The Impact of Brand Equity on Customer Acquisition, Retention, and Profit Margin

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ABSTRACT

This paper examines the relationship between brand equity and customer acquisition, retention, and profit margin, the key components of customer lifetime value (CLV). We examine a unique database from the U.S. automobile market that combines 10 years of acquisition rate, retention rate, and customer profitability data with measures of brand equity from Young & Rubicam's Brand Asset Valuator (BAV) over the same time period. We hypothesize and find that BAV brand equity is significantly associated with the components of CLV in expected and meaningful ways. For example, customer Knowledge of a brand has an especially strong positive relationship with all three components of CLV. Interestingly, however, Differentiation is a double-edged sword. While it is associated with higher customer profitability, it is also associated with lower acquisition and retention rates. We also find that marketing efforts exert indirect impacts on CLV through brand equity. Simulations show that changes in marketing, or exogenous changes in brand equity, can exert important effects on CLV. Overall, the findings suggest the "soft" and "hard" sides of marketing need to be managed in a coordinated fashion. We discuss these and other implications for researchers and practitioners.

INTRODUCTION

The development and application of marketing metrics has been both a major focus of academic work (e.g., Srivastava et al. 1998; Lehmann and Reibstein 2006; Srinivasan and Hanssens 2009) and a key issue for practitioners, having been a top priority of the Marketing Science Institute for the last decade. Previous research has demonstrated the importance of two key marketing assets: brand equity and customer lifetime value (CLV). This paper attempts to demonstrate how these two constructs are related; more precisely, how brand equity drives the key components of CLV: acquisition, retention, and profit margin.

Leone et al. (2006) emphasize that while many different methods have been proposed for measuring brand equity, they share the premise that "The power of a brand lies in the minds of consumers" (p. 126). Numerous commercial measures exist including Milward-Brown's BrandZ, Research International's Equity Engine, IPSOS's Equity*Builder and Young and Rubicam's Brand Asset Valuator (BAV), the measure we use in this paper.

While brand equity is rooted in the hearts and minds of consumers, CLV is manifested in the dollar value of customer purchases. CLV is driven by retention rates, acquisition rates, and profit margins and, ultimately, is the net present value of the long-term profit contribution of the customer (Farris et al. 2006). CLV is a financial measure that has immediate application as a metric for assessing customer prospecting, as an objective to be managed, and as a method for valuing the firm (Blattberg, Kim, and Neslin 2008; Gupta, Lehmann, and Stuart 2004).

As pointed out by Leone et al. (2006), Peppers and Rogers (2004, p. 301), and Rust, Zeithaml, and Lemon (2000, p. 55), brand equity is logically a precursor of CLV. If brand managers win the hearts and minds of the customer, customer managers have an easier time retaining and acquiring customers. This perspective is supported by the theory of reasoned action (Engel, Blackwell, and Miniard 1995, pp. 387-389), as well as "hierarchy of effects" models of consumer behaviour (e.g., Lavidge and Steiner 1961) which posit that consumer attitudes are a precursor to consumer actions. Quantifying the link between brand equity and CLV provides

several benefits, including: (1) a basis for valuing the "qualitative" aspects of a brand manager's plan for advertising and positioning the brand, and (2) diagnostic information about drivers of CLV. Keller and Lehmann (2006) identified the link between brand equity and CLV as a key area for future research.

Marketing actions – advertising, price, promotions, new products, etc.– drive brand equity and CLV. Researchers including Ailawadi, Lehmann, and Neslin (2003) and Srinivasan, Park and Chang (2005) show how marketing actions are associated with brand equity. Others such as Venkatesan and Kumar (2004) show how marketing actions are associated with CLV (see also the review by Blattberg, Malthouse, and Neslin 2009).

In summary, previous work has examined pair-wise relationships among marketing, brand equity, and CLV. However, work is needed that unifies these constructs. One important step in this direction is the work of Rust, Lemon, and Zeithaml (2004b). They measure "return on marketing" by showing specific examples of the relationship between marketing and customer product ratings, and how these ratings determine CLV. We build on their work by (1) allowing marketing to influence CLV not only through brand equity but directly as well, (2) examining the impact of brand equity on profit margins in addition to acquisition and retention, and (3) using a widely used measure of brand equity (BAV) to examine a particular industry over an extended period of time – one decade. Accordingly, the purposes of our paper are to:

- Determine the impact of brand equity on the components of CLV – customer acquisition, customer retention, and profit margin;

- Determine whether brand equity impacts the components of CLV even after accounting for the impact of marketing activity;

- Measure the impact of marketing on brand equity and the components of CLV;

- Demonstrate and easy-to-implement method for quantifying these relationship to help managers improve brand equity and CLV using readily available real world data.

More succinctly, our goal is to quantify the strategic relationship between brand management (brand equity) and customer management (the components of CLV), and to demonstrate the role that marketing activities play in this relationship.

LITERATURE REVIEW

Brand Equity

Brand equity has been defined as "outcomes that accrue to a product with its brand name compared with those that would accrue if the same product did not have the brand name" (Ailawadi, Lehmann, and Neslin 2003, p. 1), i.e., the benefits a product achieves through the power of its brand name. Keller and Lehmann (2003) delineate three approaches for assessing brand equity: customer mind-set (e.g. Aaker 1996, Keller 2008), product-market (e.g., Park and Srinivisan 1994), and financial-market (e.g., Mahajan, Rao, and Srivastava 1994). These approaches have different strengths and weaknesses (Ailawadi, Lehmann, and Neslin 2003). While financial-market measures theoretically capture current and future brand potential, they often rely on subjective judgements or volatile measures to estimate future value (Simon and Sullivan 1993). Product-market measures are more closely related to marketing activity but don't capture future potential (e.g., Kamakura and Russel 1993; Swait et al. 1993). More importantly, both approaches have limited diagnostic value. Customer mind-set metrics, on the other hand, identify brand strengths and weaknesses (Keller 1993). While these provide insights for strengthening brand equity, they provide little information about brand performance in terms of market share or profitability.

Keller (2008), and this paper, focus on customer mind-set equity, which Keller refers to as "customer-based brand equity." According to Keller, the "power of a brand lies in what customers have learned, felt, seen, and heard about the brand" (p. 48), i.e., the customer mind-set. He develops a theory that identifies two key elements of mind-set equity (see also Keller and Lehmann 2003): (1) awareness and familiarity, and (2) strong, favourable brand associations. It

is therefore imperative that any customer mind-set measure of equity include both awareness/familiarity and brand associations.

Not surprisingly, there are several mind-set measures of brand equity. Commercial measures such as Young & Rubicam's (Y&R) Brand Asset Valuator (BAV), Milward Brown's BrandZ or Research International's Equity Engine assess four to five major facets of brand perceptions. Lehmann, Keller and Farley (2008) demonstrate significant correlations between the BAV pillars and the dimensions of other commercial equity measures as well as measures such as attitude and satisfaction. Of the commercial measures, BAV is probably the best known and is "the world's largest database of consumer-derived information on brands" (Keller, 2008, P. 393) as well as the first brand equity model discussed by Kotler and Keller (2009, P. 243). It also serves as a basis for Aaker's (1996) ten measures of brand equity.

Young & Rubicam has measured brand equity for two decades and currently covers 50,000 brands in 51 countries. Y&R's BAV measure consists of four "pillars" that capture the awareness/familiarity and brand association constructs encompassed by Keller's theory:

- Knowledge: The extent to which customers are familiar with the brand.

- Relevance: The extent to which customers find the brand to be relevant to their needs.

- Esteem: The regard customers have for the brand's quality, leadership, and reliability.

- Differentiation: The extent to which the brand is seen as different, unique, or distinct.

The "Knowledge" pillar directly taps the awareness/familiarity construct and is a key component in Lehmann, Keller, and Farley (2008). The three additional pillars – Relevance, Differentiation, and Esteem – capture brand associations. Relevance is also the focus of Aaker's (2011) recent book. Our paper examines how these four "pillars" relate to customer acquisition, retention, and profit margin. We note, however, that while BAV is rooted in the conceptual elements of mind-set equity and correlates highly with other measures of it, strictly speaking our results apply only to this widely known but not universally accepted measure of customer mind-set equity.

Numerous studies have shown the link of marketing activities such as advertising to brand equity (e.g., Ailawadi, Lehmann, and Neslin 2003). In addition, Aaker and Jacobson (1994, 2001) found a positive link between perceived brand quality and attitude and stock prices. A link between brands and stock price was also demonstrated in Kerin and Sethuraman (1998), Mizik and Jacobson (2008) and Madden, Fehle, and Fournier (2006). Scholars have also focused on the impact of brand equity on customer loyalty and tolerance of corporate misconduct (e.g., Chaudhuri and Holbrook 2001; Aaker, Fournier and Brasel 2004) as well as willingness to pay (Swait et al. 1993). Furthermore, even simple mind-set metrics, such as brand recall, have been shown to explain demand over and above marketing activity (Srinivasan, Vanhuele and Pauwels 2010). These findings, as well as work by Leone et al. (2006), Rust, Zeithaml, and Lemon (2000), and Peppers and Rogers (2004), support the notion that brand equity should link to hard measures of customer behavior such as the components of CLV.

Customer Lifetime Value

Farris et al. (2006, p. 143) define CLV as "The present value of the future cash flows attributed to the customer relationship." CLV is used as a metric for deciding whether a group of customers is worth acquiring (Blattberg, Kim, and Neslin 2008), as a means to value the firm (Gupta, Lehmann, and Stuart 2004), and as an objective to be managed (e.g., Kahn, Lewis, and Singh 2009; Blattberg, Kim, and Neslin 2008, Chapter 28). A substantial portion of research has focused on assessing the financial value of customers (Hogan et al. 2002; Hogan, Lemon, and Libai 2003) and on its determinants such as marketing actions (Rust, Lemon, and Zeithaml 2004b; Venkatesan and Kumar 2004).

There are two main methods of calculating CLV (Dwyer 1989; Berger and Nasr 1998; Blattberg, Kim, and Neslin 2008): (1) the simple retention model, and (2) the Markov migration model. The simple retention model assumes that the customer is acquired, retained and at some point ceases to be a customer. The migration model explicitly addresses the possibility that customers move in and out of the brand. A customer may *temporarily* defect, that is, skip purchasing for a period or two and then resume purchasing. For example, a McDonalds customer

may visit the establishment in week 1, skip weeks 2 and 3, and return in week 4. The same can occur for a durable product, e.g., a Ford owner may switch to a Toyota, but then, after a few years, come back and buy a Ford. Whereas the retention model is driven by retention rates and profit margin, the migration model also incorporates (re)acquisition rates. The data we have from the automobile industry include acquisition as well as retention measures. This allows us to exploit the strengths of the Markov migration model so we compute CLV using this approach.

CONCEPTUAL FRAMEWORK AND HYPOTHESES

Conceptual Framework

The literature review suggests the simple framework depicted in Figure 1. The framework is essentially a value chain similar to those discussed by Keller and Lehmann (2003), Gupta and Lehmann (2005), and Reibstein and Lehmann (2006). Theoretically it is rooted in hierarchical models of purchase behavior. The framework proposes that marketing actions influence both brand equity and the components of CLV, and that brand equity has a direct impact on the components of CLV controlling for marketing actions. Put differently, we argue that customer mindset brand equity partially mediates the impact of marketing activities on customer behavior.

