individual brand level by measuring the response of brand equity to major marketing decisions. Our methodology does not assign objective values to individual brand names of multi-brand companies, although the conclusion discusses how our technique could be used to provide rough estimates of individual brand values.

We define brand equity as the incremental cash flows which accrue to branded products over and above the cash flows which would result from the sale of unbranded products.[2] To implement this definition, we begin by estimating the current market value of the firm. The market value of the firm's securities provides an unbiased estimate of the future cash flows that are attributable to all of the firm's assets. Our methodology extracts the value of a firm's brand equity from the value of the firm's other assets. The result is an estimate of brand equity which is based on the financial market valuation of the firm's future cash flows. The methodology has three important features: (1) Brand equity is treated as an asset of the firm and the methodology objectively separates brand equity from the other assets of the firm. (2) Brand equity is measured in a forward-looking perspective, since market value of the firm's traded securities reflect an unbiased estimate of future cash flows. (3) The value of a firm's brands changes as new information becomes available in the market.

Specifically, we construct two empirical analyses to illustrate how the methodology can be used to estimate brand equity. The *macro* approach estimates brand equity at the firm level. Firm-level estimates of brand equity are of interest because they allow a firm to compare the effectiveness of its portfolio of marketing policies to others in the industry. One drawback of this approach is that it does not provide estimates of brand equity at the individual brand level.

The *micro* approach isolates brand equity at the individual brand level by measuring the response of brand equity to major marketing decisions. Since the value of a firm's securities changes as new information hits the market, our estimate of firm-level brand equity adapts to marketing decisions, such as new-product introductions and major advertising campaigns. A change in firm-level brand equity which is prompted by a brand-level decision reflects the change in the value of the underlying brand. The micro approach allows us to evaluate the impact of specific marketing decisions made by the firm and its competitors. One disadvantage of this procedure is that stock market data are noisy, so only major events will have a sufficiently large impact on brand equity to be detected. In addition, this procedure requires a knowledge of when the stock market first learned of the decision.

The first alternative approach, developed by Mahajan et al. (1990), measures brand equity under conditions of acquisition and divestment. Their methodology is based on the premise that brand equity is dependent on the ability of the owning company to utilize the brand assets. It should be noted that the technique presented in our paper estimates the value of a company's brand names in their current use, not their potential value to another company.

The second alternative technique is based on the price premia commanded by a product. A price premium is a proxy for the elasticity of demand, a measure of brand loyalty.

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[1] This summary draws heavily on Aaker (1991), Barwise et al. (1989), and Wentz and Martin (1989).
[2] The incremental cash flows are based on the value consumers place on branded products and on cost savings brand equity generates through competitive advantages.

While techniques that employ price premia are intuitively appealing, they can result in biased estimates of brand equity. The first problem is that price premia capture only one dimension of brand equity. Another dimension of brand equity is its ability to reduce the marketing costs of current and future products. Marlboro cigarettes do not command a price premium over most other brands (except generics), but it would be difficult to argue that Marlboro, with a 25% market share worldwide, does not have considerable brand equity. A second problem with this technique is that price premia often result from high-quality physical attributes. Consequently, estimates of brand equity based on price premia will be too high unless adjusted for the differential production costs. Third, the price premium technique does not consider expected future profits from the brand name. To the extent that the current price and marketing expenditures affect future demand, estimates based on price premia will be biased.

The third alternative technique is based on the brand name's influence on customer evaluation. This technique typically employs surveys of preference, attitude, or intent to purchase. One problem with this approach is that there is no metric for translating customer ratings into estimates of profits for the company. Furthermore, like the price premium technique, it excludes expected future brand-related profits and fails to control for differences in the costs of producing branded products.

The scanner-based measure of brand equity developed by Kamakura and Russell (1991) provides three measures of brand value. The first measure, perceived value, estimates the value to consumers of the brand that cannot be explained by price and promotion. The second measure, the dominance ratio, places an objective value on a brand's ability to compete with other brands on price. The third measure, intangible value, provides a measure of quality perceptions not attributable to physical attributes of a product. Kamakura and Russell's technique differs from the customer-evaluation technique because, instead of using consumer surveys, they base their estimation on purchase histories from scanner data. The use of secondary data allows them to objectively measure brand preference. One drawback is that since their technique relies on past and present purchase patterns, it does not necessarily forecast future profits from brand names.

The fourth alternative technique estimates brand replacement cost, the cost of establishing a product with a new brand name. For example, if it costs $100 million to launch a new product and the probability of success is 25%, then the expected cost of establishing a comparable brand name is $400 million. This approach measures only one component of brand equity—its value in launching new products. The method provides no information about the value of brand equity in its current use from existing products.

A fifth alternative method is based on a brand-earnings multiplier. One such technique multiplies brand "weights" by the average of the past three years' profits.[3] The brand weights are based on both historical data, such as brand share and advertising expenditures, and individuals' judgments of other factors, such as stability of product category, brand stability, and internationality. This technique will produce biased and inconsistent estimates of brand equity due to its use of historical data, which do not accurately translate into future earnings. Furthermore, reliance on individuals' judgments makes it difficult to apply the technique consistently in different time periods or across companies.

Our technique overcomes several limitations inherent in other approaches. First, it uses objective market-based measures, and thus permits comparisons over time and across companies. Second, it implicitly incorporates the effect of market size and growth, and any other factors that influence future profitability. Third, it accounts for both the revenue-enhancing and the cost-reducing capabilities of brand equity.

The paper is organized as follows. Section 2 explains how financial market data can be used to uncover the value of brand equity. Section 3 outlines the methodology. Section

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[3] This technique, described in Wentz and Martin (1989), has been used by the Interbrand Group, a London-based brand consulting firm.

4 presents the macro estimates of brand equity for a sample of industries and companies. In Section 5, we provide an example of the micro approach that traces the brand equity of Coca-Cola and Pepsi over three major events in the 1980s. Section 6 summarizes the main results and discusses the strengths and limitations of our approach. We consider how internal company data could be used to increase the scope of our method, and identify fruitful avenues for further research.

2. How Financial Markets Evaluate Brand Equity

The financial market value of a firm is based on the aggregate earning-power of its assets, both tangible and intangible. From the perspective of financial markets, brand equity is the capitalized value of the profits that result from associating that brand's name with particular products or services.[4] Our methodology first separates the value of a firm's securities into tangible and intangible assets, then carves brand equity out from the other intangible assets.

A road map to the taxonomy of a firm's assets will help to motivate our approach. The tangible assets fall into three groups: (1) property, plant, and equipment, (2) current assets, made up of inventories, marketable securities and cash, and (3) investments in stocks and long-term bonds. The tangible assets, when valued at their market prices, comprise the physical replacement value of the company. Hire labor, and the firm we have described above is a basic going-concern; basic, in the sense that its products can be produced using only the aforementioned tangible inputs, and these inputs can be readily acquired in the marketplace. Since the firm's inputs and outputs can be readily replicated, its product is not unique and it earns a rate of return commensurate with that of its competitors. The firm described above has no brand equity, nor does it enjoy a competitive advantage in the production or distribution of its goods.

Intangible assets are defined as any factors of production or specialized resources that permit the company to earn cash flows in excess of the return on tangible assets. Intangible assets augment the earning power of a firm's physical assets. Patents, trademarks, franchises, R&D, and goodwill are all considered intangible assets; so too is brand equity.[5]

We can readily compute the total financial market value of a firm that has publicly traded securities. Breaking down the assets into tangible and intangible components is not as straightforward. The value of tangible assets can be estimated using accounting book values and reported estimates of replacement costs (Hirschey and Weygandt 1985; Lindenberg and Ross 1981). However, accounting measures are fundamentally inadequate for assessing the value of a firm's intangible assets. Research and development, advertising, and promotional expenditures are not reported on the firm's balance sheet. Instead, outlays on these intangibles are expensed in one period, although their benefits are known to persist in future periods. A financial market-based, rather than accounting-based, estimate of intangible assets is used in this study. The difference between the financial market value of the firm and the value of its tangible assets is equal to intangible assets.

This financial market based approach to brand valuation has many attractive aspects. First and foremost, it has strong theoretical and empirical foundations in the *efficient-markets* literature (Ross 1983; Fama 1970). The efficient-markets hypothesis predicts that in a well-functioning capital market securities prices provide the best available unbiased estimates of the value of a company's assets. That is, that the company's stock

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[4] The capitalized value of profits equals the sum of the future profits, discounted in each period by a risk-adjusted interest rate.

[5] It is obvious that not all of a firm's intangible assets are attributable to brand equity. A recent event illustrates this point. The value of Liz Claiborne's company was influenced by both the brand equity associated with her name and her ability as a designer. Both are intangible assets; the former is brand equity but the latter is not. When Liz Claiborne retired, the value of the company declined because it lost her contribution as a designer. This market experiment provided a natural way to separate the value of Claiborne's skill from the value of her name. One of the objectives of our methodology is to separate brand assets from other intangible assets.

price at any time "fully reflects" all available information on expected future cash flows to stockholders.[6]

How does all of the available information get into the stock price? Essentially, new information provides traders with arbitrage opportunities. If an advertising campaign increases the expected future returns to the company's stock, the stock will be temporarily undervalued. Traders who believe that the campaign was successful will buy more of the stock today. Increased demand for the stock will cause its price to increase until the price of the stock fully reflects the expected future returns from the new information. Included in these expected future returns is the increased value of brand-related assets—i.e., brand equity.

