

TESTING BRAND VALUE MEASUREMENT METHODS IN A RANDOM COEFFICIENT MODELING FRAMEWORK

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Abstract: Our objective is to provide a framework for measuring brand equity, that is, the added value to the product endowed by the brand. Based on a demand and supply model, we propose a structural model that enables testing the structural effect of brand equity (demand side effect) on brand value (supply side effect), using Monte Carlo simulation. Our main research question is which of the three brand value measurement methods (price premium, revenue premium and profit premium) is more suitable from the perspective of the structural link between brand equity and brand value. Our model is based on recent developments in random coefficients model applications.

Keywords: random coefficients logit, brand equity, brand value

JEL classification: D58, L10, M30

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1. Introduction

The main objective of our research is which of the three brand value measurement methods, namely price premium, revenue premium or profit premium is more suitable from the perspective of the structural link between brand equity and brand value.

In the literature brand value is conceptualized in different ways, some measures it with price premium ((Randall et al. 1998, Aaker 1991, Sethuraman 2001) or revenue premium (Ailawadi et al. 2003) others use profit premium (Goldfarb et al. 2009). Acknowledging that all tree measures advantages and disadvantages we will analyze what is the most appropriate method of brand value conceptualization.

In order to distinguish between consumer-based brand equity and brand equity expressed in financial terms, the literature uses consumer-based brand equity (Keller 1993) instead of brand equity, the latter appears without a distinctive epithet referring to brand equity expressed in financial terms (Ailawadi et al. 2003) and in other cases is called brand value (Raggio and Leone 2006, Goldfarb et al. 2009).

We will use the following formulations: brand equity refers to the preference of consumers towards the brand; brand value refers to the financial performance of the measured brand, acknowledgeable to the brand equity.

Based on the former formulation we are interested in measuring correlation between brand equity and price, revenue and profit premium. These correlations cannot be computed directly, so we proceed by Monte Carlo simulations.

The greatest number of studies are concerned with brand equity measurement (Kamakura and Russel 1993, Erdem et al. 2006), there are smaller number of studies focusing on brand value estimation (Ailawadi et al. 2003, Simon and Sullivan 1993), and there are a only a few that are estimating both brand equity and brand value (Goldfarb et al. 2009). A great number of studies are based on survey based data (Yoo and Donthu

2000, Netemeyer et al. 2004, Erdem et al. 2006), others are using market level scanner data (Kamakura and Russel 1993, Ailawadi et al. 2003, Goldfarb et al. 2009). The rest of the paper is organized as follows.

2. Literature review

Brands stand out of the other marketing mix elements owing to the fact that they are capable of incorporating the positive effects of all marketing activities, and by this they become effective signals of quality for the experience and credence attributes (Erdem et al. 2006, Goldfarb et al. 2009).

In the brand equity literature Kamakura and Russel (1993) are the first to address the problem of brand valuation by using a random utility framework. The probability of choice is estimated in a multinomial logit model by using market level scanner data.

Brand value is modeled by the utility component intrinsic to the brand, which reflects consumer's perceptions and needs after controlling for price and advertising expenditure. Kamakura and Russel (1993) calculate brand value as indices; the values of measured brands are scaled to sum up to zero..

Kamakura and Russel (1993) proposed brand intercept as a brand equity measure. Sriram et al (2007) based on recent methodological advances (Berry et al. 1995) tested this measurement method using store level data on toothpaste and dish detergents. They found that the brand intercept effectively captures high equity of measured popular brands. They also validated brand intercept as a brand equity measure by analyzing its correlation with other brand equity measures (price premium, sales premium, revenue premium) finding in every case positive correlations.

Ferjani et al. (2009) built a conjoint based brand-attribute interaction model, and tested its fit while analyzing five other specifications. They found strong evidence for the empirical superiority of the brand-attribute interaction model, and the Kamakura and Russel (1993) model specification performed second best in this comparison.