--- Figure 1 ---

Hypotheses

The link from brand equity to the components of CLV is rooted in multiple prior research streams. One of the earliest is the AIDA model, a hierarchical structure beginning with awareness and progressing through interest and desire to action (East 1997, p. 263). Howard and Sheth (1969), in their seminal work, proposed an expanded "hierarchy of effects" model (Lavidge and Steiner 1961) that begins with Knowledge and moves through attribute beliefs to confidence, attitudes, intention, and purchase. Farley and Ring (1970) tested the model incorporating advertising and couponing as marketing activities. Farley, Howard and Lehmann (1976) proposed a simplified "working system model" which had five key constructs: recall,

comprehension (knowledge), confidence, attitude, and intention. What these (and other) models have in common is a hierarchy beginning with awareness and/or knowledge (familiarity) leading through brand associations (cognitions, image) to behavior.

The BAV variables follow this general model by including Knowledge as a measure of awareness/familiarity, and Relevance, Esteem, and Differentiation as brand associations. The above theories suggest that these measures should all predict purchase behavior. Consequently we propose:

H1: Changes in the four pillars of brand equity, i.e. Knowledge, Relevance, Esteem, and Differentiation, will be associated with changes in behavior, i.e. customer acquisition, customer retention, and profit margin per customer.

One could argue that Knowledge should operate solely through the other three pillars, i.e. is a necessary condition. However, the "high involvement with emotional distortion" model of consumer behavior (cf. Reed and Ewing 2004) posits that consumers faced with highly complex decisions can resort to a direct translation of awareness (Knowledge in our context) to purchase.

One might question why we examine the individual elements of BAV rather than aggregating them to one measure. The reason is that combining the elements into one measure would mask the relative contribution of each. Also, we will hypothesize, and find, that the components have different effects on the components of CLV.

A key premise of Figure 1 is that marketing activities can increase both brand equity and CLV. The theoretical basis for this is in the hierarchical models cited above – marketing both plays a crucial role in creating the awareness and associations that drive purchase and can work directly on translating the customer's existing mind-set into purchase. In Figure 1, "Marketing activities" are operationalized as the elements of the marketing mix (i.e. advertising, new product launches, price, price promotion, and distribution). Previous work has not examined the impact of the elements of the marketing mix on the separate components of brand equity and CLV in the same setting.

Our main goal is to assess the impact of brand equity on CLV. To do so we must control for marketing activities and consequently we include these as control variables. We test whether the BAV pillars mediate the impact of marketing variables as well as whether they add significant explanatory power to them.

We next formulate specific hypotheses about how the different aspects of brand equity in the BAV model impact the three components of CLV.

Knowledge: Knowledge plays an important role in mitigating perceived risk (Alba and Hutchinson 1987). Customers should be more apt to switch to a brand if they are familiar with it because there is less risk that the product will not meet their needs. Similarly, well known brands do not have to pay customers a "risk premium" in the form of lower prices. Therefore, knowledge (familiarity) with a brand should have a positive effect on both acquisition and profit margin. In terms of retention, current customers have adapted to a product and hence learned to value its attributes (Carpenter and Nakomoto 1989). They also will be more confident in their judgment of the product, leading to it being more appealing when considering the mean and variance of alternatives in future choice decisions.

Relevance: Consistent with most mind-set models of brand equity, BAV includes a measure of need fulfillment, captured by relevance. Products can provide utility through functional, experiential or symbolic benefits (see Park, Jaworski, and MacInnis 1986). While the importance of these benefits differs across individual consumers and change over time (Keller 1993), brands that fulfill the core needs of customers are likely to be considered for purchase (Punj and Brookes 2002) and consequently produce higher acquisition and retention rates as well as increased willingness to pay and hence higher margins.

Esteem: Higher esteem means that the quality and reliability of the brand are judged favorably. Evaluative judgments such as esteem are seldom formed with regard to benefits of little subjective importance (Ajzen and Fishbein 1980). Put differently, brand respect and deference will be related to favorable appraisals of important attributes (MacKenzie 1986).

Hence, brands which satisfy important consumption goals should be able to achieve higher acquisition and retention rates and command price premiums.

Taken together, this discussion suggests the following hypothesis:

H2: Increases in Knowledge, Relevance and Esteem will be associated with positive changes in customer acquisition and retention rates and profit margins.

Differentiation: Differentiation has long been the mantra of marketing, and hence one might expect it also to be positively associated with all the components of CLV (e.g., Day and Wensley 1988). To form a hypothesis regarding the impact of Differentiation on CLV, we consider three issues: the size of the brand's target segment, the sustainability of this target group, and the psychological aspects of distinctiveness. As a brand becomes more differentiated, its target group becomes smaller (because it is catering to more specialized needs) and more ephemeral (specialized needs for a given consumer change over time).

Those consumers for whom the brand hits their "sweet spot" will be willing to pay a premium for it. Thus, as a brand becomes more strongly differentiated, its profit margin should increase. However, as a brand becomes more differentiated, its target market generally shrinks which makes it more difficult to attract customers (see Romaniuk, Sharp and Ehrenberg 2007). In addition, distinctiveness, a key component of differentiation, has no positive customer benefit *per se*. For example, psychologists find that individuals tend to rate distinct stimuli lower because they are harder to process and evaluate (Winkielman et al. 2006). Failures such as the Pontiac Aztec and the Ford Edsel attest to this. Studies of the German automobile market show that aesthetically distinct vehicles turn over more slowly than less distinct automobiles (Landwehr, Labroo and Herrmann 2011). Distinct brands, versus a category exemplar, are also less likely to be recalled when a category is evoked and hence are less likely to be considered before purchase.

Concerning the relationship between Differentiation and retention, the needs of the target group matched to a highly differentiated product change over time. The perfect match of today quickly moves out of synch with customer needs. Customer needs evolve due to changes in

family status, social environment or cultural norms. A Porsche, for example, is clearly a very differentiated and unique sports car. However, it addresses specialized needs and its customers may make different choices the next time after they have had their sports car "fix" or their circumstances change, e.g., they begin raising a family. Also, differentiated goods may be trendy and appealing in the short run, but what looks trendy now can look dated in the future. Furthermore, consuming a unique, distinctive product would be expected to attract public attention, and the public scrutiny that engenders has been associated with variety seeking (Ratner and Kahn 2002, Levav and Ariely 2000). These arguments suggest that as a brand becomes more highly differentiated, it will have a more difficult challenge retaining customers.

Therefore we propose the following hypothesis:

H3: Changes in Differentiation will be positively associated with changes in profit margins, but negatively associated with changes in acquisition and retention rates.

DATA

We focus on a single, major industry of great economic importance – the U.S. automotive industry. Cars are high involvement products in terms of interest, risk, symbolic and hedonic value (Lapersonne, Laurent, and Le Goff 1995). We utilize data for 39 major brands between 1999 and 2008 (comprising more than 97% of all automobile sales in the US market). The level of our analysis is car brands (such as Chevrolet or Honda), not models (such as Malibu or Civic). Information on customer switching behavior is available since most customers trade in a used car when purchasing a new one. We compiled data on brand equity, customer acquisition, retention, and profit margin, and marketing variables from several sources, as detailed below.

Customer-Based Brand Equity

In the U.S., Young & Rubicam collects annual data from more than 6,000 respondents designed to mirror the U.S. population over 18 years of age (Agres and Dubitsky 1996). Table A1 in the Appendix describes the perceptual metrics that comprise the four components of BAV: "Differentiation," "Relevance," "Esteem," and "Knowledge". Items belonging to each

component were averaged to calculate a formative index. We rescaled items that were on different scales to a 1 to 100 scale to make them comparable.

BAV is one of the few measures available over a ten-year period for all the relevant brands of a major industry. This allows us to examine how longitudinal variation in equity relates to changes in CLV, making our results applicable to managers who wish to improve the equity, and CLV, of their brands. One weakness of the data is that the number of "sub-scales" differs from one to seven across the pillars, and some sub-scales use simple yes-no responses when interval scales might have been more powerful. More broadly, our results are limited to the dimensions of BAV as well as the product category studied, U.S. automobiles. The results therefore should be taken strictly as "hypotheses" of what would happen in other situations.

Customer Acquisition and Customer Retention

The customer purchase data we use to measure acquisition and retention were provided by the Power Information Network (PIN) and consist of aggregate level trade-ins and purchases for 39 different automobile brands in the U.S. between 1999 and 2008. These data cover about 40% of transactions, are considered representative of the U.S., and have been successfully applied in previous research on automotive choice (Bucklin, Siddarth and Silva-Risso 2008; Jie, Lili and Schroeder 2009).

The PIN data rely on trade-in information to infer whether a customer has switched brands or been retained. Since the data exclude non-trade in purchases, strictly speaking our results pertain to the 57% of automobile purchases that involve trade-ins (Hyatt, 2001, Zhu et al. 2008). Our hypotheses are in no way contingent on their being a trade-in, so we expect our results would hold for non-trade in purchases. Another limitation is that the data do not account for multiple car ownership within a household. Thus if a household owned Brand A (a sedan) and Brand B (a minivan), and on a given purchase occasion, traded in Brand A for Brand B, we would count this as a switch. Our assumption is that whatever bias this creates stays constant over time, a reasonable assumption, on average, for a given brand. We use fixed effects to account for the mean acquisition and retention levels for each brand, and use longitudinal

variation to quantify the impact of equity on CLV. This allows us to establish one of our contributions, which is to demonstrate a tool that managers can use to analyze changes in marketing and/or equity on the CLV of their brands.

The migration CLV model requires switching probabilities *conditional* on which brand customers previously purchased, i.e., the percentage of customers who bought the focal brand in period t among customers who owned the brand in t-1 and made a purchase in t (retention) and the percentage of customers who bought the focal brand in period t among those who owned another brand in *t-1* and made a purchase in period t (acquisition). These differ from the *unconditional* probabilities, i.e., the number of customers repurchasing the focal brand in t as a percentage of *all* customers purchasing in t (retention) and the number of customers switching to the focal brand in t as a percentage of *all* customers purchasing in t (acquisition). Table WA1 of the Web Appendix illustrates the aggregate level switching data and the calculation of unconditional and conditional acquisition and retention probabilities. Unconditional probabilities sum to one, which we incorporate in our analysis to ensure logical consistency of our predictions. We convert predicted unconditional probabilities to conditional probabilities for use in the migration CLV model.

Customer (Gross) Profit Margin

We measure the customer (*gross*) profit margin of a sold car as the difference between a brand's average wholesale price and its variable production costs, i.e. its costs of goods sold (COGS).[1] Power Information Network (PIN) provided data on each brand's retail price and dealer margin per sold car, which enables us to compute its wholesale price. COGS data are derived from annual reports. Our analysis excludes fixed costs such as advertising and R&D and represents the marginal contribution of a sale/customer. The merits of using only variable costs in CLV calculations are discussed by Blattberg, Kim and Neslin (2008, pp. 149-151). Similarly,

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[1] There is a process by which brand equity would be reflected in retail prices, and in turn in wholesale prices and hence wholesale gross margin. Modeling this (largely negotiated) process is beyond the scope of our research. We instead model wholesale gross margin as a reduced form function of brand equity, consistent with our focus on the manufacturer's management of brand equity and CLV.

Berger and Nasr (1998) do not consider fixed costs in their seminal paper on calculating CLV, a perspective shared by Mulhern (1999).