Any meaningful measure of brand equity must incorporate the impact of the brand name on future profitability. The financial market's valuation of the firm is a "forward-looking" measure, meaning that it incorporates the expected value of *future* returns. If a new advertising campaign increases the future profitability of a product, the increase is impounded into security prices as soon as the news is revealed. This gives our methodology an advantage over those that use accounting rates of returns and historic measures to estimate brand equity. For example, estimates that rely on the historic profits of branded products are highly sensitive to assumptions made about future growth rates, leading to widely divergent estimates of a brand's worth.

3. Methodology

3.1. *Background and Motivation*

In this section we outline our technique for extracting the value of brand equity from the financial market value of the firm. We borrow from empirical studies quantifying the intangible asset values of the firm as "Tobin's Q" (hereafter referred to as Q). Q is defined as the ratio of the market value of the firm to the replacement cost of its tangible assets (Tobin 1969, 1978). A value of Q greater than 1.0 indicates that the firm has intangible assets. Brand equity is a specialized, intangible asset which augments the cash flows of the firm. Hence the measured value of Q varies directly with accumulated brand equity.

The method we develop parallels techniques used in the economic and financial literatures to compute the capitalized value of returns arising from a wide variety of intangible factors of production. Smirlock et al. (1984) use Q to measure the capitalized value of profits that arise from monopoly conditions as well as superior firm-specific assets. Hirschey and Weygandt (1985) examine the underlying factors determining Q. They posit that advertising and R&D expenditures are important determinants of the market value of the firm, though not included on the balance sheet. They find that both advertising and R&D intensities have positive and highly significant effects on Q values.

Lindenberg and Ross (1981) explore the relationship between Q and accounting measures of profitability. Their results indicate that consumer brand companies often have Q values of significantly greater than one, while firms specializing in industrial products or undifferentiated commodity goods had low estimated Q's.[7] Many of the industries with the highest estimated Q's contain firms that market differentiated products, suggesting that Q is positively related to brand equity.

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[6] The finance literature provides ample support for the efficient markets hypothesis. Fama (1970) provides an excellent review of the theoretical and empirical literature and concludes that prices efficiently adjust to publicly available information. There have been numerous refinements in the models and empirical methodology and the results uniformly suggest that financial markets will incorporate the effect of marketing actions into the financial value of the firm.

[7] For example, over 1960–1977 the average estimated Q for Coca-Cola was 4.2, and for Pepsico was 2.3. The average Q for Kellogg measured 3.2, while General Foods received a Q of 2.1. greater than one. Conversely, primary metals producers averaged Q values of 0.9, while paper products manufacturers had estimated Q's of about 1.0.

We identify three categories of intangible assets: (i) brand equity, (ii) the value of other firm-specific factors not associated with brand equity, and (iii) market-specific factors that lead to imperfect competition. This decomposition draws on the Tobin's Q literature cited above and on cross-sectional studies on the determinants of firm profit rates.[8] Unlike previous studies which focused on (ii) and (iii), this paper asserts that a major component of intangible asset value can be attributed to brand equity. The brand equity estimates derived by our technique depend on the factors included as determinants of brand equity. The factors we explicitly consider are detailed below.

Current and past advertising. Advertising can affect brand equity through brand associations, perceived quality, and use experience. Advertising that provides information about verifiable attributes, such as price and physical characteristics, will influence brand associations (Stigler 1961, Keller 1991). Heavy advertising can enhance perceived quality for experience goods, the quality of which cannot be determined prior to purchase (Nelson 1974). Positioning advertising creates brand associations and perceptions of quality by emphasizing the desirable attributes of the brand (Aaker and Shansby 1982). Advertising can also influence the way consumers learn about products. Hoch and Ha (1986) provide experimental evidence that advertising influences consumers' perceptions of the products when they experience it. Finally, advertising can make positive brand evaluations and attitudes readily accessible in memory (Farquhar 1989).

The timing of advertising effects and their durability effects has been extensively studied in the marketing literature.[9] Most studies have focused on a distributed lag relation between current product sales and advertising expenditures. Advertising may have a long-term affect on sales that carries over multiple years (Peles 1971, Telser 1962, Palda 1965) or the cumulative effects of advertising may be exhausted within a matter of months (Bass and Clarke 1972; Montgomery and Silk 1972). Differences may depend on the age and nature of the product, or may be artifacts of modeling and estimation techniques.

Our study focuses on measuring the equity value of advertising (and other brand-enhancing) expenditures, which is necessarily forward-looking. Advertising can be viewed as an asset of the firm if its effects that last for more than one period and if advertising generates positive net revenues for the firm. This distinction has important implications for modeling and interpreting advertising dynamics. While much of the distributed lag literature examines the relation between advertising flows and sales flows, we will emphasize the relation between advertising flows and the stocks of value (brand equity) that they create.[10] Our approach directly estimates the cumulative effects of advertising based on forward-looking forecasts of brand-related profits.

We include current and lagged values of advertising in our model. The estimated coefficient on current advertising will reflect the present discounted value of all the future returns on *this period's* advertising. Lagged advertising expenditures are included for several reasons. First, if the effects of advertising do not completely dissipate in a single period, these stocks of advertising will generate returns in subsequent periods. Second, the expected value of an advertising campaign may be revised over time. Finally, successful advertising may generate feedback in ways that further enhance brand value. Givon and Horsky (1990) note that some of the long-term effects of advertising can be attributed to experience with the product, prompted by the initial advertising.[11]

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[8] A review of this literature is provided in Weiss (1971).

[9] A review of this literature with an eye to modeling techniques is provided in Hanssens et al. (1990).

[10] Garrick (1989) also argues that profitability rather than sales may be the appropriate criterion for evaluating the success of advertising. Using scanner data, he finds that television advertising enhances profit margins for 2–3 years.

[11] Based on the discussions of Clarke (1976) and Hanssens, et al. (1990) we posit that advertising should be relatively short-lived. Revisions in expectations and feedback will likely be limited to a few years, if not a few

Age of the brand. We assume that the longer a brand has survived, the better the ability of the firm to produce a consistent quality product that meets consumer expectations. Because of this, the brand will benefit from greater awareness and loyalty. There are relatively few surprises in consuming these goods. In support of this conjecture, Ries and Trout (1986) report that of the 25 leading brands in the US in 1923, 20 were still the top brands in their respective categories 60 years later.

Order of entry. The ability of a brand to establish a loyal customer base and charge a price premium depends on competitive positioning. Both theoretical and empirical research has considered the relationship between strategic positioning and order of market entry. Schmalensee (1982) develops a theoretical model in which brand loyalty accrues to the pioneering brand because consumers familiar with that brand perceive others to be riskier. A number of empirical studies have found an inverse relation between order of entry and market share (Robinson and Fornell 1985; Urban et al. 1986).

Current and past advertising share. Consumers' perceptions of a brand are influenced by competitive positioning and competitors' advertising. Little (1979) argues that advertising models should control for competitors' advertising, since the advertising of one brand can have a negative effect on the sales of other brands. Thomas (1989) finds that own-brand advertising most strongly affects sales relative to the stock of advertising carried out by competitors. The same reasoning can be extended to gauge the effect of competition on brand equity. To reflect the impact of competitors' advertising, we include advertising share variables, where advertising share is defined as

(own advertising)$_t$/(total competitors' advertising)$_t$.

3.2. *Methodology: Specifics*

Capitalizing the cash flows attributed to total firm assets we can write the asset value of the firm V^* as follows:

$$V^* = V_T + V_I \qquad (1)$$

where V_T is the value of the firm's tangible, nonspecific assets and V_I is the value of the firm's intangible assets. For publicly traded firms, V^* is the sum of (1) the market value of the common stock, (2) the market value of the preferred stock, (3) the market value of the long-term debt, and (4) the market value of the short-term debt.

V_T equals the replacement value of the firm's tangible assets. Replacement value is defined as the current cost of purchasing an asset of equivalent productive ability.[12] Intangible asset value is estimated as the difference between the financial market's valuation of the firm and the firm's replacement cost: $V_I = V^* - V_T$. Since brand equity is a component of intangible asset value, V_I serves as an upper bound for brand equity.

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months. We report results for a one year (period) lag in the sections that follow. Longer lags have been tested and are not generally significant, statistically or conceptually, for our sample.

[12] Replacement value adjusts for changes in the price level and technological advances. Accounting statements typically reflect the historic cost of long-lived assets. Hence, the book values of plant, equipment and inventories are likely to be biased. Since 1976, the SEC has required that firms note the replacement value of capital stock and inventories on 10-k's. Prior to 1976, replacement cost can be estimated from 10-k's and balance sheets following a technique employed by Lindenberg and Ross (1981) or alternatively techniques used by the National Bureau of Economic Research (NBER) in compiling their R&D Master File. The R&D Master file describes a panel of 2,600 publicly traded manufacturing firms for the years 1959–1988. Adjusted financial information and information on research activities are included in the data set. The Lindenberg and Ross method has been used in numerous subsequent Tobin's Q papers. See Smirlock et al. (1984), Wernerfelt and Montgomery (1988) and Salinger (1984). The NBER data are used in Morck et al. (1988). Both techniques adjust for productivity changes and estimates of real economic depreciation.

