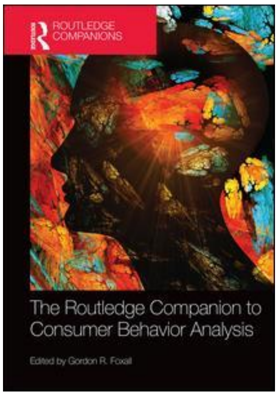

The Routledge Companion to Consumer Behavior Analysis

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Essential value in the Behavioral Perspective Model

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Essential value in the Behavioral Perspective Model

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Introduction

Essential value is a novel measurement of the value of reinforcers, first defined by Hursh and Silberberg (2008) in an exponential model. It measures a fixed rate of behavioral change relative to the change of cost paid to attain a reinforcer. As the given percentage of cost went up, the lower the fixed rate of behavioral change, the higher value of reinforcers, and thus the higher was essential value. This measurement is more advanced than other measurements of the strength of reinforcement, and has been documented empirically by experimental data based on animal food consumption, human drug usage and human economic consumption (Hursh & Silberberg, 2008; Christensen et al., 2008a; Christensen et al., 2008b; Christensen et al., 2009; Yan et al., 2012a, 2012b). Understanding this advanced measurement of the value of reinforcers is important for the Behavioral Perspective Model (BPM) (Foxall, 1990/2004), since essential value not only measures the value of reinforcers but also indicates the demand response sensitivity pattern by comparing the value of reinforcers across different behavioral settings (open vs. closed), different types of reinforcement (utilitarian and informational), and brand groups.

What is essential value?

Essential value and economic demand

Learning theorists have realized the usefulness of microeconomics in scaling reinforcer value (Allison, 1983; Hursh, 1980; Hursh, 1984; Lea, 1978). Demand analysis, which evaluates the strength of reinforcers, has achieved considerable reliability across different essential commodities (Bauman et al., 1996; Foster et al., 2009; Foxall & Greenley, 2000; Foxall et al., 2004; Hursh, 1980; Hursh, 1984; Madden et al., 2007; Tsunematsu, 2000) and inessential commodities (Gunnarsson et al., 2000; Harris et al., 1999; Hursh, 1991; Hursh & Winger, 1995; Jacobs & Bickel, 1999; Johnson & Bickel, 2006; Rowlett, 2000). For example, Hursh (1978) argued that animal subjects working for food and water can demonstrate a behavioral model affected by price and consumption.

Several demand models are examined using experimental laboratory methods and they have successfully been applied to non-human data (primarily rats and pigeons) (Burke et al., 2008; Christensen et al., 2008a; Christensen et al., 2008b; Christensen et al., 2009; Dean et al., 2007;

Foster et al., 2009; Greenwald & Hursh, 2006; Hienz et al., 2008; Hursh & Silberberg, 2008; Madden et al., 2007; Winger et al., 2002; Winger et al., 2006; Winger et al., 2007) and additional studies (i.e., drugs, alcohol) on human beings (Bickel et al., 1990; Bickel et al., 1991; Hursh, 1991; Vuchinich & Tucker, 1988). Recently, the traditional demand curve is also reported to have contributed to the assessment of reinforcer efficacy in human economic consumption data (Foxall et al., 2004; Oliveira-Castro et al., 2006; Oliveira-Castro et al., 2008b).

Demand analysis provides a number of advantages over alternative methods by offering a more straightforward measure (i.e., elasticity of demand) which indicates how sensitive the level of consumption is to changes in price. Demand analysis, like the microeconomic framework to which it belongs, also has the advantage of avoiding referencing hypothetical factors such as deprivation, value, strength or probability (Christensen et al., 2008a; Christensen et al., 2008b; Elsmore et al., 1980; Foster et al., 2009; Hursh, 1991; Jacobs & Bickel, 1999).

Nevertheless, demand analysis differs from the traditional operant methods in language, methods, and predictions. For example, the quantity of consumption of relative reinforcers is required to produce the demand curve. Although in many ways the use of demand analysis is more advantageous than traditional operant analysis, this measure has a significant drawback in that it can sometimes lead to misinterpretation of the data. The linear demand curve confronted several problems to accurately present the curvilinear line that often reflects the base structure of the real data. In this regard, behavioral economists have exploited many alternative functions to scale reinforcer values on the basis of the economics of the demand curve. Their efforts broaden the applicability of demand curve into consumer behavior analysis.

The development journey of essential value

Several attempts have been made to model the demand curve (Hursh & Winger, 1995; Hursh & Silberberg, 2008) to bridge the inter-discipline differences when applying economic demand theory to behavioral analysis. The development of essential value stems from the simplest measure of the elasticity demand curve equation (Equation 1), following the monotonic decreasing law and presenting two essential parameters (i.e., the intensity and elasticity of demand). Price elasticity is measured by fitting the data into log-linear function:

$$LogQ = b_0 + b_1 LogP \tag{1}$$

where Q equals the quantity of commodity/reinforcers consumed in experimental period, P is the price, b_0 is the intercept when price is at a minimum level, and b_1 is a single direct measure of elasticity (called E.C. in Figure 4b in Hursh, 1984).

Equation 1 is the elementary model that behavioral psychologists and behavioral economists have investigated. Based on this equation, numerous influential researchers have found that demand curve analyses can contribute to the assessment of reinforcer efficacy and, subsequently, the validation of preference assessments (e.g. Foxall et al., 2004; Hursh, 1980, 1984; Kagel et al., 1995). It is used to avoid reference to hypothetical factors in experiments, such as deprivation, value, strength, or probability.