Marketing Activities

We include several marketing mix variables that have been shown to influence customer acquisition and retention (Pauwels et al. 2004; Slotegraaf and Pauwels 2008; Ataman, Van Heerde, and Mela 2009; Ailawadi, Lehmann and Neslin 2003). These include each brand's yearly U.S. ad spending (*advertising*, provided by TNS Media), the number of U.S. dealers (provided by Automotive News), product range (measured as the number of distinct models offered), the number of new model launches introduced in a year (both provided by Wards Automobile), retail price (*price*, provided by PIN) and average customer incentives (*price promotions*) during the year (provided by Automotive News). Because of the high correlation between number of dealers (distribution) and product range/brand breadth (0.59), we average them to create a variable we called "*market presence*," i.e., the ubiquity of the brand in the market. Since these measures are on different scales, we rescale them to range between one and ten. Market presence is calculated as a formative index by averaging the rescaled components.

We adjust ad spending by the consumer price index (CPI), as reported by the U.S. Bureau of Economic Analysis. Brands' retail prices are adjusted by the CPI for gross domestic purchases of motor vehicles using the same source of information. The baseline year for all prices and budgets is 1999.

ANALYSIS APPROACH

Statistical Analysis

Figure 1 suggests two sets of equations: (1) Brand equity as a function of marketing activity and (2) Retention, acquisition, and profit margin as a function of brand equity and marketing activities.

Brand equity: To analyze the four BAV brand equity measures – Relevance, Esteem, Differentiation, and Knowledge – as a function of marketing activities, we estimate four regression equations jointly using seemingly unrelated regression.

$$(BE_{kit} - \overline{BE}_{kt}) = \sum_{i=1}^{I} \alpha_{ik} F_i + \sum_{m=1}^{M} \delta_{mk} (X_{mit} - \overline{X}_{mt}) + \mu_{kit} \tag{1}$$

i	1,...,39 indexes the 39 brands, where I = 39
t	1,...,10 indexes the 10 years of data
k	1,...,4 indexes the four brand equity measures
m	1,...,5 indexes the five marketing activities defined earlier
BE_{kit}	Value of brand equity component k for brand i in period t
α_{ik}	Fixed effect for firm i on brand equity component k
F_i	Dummy coding for brand i
δ_{mk}	The impact of marketing activity m on brand equity measure k
X_{mit}	Value of marketing activity m for brand i in period t
μ_{kit}	Error term for brand equity component k, brand i and period t

The key coefficients are the δ's, which assess the impact of marketing on each brand equity component. We include brand-specific fixed effects to control for cross-sectional variance so that changes in brand equity will be due to changes in marketing activity *over time* rather than stable and unique characteristics of the brand. Second, we scale all variables relative to their mean across brands for the given time period. This provides a convenient way to control for (possibly nonlinear) trends from year to year. The model assumes that what matters is not, for example, the level of advertising, but rather the level of advertising relative to competition. Thus what we examine is (1) how deviations in marketing activities from the industry average impact the four pillars of BAV and (2) how deviations in each pillar of BAV from the industry average impact acquisition and retention as well as margin.

Customer Acquisition and Customer Retention: As discussed in the data section, we model unconditional acquisition and retention probabilities because these have consistency properties (summing to one) we can exploit. Define S_{irt} as the unconditional acquisition probability ($r = 1$) or retention probability ($r = 2$) for brand i in period t. As shown in Table WA1 of the Web Appendix, summing S_{irt} produces:

$$\sum_{i=1}^{I}\sum_{r=1}^{R} S_{irt} = 1 \tag{2}$$

S_{irt} Unconditional probability of acquisition or retention (r) for brand i in period t
r 1, acquisition; 2 for retention.

We employ a differential effects multinomial attraction model (Cooper and Nakanishi 1988) to maintain the logical consistency of equation (2). We predict unconditional acquisition and retention probabilities, use them to derive absolute numbers (Table WA1), and then derive the conditional acquisition and retention probabilities needed for calculating CLV. The differential effects multinomial attraction model is:

$$S_{irt} = \frac{A_{irt}}{\sum_{j=1}^{J}\sum_{r=1}^{R} A_{jrt}} \tag{3}$$

A_{irt} Attraction of acquiring/retaining(r) brand i in period t

The A_{irt}'s are expressed as:

$$A_{irt} = \exp\left(\gamma_i F_i + \gamma_r A_r + \sum_{k=1}^{4} \beta_{kr}(BE_{kit} - \overline{BE}_{kt}) + \sum_{m=1}^{5} \delta_{mr}(X_{mit} - \overline{X}_{mt}) + \varepsilon_{irt} \right) \tag{4}$$

γ_i Fixed effect for brand i
F_i Dummy coding for brand i
γ_r Fixed effect for acquisition and retention
A_r Dummy coding for acquisition and retention
β_{kr} Effect of brand equity component k on acquisition/retention (r)
BE_{kit} Value of brand equity component k of brand i in period t
δ_{mr} Effect of marketing activity m on acquisition/retention (r)
X_{mit} Value of marketing activity m of brand i in period t
ε_{irt} Error term for brand i, acquisition/retention (r) and period t

Equation (4) models attraction, and hence unconditional retention and acquisition, as functions of brand equity and marketing activities. The coefficients are retention or acquisition

specific, so that brand equity measure k can have a different impact on retention than on acquisition. We also include fixed effects for brand and for retention vs. acquisition.[2]

Taking the logarithm of equation (3), substituting in equation (4), summing over $I = 39$ brands and over $R = 2$ acquisition/retention, and multiplying both sides by 1/IR yields:

$$\frac{1}{IR}\sum_{i=1}^{I}\sum_{r=1}^{R}\ln S_{irt} = \frac{1}{IR}\sum_{i=1}^{I}\sum_{r=1}^{R}\left(\gamma_i + \gamma_r + \sum_{k=1}^{K}\beta_{kr}(BE_{kit} - \overline{BE}_{kt}) + \sum_{m=1}^{M}\delta_{mr}(X_{mit} - \overline{X}_{kt}) + \varepsilon_{irt}\right)$$
$$- \ln\sum_{j=1}^{J}\sum_{r=1}^{R}A_{jrt} \tag{5}$$

Following Cooper and Nakanishi (1988) we subtract equation (5) from the log of equation (3) to form a single regression equation:

$$\ln\frac{S_{irt}}{\tilde{S}_t} = \gamma_i^* + \gamma_r^* + \left(\sum_{k=1}^{K}(\gamma_{r=1}\beta_{k1} + \gamma_{r=2}\beta_{k2})(BE_{kit} - \overline{BE}_{kt})\right)$$
$$+ \left(\sum_{k=1}^{K}(\gamma_{r=1}\delta_{m1} + \gamma_{r=2}\delta_{m2})(X_{mit} - \overline{X}_{mt})\right) + \varepsilon_{irt}^* \tag{6}$$

$\tilde{S}_t$ Geometric mean of S_{irt}

γ_i^* $\gamma_i - \overline{\gamma}_i$, γ_r^* = $\gamma_r - \overline{\gamma}_r$

$\gamma_{r=1}$ 1 if acquisition, $\gamma_{r=1} = 0$ if retention

$\gamma_{r=2}$ 0 if acquisition, $\gamma_{r=2} = 1$ if retention

ε_{irt}^* $\varepsilon_{irt} - \overline{\varepsilon}_t$

Equation (6) is estimated using ordinary least squares on the stacked retention and acquisition numbers for each brand for each time period, resulting in 39 brands × 10 time periods × 2 (acquisition or retention) = 780 observations.

Customer Profit Margin: We model customer (*gross*) profit margin as:

$$(\pi_{it} - \overline{\pi}_t) = \sum_{1}^{I}\varphi_i F_i + \sum_{k=1}^{K}\beta_{pk}(BE_{kit} - \overline{BE}_{kt}) + \sum_{m=1}^{M}\delta_{pm}(X_{mit} - \overline{X}_{mt}) + \upsilon_{it} \tag{7}$$

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[2] We also experimented with a model using a fixed effect for acquisition/retention (r) for each brand i. This model produced similar effects. We therefore report the results for equation (5) which uses fewer degrees of freedom.

φ_i	Fixed effect for brand i
β_{pk}	Effect of brand equity component k on profit margin (p)
BE_{kit}	Value of brand equity component k of brand i in period t
δ_{pm}	Effect of marketing activity m on profit margin (p)
X_{mit}	Value of marketing activity m of brand i in period t
υ_{it}	Error term for brand i, profit margin (π) and period t

We include fixed effects and scale all variables relative to competition. The coefficient β_{pk} represents the unit change in a brand's profit margin, relative to competition, per unit change in its brand equity component k, relative to competition. The coefficient δ_{pm} represents the impact of marketing activity m on profit, again relative to competition.

We use annual data at the brand level. This does not allow for inferences regarding differences across customers which may be worthy of investigation, e.g. for developing communication strategies for different target segments. Moreover, the average effects we estimate may differ across brands, in particular between luxury vs. non-luxury brands. We therefore test for differences in the brand equity effects across brand type.

Customer Lifetime Value

We calculate CLV using the Markov migration model advanced by Dwyer (1989) and Berger and Nasr (1998). We draw directly on Pfeifer and Carraway (2000) who show how to perform the calculation in a convenient matrix form. The migration model acknowledges that customers are acquired, lost, and then sometimes return to the "nest" over time (see Blattberg, Kim, and Neslin 2008, Chapter 5). In the context of the automobile market, the migration model captures the scenario of a customer who purchases a Buick in Year 1, switches to another car in Year 4, and returns to Buick in Year 7.

The migration model starts with "states" that characterize a customer at a particular point in time. We define three states:

1. Own focal car, purchased it in period t

2. Own focal car, purchased it earlier than period t.

3. Own competitive car, purchased it in period t or earlier.

Given these states, the following parameters are needed to calculate CLV for focal car i:

p Probability of purchasing a car in period t, i.e., the probability the customer is "in the market" in period t.

S^*_{irt} Probability of purchasing the focal car i in period t, given the customer currently owns the focal car and purchases a car in period t (retention).

S^*_{iat} Probability of purchasing the focal car i in period t, given the customer currently owns a competitive car and purchases a car in period t (acquisition).

π_{it} Profit margin per customer for the focal car i in period t.

The above definitions produce a "transition matrix" (Table 1) of the probabilities that customers migrate from one state to another each period, as follows:

--- Table 1 ---

Own focal car, purchased it in period t: The customer purchases a new car in period $t + 1$ with probability p. The probability that the purchased car will be the focal car is S^*_{irt}. Therefore, the probability of buying the focal car in period $t + 1$ is pS^*_{irt}, i.e. the customer purchased and was retained. The customer purchases a different car with probability $p(1 - S^*_{irt})$. A customer who does not purchase any car is still an owner of the focal car; so moves from state 1 to state 2.

Own focal car, purchased it earlier than period t: The probabilities of transitioning to the various states are the same as if the customer started in state 1. The reason we distinguish between states 1 and 2 is the profit implications are different – profit margin in period $t + 1$ is earned only when the customer purchases the focal car in period $t + 1$.

Own competitive car, purchased it in period t or earlier: The probability the customer purchases a car is still p, but now the probability of it being the focal car is the acquisition probability, S^*_{iat}. So the probability of transitioning to state 1, owning the focal car purchased in the period $t + 1$, is pS^*_{iat} and the probability of remaining in state 3, owner of a competitive car purchased in period $t + 1$ or earlier, is $1 - pS^*_{iat}$. A customer in state 3 cannot transition to state 2 because the customer owned a *competitive* car purchased before period $t - 1$.