The Components of V_I. Three major categories of intangible assets can be identified:

$$V_I = f(V_b, V_{nb}, V_{ind}) \qquad (2)$$

where V_b is the value of brand equity, V_{nb} is the value of nonbrand factors that reduce the firm's costs relative to competitors, such as R&D and patents, and V_{ind} is the value of industry-wide factors which permit monopoly profits, such as regulation.

Brand equity can be further divided into two components:

$$V_b = V_{b1} + V_{b2} \qquad (3)$$

where V_{b1} is the value of the "demand-enhancing" component of brand equity, and V_{b2} is the value of expected reductions in marketing costs that result from established brand equity.

V_{b1} is influenced by factors that enhance the perceived quality of the brand, such as advertising and positive experiences with the product. Returns to these investments will take the form of price premia over the prices commanded by generic goods in the market. These enhanced cash flows will be capitalized into the value of the firm, producing intangible brand assets. The second component of brand equity, V_{b2}, is the value of the marketing costs that are saved by promoting branded products. Recall that use of a brand name confers a cost advantage in new product introductions and may permit the firms to realize scale economies in distribution.

Combining the two components of brand equity with the nonbrand factors we can write:

$$V_I = (V_{b1} + V_{b2}) + V_{nb} + V_{ind}. \qquad (4)$$

The following sections look in turn at the determinants of brand equity ($V_{b1} + V_{b2}$), nonbrand factors that give rise to cost advantages (V_{nb}), and anticompetitive industry structures (V_{ind}).

Decomposing V_I. We begin by considering the determinants of V_{b1}. The V_{b1} component of brand equity is a function of factors that influence the brand's perceived quality, affecting consumer demand for the product. The ability of the brand to command a price premium is related to advertising and quality expenditures. Empirically, we examine the contribution of current and past levels of advertising expenditures to intangible asset value. We use the age of the firm's dominant brand as a proxy for the product-quality investments that generate loyalty and awareness.[13]

Next we consider the determinants of V_{nb} and V_{b2}, the components of intangible asset value that affect a firm's market share. These components of intangible asset value reflect both cost advantages and consumer demand. Firms that enjoy some competitive advantage in producing their goods and services tend to grow large relative to their competitors.[14]

Consider first the brand equity related factors. The value of V_{b2} stems from its marketing cost advantages. The value results from having extensive brand awareness and a favorable image. The process creating V_{b2} is complex because there are many marketing actions that develop brand-awareness. We use the order of market entry (ord) and the brand's advertising expenditures relative to its competitors' (adshr) as proxies for information

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[13] In the firm-level analysis we use firm level variables, while in the micro analysis, we use measures specific to a particular brand. For advertising, this implies that aggregate expenditures on advertising and promotion are used in the macro analysis, while the micro analysis relies on brand-specific advertising expenditures from sources such as LNA. With respect to age, in the macro analysis we have either (1) the age of the brand associated with the firm name, or (2) the length of time that the firm has been involved in its primary line of business, which ever is shorter. In the micro-level analysis, the age of the specific brand is used.

[14] Specialized factors of production that result in lower costs are called *Ricardian factors* in the economics literature. If firms differ in costs and/or productivity, there will be a direct relation between observed market share and profitability. Demsetz (1973) and Peltzman (1977) provide theoretical and empirical support for this proposition.

expenditures and positioning advantages. Boulding and Staelin (1991) confirm the link between lower costs and higher market share.

Superior technologies and specialized know-how confer non-brand-related cost advantages. These sources of superior productivity are unrelated to the existence of specific brand names. We posit that the firm's technological advantages, capitalized in V_{nb}, are related to patshr, the firm's share of patents relative to competitors and rndshr, the firm's share of R&D expenditures.[15]

We can observe market share, however we cannot directly observe which component of market share is attributable to brand equity. It is necessary to separate brand-related factors which give rise to market share advantages from those specialized factors which are unrelated to brand equity. The breakdown of $V_{nb} + V_{b2}$ must be estimated. Let $V_{b2} = f(S_{b2})$ and $V_{nb} = f(S_{nb})$ where S_{b2} is the market share attributable to brand equity and S_{nb} is the market share attributable to nonbrand factors.

Combining the brand-related and non-brand-related factors in the market share equations:

$$S = S_{b2} + S_{nb} \tag{5}$$

$$S_{b2} = f(\text{ord, adshr}) \tag{6}$$

$$S_{nb} = f(\text{patshr, rndshr}) \tag{7}$$

where S is the total market share of the brand.

To separate the market share attributable to brand factors from the market share attributable to nonbrand factors, we will regress the observed market share on all of the factors:

$$S = b_0 + b_1 * \text{ord} + b_2 * \text{adshr} + b_3 * \text{patshr} + b_4 * \text{rndshr} + \epsilon \tag{8}$$

$$E(S_{b2}) = \hat{b}_1 * \text{ord} + \hat{b}_2 * \text{adshr} \tag{9}$$

$$E(S_{nb}) = \hat{b}_0 + \hat{b}_3 * \text{patshr} + \hat{b}_4 * \text{rndshr} + \hat{\epsilon} \tag{10}$$

where the $\hat{b}$'s are estimated regression coefficients and $\hat{\epsilon}$ is the estimated regression residual.[16]

Finally we discuss the determinants of V_{ind}. Following the industrial organization literature, a firm's pricing strategy and profitability are affected by industry structure and the regulatory environment. Highly concentrated markets mean fewer competitors, greater ease of collusion and, in general, may imply higher profit margins on goods sold. These profits are capitalized into the intangible asset value of the firm (V_{ind}). Two theories on the relation between regulation and V_{ind} deserve consideration. In practice, regulation can impose barriers to entry, raising prices and profits.[17] Alternatively, to the extent that regulation policies anticompetitive practices, regulation may limit profit-taking and, hence, reduce V_{ind}.

Market concentration is proxied by the four-firm concentration ratio (CR4). The presence of regulatory barriers to entry is captured using industry-specific dummy variables.

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[15] We adopt a conservative approach in quantifying brand equity. Technological factors may in fact enhance brand equity. By excluding technological factors from brand-related market share, we admittedly understate measured brand equity in some industries. Specifically, R&D and patents could be an important determinant of brand equity when technological innovation is of utmost importance to consumers.

[16] We conservatively attribute the constant to nonbrand related factors. The decomposition is in part arbitrary. It does not significantly affect any of our findings, nor does it affect the use of our measure in competitive analyses or in the evaluation of brand equity over time.

[17] Some examples include the airline industry (Kahn 1988), security markets (Jarrell 1984), and pharmaceuticals (Peltzman 1973).

Putting it all together. The market share estimates $E(S_{b2})$ and $E(S_{nb})$ serve as proxies for the brand and nonbrand factors that reduce costs, enhance market share and contribute to profitability. We combine Equations (4)–(10) to arrive at a reduced form structural equation for estimating the determinants of intangible capital values:

$$V_I = \beta_0 + \beta_1 * \text{CR4} + \beta_2 * \text{reg} + \beta_3 * \text{adv} + \beta_4 * \text{age}$$

$$+ \beta_5 * E(S_{b2}) + \beta_6 * E(S_{nb}) + \nu \qquad (11)$$

where CR4 is the four-firm concentration ratio, reg is a dummy variable indicating presence or absence of regulation, adv equals advertising expenditures, both current and past, and age is the age of the firm.[18]

Brand equity can be computed from the estimates of the structural equation as[19]

$$\hat{V}_b = \hat{\beta}_3 * \text{adv} + \hat{\beta}_4 * \text{age} + \hat{\beta}_5 * E(S_{b2}). \qquad (12)$$

4. Estimates of Brand Equity

4.1. *Characteristics of the Sample*

Following the methodology outlined in the previous section, Equations (8)–(12) were used to estimate brand equity for a sample of 638 firms for the year 1985. The sample was constructed to contain firms from a wide range of manufacturing industries, with a wide range of consumer and industrial products, both branded and unbranded. Firms meeting the following criteria were selected for the sample: (1) The firm was a public corporation whose stock was listed on the NYSE, AMEX or NASDAQ, (2) the major activity of the firm was classified as manufacturing (Standard Industrial Classifications 20–39), (3) information on the firm's assets, advertising activities, R&D expenditures, patents, sales and lines of business were available for the period 1981–1985 in the Compustat and NBER data bases, (4) the firm did not acquire or divest of major business units in 1984 or 1985, and (5) the firm was not merged or acquired by another firm in 1984 or 1985.

Mergers, acquisitions and divestitures of major business lines pose special problems since they are frequently accompanied by significant restructuring of the corporation and repositioning of its products. We exclude firms with significant merger and acquisition activity in order to better focus on internal activities, such as advertising and R&D, that affect the value of the firm and its products.

Table 1 presents descriptive statistics on the characteristics of the sample. The variables are described in the Appendix.