The Goldfarb et al. (2009) model can be considered one big step forward in brand equity measurement. In contrast to Ailawadi et al. (2003) Goldfarb et al. (2009) calculates the difference between equilibrium profit earned by the brand and the profit equilibrium in a counterfactual situation where the brand enters the estimation without its experiential attributes.

The Goldfarb et al. (2009) model measures brand effect on both demand (brand equity) and supply side (brand value). The positive brand effect on consumers (demand side effect) is defined as brand equity, and the positive effect of brand on the financial performance (supply side effect) is defined as brand value (operationalized as profit premium).

3. Proposed structural model of brand equity

We build a random logit model based on previous empirical findings (Kamakura and Russel 1993, Goldfarb et al. 2009) and methodological advancement (Berry et al. 1995). We propose a model that will account for both demand and supply side effects of brands measured. The estimation will be realized by using the semiparametric maximum likelihood estimator which holds some important advantages over previous estimation methods.

"The productivity of brand assets comes from both the demand and supply sides." Goldfarb et al. (2009).

3.1 Demand side effects - Brand equity

A brand, through indicating quality, decreases the time for consumer decision, particularly when a consumer has no knowledge of the product category (Pashigian and Bowen 1994, Tsao et al. 2006, Ramello 2006). Consumers possess an image of product attributes based on previous experiences or marketing communication activities, and they, when recognizing a certain brand, are able to make a quick decision whether to purchase a particular product or not.

The demand side effect of the brand was operationalized in the economic theory based literature as the brand preference measured with the intercept term in the utility function (Kamakura and Russel 1993). Jedidi et al. (1999) captures the main effects of advertising and promotions on brand intercepts interpreted as brand equity. Brand preference is also extracted from brand intercept in the random utility of the multinomial logit in Chintagunta (1994). In Chintagunta et al. (2005) and Aribarg and Arora (2008) intrinsic brand value is also measured with the intercept term of the utility function. In Goldfarb et al. (2009) brand equity is conceptualized as the unobserved component of utility of products.

Consumer i 's direct utility from buying product $j \in \mathcal{G}_f$, where \mathcal{G}_f is the set of products produced by firm f , is:

$$u_{ij} = \beta_f + \beta_i x_j - \alpha_i p_j + y_f \eta_i + \delta_i M_j + \xi_j + \varepsilon_{ij} \quad (1)$$

where β_f is a parameter common to all products of firm f (we assume that all products of firm f have the same brand name), x_j is the $1 \times K$ -dimensional row vector of search attributes of product j whose first component is 1 for intercept, p_j is the unit price of product j , y_f and M_j are vectors of experience attributes and marketing activities (advertising expenditure, promotion, innovation, guaranty period), respectively, ξ_j is the brand specific unknown (to the econometrician) product characteristic not expressed by the other attributes (e.g., demand shocks, but also loyalty or support for regional products, etc.), ε_{ij} is an iid type extreme value distributed error term.

In the market consumers can choose from J products and the outside alternative, which represents the option of not purchasing any of the J products, and is assumed to yield utility:

$$u_{i0} = \varepsilon_{i0} \quad (2)$$

Building on empirical research based on Kamakura and Russel (1993), more specifically on Goldfarb et al. (2009) we define brand equity as brand preference accountable for experience attributes. The brand equity of brand f is $be_f = y_f \eta$ (that is we omit the random part).

The aggregate market share of brand j can be obtained by the following equation:

$$s_{ij} = \int \frac{\exp(\lambda_{ij})}{1 + \sum_{j=1}^J \exp(\lambda_{ij})} f(v) d(v) \quad (3)$$

where

$$\lambda_{ij} = \beta_f + \beta_i x_j - \alpha_i p_j + y_f \eta_i + \delta_i M_j + \xi_j \quad (4)$$

3.2 Supply side effects – Brand value

A company's protection against competitive attacks increases as the more differentiated brands result in lower price elasticity (Boulding et al. 1994). The company that is more protected against competitive attacks (Srivastava and Shocker 1991) can apply premium

pricing (Farquhar 1998), and can achieve a more successful brand extension (Keller 2003). Simon and Sullivan (1993) confirmed that stock exchange evolution contains information referring to brand equity as well. There is also a positive relationship between new products and stock return, which is a strong relationship only when a company has introduced a great number of newly developed products into the market (Chaney et al. 1991). Companies of high brand equity can expect a significant market share increase if they cut prices, while their share decrease would be insignificant if they increased their prices (Ailawadi et al. 2003).