The final ingredient needed to compute CLV is the profit margin. This is captured by a 3 × 1 vector reflecting the contribution based on whether they buy the focal car, buy a competitors car, or by no car:

$$R = \begin{pmatrix} \pi_{it} \\ 0 \\ 0 \end{pmatrix} \tag{8}$$

If the customer purchases the focal car in the current period, the profit margin is π_{it}. Pfeifer and Carraway (2000) show that CLV can be calculated as follows:

$$CLV = (I - (1+d)^{-1}P)^{-1}R \tag{9}$$

I   Identity matrix (3 × 3 in our case since we have three states).
P   Transition matrix defined above and in Table 1 (3 x 3).
d Discount parameter (we set this to 0.10 or 10% per year for our calculations).

The key drivers of CLV are the conditional acquisition and retention probabilities (contained in P) and the profit margin (contained in R). Equation (6) provides predictions of the unconditional probabilities of acquisition and retention. As described earlier, we use these to work backwards to obtain the conditional probabilities, (the S^*'s). The estimates of Equation (7) provide the predictions of profit contribution needed for equation (8). We consider the probability the customer purchases any car (p) to be exogenous, i.e., we assume that brand equity does not affect the average interpurchase time nor vice-versa. According to the data of Power Information Network (PIN) the average interpurchase times for the years we studied were 5.09 years. A regression analysis of the average time customers are in possession of vehicles versus the BAV brand equity pillars as independent variables revealed no statistically significant relationships (p>.10). We therefore use a value of $p = 0.20$, meaning that a customer replaces a car every five years on average. This parameter clearly affects CLV (a higher p means higher CLV). Nonetheless we believe the assumption of constant p is reasonable for illustrating the impact of changes in brand equity and will not dramatically alter the implications of our scenario calculations.

RESULTS

Correlations and Endogeneity

We first examine correlations among all variables and find differentiation to be highly correlated with margin (.63) and negatively with retention (-.43) and acquisition (-.48). This suggests, as hypothesized, that Differentiation is a double-edged sword: high Differentiation means the automobile is highly targeted and may appeal to customers in certain lifestages. Relevance and Knowledge are highly correlated with customer retention (.79 and .76) and Relevance is unsurprisingly highly correlated with acquisition (.69). All correlations are listed in the web appendix (Table WA2). The correlations portend multicollinearity problems that may inflate standard errors and render fewer results significant. However, we felt it was important to be able to compare our results with other work on BAV and therefore did not orthogonalize the BAV measures. To the extent we find significant effects consistent with our hypotheses in the presence of this multicollinearity, we believe that makes the results all the stronger.

The relationships among acquisition, retention, profit margin, marketing effort, and brand equity may be subject to endogeneity, particularly given the annual nature of our data. Customers may notice a car is popular (because it is acquiring and retaining many customers) and adjust their brand perceptions accordingly. Managers may observe their brands' acquisition and retention rates and adjust marketing accordingly. It is quite possible that these problems will not materialize. For example, customers may not notice acquisition and retention rates. However, this is an empirical question that we resolve by conducting Wu-Hausman and Durbin-Wu-Hausman endogeneity tests, using fixed effects for each brand, and lagged values of potentially endogenous variables (one-period and two-period lags). We test seven equations: acquisition, retention, profit margin, and the four pillar equations. None of the 28 tests is significant at the 5% level suggesting endogeneity is not a problem (Web Appendix Table WA3).

Marketing Determinants of Brand Equity Components

Table 2 presents estimates of equation (1) – brand equity as a function of marketing. Advertising is positively linked to differentiation, relevance, and esteem while market presence

is positively related to relevance, esteem, and knowledge but negatively to differentiation - being widely present is inconsistent with being "unique". Overall, marketing, in particular advertising and market presence, clearly exerts an important impact on the components of brand equity. One counter-intuitive finding is that advertising does not exert a significant impact on knowledge. Advertising is highly correlated with market presence as well as new model launches. These correlations may have inhibited our ability to detect a significant effect on knowledge. It may also be that customers are already highly familiar with automobile brands, so that at the margin, increases in advertising do not increase familiarity. It is also noteworthy that other studies have shown weak effects of advertising (e.g., Sethuraman, Tellis and Briesch 2011). However, we caution against generalizing the non-significant relationship we observe.[3]

--- Table 2 ---

Impact of Brand Equity on Acquisition and Retention

Table 3 presents the estimates of Equation (6), linking brand equity and marketing actions to acquisition and retention. The brand equity components are related to both acquisition and retention. In support of H3, Differentiation is negatively related to acquisition and retention. Knowledge is positively related to acquisition and retention, supporting H2. Esteem is positively related to customer retention but not to acquisition, partially supporting H2. In partial support of H2, Relevance has a positive effect on acquisition ($p < .10$) but no significant impact on retention. Overall, six out of the eight coefficients relating brand equity to acquisition and retention are statistically significant at $p < .10$ (five coefficients at $p < .05$). Apparently, acquiring and retaining customers requires capturing their hearts and minds (Fournier 1998). Taken together, these findings lend support for Hypothesis H1 – "soft" customer mind-set

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[3] We note two other non-significant results of interest: (1) Product launches did not significantly increase Differentiation. However, it is not clear what the nature of that relationship should be. Product launches of radically new models might differentiate the brand, while product launches might simply represent the brand imitating its competitors, and therefore make it less distinctive. It is noteworthy that the raw correlation between product launches and Differentiation is small (-0.16). (2) The main effect of Price on Esteem is not significant. However, there are significant interactions involving price that drive Esteem (see Table 5).

measures of brand equity relate to "hard" measures of acquisition and retention, the prime ingredients of CLV, even after controlling for the impact of marketing activities.

--- Table 3 ---

One explanation for the negative relationship between Differentiation and acquisition/retention, is that the range of brands was broad, so they are not comparable. Therefore we repeated the analysis using only the 12 brands JD Power defines as luxury (e.g. BMW, Jaguar, Lexus) and the 27 non-luxury brands. Chow tests revealed there were no significant differences in the models estimated for the two groups. The direction of relationships was essentially identical; e.g., in both cases Differentiation was negatively related to both acquisition and retention. While being different and unique provides some of the advantages of monopoly pricing power (and may be desirable for ad recall), it seems that it doesn't attract a large number of customers in this industry.

There are several significant direct effects of marketing on acquisition and retention. Advertising is a crucial driver of acquisition as well as retention. Price promotions are related to acquisition but not retention, consistent with results on consumer packaged goods, where promotions tend to increase "penetration" but have a weaker impact on "share of requirements" (Ailawadi, Lehmann, and Neslin 2003). Market presence increases acquisition as well as retention. Interestingly, the number of new model launches and the average price are not significantly related either to acquisition or retention. The absence of a price effect may be due to the significant impact of incentives, which involve price. The absence of a new model effect could be due to the fact that most new models were not significantly different from, or replaced, existing ones so that they may primarily have cannibalized existing business.

Impact on Customer Profit Margin

The estimates of Equation (7), relating brand equity and marketing to customer profit margin, are shown in Table 3. Differentiation and Knowledge are both significantly and positively related to profit margin, supporting Hypotheses H2 and H3. The impact of Relevance is significant at the 10% level, also supporting H2. The impact of esteem has an unexpected sign

but is not significant at the 10% level. (As a *post hoc* explanation, Esteem involves perceptions of reliability and quality which may not translate into higher profit margins. For example, Honda and Toyota excel on these attributes yet profit margins for these brands are not exceptionally high.) Overall, the finding that three of the four equity measures relate significantly to profit margin provides support for H1.

Two marketing activities, advertising and market presence, are significantly related to profit margin. The negative impact of advertising, although only significant at the 10% level, is consistent with the "advertising as information" theory, which suggests that advertising exposes consumers to more alternatives, underscores product differences, and accentuates competition (Nelson 1974; Meurer and Stahl 1994). Such effects are particularly likely in oligopolistic industries and those in which customers negotiate individual prices (Scherer and Ross 1990; Gatignon 1984). Other studies have also found negative effects of advertising on price elasticity as well as revenues (e.g., Kanetkar et. al. 1992; Lodish et al. 1995). Market presence, on the other hand, has a strong positive impact on profit margin, consistent with a social approval/endorsement effect.

Indirect Effects

To further assess the role of brand equity, we conduct a series of Sobel tests to calculate the indirect effect of each marketing variable on the components of CLV, operating through their impact on the four brand equity components (Preacher and Hayes 2008). We use the product of the unstandardized coefficients to calculate the indirect effects. We obtain standard errors for these coefficients using bootstrapping and test for the statistical significance of the indirect effects. These tests reveal that the effect of market presence on acquisition and retention operates partially through customer based brand equity. Specifically, 31% of the total effect of market presence on acquisition and 23% of the effect on retention operates indirectly through the brand equity pillars. This is driven mostly by the effect of market presence on Knowledge, which is twice (acquisition) and four times (retention) stronger than the other indirect paths. We also find a positive indirect effect of advertising on profit margin, operating mostly via Differentiation.

Thus, advertising increases margins by increasing brand equity, but decreases margins through its direct effect as noted earlier. Taken together, the two effects cancel out and lead to a non significant total effect of advertising on margins. Table 4 shows the indirect and direct effects in which the coefficients have been standardized for ease of interpretation.

--- Table 4 ---

Interaction Effects

It is possible the pillars have interaction effects on customer behavior. Further, interaction effects among marketing activities may impact both brand equity and customer behavior.

In terms of the impact of marketing interactions on the pillars, a likelihood ratio test shows that as a group they were significant ($p < .05$) for Relevance and Esteem but not for Differentiation and Knowledge. The advertising by price interaction was negative for Relevance and Esteem (Table 5), suggesting advertising is more effective for low priced brands. On the other hand, the promotion by price interaction was significantly positive, consistent with evidence that high priced brands get larger benefits from price cuts (Blattberg and Wisniewski, 1989; Allenby and Rossi, 1991; Hardie, Johnson and Fader 1993).

--- Table 5 ---

With regard to interactions among pillars, we first investigated those that had a theoretical basis. Here we were influenced by Aaker's (2011) arguments regarding the role of Relevance as the key to brand equity. Logically, perceptions will only affect behavior for those brands that are relevant (i.e., in the consideration set). Therefore we first investigated the interactions between Relevance and the three other pillars. The three interactions involving Relevance were significant for all three behavioral variables (Table 6). The *Relevance by Differentiation* interaction had a significantly negative effect on customer acquisition and retention. This reinforces one of the arguments underlying H3, namely, the role of a specialized product and a smaller target group for highly differentiated products. Because both Differentiation and Relevance have a positive main impact on profit margin, the negative interaction between them suggests they are substitutes. Put differently, the advantage of being relevant is decreased when

the brand is highly differentiated. The positive *Relevance by Esteem* interaction on acquisition shows that Esteem pays off if the brand is relevant. This makes sense. The consumer may admire a Jaguar but is not going to purchase it unless it's relevant to his or her lifestyle, needs, etc. We also find that Knowledge and Relevance positively interact on profit. It is not surprising that Knowledge has a stronger effect for brands that are relevant.

--- Table 6 ---

We next employed an incremental F-test to investigate the remaining three interactions between pillars (Differentiation/Esteem, Differentiation/Knowledge, Esteem/Knowledge). The F-test was not significant in any of the acquisition, retention, or profit margin models.