4.2. *Estimates of the Determinants of Market Share*

Macro estimates of brand equity are derived from OLS estimates of Equations (8) and (11). We present pooled cross-industry estimates in the body of the paper.[20] We

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[18] Note that equation (11) contains two types of advertising variables: *adv* and *adshr adv* includes current and past advertising expenditures, which are intended to capture the demand-enhancing component of brand equity. The demand-enhancing component of brand equity should create value through price premia over unbranded products. The other advertising variable, *adshr*, includes current and past advertising share relative to competitors. The purpose of including adshr is to proxy for competitive marketing cost advantages. The cost-advantage component of brand equity generated by adshr works through the market share of the brand: the larger the component of market share caused by adshr, the larger the marketing cost advantage due to brand equity.

[19] Admittedly, this specification understates the range of relevant marketing mix variables and their interrelationship. To the extent that omitted factors are correlated with advertising and promotion our specification is an adequate proxy for the "true" model. Richer data are required to support a more detailed model.

[20] Standard diagnostics for the homoscedasticity of residuals were performed. Scaling and weighting transformations, where required, are noted below.

TABLE 1

Characteristics of the Firms in the Sample

Variable	Mean	Median	Std. Deviation	Range
Firm Value ($mill)	726	601	1560	25–92636
Tobin's Q	1.34	1.28	1.05	0.38–9.81
$\dfrac{\text{Advertising}}{\text{Firm Value}}$	0.036	0.032	0.075	0–0.531
$\dfrac{\text{R\&D}}{\text{Firm Value}}$	0.053	0.041	0.087	0–0.813
Patents	5.3	2	28	0–510
Market Share (%)	1.58	1.26	0.57	0.15–28.6

recognize that the coefficients on the structural equations may vary significantly across industries in which the model is reestimated at the 2-digit SIC industry level. Results of the industry-by-industry estimation are available from the authors.[21]

As discussed in the previous sections, both brand strength and technological or managerial know-how will affect a firm's ability to command market share. Before estimating the value of brand equity we must apportion market share into brand-related and non-brand-related components.

Estimating the market share Equation (8) for our sample of firms, we obtained

$$\hat{S} = \begin{array}{c} 1.25 \\ (2.75) \end{array} + \begin{array}{c} 1.02 \\ (2.56) \end{array} * \text{adshr}_t + \begin{array}{c} 0.50 \\ (1.99) \end{array} * \text{adshr}_{t-1} - \begin{array}{c} 0.91 \\ (1.68) \end{array} * \text{ord}$$

$$+ \begin{array}{c} 0.02 \\ (1.56) \end{array} * \text{patshr} + \begin{array}{c} 0.53 \\ (2.79) \end{array} * \text{rndshr} \tag{13}$$

where $R^2 = 0.71$ and the t-statistics are listed in parentheses.

As predicted both brand and nonbrand factors contribute to the observed market share of the company. There is a direct, approximately one-for-one relationship between a firm's share of advertising in the current year and its market share. Product awareness generated by advertising extends beyond the first year. The positive significant coefficient on lagged advertising suggests that promotion expenditures retain about half of their original effectiveness into the second year. Early entrants enjoy sustained market share advantages, as suggested by the negative coefficient on the order of entry variable. The estimated coefficient implies approximately a one percent market share increase for the first entrant relative to the last.[22]

Technological factors contribute to higher market shares by reducing production costs or generating innovative products. Both R&D expenditures and the number of patents owned by a firm tend to augment market shares. The technological ability captured in these variables, however, has a smaller impact on market share than do the brand-related factors.

From the estimates above and Equation (9), we can derive the estimate of the market share attributable to brand equity:

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[21] Pooling reduces the precision of the brand equity estimates. We can reject the hypothesis at $\alpha = 0.05$ that the coefficients on advertising and advertising share are equal across industries. With few exceptions, however, the qualitative results are not affected by pooling. Hence, pooled results are presented to succinctly illustrate how the methodology may be operationalized.

[22] A relatively broad definition of a market is used in this study. This will tend to reduce the size and significance of the coefficients in the market share regression.

$$\hat{S}_{b2} = 1.02 * \text{adshr}_t + 0.50 * \text{adshr}_{t-1} - 0.91 * \text{ord}. \tag{14}$$

The market share attributable to brand equity $\hat{S}_{b2}$ is used below in the brand equity regressions.[23]

4.3. Estimates of Brand Equity

Our representation of the factors that contribute to brand equity is given in Equation (12). It is instructive to compare measured brand equity across companies of widely-varying size. For that reason, brand equity is estimated as a percentage of tangible asset value. We scale V_I and all independent variables in Equation (15) by V_T, i.e. the replacement value of the firm. Hence, V_I/V_T is the transformed dependent variable.[24]

The estimated coefficients from this regression are

$$\hat{V}_I = \ 0.18 \ + 0.0111 * \text{CR4} + \ 0.525 \ * \text{adv} + 0.0330 * \text{adv}_{t-1}$$
$$(2.10) \quad (0.58) \quad\quad\quad (2.31) \quad\quad\quad (0.89)$$

$$+ \ 0.0026 * \text{age} + 0.0254 * S_{b2} + 0.0318 * S_{nb}$$
$$(1.89) \quad\quad\quad (2.17) \quad\quad\quad (2.49) \tag{15}$$

where $R^2 = 0.39$.

From the estimated coefficients, we derive brand equity as a fraction of the firm's replacement value:

$$B^* = 0.0525 * \text{adv}_t + 0.0330 * \text{adv}_{t-1} + 0.0026 * \text{age} + 0.0254 * \hat{S}_{b2}. \tag{16}$$

The coefficients may be naturally interpreted as rates of return on "investments" in brand assets. Hence, on average, there is a five percent return on advertising in the current period. Prior period advertising expenditures reflect depreciation of advertising messages, averaging approximately a three percent return across industries.

Table 2 reports the estimates of brand equity by industry.[25] Intangible asset value is also reported. It is interesting to note that not only do industry groups vary significantly according to the importance of intangible assets, but the portion of intangible asset value ascribed to brand equity also varies considerably. The average estimated brand equity for the 638 firms in the sample was 19% of tangible asset value. The median brand equity for the sample was 14%. Note that the industries that produce and sell consumer brand products have much higher than average estimated brand equity. For example, in the Food Products industry, the ratio of tangible assets to intangible assets is approximately 2:1. Food processing is not a high technology industry. The cost advantages that one firm has over another are likely to be based on superior distribution or managerial ability.[26] However, food products are heavily branded. Our methodology attributes over 80% of intangible asset value to brand-related activities in the food processing industries.

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[23] A two-stage estimation technique is used because we are interested in observing the structural coefficients in the market share equation and the coefficient on the share variable in the intangible asset equation. These cannot be identified in reduced form estimation. Furthermore, given that the share variables are likely measured with some error, the use of predicted share in the intangible asset equation will improve coefficient estimates. In practice, two-stage model and the reduced form model yield very similar estimates of brand equity.

[24] V_I/V_T = (Tobin's Q) -- 1. Scaling improves the econometric properties of the estimates. Without scaling, the regression residuals are heteroscedastic. We scale by tangible assets rather than sales, as do Hirschey and Weygandt (1985), to avoid feedback between our independent variables and the scaling variables. A sales variable would be endogenous.

[25] Only one industry in our sample, pharmaceutical products (SIC 2834), is subject to significant regulation. A dummy variable was added to the regression to examine whether the drug industry was characterized by higher or lower levels of intangible asset value. The estimated coefficient on the dummy variable was small and positive, but not statistically significant.

[26] Our methodology does not account for the effects of superior managerial ability. The value of either superior or inferior managers will be captured in the residual of the V_I regression. Our estimates of brand equity will be unbiased under most assumptions on the effects that specific managers have on corporate value.

TABLE 2

Brand Equity (B*) and Intangible Asset Value (V_I) by Industry (as a % of Firm Replacement Value) 1985 Average

Industry (SIC)	B*	V_I
Food Products (20)	37	45
Tobacco (21)	46	30
Textile Mills (22)	9	20
Apparel (23)	61	73
Lumber and Wood Products (24)	20	18
Furniture and Fixtures (25)	11	15
Paper and Allied Products (26)	−3	5
Printing and Publishing (27)	58	63
Chemicals (28)	34	81
Petroleum and Coal (29)	−3	−18
Rubber and Misc. Plastic (30)	26	39
Leather (31)	28	30
Stone, Glass, and Clay (32)	0	−5
Primary Metals (33)	1	11
Fabricated Metals (34)	−1	7
Nonelectric Machinery (35)	17	40
Electric Machinery (36)	22	47
Transportation Equipment (37)	20	28
Measure, Photo Equipment (38)	39	84
Miscellaneous Mfg. (39)	26	38

TABLE 3

Measured Brand Equity for Food Product Companies (as a % of Firm Replacement Value) 1985 Average

Company	B*
Anheuser Busch	35
Brown-Forman	82
Cadbury-Schwepps	44
Campbells	31
Dreyers Ice-Cream	151
General Mills	52
Heinz	62
Kellogg	61
Pillsbury	30
Quaker	59
Ralston-Purina	40
Sara Lee	57
Seagram	73
Smucker	126
Tootsie Roll	148

Conversely, consider the Chemical industry (SIC 28). This grouping includes Dow Chemical and Squibb Pharmaceuticals, as well as Revlon Inc. and Avon Products. All of these firms have high levels of intangible assets (high values of Q). As an industry, a little over a third of intangible asset value is attributed to brand equity. There is considerable variation in this split. In general, the stronger the consumer product orientation, the more is measured brand equity. Dow Chemicals high intangible asset value is driven by relatively high R&D expenditures, while Squibb enjoys strong patent protection as well as healthy returns from R&D. For Avon and Revlon, on the other hand, more than two-thirds of intangible asset value is attributed to brand-related factors.[27]

Finally, we examine our measure of brand equity for a sample of firms within one broadly defined industry group. We choose Food Processing (SIC 20) because it included companies with many of the most recognized consumer as well generic food processing companies.