According to the widely accepted (Keller 1993) definition measurement of brand equity presupposes a comparison between the measured brand and a base brand or a factual and a counterfactual (Goldfarb et al. 2009). Different solutions were offered: private label (Ailawadi et al. 2003), fictive brand (Ferjani 2009), the brand with the smallest market share. Following Goldfarb et al. (2009) we define the counterfactual as a brand shorn of its experience attributes. Goldfarb et al. (2009) presume, that a brand name is valuable only because it can signal products' experience attributes, while search attributes can be always verified by the consumer.

The utility function of the counterfactual is reduced to the following form:

$$u_{ij} = \beta_f + \beta_i x_j - \alpha_i p_j + \delta_i M_j + \xi_j + \varepsilon_{ij} \quad (5)$$

Brand value will be computed through counterfactuals in the following three forms: price premium, revenue premium, profit premium.

In order to estimate price premium we compute equilibrium prices p_j , counterfactual equilibrium prices p_j^c and subtract the average of the latter from the average of the former. For a brand f price premium is equal to:

$$pp_f = \frac{1}{J_f} \sum_{j \in G_f} (p_j - p_j^c) \quad (6)$$

The price vector P_f of each firm f are determined as the Nash equilibrium in the pricing game where the profit of firm f is

$$\Pi_f (P_f, P_{-f}) = \sum_{j \in G_f} (p_j - c_j) s_j \quad (7)$$

where c_j is the marginal cost of producing brand j .

To estimate revenue premium we compute equilibrium revenues, counterfactual revenues and subtract the latter from the former. In the case of brand f revenue premium is:

$$rp_f = \sum_{j \in G_f} (p_j s_j - p_j^c s_j^c) \quad (8)$$

Profit premium for brand f is equal to:

$$pr_f = \sum_{j \in G_f} ([p_j - c_j] s_j - [p_j^c - c_j^c] s_j^c) \quad (9)$$

4. Analysis

As brand value is defined as the financial performance of the brand attributable to the brand equity (Goldfarb et al. 2009, Sun 2012) we hypothesize that the most suitable brand value measure is that is strongly correlated with brand equity.

We simulate the market nr (=1000) times by drawing the characteristics each time from the specified distributions. We do the computations in each case and obtain nr values for all these quantities for each brand. We compute the correlations by the correlation coefficients over the nr repetitions.

In the following table we present the estimated correlation coefficients between brand equity and the different brand value measures. We simulate three different markets. In the first case there are many small firms on the market with a variable number of products (1), in the second case there are few large firms with a variable number of products (2), and in the last case there is a large number of firms with only one product on the market (3). Every firm is present on the market with one brand and with different product (or subbrands).

Table 4. Correlation between brand equity and brand value measures

			Price premium	Revenue premium	Profit premium
(1)	Many small firms	BE	0.568	0.151	0.102
(2)	Few large firms	BE	0.492	0.232	0.170
(3)	Large number of firms, one product	BE	0.996	-0.231	-0.297

5. Conclusions

From the three brand value measures price premium is more strongly correlated to brand equity than other measures. The relations gets stronger as the firms has a smaller number of products. One explanation could be that brand equity is measured at the level of the firm and its effect is stronger in the presence of only one product, and its effect is diluted in the case of a larger number of products.

In the third case (3) revenue premium and profit premium are negatively correlated. The explanation could be that on a market where every firm compete with only one brand investments in brand equity development will result in reduced revenue and profit. Important to mention that negative correlation signals only reduced revenue or profit premium.

We conclude that from the perspective of the structural link between brand equity and brand value price premium is the most suitable measure of brand value. That is price premium represents better the value added of the brand on the demand side.

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