Interactions between marketing activities were also significant predictors of customer acquisition (in a nested model test, $p < 0.05$) and customer retention but not profit margin. Due to the noticeable collinearity among the interactions, only two were individually significant. The *Advertising by Market Presence* interaction was negative for acquisition, suggesting they substitute for each other such that for a high market presence brand, advertising is less effective. *Price by Market Presence* had a positive impact on retention, suggesting higher priced widely present brands tend to have more loyal customers.

Overall, there are some significant interaction effects. Importantly, however, the predictive power they add is limited. Moreover, the main effects are largely the same when they are included, suggesting the results are robust.

ESTIMATING THE IMPACT OF MARKETING AND BRAND EQUITY ON CLV

We use scenarios to illustrate the impact of changes in marketing actions on brand equity and CLV. Our longitudinal analysis takes the perspective of a brand manager wishing to change the brand equity / CLV of his or her brand. Specifically, we alter a marketing variable, calculate its impact on brand equity and then calculate the impact of the change in brand equity as well as the direct impact of the marketing activity on CLV. We incorporate the cost of the changes to

calculate return on investment (ROI). We also exogenously change the value of one brand equity pillar – Differentiation – to examine the marginal impact this would have.

The two marketing changes we examined are – (1) an increase in advertising and (2) an increase in market presence driven by a broader product line. We calculate equations (1) (marketing => brand equity), (6) (brand equity and marketing => acquisition and retention), and (7) (brand equity and marketing => profit margin) recursively to estimate the net impact on acquisition, retention and profit margin. We then calculate CLV using equations (8) and (9). The scenarios are hypothetical but demonstrate the magnitude, and hence managerial relevance, of the link between "soft" measures (brand equity) and "hard measures" (acquisition, retention, profits, and CLV). Note, the multinomial attraction model, implicitly allows for non-linear relationships but we did not explicitly incorporate potential decreasing returns to scale. Consequently, we limit our analysis to small changes from the status quo, where linearity is most likely to hold. Note these scenarios are meant as illustrations of these changes on one specific brand starting from a specific equity/CLV profile and not meant to generalize across all brands.

Table 7 shows the scenarios for a 2008 luxury car brand. The first column represents the current state of affairs – the base case. For comparison purposes, the brand equity and CLV components in the base case are predicted by the estimates of equations (1), (6), and (7) in Tables 5 and 6. These are compared to the predictions for the scenarios to illustrate the impact of changes in marketing activities and brand equity. The focal brand is predicted to have a high retention rate, 45.69%, but a low acquisition rate, 1.49%. Since there are 39 brands, a "benchmark" acquisition rate would be approximately 1/39 or 2.5%. The focal brand's low acquisition rate is likely due to its smaller target group. In terms of equity, the brand is higher than average on all components with particular strength in Esteem. It introduces fewer new models and uses fewer incentives compared to other brands. However, its advertising and market presence are slightly above average. The brand charges higher prices and is able to achieve an above average profit margin of $19,643. Assuming a 5-year purchase cycle as discussed earlier, the predicted baseline CLV of its customers is $29,036.

---Table 7---

In this illustration, the interpurchase time of 5 years and the retention rate of 46% play an important role. The focal brand gets $19,643 when the customer is first acquired, so there is $29,036-$19,643 = $9,393 in CLV remaining. The value if a customer re-buys five years later, assuming a 10% discount rate, is $(1/(1.1))^5 \times \$19,643 = \$12,197$. In another five years, the discount factor is $(1/(1.1))^{10} = .39$ so the NPV of this is $.39 \times \$19,643 = \$7,661$. Since the probability of retaining the customer the first time is 0.46, and the next time $0.46 \times 0.46 = 0.21$, the contribution from these repeat purchases is $.46 \times \$12,197 + .21 \times \$7,661 = \$7,219$ is the majority of the $9,393 remaining NPV after the initial purchase. The NPV of customers who buy a third time, etc., or defect and are then re-acquired, comprise the remaining $1,732 contribution to CLV. Clearly, retention and interpurchase time play a large role in determining CLV.

Scenario 1: Increased advertising

We assume the focal brand increases its advertising by .25 standard deviations, an increase of $55 million or 20%. The net effect on acquisition and retention is positive (consistent with Table 6) although small. The reason is that the positive direct effects of advertising on acquisition and retention (Table 6) are not enhanced by indirect effects through brand equity. For example, advertising increases Differentiation (from 2.34 vs. 2.54) but Differentiation has a negative association with acquisition and retention. The same problem – lack of congruence between direct and indirect effects – occurs with regard to profit impact, but this time in the opposite direction. Advertising has a negative direct effect on profit margin (Table 6) but a positive indirect effect through, for example, the increase in Differentiation. The net impact on profit margin per car in Table 7 is a negligible - $1. The net impact on CLV is +$34, due to the slightly higher acquisition and retention rates. This scenario illustrates the offsetting direct and indirect effects (through brand equity) of advertising. Note the ROI impact, however, is $1 per dollar invested. The positive impact on CLV becomes meaningful when cumulated across the brand's installed base of 3,298,307 customers (see footnote in Table 7).

Scenario 2: Increased market presence

One way to increase market presence is to have a broader product line. The focal brand's product line in 2008 had nine models. We calculate CLV assuming the brand had 10 rather than nine models. Urban and Hauser (2004, p. 72) estimate the cost of an additional "platform", required for another model, as $1 billion to $2 billion. We use $1.5 billion as the additional cost the brand would have had to incur in order to have 10 rather than nine models.

The increase in market presence (from 0.36 to 0.58 on our scale) results in a decrease in Differentiation, an increase in Relevance and Knowledge, and a decrease in Esteem (Table 5). The car becomes less unique because the product line covers more of the market. A broader product line is more relevant and helps customers become more familiar with the brand. However, it loses a bit of esteem, probably because a broader line makes it less exclusive. These changes in equity, plus the direct effects of market presence (Table 6), produce increases in acquisition, retention, and net profit margin. As a result, CLV increases from $29,036 to $29,846, a gain of $810, or 2.8%. The ROI is $0.78 per dollar invested.

Market presence therefore is an important marketing "lever". It sets in motion gains in Relevance and Knowledge that increase draw acquisition and, more substantially, retention. Net profitability per customer also increases. The 2.8% gain in CLV has face validity. A doubling or even a 50% increase in CLV from having 10 rather than nine models, by contrast, would seem unrealistic. The impact of market presence on CLV may seem strong compared to that of advertising. However, non-linear effects may exist and one may find different results under other base levels of advertising or market presence.

Scenario 3: Exogenous change in brand equity

Brand equity can change for reasons outside the managerial actions included in our model, e.g., a competitive mis-step (e.g., Toyota's acceleration problem), changes in advertising content (while keeping budget constant), or "viral" activity (e.g., placing the Mini-Cooper in the movie The Italian Job). Further many companies monitor the equity of their brands for an early indication of potential need for action. They may be put in a position where they notice a change

in an equity component but need to know whether it is managerially (i.e., financially) important. While our regression coefficient estimates show statistically significant relationships, these coefficients by themselves do not directly measure financial consequences. Finally, interpreting the role of brand differentiation is complicated by its conflicting effects on acquisition/retention and profit. To understand the net effect in more detail, we consider a scenario where the brand experiences an increase in differentiation from 2.25 to 3, the level of a more differentiated competitor. We keep the three other brand equity pillars constant to focus on the marginal effect of Differentiation[4]. The results clearly illustrate the double-edged sword of Differentiation. Acquisition and retention both decline (acquisition from 1.48% to 1.47%; retention from 45.7% to 44.3%). Offsetting this, however, increased Differentiation begets higher profit margins (from $19,643 to $20,158). The net result is an increase in CLV to $29,577, an improvement of 1.9%.

Overall these scenarios show that changes in marketing actions can have a meaningful impact on brand equity, which in turn drives meaningful changes in acquisition, retention, profit margin per customer, and ultimately, CLV. Clearly "soft" brand equity measures are managerially important, not only from a "positioning" standpoint, but from a financial standpoint as well, namely in determining the lifetime value of the brand's customers.

SUMMARY

We examined the relationship between brand equity and the components of CLV, capitalizing on a unique database comprised of 10 years of BAV (Brand Asset Valuator) brand equity measures as well as transaction-based measures of customer acquisition, retention, and profitability. We examined the role of marketing actions in this context, both as generators of brand equity and controls for ensuring the apparent relationship between brand equity and CLV is not spurious. The overall findings are:

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[4] Note this unilateral increase in Differentiation ignores correlations among the pillars. However, Differentiation is the pillar least correlated with the other pillars, and this example is only used to calculate the marginal impact of a change in Differentiation.

- Brand equity has a predictable and meaningful impact on customer acquisition, retention, and profitability.

- The relationship stands even after controlling for a broad array of marketing activities, which impact CLV both directly and indirectly through brand equity.

- The components of brand equity exert different effects on acquisition, retention, and profit, suggesting that brand equity indeed is a multidimensional construct.

Our findings regarding the components ("pillars") of BAV brand equity – Knowledge, Relevance, Esteem, and Differentiation – are particularly interesting. We find: (1) Knowledge and Differentiation have positive main effects on all three components of CLV. (2) Relevance and Esteem have main effects on at least one of the three components of CLV. (3) There are interactions effects among the BAV brand equity pillars involving Relevance. For example, there is a positive interaction between Relevance and Esteem with respect to customer acquisition. This suggests that Esteem by itself does not woo customers – the product has to be relevant to customer needs in order to translate that respect into purchase and (4) Differentiation is a double-edged sword. As a brand becomes more differentiated, it increases profit margin, but experiences declines in acquisition and retention.

These findings demonstrate a link between the "soft" measures of the customer's attachment to the brand and the "hard" measures that comprise CLV. This means that the battle for the hearts and minds of customers is a meaningful one which has quantifiable ramifications for customer profitability. The results also show that brand equity is one useful indicator for the effectiveness of marketing instruments. Note however that brand equity only partially mediates the link between marketing activities and profitability. Accordingly, other drivers of success should also be considered.

The case of Charles Schwab shows how things can go wrong when brand and customer management are not sufficiently coordinated. At the beginning of this millennium the company emphasized customer management by launching a host of targeted direct marketing campaigns. "Schwab's marketing emphasis had been on creating direct mail and e-mail campaigns [. . .] with

minimal and inconsistent investments in corporate brand advertising." (Quelch and Winig 2007, p. 4). During this period, the BAV brand equity pillars showed a precipitous decrease (Ibid, p. 15), and profitability suffered. This led the company to develop the "Talk to Chuck" advertising campaign, clearly focused on mindset brand equity.

In terms of limitations, while our database consisting of 10 years of data on the widely utilized BAV model of mind-set brand equity is one of the strengths of this research, we acknowledge that BAV is subject to limitations. It is one of several models of brand equity. While Knowledge, Relevance, Esteem and Differentiation can be linked to brand equity, other models conceptualize different elements (see Lehmann, Keller and Farley 2008). Furthermore, two elements, Relevance and Knowledge, are measured with single items. This raises the question of whether these measures correspond perfectly to the concepts they aspire to capture. This may explain why we were not able to detect significant effects for some of the relationships of our model (e.g., effect of Relevance on retention). It would be desirable if future research reached agreement on how to measure mind-set brand equity and developed improved multi-item measures.