Table 3 reports the macro estimates of brand equity for several food products companies. Estimates employ industry-specific coefficient estimates for the food products industry, SIC 20.[28]

The high estimated brand equity of Tootsie Roll suggests that even though it may be relatively easy to develop a "me-too" candy product, a considerable amount of the profits

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[27] The industries with companies with highly visible brand names have the highest measured brand equity. To demonstrate this, play the following game: calculate how long it takes you to think of the top brands in each industry. How long does it take you to think of the top tobacco brand names? The stone, glass, and clay brand names? It appears that there is an inverse correlation between the time it takes to remember the brands and estimated brand equity.

[28] The market-share equation for the food-products industry is

$$\hat{S} = b_0 - 1.03*\text{ord} + 1.28*\text{adshr}_t + 0.60*\text{adshr}_{t-1} + 0.17*\text{patshr} + 0.63*\text{rndshr}.$$

The intangible asset equation for the food products industry is

$$V_I = \beta_0 + 0.008*CR4 + 0.092*\text{adv}_t + 0.044*\text{adv}_{t-1} + 0.008*\text{age} + 0.057*\hat{S}_{b2} + 0.061*\hat{S}_{nb}.$$

ascribed to Tootsie Roll accrue directly from its strong brand name. Dreyer's Ice-Cream markets premium ice-cream under its corporate brand name in western states and under the Edy's brand name in eastern states. The premium ice-cream market exhibited high rates of growth in the mid- and late-1980s, and Dreyer's was well positioned to take advantage of expanding market opportunities. Measured in 1985, Dreyer's brand equity captures the expected growth in the market and the success of the Dreyer brands. The high brand equity of Brown-Forman undoubtedly comes mostly from Jack Daniel's brand name. General Mill's macro-level brand equity is based on such brand names as Betty Crocker, Bisquick, and Cheerios.

5. The Impact of Marketing Events on Brand Equity

In this section we describe the micro approach to analyzing brand equity. This approach allows us to determine the effect of "marketing events," such as the company's marketing decisions, competitors' actions, and changes in market demand, on the firm's brand equity. In a well-functioning securities market, any marketing event that affects cash flows will cause a change in estimated brand equity as soon as the event is anticipated. When the marketing event is a brand-level decision, the change in the firm's brand equity can be attributed to a specific brand. To illustrate the micro approach, we analyze how three marketing events in the 1980s affected the brand equity of Coca-Cola and Pepsico: the introduction of Diet Coke in 1982, the approval of aspartame for use in soft drinks in 1983, and the introduction of New Coke in 1985.

This analysis is similar to event studies that are commonly used to determine how regulatory decisions, corporate takeovers, and marketing decisions affect the value of the firm (Schwert 1981). For example, Jarrell and Peltzman (1985) use an event study to show that drug and automobile recalls significantly effect the market value of the stricken firms. In the marketing literature Horsky and Swyngedouwn (1987) examine the effect of company name changes on stock returns. Chaney et al. (1991) analyze the impact of new-product introductions on the market value of firms. Our methodology differs from the traditional event-study approach in that we are concerned with how events specifically affect brand equity. By removing the influence of nonbrand factors like R&D expenditures and patent applications, we focus on the effect of brand-related factors rather than other factors that could alter the value of the firm, but that do not influence brand equity.

We measure the impact of an event by comparing the value of brand equity at two points in time: the first, before any "pre-event" information becomes available; the second, some time after the event has been disclosed to the public, allowing "post-event" information to be released. First we need to demarcate the time period over which the financial markets received news of the event. The problem of setting the event window is not trivial; it is often difficult for researchers to determine when a marketing action was first anticipated by the financial markets and how long the market's response to the decision is felt.

Selecting an early starting date is beneficial because it allows relevant information to be captured in the estimate of brand equity. It is common for information about the event to leak out before the first public announcement date. For example, securities markets respond to information about merger negotiations on the day that they are announced in the *Wall Street Journal*. There is evidence, as well, of a significant amount of leakage in the preceding days or even weeks. For regulatory changes, the lead time is usually longer, due to prolonged deliberations of committees or the results of extensive studies.[29] Consequently, event windows in cases of regulation start several months before

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[29] See Jarrell and Poulsen (1989) for evidence of a significant leakage of information in mergers and acquisitions in the month prior to announcement. Binder (1985) studies 20 regulatory events and finds systematic evidence of information leakage beginning at least three months prior to the first announcement.

announcement dates to capture public knowledge of the pre-event activities. Marketing decisions are frequently leaked prior to the official announcements to the public, since these decisions are preceded by batteries of surveys, market tests, and managerial deliberations. For example, new-product introductions in the computer industry are typically anticipated by industry analysts months before the introduction.

Once the appropriate starting point is selected, it is necessary to pinpoint a final date that permits the full impact of the event to be captured. Brand equity will subsequently adjust to unanticipated responses by consumers and competitors. The final date should be selected to capture the effect of these responses. For example, customer acceptance of a new product might be higher or lower than initially expected.

Extending the event window too far in either direction reduces our ability to focus on the specific event of interest. The wider the event window, the greater the probability that other events will occur, confounding the measurement of the event being analyzed.

To determine whether other events could be driving the results of our event studies, we conducted an extensive search of public sources, such as the *Wall Street Journal Index* and the *Business Periodicals Index*. It does not appear that other important events took place at the same time as our events of interest.[30] Table 4 provides a list of the marketing events for Coca-Cola and Pepsi from 1980 to 1985. The list includes all events related to marketing the companies' soft drinks. The major events are in boldface type.

It is important to note that the efficient-markets hypothesis does not imply that investors have perfect foresight about the effects of a marketing event. While there is ample support for the proposition that securities prices incorporate unbiased forecasts of the future, it is possible that the actual effects will turn out to be quite different, for reasons that were unanticipated at the announcement date. By analyzing changes in brand equity and market share after the event, it should be possible to determine whether original forecasts were borne out.

Our objective in this section is to analyze the changes in brand equity of the two top soft-drink producers from 1980 to 1986. The leading companies in the soft drink industry make heavy use of brand names and advertising. In 1980, the estimated brand equity of Coca-Cola was 55% of the company's market value, and was 39% for Pepsi. In the 1980s, the soft drink industry experienced increasing demand and many new-product introductions. Overall, we find that Coca-Cola and Pepsico experienced major changes in brands equity in response to three major events. Furthermore, the changes in brand equity tended to precede changes in the companies' market shares.

The remainder of this section describes each of the three main events in the soft drink industry in the 1980s. For each event, an event window is constructed. The changes in brand equity for Pepsi and Coca-Cola are shown for each window. Also analyzed are the companies' market shares in certain submarkets surrounding each event.

The introduction of Diet Coke has been touted as the most successful new product introduction in the history of the beverage industry. It also initiated a major policy change for Coca-Cola, since it was the first time that the company extended its corporate name. The idea of marketing a diet soft drink bearing the Coke was not new—Coca-Cola executives had discussed the possibility as early as 1964, the year in which Tab was introduced.[31] A major impediment in the decision to go ahead with the project was the risk of damage to the Coke name by linking it with saccharin, a potentially cancer-causing substance. The project was finally pushed through by the new CEO Roberto Goizueto, who did not share the traditional corporate view that Coke should be a single-product brand name.

There are three reasons we expect the Diet Coke introduction to affect Coca-Cola's brand equity. First, the new product itself was very successful and, presumably, very profitable. If the anticipated profits from Diet Coke stem from the Coke name, our

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[30] We removed the days in which earnings announcements were made from our calculations.

[31] The details of this summary were taken from Oliver (1986), Chapter 7.

TABLE 4

Marketing Events in the Soft Drink Industry

		Coca-Cola	Pepsi
1980	January	Diet Coke project is initiated	
	April	New Mr. Pibb formula	
	May	Coke is marketed in China	
1982	July	**Diet Coke announced**	Caffeine-free Pepsi introduced
	August	Diet Coke introduced	
1983	April	Caffeine-free Coke introduced	Scully leaves Pepsi
	June		Burger King switches to Pepsi
	July	**Aspartame approved for use in soft drinks**	**Aspartame approved for use in soft drinks**
	August	Searle signs contract with Coca-Cola	
	September		Searle signs contract with Pepsi
1984	February		Slice introduced
	March	Coca-Cola alters advertising so as to not mislead consumers regarding use of saccharin	
		Diet Coke overtakes 7-Up as the third most popular soft drink in the U.S.	
	May	Coke changes formula to 100% corn sweetener from sugar	Advertisement with Jacksons
	June	Minute Maid introduced	
	November	Coke drops saccharin completely in response to move by Pepsi	Pepsi first soft drink producer to drop saccharin completely
			Pepsi changes formula to 100% corn sweetener from sugar
1985	February	Cherry Coke introduced	
	April	**New Coke introduced**	Pepsi commercial with Geraldine Ferraro
	July	**Original Coke formula reintroduced as Coke Classic**	
	August	Coca-Cola clothing	
	October	Coca-Cola test markets a reformulated version of Fresca	

estimate of brand equity will increase. Second, if the link with saccharin was detrimental to the Coke name, this would reduce the company's brand equity. Third, the change in Coca-Cola's extension policy should affect brand equity, although it is not obvious ex ante what the effect will be. It can be argued that allowing brand extension will increase brand equity. If a company owns a valuable brand name and has a policy of never using brand extension, the company is underutilizing a profitable asset. Alternatively, a policy that results in the inappropriate extension of brands could reduce brand equity (Ries and Trout 1986). Misuse of brand extension can damage a company's image and its brand equity (John and Loken 1990).

By analyzing the changes in Coke and Pepsi's brand equity surrounding the introduction of Diet Coke, we can determine how the event influenced the relative strength of the Coke brand. If the introduction increased Coke's market share and profitability at Pepsi's expense, then Pepsi's brand equity should decrease.

Figure 1 graphs the changes in brand equity for Coca-Cola and Pepsi over the event window surrounding the introduction of Diet Coke.[32] The announcement was made in July 1982, and the event window extends from February 1982 to November 1982. The

[32] In each of the events, we calibrate the model using industry-level data for a period that overlaps the event window.
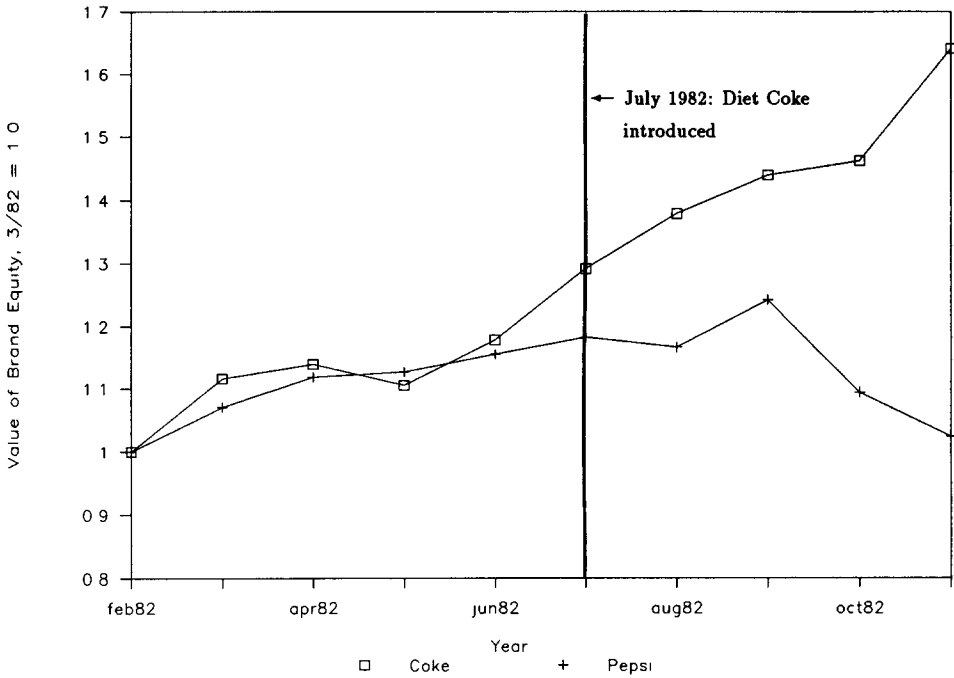
FIGURE 1.   Brand Equity of Coca-Cola and Pepsico: Introduction of Diet Coke.

brand equity of both Coca-Cola and Pepsi have been normalized to unity at the beginning of the event window. The brand equity of Coca-Cola began to increase three months prior to the announcement, which suggests that there was leakage of information about the forthcoming launch. When Diet Coke was publicly announced. Coca-Cola's brand equity continued to increase. In October 1982, Coca-Cola's brand equity increased rapidly, probably due to Diet Coke's strong initial performance.[33] At the same time, Pepsi's brand equity leveled off, then dropped dramatically in September 1982 after a brief increase in August. This indicates that Diet Coke enhanced Coke's brand equity and put Pepsi at a relative disadvantage. This is borne out by the change in market shares over the period. Figure 2 shows that the market shares of Coca-Cola and Pepsi's diet brands were increasing at about the same rate between 1981 and 1982. With the introduction of Diet Coke, Coca-Cola's share of this market increased at a higher rate than before, while Pepsi's growth leveled off. This shows that Pepsi was hurt by the introduction of Diet Coke and by the change in Coca-Cola's brand extension policy.

   The second major event we examine is the approval of aspartame for use in soft drinks in July 1983.[34] The introduction of aspartame had the potential to substantially expand the market for diet soft drinks. Aspartame did not pose the health risks of saccharin. Also, it tasted better than saccharin. New soft drinks bearing recognized brand names would presumably be greeted with higher consumer acceptance. For this reason, established brand names would reduce the cost of entering into the aspartame-sweetened diet soft drink market. Immediately following the aspartame announcement, we predict that the financial measures of brand equity derived in this study will adjust to reflect the expected success of Coca-Cola and Pepsi in their expansion into aspartame-sweetened soft drinks.

   Figure 3 traces brand equity before and after the FDA's approval of aspartame for use in soft drinks in July 1983. The event window extends from February 1983 to November

[33] Diet Coke achieved a 3.3% share of the entire soft drink market in its first full year after being introduced.
[34] The details of the approval of aspartame and its subsequent licensing to soft-drink producers were taken from a series of *Wall Street Journal* articles.
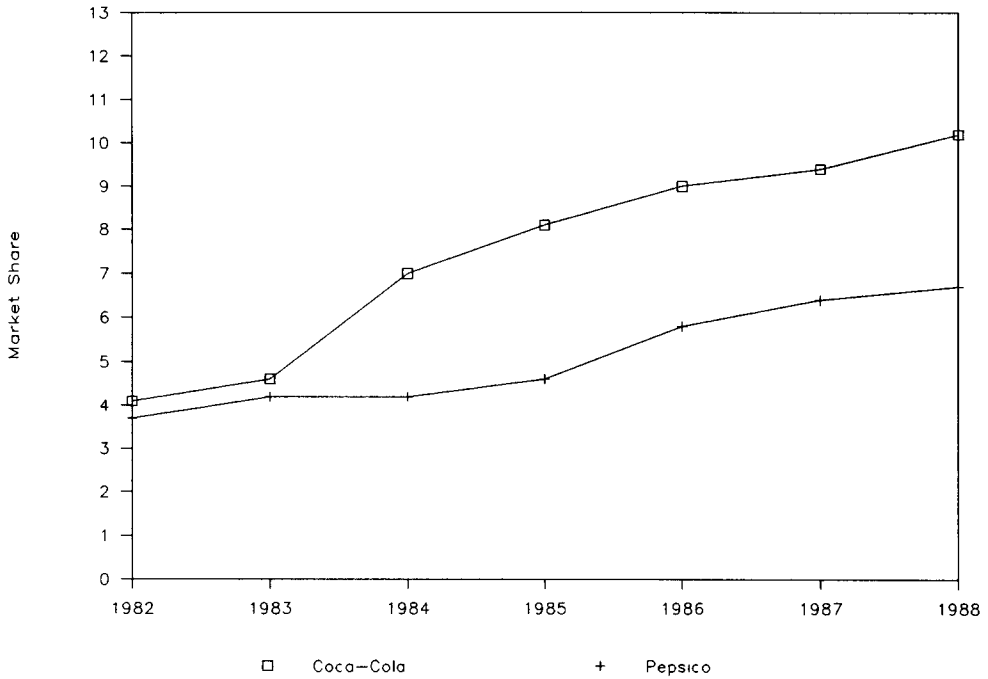
FIGURE 2.   Market Shares of the Diet Brands of Coca-Cola and Pepsico.