Furthermore, our data were tinged with multicollinearity, and our statistical models used fixed effects. Because this much "control" can wipe out statistical relationships, the fact that we still obtained statistically and managerially significant results is encouraging. Several robustness checks, such as redoing our analysis with random subsamples as well as for luxury versus non-luxury brands, found our results to be reliable, in particular regarding the effect of brand equity.

Because we measured the impact of brand equity on the components of CLV, we could calculate the impact on CLV. To this end, we used the Markov migration model of CLV, which allows customers to switch in and out of a brand over time. We demonstrated using reasonable scenarios how changes in marketing activity would change brand equity, which in turn would change acquisition, retention, and profitability. We also showed that exogenously caused changes in brand equity could affect CLV in meaningful ways.

While marketing actions served primarily as control variables in our study, results involving them are interesting. Foremost would be the power of "market presence", the ubiquity of the brand as measured by product line breadth and distribution (operationalized by number of models and dealers in the automobile market). Market presence has a direct impact on the components of CLV, but also a strong indirect impact through its influence on Knowledge. In fact we found that market presence and advertising acted as substitutes (had a negative interaction) in their impact on acquisition and retention.

Note, some companies in our dataset sell multiple brands (e.g., Toyota sells both Lexus and Toyota products). Our level of analysis is at the brand not the firm level,which is appropriate for understanding the dollar value of brand equity in more detail. Furthermore, it directly addresses brand managers who are in charge of individual profit centers. From a corporate level perspective, however, Toyota may consider customers switching from Toyota to Lexus as upselling, i.e., retention. To investigate the robustness of our results, we recoded all within-firm transitions as retentions as opposed to acquisitions. When we did this, we obtained similar results regarding statistical significance and relative effect sizes, suggesting that our findings are valid for corporate as well as brand level management.

Our work has several important managerial implications. First, the management of brand equity and customer lifetime value should be coordinated. For example, the customer manager unaware that brand management is increasing differentiation of the product line could set unrealistically high acquisition and retention goals, not realizing that differentiation will make these goals more difficult to achieve. Second, relatively simple regression models such as illustrated in this paper can be used to predict, for a given brand, the impact of changes in marketing on brand equity, and in turn how these changes affect customer lifetime value. This can be used to calculate an ROI of marketing that incorporates its impact on brand equity as well as on the "bottom line" represented by CLV. Third, among the BAV pillars, Knowledge, i.e., familiarity with the brand, is particularly important for achieving high acquisition and retention rates. The best way to build Knowledge is through increased market presence. Fourth, advertisers

need to be mindful of the double-edged sword of the differentiation that can be created by advertising. This differentiation can decrease acquisition and retention rates while increasing profit margins.

While our work benefited from an exceptional database, it still begs for replication and extension. We examined an important industry (automobiles); clearly the field needs to generalize beyond this. In particular, other industries such as consumer durables, services or consumables differ with regard to usage, interpurchase times and price levels which could lead to different effects. Higher uncertainty due to longer planning horizons could increase the effect of brand equity while importance of the buying decisions and high average price levels could shift attention towards objective product attributes, decreasing the effect of brand equity. Furthermore, we do not account for strategic resources of individual corporations. Implicitly, we have assumed these to be constant while other factors of our models change, which is appropriate for the typical planning horizon in operational marketing. However, to fully capture long-term effects, it would be interesting to capture the effects of marketing actions on strategic resources, which may in turn impact on CLV. For example, Montgomery and Wernerfelt (1988) found that more diversified and generalist firms performed worse in terms of Tobin's q. Similarly, market presence (reflecting product range) may be related to over-diversification, weaker learning, or poorer market perceptions and lead to long-term effects on ROI even lower than the ones we observe in Scenario 2. Further research is needed to quantify this potential effect.

We utilized one particular well known measure of brand equity, BAV. While BAV is widely used in practice and has been the subject of academic research, future work should examine different measures. In addition, our work is at the aggregate product/year level. Further work is needed to examine these relationships at the customer level to better understand the process behind the results. As noted earlier, our data are derived from purchases when there were trade-ins, future research should utilize data that include non-trade-in purchases. Note also we have not captured the financial benefit of acquiring cohorts of new customers (for example, new drivers), which depends on brand equity. Finally, the CLV calculations do not capture word-of-

mouth effects (which are only indirectly represented by market presence and the four BAV pillars) nor the profits from service (of major importance to dealers as well as a profit source to the manufacturer for parts sold to dealers). We hope this paper encourages work in these and related directions.

Overall, our work suggests that firms should not choose between "brand management" and "customer management." The notion that brand managers are in one corner, working with ad agencies to win hearts and minds, while the customer/CRM managers are in another corner, designing direct marketing campaigns for acquisition and retention, is outdated. The two need to work together, because brand equity and CLV work together. Thus we hope our work impacts how firms are organized and managed at a strategic as well as tactical level.

REFERENCES

Aaker, David A. (1996), "Measuring Brand Equity Across Products and Markets," *California Management Review*, 38(3), 102-20.

------ (2004), *Brand Portfolio Strategy*. New York: The Free Press.

------ (2011) *Brand Relevance: Making Competitors Irrelevant*, John Wiley and Sons, San Francisco, CA.

------ and Robert Jacobson (1994), "The Financial Information Content of Perceived Quality," *Journal of Marketing Research*, 31(2), 191-201.

------ and ------ (2001), "The Value Relevance of Brand Attitude in High-Technology Markets,"

Journal of Marketing Research, 38(4), 485-93.

Aaker, Jennifer, Susan Fournier, and S. Adam Brasel (2004), "When Good Brands Do Bad," *Journal of Consumer Research*, 31(1), 1-16.

Agres, Stuart J. and Tony M. Dubitsky (1996), "Changing Needs for Brands," *Journal of Advertising Research*, 36(1), 21–30.

Ailawadi, Kusum L., Donald R. Lehmann, and Scott A. Neslin (2003), "Revenue Premium as an Outcome Measure of Brand Equity," *Journal of Marketing*, 67(4), 1-17.

Ajzen, Icek and Martin Fishbein (1980), *Understanding Attitudes and Predicting Social Behavior*. Englewood Cliffs, NJ: Prenctice-Hall.

Alba, Joseph and Wesley J. Hutchinson (1987), "Dimensions of Consumer Expertise," *Journal of Consumer Research*, 13(4), 411-54.

Allenby, Greg M. and Peter E. Rossi (1991), "Quality Perceptions and Asymmetric Switching Between Brands," *Marketing Science*, 10(2), 185-204.

Ataman, Berk M., Herald J. van Heerde, and Carl F. Mela (2009), "The Long-term Effect of Marketing Strategy on Brand Sales," Working paper.

Berger, Paul D. and Nada I. Nasr (1998), "Customer Lifetime Value: Marketing Models and Applications," *Journal of Interactive Marketing*, 12(1), 17–30.

Blattberg, Robert C., Byung-Do Kim, and Scott A. Neslin (2008), *Database Marketing: Analyzing and Managing Customers*. New York: Springer.

Blattberg, Robert C., Edward C. Malthouse, and Scott A. Neslin (2009), "Customer Lifetime Value: Empirical Generalizations and Some Conceptual Questions," *Journal of Interactive Marketing*, 23 (2), 157-168.

Blattberg, Robert C. and Kenneth J. Wisniewski (1989), "Price-Induces Patterns of Competition," *Marketing Science*, 8 (3), 291-309.

Boulding, William, Eunkyu Lee, and Richard Staelin (1994), "Mastering the mix: Do advertising, promotion, and sales force activities lead to differentiation?," *Journal of Marketing Research*, 31(1), 159-72.

Bucklin, Randolph E., S. Siddarth, and Jorge M. Silva-Risso (2008), "Distribution Intensity and New Car Choice," *Journal of Marketing Research*, 45(4), 473-86.

Carpenter, Gregory S. and Kent Nakamoto (1989), "Consumer Preference Formation and Pioneering Advantage," *Journal of Marketing Research*, 26(3), 285-98.

Chaudhuri, Arjun and Morris B. Holbrook (2001), "The Chain of Effects from Brand Trust and Brand Affect to Brand Performance: The Role of Brand Loyalty," *Journal of Marketing*, 65(2), 81-93.

Cooper, Lee G. and Masao Nakanishi (1988), *Market Share Analysis: Evaluating Competitive Marketing Effectiveness.* Boston: Kluwer Academic Publishers.

Day, George S. and Robin Wensley (1988), "Assessing Advantage: A Framework for Diagnosing Competitive Superiority," *Journal of Marketing*, 52(1), 1-20.

Durbin, J. (1954), "Errors in Variables," *Review of the International Statistical Institute*, 22(1), 23-32.

Dwyer, F. Robert (1989), "Customer Lifetime Valuation to Support Marketing Decision Making," *Journal of Direct Marketing*, 3(4), 8-15.

East, Robert (1997), *Consumer Behaviour: Advances and Applications in Marketing*, Hemel Hempstead, Hertford shire, UK: Prentice Hall.

Engel, James F., Roger D. Blackwell, and Paul W. Miniard (1995), *Consumer Behavior*. Eighth Edition, Fort Worth, TX: The Dryden Press.

Farley, John U. and L. Winston Ring (1970), "An Empirical Test of the Howard-Sheth Model of Buyer Behavior," *Journal of Marketing Research*, 7(November), 427-438.

Farley, John U., John A. Howard and Donald R. Lehmann (1976), "A 'Working Version' Car Buyer Behavior Model," *Management Science*, 23(3), 235-247.

Farris, Paul W., Neil T. Bendle, Phillip E. Pfeifer, and David Reibstein (2006), *Marketing Metrics*: 50+ *Metrics Every Executive Should Master*. Upper Saddle River, NJ: Wharton School Publishing.

Fournier, Susan (1998), "Consumers and Their Brands: Developing Relationship Theory in Consumer Research," *Journal of Consumer Research*, 24(4), 343-73.

Gatignon, Hubert (1984), "Competition as a Moderator of the Effect of Advertising on Sales," *Journal of Marketing Research*, 21(4), 387-98.

Gupta, Sunil and Donald R. Lehmann (2005), *Managing Customers as Investments*, Philadelphia, Wharton School of Publishing.

Gupta, Sunil, Donald R. Lehmann, and Jennifer Ames Stuart (2004), "Valuing Customers," *Journal of Marketing Research*, 41(1), 7-18.

Hardie, Bruce G., Eric J. Johnson and Peter S. Fader (1993), "Modeling Loss Aversion and Reference Dependence Effects on Brand Choice," *Marketing Science*, 12(4), 378-394.

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

Hogan, John E., Donald R. Lehmann, Maria Merino, Rajendra K. Srivastave, Jacquelyn S. Thomas, and Peter C. Verhoef (2002), "Linking Customer Assets to Financial Performance," *Journal of Service Research*, 5(1), August, 26-38.

------, Katherine M. Lemon, and Barak Labai (2003), "What is the True Value of a Lost Customer?," *Journal of Service Research*, 5(3), 196-208.

Howard, John A. and Jagdish N. Sheth (1969), *The Theory of Buyer Behavior.* NY: John Wiley.

Hyatt, David F. (2001), "Franchise Laws in the Age of the Internet", White Paper. NADA Public Affairs.