1983. The brand equity of both companies was falling prior to the event. This may be attributable to soft drink sales being lower than expected (Standard and Poors 1983). Immediately after the announcement, Coca-Cola's brand equity increased. Pepsi's brand equity started to increase in September when Pepsi signed a contract with Searle for the Nutrisweet brand of aspartame. Brand equity for both Pepsi and Coke increased until
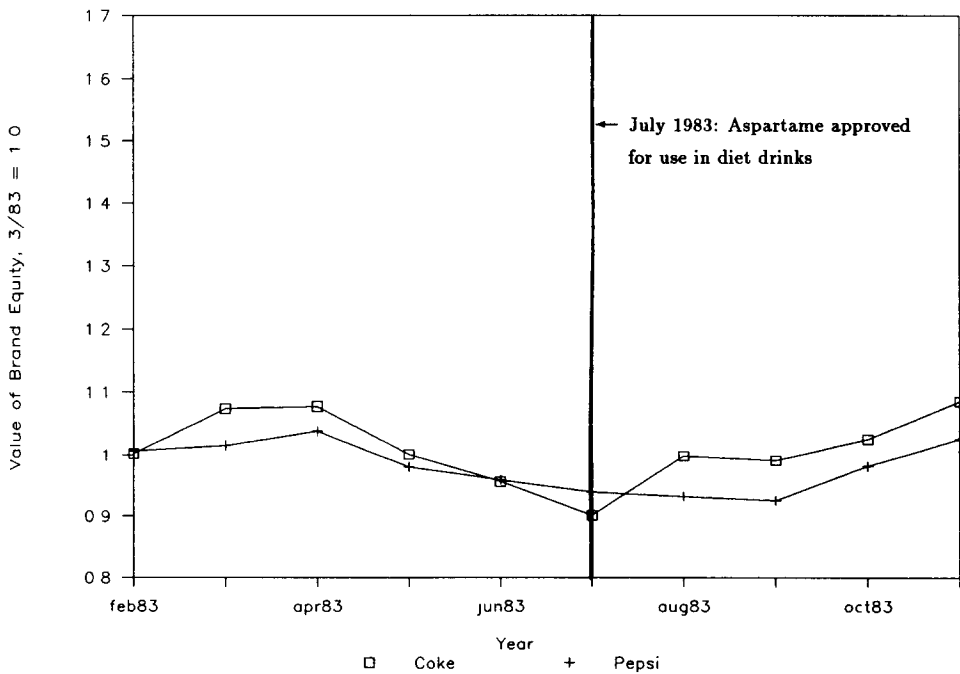

FIGURE 3.   Brand Equity of Coca-Cola and Pepsico: Approval of Aspartame for Use in Soft Drinks.

November 1983. The announcement had a larger impact on Coca-Cola than on Pepsi, which is consistent with the fact that soft drinks comprised about 80% of Coca-Cola's revenues, and only 40% of Pepsi's. Figure 2 shows that both Coca-Cola and Pepsi's shares of the diet market increased after the approval of aspartame. For Pepsi, this increase marked a change in their stagnant performance in 1982–1983 following the introduction of Diet Coke.

The third major event was the introduction of New Coke in April 1985.[35] Prior to this, the original Coke formula had never been altered. Since the mid-1960s Coke had lost market share to the sweeter-tasting Pepsi. Coca-Cola executives believed that by repositioning their product to taste more like Pepsi, they could recapture market share. Coca-Cola CEO Goizueta said that the decision was supported by almost 200,000 consumer taste tests, which revealed a strong preference for the new formula. However, New Coke formula was not well received by customers, and Coca-Cola decided to reintroduce its old formula as Coke Classic in July 1985.

Whether the New Coke episode ultimately helped or hurt Coca-Cola has never been resolved. Marketing experts differ in their opinions, with some calling it an admission of failure and others, a brilliant move (Kilman 1985). On the one hand, since the initial decision elicited an unfavorable reaction, we expect that the introduction of New Coke would reduce Coca-Cola's brand equity. The event also put to question the ability of Coca-Cola's management team. In addition, there was a loss in consumer confidence in Coca-Cola's products. Finally, there were substantial costs involved in introducing New Coke, which were not recovered by the new product's low sales. On the other hand, it has been claimed that Coca-Cola came out ahead from the free publicity (Oliver 1986), which could have increased brand equity through enhanced product awareness.

One expects Pepsi's brand equity to increase from the new Coke incident, for two reasons. First, Coca-Cola's move was defensive, and Pepsi was perceived as having outmaneuvered Coke. Second, the widespread publicity should have increased awareness of the Pepsi name.

Figure 4 shows the impact on brand equity of Coca-Cola's decision to introduce New Coke in April 1985. The event window extends from November 1984 to November 1985. Coca-Cola's brand equity declined slightly after the announcement in April, then stabilized. Pepsi's brand equity continued to increase, as it had been since January. It is surprising that the announcement of New Coke had only a small effect in Coke's brand equity. However, analyzing brand equity from the beginning of the window in November 1984 reveals a possible explanation. Coca-Cola's brand equity started a three-month downward trend in January 1985, while Pepsi's brand equity started to increase at the same time. Perhaps not coincidentally, there was a meeting of Coca-Cola and McCann-Erickson executives to plan the New Coke launch in January 1985. While the meeting was supposed to be confidential, the drop in Coke's brand equity early in 1985 and Pepsi's simultaneous increase suggest that some information from this meeting leaked out.

Figure 5 graphs the market shares of Coke and Pepsi's flagship products.[36] The shares of both products had been declining since 1981 as consumers began to substitute diet soft drinks for regular soft drinks. In 1983, Pepsi's share stabilized, while Coke's position continued to deteriorate. In 1985, the year that New Coke was introduced, Coke's share increased, while Pepsi's decreased slightly. Apparently Coke's flagship products experienced a large drop in share after the event, and the share was only partially recovered in subsequent years. Overall, the changes in relative brand equity and market shares show that Coca-Cola was hurt by introducing New Coke.

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[35] This summary was constructed from Oliver (1986) and Benjamin and Mitchell (1988).

[36] For Coke, this includes original Coke, New Coke, and Coke Classic. For Pepsi, this includes only the flagship Pepsi formula.
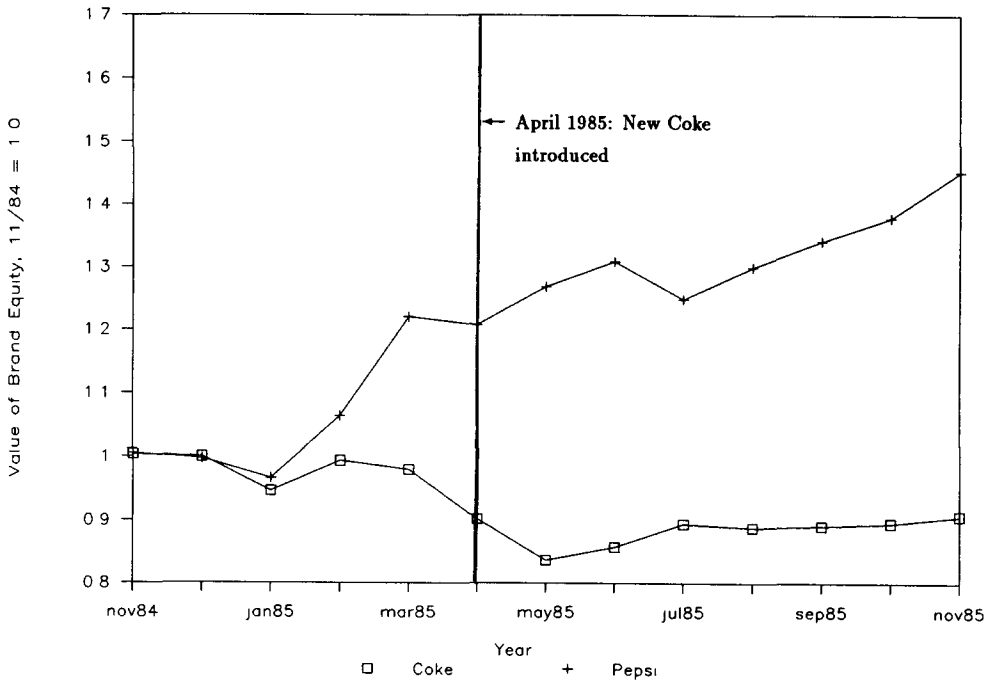
FIGURE 4.   Brand Equity of Coca-Cola and Pepsico: Introduction of New Coke.

The results of this analysis demonstrate that the micro approach can be used to measure the impact of brand-level decisions and other marketing events on estimated brand equity. We found that Coca-Cola's brand equity increased when the Coke name was extended to Diet Coke and that the brand equity of Pepsi was reduced. The approval of aspartame for use in soft drinks resulted in higher brand equity for both Coke and Pepsi, due to the
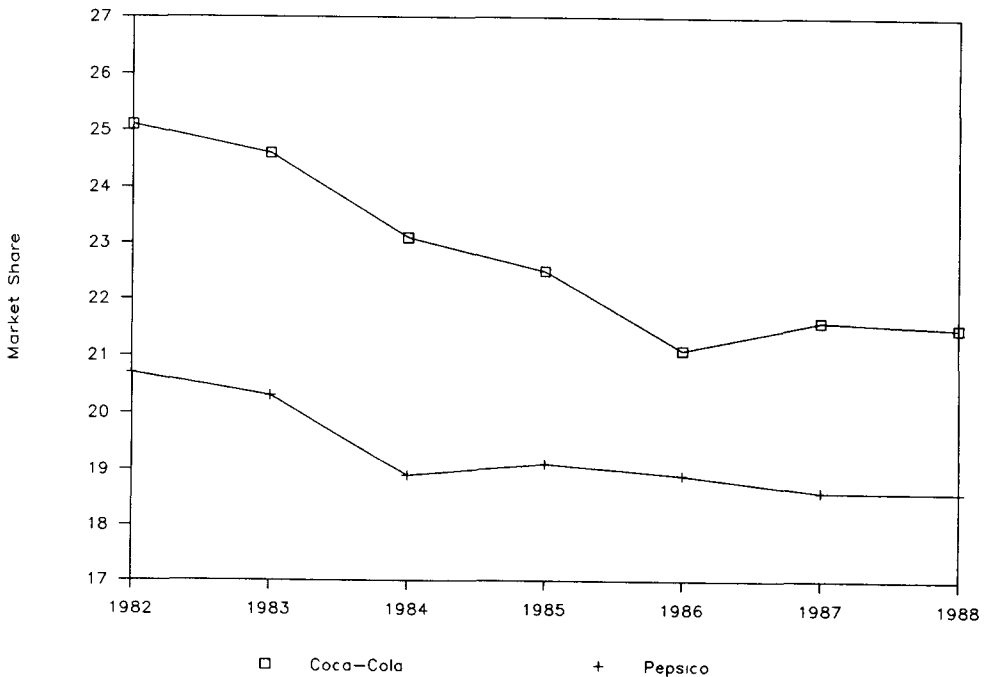
FIGURE 5.   Market Shares of the Flagship Products of Coca-Cola and Pepsico.

expected profitability of future aspartame-sweetened products. New Coke, the controversial reformulation of Coke, reduced Coca-Cola's brand equity and increased Pepsi's.

6. Implications, Limitations, and Extensions

We have presented a technique for placing an objective value on a company's brand names. The technique was first demonstrated by estimating macro-level brand equity of a sample of industries and a sample of firms. The results are in accordance with what one would expect: the industries and companies with big brand names have high macro estimates of brand equity. We further substantiated our methodology by showing that micro estimates of changes in brand equity vary with marketing decisions and market conditions.

Our study demonstrates that Wall Street does *not* ignore marketing factors. This is important because marketers have been confused as to the extent to which marketing decisions are captured by financial markets. Some have even claimed that brand equity is ignored by investors. For example, in Maltz (1991) Dave Fredericks says "Brands are [. . .] largely ignored by the financial community." We could not disagree more strongly. The significance of the coefficients in the macro analysis and the response of brand equity in the micro analysis show that marketing factors are reflected in stock prices.

Our estimates of brand equity could be improved by using confidential company-level data. Specifically, more refined measures of market share and advertising would result in more accurate estimates of brand equity. In addition, our measure of advertising could be broken down to distinguish between types of promotional expenditures, or to include such factors as sales force expenditures and marketing research expenditures. Since data of this nature are largely proprietary they were not available for this study but would be available to company insiders. Including these factors would improve estimates of brand equity and would allow managers to answer puzzling questions about brand equity formation. For example, does promotion increase or decrease brand equity? For industrial companies, how much do sales force expenditures increase brand equity relative to advertising? Do companies that spend more on marketing research obtain more brand equity for a given investment in advertising?

While we have estimated brand equity at the firm level in this paper, our macro technique could be extended to estimate approximations of brand equity for large individual brands or brand categories using time series data. In this paper, our illustration of the macro technique utilizes cross-sectional data to estimate firm-level brand equity with industry-average coefficients. This technique can be modified to estimate brand-level brand equity using company-average coefficients derived from time-series data. Data availability and conceptual issues will guide estimation. The market value of the firm is updated daily in financial markets. Hence, observations on the independent variable, intangible asset value, are available over very short intervals. The firm will also need to obtain time-series brand-level information on advertising, advertising share, age, order of entry, and other factors. Whether weekly, monthly, or annual data should be used depends on the durability of advertising expenditures and the variance of brand-development expenditures from period to period.

Assume, for simplicity, that the factors affecting equity value in each of the brand categories are independent. Then the following procedure will yield individual estimates: For each brand i, estimate Equation (17), from Equation (8):

$$S_{it} = b_{0i} + b_{1i}*\text{ord}_t + b_{2i}*\text{adshr}_{it} + b_{3i}*\text{patshr}_{it} + b_{4i}*\text{rndshr}_{it} + \epsilon_i. \quad (17)$$

Then use the results in Equation (18), an aggregation of Equation (11):

$$V_{It} = \sum_{i=1}^{N} \{ \beta_{0i} + \beta_{1i}*\text{CR4}_{it} + \beta_{2i}*\text{reg}_{it} + \beta_{3i}*\text{adv}_{it}$$

$$+ \beta_{4i}*\text{age}_{it} + \beta_{5i}*E(S_{b2it}) + \beta_{6i}*E(S_{nbit}) + \nu_i \}. \quad (18)$$

Alternative specifications—for example, incorporating interaction terms—would be required to examine portfolio effects between brands or spillovers between brand categories. Furthermore, the firm should experiment with the lag structures on advertising and advertising share variables to accommodate differences in the durability of advertising expenditures.

Competitive insights can be gained by comparing the structural coefficients for the firm-specific model with an industry model estimated over the same time period. If company brand equity deviates from predictions made from industry estimates, our technique could uncover whether the problem is due to low investments or poorly-performing investments. If the industry-level and company-level estimates are the same, then one could conclude that their brand investments are performing as well as the industry average. In this case, the company's deviations in brand equity may be due to differences in the levels of advertising or other factors. It is important to determine the cause of the low brand equity before changing the advertising policy. This is a fruitful area for future research.

The micro analysis allows the firm to monitor the market's response to its marketing decisions and to its competitors' responses. The change in brand equity from a marketing decision provides immediate feedback. For example, the introduction of Diet Coke witnessed an increase in Coca-Cola's brand equity and a decrease of Pepsi's. This is not a surprise, because Diet Coke has been accepted as one of the most successful new-product introductions in the beverage industry. However, there has been considerable debate as to effect of the introduction of New Coke on the Coke and Pepsi brands. With our micro analysis, we determined that Coke's brand equity neither increased nor decreased in response to the event, although Pepsi's brand equity increased. This suggests a competitive loss for Coke.

Company insiders are privy to more of the circumstances that affect brand equity, such as the results of test markets and managerial deliberations prior to the official announcement. A company could improve upon the event study analysis by setting more accurate event windows, that is, event windows that capture the release of pre- and post-event information.

There are several limitations of our technique for estimating brand equity. First, the results reported in this paper are based on data aggregated to the corporate and major line of business levels. Consequently, our macro approach estimates the aggregate value of the company's brands and not the value of its individual brands. In practice, the estimates could be refined by using brand-level data. This would permit the value of individual brands to be estimated, for brands that comprise a sufficiently large fraction of the company's revenue.[37]

Second, our micro approach is not appropriate for all events. Most amenable to this type of analysis are major events that are not widely anticipated and hit the market within a short period of time, such as new product introductions, policy changes, and major advertising changes. Small events will not have a sufficient impact on the company's profits to be separated from random changes in the company's brand equity. Events for which information is released to the market gradually over a long period are similarly unsuitable.

There are a myriad of techniques currently being used by companies to estimate brand equity. The introduction reviewed several alternative techniques. To come up with a comprehensive perspective on brand equity, estimates derived from our technique should be compared to those from other techniques. For example, a company could use our procedure described above for estimating individual brand equity, then compare the estimates to price premia, consumer attitude surveys, and scanner-based measures.

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[37] The minimum size brand suitable for analysis will differ across firms and industries. An initial guess is that the brand should make up at least 5–10% of the company's revenue to offset stock market "noise."

To conclude, this research has demonstrated that brand equity comprises a large percentage of the total value of many firms. This underscores the need for effective marketing within the company. Brands are assets that must be managed carefully in order to achieve their maximum value.[38]

[38] This paper was received September 19, 1990 and has been with the authors 10 months for 2 revisions. Processed by Dominique M. Hanssens, former Area Editor.

Appendix: Variable Definitions

adv: Advertising and selling expenditures of the firm (for the macro analysis) and of the brand (for the micro analysis). Source: Compustat and 10-k's.

adshr: Advertising and selling expenditures divided by total expenditures by competitors in the same industry. Source: Compustat and 10-k's.

age: In the macro analysis age is defined as either (1) the age of the brand associated with the firm name, or (2) the length of time that the firm has been involved in its primary line of business, which ever is shorter. In the micro-level analysis, the age of the specific brand is used. Source: Compustat, 10-k's, and annual reports.

CR4: The four-firm Concentration Ratio. CR4 equals the share of industry sales accounted for by the four largest firms in the industry. Source: Compustat, 10-k's, and annual reports.

M: Financial market value of the firm. Equals the sum of the market values of the common stock, preferred stock long term and short term debt. Where market values of the debt are not available, NBER estimates are used. Where NBER estimates are unavailable, the book values have been used. Sources: NBER, Compustat, CRSP.

mktshr: Market share. Equals firm sales divided by industry sales. Industries are defined according to 3-digit SIC's except where 8 or more firms can be identified at the finer, 4-digit level. Source: Compustat, 10-k's, and annual reports.

ord: Relative order of entry. Equals the order which the firm entered its major product market divided by the number of firms in that market. Source: Moody's Industry and Stock Reports (various years).

patshr: Firm share of patents granted. Equals the number of patents owned by the firm divided by the total number owned by competitors in the same industry. Source: NBER.

rndshr: Firm R&D stock divided by total stock of R&D controlled by competitors in the same industry. The stock of R&D is estimated by NBER for each industry in the sample. Stock measures are calculated by adding the present value of past R&D expenditures to current R&D spending. NBER estimates industry-specific rates for the depreciation of R&D expenditures and uses these in their calculations of the stock of R&D. Source: NBER, Compustat, 10-k's, and annual reports.

V_T: Tangible asset value of the firm. Equals the replacement cost of the firm's physical assets (plant, equipment, inventory) plus the value of cash and marketable securities. Source: Compustat, NBER and individual firm 10-k's.

V_I: Intangible asset value. Equals $M - V_T$.

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