Jie, Du, Xie Lili, and Stephan Schroeder (2009), "PIN Optimal Distribution of Auction Vehicles System: Applying Price Forecasting, Elasticity Estimation, and Genetic Algorithms to Used-Vehicle Distribution," *Marketing Science*, 28(4), 637-44.

Kamakura, Wagner A. and Gary J. Russel (1993), "Measuring Brand Value with Scanner Data," *International Journal of Research in Marketing*, 10(1), 9-22.

Kanetkar, Vinay, Charles B. Weinberg, and Doyle L. Weiss (1992), "Price Sensitivity and Television Advertising Exposures: Some Empirical Findings," *Marketing Science*, 11(4), 359-472.

Keller, Kevin L. and Donald R. Lehmann (2003), "How do Brands Create Value", *Marketing Management*, 12, May-June, 26-31.

Keller, Kevin L. (1993), "Conceptualizing, Measuring, Managing Customer-Based Brand Equity," *Journal of Marketing*, 57(1), 1-22.

Keller, Kevin L. (2008), *Strategic Brand Management.* 3rd. Ed. Englewood Cliffs, NJ: Prentice Hall.

------ and Donald R. Lehmann (2003), "The Brand Value Chain: Optimizing Strategic and Financial Brand Performance," *Marketing Management,* 12(3), 26-31.

------ and ------ (2006), "Brands and Branding: Research Findings and Future Priorities," *Marketing Science,* 25(6), 740-59.

Kerin, Roger A. and Raj Sethuraman (1998), "Exploring the Brand Value-Shareholder Value Nexus for Customer Goods Companies," *Journal of the Academy of Marketing Science*, 26 (14), 260-73.

Khan, Romana, Michael Lewis, and Vishal Singh (2009), "Dynamic Customer Management and the Value of One-to-One Marketing," *Marketing Science*, 28(6), 1063-79.

Kotler, Philip, and Kevin L. Keller (2009), *Marketing Management*, 13th Edition, Upper Saddle River, NJ: Pearson Education Inc.

Landwehr, Jan R., Aparna A. Labroo and Andreas Herrmann (2011), "Gut Liking for the Ordinary: Incorporating Design Fluency Improves Automobile Sales Forecasts," *Marketing Science*, 30(3), 416-429.

Lapersonne, Eric, Gilles Laurent, and Jean-Jacques Le Goff (1995), "Consideration Sets of Size One: An Empirical Investigation of Automobile Purchases," *International Journal of Research in Marketing*, 12(1), 55–66.

Lavidge, Robert J. and Gary A. Steiner (1961), "A Model for Predictive Measurements of Advertising Effectiveness," *Journal of Marketing* 25(October), 59-62.

Lehmann, Donald R., Kevin L. Keller, and John U. Farley (2008), "The Structure of Survey-Based Brand Metrics," *Journal of International Marketing*, 16(4), 29-56.

------ and David J. Reibstein (2006), *Marketing Metrics and Financial Performance*, Marketing Science Institute Monograph.

Leone, Robert P., Vithala R. Rao, Kevin L. Keller, Anita M. Luo, Leigh McAlister, and Rajendra Srivastava (2006), "Linking Brand Equity to Customer Equity," *Journal of Service Research*, 9(2), 125–38.

Levav, Jonathan and Dan Ariely (2000), "Sequential Variety-Seeking in Group Settings: Taking the Road Less Traveled and Less Enjoyed," *Journal of Consumer Research*, 27(3), 279-90.

Lodish, Leonard M., Magid Abraham, Stuart Kalmenson, Jeanne Livelsberger, Beth Lubetkin, Bruce Richardson, and Mary E. Stevens (1995), "How T.V. Advertising Works: A Meta-Analysis of 389 Real World Split Cable T.V. Advertising Experiments," *Journal of Marketing Research*, 32(2), 125-39.

MacKenzie, Scott B. (1986), "The Role of Attention in Mediating the Effect of Advertising on Attribute Importance," *Journal of Consumer Research*, 13(2), 174-195.

Madden, Thomas J., Frank Fehle, and Susan Fournier (2006), "Brands Matter: An Empirical Demonstration of the Creation of Shareholder Value Through Branding," *Journal of the Academy of Marketing Science*, 34(2) 224-35.

Mahajan, Vijay, Vithala R. Rao and Rajendra K. Srivastava (1994), "An Approach to Assess the Importance of Brand Equity in Acquisition Decisions," *Journal of Product Innovation Management,* 11(3), 221-235.

Meurer, Michael and Dale Stahl (1994), "Informative Advertising and Product Match," *International Journal of Industrial Organization*, 12(1), 1-19.

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

Montgomery, Cynthia A. and Birger Wernerfelt (1988), "Diversification, Ricardian Rents, and Tobin's q," *The RAND Journal of Economics*, 19 (4), 246-50.

Mulhern, Francis J. (1999), "Customer Profitability Analysis: Measurement, Concentration, and Research Directions," *Journal of Interactive Marketing*, 13 (1), 25-40.

Nelson, Phillip (1974), "Advertising as Information," *Journal of Political Economy*, 82(4), 729-54.

Neslin, Scott A., Caroline Henderson, and John Quelch (1985), "Consumer Promotions and the Acceleration of Product Purchases," *Marketing Science*, 4(2), 147-66.

Park, Chan S. and V. Srinivasan (1994), "A Survey-Based Method for Measuring and Understanding Brand Equity and its Extendability," *Journal of Marketing Research*, 31(2), 271-88.

Park, Whan C., Bernard J. Jaworski, and Deborah J. MacInnis (1986), "Strategic Brand Concept-Image Management," *Journal of Marketing*, 50(4), 135-45.

Pauwels, Koen, Jorge Silva-Risso, Shuba Srinivasan and Dominique M. Hanssens (2004), "New Products, Sales Promotions, and Firm Value: The Case of the Automobile Industry," *Journal of Marketing*, 68(4), 142-56.

Peppers, Don and Martha Rogers (2004), *Managing Customer Relationships*. Hoboken, NJ: John Wiley & Sons.

Pfeifer, Phillip E. and Robert L. Carraway (2000), "Modelling Customer Relationships as Markov Chains," *Journal of Interactive Marketing*, 14(2), 43–55.

Preacher, Kristopher J. and Andrew F. Hayes (2008), "Asymptotic and Resampling Strategies for Assessing and Comparing Indirect Effects in Multiple Mediator Models," *Behavioral Research Methods*, 40(3), 879-891.

Punj, Girish and Richard Brookes (2002), "The Influence of Pre-Decisional Constraints on Information Search and Consideration Set Formation in New Automobile Purchases," *International Journal of Research in Marketing*, 19(4), 383-401.

Quelch, John A. and Laura Winig (2007), "Charles Schwab & Co., Inc.: The 'Talk to Chuck' Advertising Campaign," *Harvard Business School Case* (Case 9-507-005), January 2007.

Ratner, Rebecca K. and Barbara E. Kahn (2002), "The Impact of Private versus Public Consumption on Variety-Seeking Behavior," *Journal of Consumer Research*, 29(2), 246-57.

Reed, Peter W., and Michael T. Ewing (2004), "How Advertising Works: Alternative Situational and Attitudinal Explanations," *Marketing Theory*, 4 (1/2), 91-112.

Reibstein, David, Donald R. Lehmann (2006), *Marketing Metrics and Financial Performance*. Cambridge, MA: Marketing Science Institute.

Romaniuk, Jenni, Byron Sharp, and Andrew Ehrenberg (2007), "Evidence Concerning the Importance of Perceived Brand Differentiation," *Australian Marketing Journal* 15 (2), 42-54.

Rust, Roland T., Varlarie A. Zeithaml, and Katherine N. Lemon (2000), *Driving Customer Equity: How Customer Lifetime Value Is Reshaping Corporate Strategy*. New York: The Free Press.

Rust, Roland T., Valeria A. Zeithaml, and Katherine N. Lemon (2004a), "Customer-Centered Brand Management," *Harvard Business Review*, 82(9), 110-1189.

Rust, Roland T., Katherine N. Lemon, and Varlarie A. Zeithaml (2004b), "Return on Marketing: Using Customer Equity to Focus Marketing Strategy," *Journal of Marketing*, 68(1), 109-27.

Scherer, Frederic M. and David Ross (1990), *Industrial Market Structures and Economic Performance*, Chicago: Houghton Mifflin.

Sethurman, Raj, Gerard J. Tellis, and Richard Briesch (2011), "How Well Does Advertising Work? Generalizations from a Meta-Analysis of Brand Advertising Elasticity, " *Journal of Marketing Research*, 48(3), 457–471.

Simon, Carol J. and Mary W. Sullivan (1993), "The Measurement and Determinants of Brand Equity: A Financial Approach," *Marketing Science*, 12(1), 28-52.

Slotegraaf, Rebecca J. and Koen Pauwels (2008), "The Impact of Brand Equity and Innovation on the Long-Term Effectiveness of Promotions," *Journal of Marketing Research*, 45(3), 293–306.

Srinivasan, Shuba and Dominique M. Hanssens (2009), "Marketing and Firm Value: Metrics, Methods, Findings and Future Directions," *Journal of Marketing Research,* 46(3), 293-31.

Srinivasan, Shuba, Marc Vanhuele, and Koen Pauwels (2010), "Mind-Set Metrics in Market Response Models: An Integrative Approach, " *Journal of Marketing Research*, 47(4), 672-84.

Srinivasan, V., Chan S. Park and Dae R. Chang (2005), "An Approach to the Measurement, Analysis, and Prediction of Brand Equity and Its Sources," *Management Science*, 51(9), 1433-48.

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

Sudhir, K. (2001), "Structural Analysis of Manufacturer Pricing in the Presence of a Strategic Retailer," *Marketing Science*, 20(3), 244-65.

Swait, Joffre, Erdem, Tulin, Louviere, Jordan, and Chris Dubelaar (1993), "The Equalization Price: A Consumer-Perceived Measure of Brand Equity," *International Journal of Research in Marketing*, 10(1), 23-45.

Urban, Glen L., and John R. Hauser (2004), "'Listening In' to Find and Explore New Combinations of Customer Needs," *Journal of Marketing*, 68(2), 72-87.

Venkatesan, Rajkumar and V. Kumar (2004), "A Customer Lifetime Value Framework for Customer Selection and Resource Allocation Strategy," *Journal of Marketing*, 68(4), 106-25.

Vilcassim, Naufel J., Vrinda Kadiyali, and Pradeep K. Chintagunta (1999), "Investigating Dynamic Multifirm Market Interactions in Price and Advertising," *Management Science*, 45(4), 499-518.

Winkielman, Piotr, Jasmin Halberstadt, Tedra Fazendeiro, and Steve Catty (2006), "Prototypes are Attractive Because they are Easy on the Mind," *Psychological Science*, 17(9), 799-806.

Wu, D. (1973), "Alternative Tests of Independence Between Stochastic Regressors and Disturbances," *Econometrica*, 41(4), 733-750.

Zhu, R., X. Chen, and S. Dasgupta (2008), "Can Trade-Ins Hurt You? Exploring the effect of trade-in value on consumers' willingness to pay for the new product," Journal of Marketing Research, 45(2), 159-170.

TABLES

Table 1: Migration Probabilities per Period

Period t	Period t+1		
	State 1: Own focal car, purchased it in period $t + 1$	**State 2: Own focal car, purchased it earlier than period $t + 1$**	**State 3: Own competitive car, purchased it in period $t + 1$ or earlier**
State 1: Own focal car, purchased it in period t	pS^*_{irt}	$1 - p$	$p(1 - S^*_{irt})$
State 2: Own focal car, purchased it earlier than period t	pS^*_{irt}	$1 - p$	$p(1 - S^*_{irt})$
State 3: Own competitive car, purchased it in period t or earlier	pS^*_{iat}	0	$1 - pS^*_{iat}$

Table 2: Drivers of the Components of Brand Equity (Equation 1)*

Brand Equity Pillars with Predictors Beneath	Stand. Coef.	t value
Differentiation (R^2 = .91)		
Advertising	.28	4.50
New Model Launches	-.00	-.01
Price Promotions	.00	.18
Market Presence	-.34	-3.36
Price	-.16	-1.61
Relevance (R^2 = .95)		
Advertising	.22	4.79
New Model Launches	.00	.03
Price Promotions	.01	.51
Market Presence	.40	5.30
Price	.02	.32
Esteem (R^2 = .96)		
Advertising	.21	4.86
New Model Launches	-.00	-.10
Price Promotions	-.01	-.73
Market Presence	.13	1.82
Price	-.02	-.23
Knowledge (R^2 = .95)		
Advertising	.03	.69
New Model Launches	-.00	-.30
Price Promotions	-.00	-.24
Market Presence	.51	7.07
Price	.04	.51

* Note: The values of the estimated fixed effects are not included in the table.

Table 3: Impact of Brand Equity on Customer Acquisition, Customer Retention (Equation 6) and Profit Margin (Equation 7)*

	Customer Acquisition		Customer Retention		Profit Margin	
	Stand. Coeff.	t value	Stand. Coeff.	t value	Stand. Coeff.	t value
Components of BE						
Differentiation	-.058	-2.16	-.127	-4.76	.36	5.97
Relevance	.089	1.94	-.028	-.61	.17	1.73
Esteem	-.035	-.72	.101	2.10	-.16	-1.52
Knowledge	.162	4.53	.349	9.76	.18	2.13
Marketing Activities						
Advertising	.099	3.45	.066	2.31	-.12	-1.74
New Model Launches	.009	.74	-.012	-1.05	-.01	-.56
Price Promotions	.042	3.62	.014	1.19	.01	.34
Market Presence	.288	4.79	.336	5.59	.32	2.69
Price	-.058	-1.50	-.014	-.35		
Intercept Acquisition/ Retention	.133	3.33	-.256	-6.39		
R^2	.95				.91	

* Note: The values of the estimated fixed effects are not shown in the table.

Table 4: Direct, Indirect and Total Effects of Marketing Activities and Brand Equity on the Components of CLV

CLV Component with Predictors Beneath	Advertising		New Model Launches		Price Promotions		Market Presence		Price	
	Stand. Coeff.	t value	Stand. Coeff.	t value	Stand. Coeff.	t value	Stand. Coeff.	t value	Stand. Coeff.	t value
Acquisition										
Direct Effect	.10	3.45	.01	.74	.04	3.62	.29	4.79	-.06	-1.50
Indirect Effect	-.01	-.03	.00	-.36	.00	.07	.13	4.69	.02	1.58
Total Effect	.08	2.49	.00	-.30	.04	3.30	.41	6.40	-.04	-2.04
Retention										
Direct Effect	.07	2.31	-.01	-1.05	.01	1.19	.34	5.59	-.01	-.35
Indirect Effect	-.01	-.54	-.00	-.56	-.00	-.89	.20	3.31	.03	1.07
Total Effect	.06	2.68	-.01	-1.08	.01	.81	.55	8.90	.03	1.08
Profit Margin										
Direct Effect	-.12	-1.74	-.01	-.56	.01	.34	.32	2.69		
Indirect Effect	.12	3.22	-.00	-.30	-.00	-.05	.02	.26		
Total Effect	.00	.00	-.02	-.66	.01	.29	.34	3.07		

Note: For ease of interpretation this table reports standardized coefficients. The text reports percentages of indirect to total effects, which were calculated, based on unstandardized coefficients. Direct Effects are from Table 3. Total effect refers to regression models including only marketing activities as independent variables.

Table 5: Drivers of the Components of Brand Equity (with interaction terms)*

Brand Equity Pillars with Predictors Beneath	Stand. Coef.	t value
Differentiation (R^2 = .91)		
Advertising	.28	4.50
New Model Launches	-.00	-.01
Price Promotions	.00	.18
Market Presence	-.34	-3.36
Price	-.16	-1.61
Relevance (R^2 = .95)		
Advertising	.19	2.95
New Model Launches	.00	.00
Price Promotions	.02	.98
Market Presence	.37	4.94
Price	-.12	-1.14
Advertising × New Model launches	-.01	-.36
Advertising × Price Promotions	.03	1.28
Advertising × Price	-.18	-3.00
Advertising × Market Presence	-.11	-1.81
New Model Launches × Price Promotions	-.00	-.03
New Model Launches × Price	-.01	-.72
New Model Launches × Market Presence	.01	.32
Price Promotions × Price	.04	2.07
Price Promotions × Market Presence	.03	1.13
Price × Market Presence	.05	.68
Esteem (R^2 = .96)		
Advertising	.14	2.48
New Model Launches	-.00	-.29
Price Promotions	.00	.00
Market Presence	.06	.85
Price	-.30	-1.22
Advertising × New Model launches	-.01	-.47
Advertising × Price Promotions	.01	.55
Advertising × Price	-.22	-4.11
Advertising × Market Presence	-.10	-1.91
New Model Launches × Price Promotions	-.01	-.65
New Model Launches × Price	-.00	-.11
New Model Launches × Market Presence	.01	.33
Price Promotions × Price	.08	4.78
Price Promotions × Market Presence	.05	2.47
Price × Market Presence	-.02	-.34
Knowledge (R^2 = .95)		
Advertising	.03	.69
New Model Launches	-.00	-.30
Price Promotions	-.00	-.24
Market Presence	.51	7.07
Price	.04	.51

* Note: The values of the estimated fixed effects are not included in the table.

Table 6: Impact of Brand Equity on Acquisition, Retention and Profit Margins (with interaction terms)*

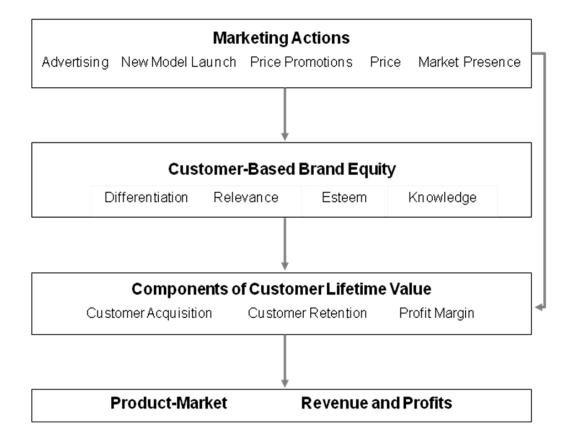|	Customer Acquisition		Customer Retention		Profit Margin	
	Stand. Coeff.	t value	Stand. Coeff.	t value	Stand. Coeff.	t value
Components of BE						
Differentiation	-.050	-1.78	-.145	-5.16	.340	5.49
Relevance	.068	1.46	-.039	-.85	.181	1.83
Esteem	-.043	-.82	.093	1.78	-.199	-1.49
Knowledge	.175	3.97	.358	8.15	.250	2.64
Relevance × Differentiation	-.052	-2.21	-.072	-3.07	-.097	-2.14
Relevance × Esteem	.086	2.77	.008	.25	-.084	-1.30
Relevance × Knowledge	-.014	-.31	-.010	-.22	.166	1.84
Marketing Activities						
Advertising	.183	4.56	.104	2.60	-.119	-1.72
Innovation	.013	1.03	-.008	-.69	-.009	-.40
Price Promotions	.027	2.26	.002	.14	.006	.25
Market Presence	.329	5.22	.336	5.33	.301	2.58
Price	.051	.95	.064	1.19		
Advertising × New Model launches	-.024	-1.05	-.029	-1.25		
Advertising × Price Promotions	-.025	-1.38	.003	.16		
Advertising × Price	.031	.76	-.028	-.69		
Advertising × Market Presence	-.168	-4.34	-.067	-1.72		
New Model Launches × Price Prom.	-.007	-.55	-.001	-.04		
New Model Launches × Price	.001	.09	-.013	-.98		
New Model Launches × Market Pres.	.012	.53	.026	1.15		
Price Promotions × Price	-.014	-1.09	.020	1.52		
Price Promotions × Market Presence	.027	1.55	.005	.27		
Price × Market Presence	.062	1.36	.145	3.17		
Intercept Acquisition/Retention	.167	4.11	-.237	-5.84		
R²			.96		.92	

* Note: The values of the estimated fixed effects are not shown in the table.

Table 7: Predicted Impact of Changes in Marketing and Brand Equity on CLV

Variable	Base Case	Scenario 1 Increased Ad Spending (+ .25 sd)	Scenario 2 Increased Market Presence (+ 1 Model)	Scenario 3 Increased Differentiation (Competitor = 3)
Marking Activities				
Advertising	41.24	**96.13**	41.24	41.24
New Model Launches	-.22	-.22	-.22	-.22
Price Promotions	-12,423	-12,423	-12,423	-12,423
Price	14,792	14,792	14,792	14,792
Market Presence	.38	.38	**.56**	**.38**
Brand Equity				
Differentiation	2.34	2.54	2.24	3
Relevance	.03	.01	.05	.03
Esteem	5.95	5.60	5.87	5.95
Knowledge	.55	.56	.58	.55
Components of CLV				
Acquisition	1.49%	1.58%	1.55%	1.47%
Retention	45.69%	45.82%	48.61%	44.32%
Net Profit	$19,643	$19,642	$19,880	$20,158
CLV	$29,036	$29,070	$29,846	$29,577
ROI*		$1.00	$0.78	N.A.

* ROI is the net dollar increase in CLV per dollar invested. For Scenario 1, the brand's 2008 advertising spending was $267,239,000. A .25 standard deviation increase amounts to a $54,897,500 advertising investment, or a 20% increase. The installed base of the brand owners in 2008 was 3,298,307, so the investment comes to $16.64 per customer. The ROI is then (($29,070-$29,036) - $16.64)/$16.64 = $1.04 (difference viz a viz the $1.00 number in the table is due to rounding). For Scenario 2, we drew on Urban and Hauser (2004, p. 72) to estimate the cost of an additional model in a product line is $1.5 billion. With an installed base of 3,298,307, this amounts to $455 per customer. The ROI is (($29,846-$29,036) - $455)/$455 = $0.78.

Figure 1: Conceptual Framework

APPENDIX

Table A1: Components of the Brand Asset Valuator Model

Components	Perceptual Metrics	Aggregate Measure
Differentiation[1]	1. Uniqueness	% responding "yes"
	2. Distinctiveness	% responding "yes"
	3. Differentiation	% responding "yes"
	4. Innovativeness	% responding "yes"
	5. Dynamics	% responding "yes"
Relevance	1. Relevant to me	Average score on 1-7 scale
Esteem[1]	1. Regard	Average score on 1-7 scale
	2. Leadership	% responding "yes"
	3. High Quality	% responding "yes"
	4. Reliability	% responding "yes"
Knowledge	1. Familiarity with the brand	Average score on 1-7 scale

[1] Values for components of brand equity are calculated as a formative index of all items