Hursh (1984) pointed out that the crucial parameter α (in Figure 4b in Hursh, 1984), elasticity of demand, is determined by: the nature of the commodity, the species of consumer, availability of substitutes, and the degree of openness of the economic context. Foxall et al. (2004) extended the species of consumer from animals to humans and proved that elasticity of demand varies across different consumer groups. It is found that consumers who purchase predominantly intermediate-level brands show higher price responsiveness than those who purchase predominantly the least- and highest-differentiated brands. The traditional demand curve has also been used in analyzing between-group differences in interpreting consumers' brand choice behavior among brand groups differing in functional and symbolic benefits (Foxall et al., 2013).

Hursh (1980) identified four principles as the base for adopting economic measurement in "a more complete science of behavior." First, he believed that a behavioral experiment is an economic system and the contingencies (open/closed economy) can significantly shape the results. A closed economy refers to an optimal state when consumption achieves the equilibrium point of supply and demand. On the contrary, an open economy indicates that one or more experimental arrangements have been added between the consumption and the equilibrium conditions. Hence, animal experiments are analogous to a closed economy, and the subject's consumption is directly determined by the equilibrium of its demand within the environment's supply. Therefore, the economic demand theory is applicable for behavioral analysis.

Second, Hursh (1980) found that elasticity as a functional property is capable of distinguishing reinforcers. In closed economies reinforcers differ in elasticity since presentations of substitutable sources of supply are under control. In an open economy substitutable commodities affect the elasticity of demand, so demand tends to be more elastic for all commodities. Hence, the substitutable effects are applicable to behavioral analysis.

Third, the experimental results support the view that the demand interactions of reinforcers can be complementary or substitutable. Hence, an economic measurement is suitable for behavioral analysis since it is capable of presenting both a complementary and substitutable relationship between commodities.

Fourth, a simple choice rule (such as strict matching) is not able to explain all choice behavior. If interactions of choice behavior are shaped by its local contingencies, Herrnstein's single summed class (Herrnstein, 1970) cannot fulfill the requirement to predict the outcome of a choice among a variety of alternatives.

A considerable amount of experimental evidence supports the idea of applying consumer demand theory to behavioral analysis. The first behavioral-economic demand curve, Equation 2, has been found to be successfully fitted into experimental data to measure reinforcers' value.

Based on Equation 1, two behavioral-economic demand curves (Equations 2 and 3), examining the relationship between consumption and price/income effects, have been investigated for scaling the rate of decline of a demand curve. Hursh et al. (1988) represented the first behavioral-economic model to show elasticity changes as price increases, using a non-linear curve-fitting procedure (SAS Institute Inc., NLIN procedure):

$$LogQ = LogL + bLogP - aP \tag{2}$$

where Q denotes consumption, P refers to price, and L, b and a are fitted parameters. The value of L is the initial level of consumption obtained at the minimal price, the parameter b is the initial slope of the demand curve which is expected to approach zero, a is the rate of change in the slope of the demand curve across price changes, and elasticity is presented as $b - aP$. Several experiments have been based on this equation to measure the strength of a reinforcer or between reinforcers involving nonhumans and humans (Giordano et al., 2001; Hursh, 1991; Hursh & Winger, 1995; Jacobs & Bickel, 1999), showing a satisfactory predictive accuracy.

Although Equation 1 contains two basic parameters to determine a demand curve, the intercept of y-axis (intensity) and the slope of the curve (elasticity), Equation 2 delivers an additional message in that an imperceptibly small increase in price should leave consumption levels unchanged. It empirically fits the experimental data as the consumption levels are inelastic to the price change at the initial level (see Figure 2.3, Hursh et al., 1988; Figure 10.2, Hursh, 1980; Figure 7.2, Jacobs & Bickel, 1999; Figure 3.1, Foster et al., 2009). Hence, it has been verified that Equation 2 produces better predictive accuracy than Equation 1. However, Equation 2 suffers from modeling demand curves by means of two parameters, *a* and *b*, instead of one. To maintain the predictive adequacy and prediction of elasticity by a single parameter, Hursh and Silberberg (2008) tested a range of equations proposed by Allen (1962) and introduced the second behavioral-economic demand equation, Equation 3, which maintains Equation 1's advantage in terms of evaluating the elasticity of the demand curve by one parameter and retains the predictive adequacy of Equation 2:

$$LogQ = LogQ_0 + k(e^{-a_i P} - 1) \tag{3}$$

where variable *Q* is consumption, *Q0* refers to the maximum consumption at zero price, *k* indicates the range of the dependent variable in logarithmic units, and *P* denotes the cost of consumption. Minimum consumption is calculated as $LogQ_0 - k$, $-a$ is the rate of change in the exponential function.

A point that has to be addressed here is the normalization of unit price. Although all demand curves confirm the monotonic decreasing trend to present the relationship between price and consumption, behavioral economics does more than simply restate the demand law and it uses elasticity of demand to signify the measure of "hedonic scaling." In human consumer behavior analysis, price is mostly related to the monetary price or time/energy consumed to obtain the commodity.

By contrast, in experimental behavioral analysis, price can be considered to a large extent as being apart from monetary price (i.e., response requirement, delay, changes in the amount of the commodity while holding the price constant). For this reason, in most circumstances of animal experiments, price is the cost paid for making a commodity available. Hence, price, which is used in the behavioral analysis when applied to generating demand curves, requires the process of normalization (Hursh, 1991; Hursh & Winger, 1995, Greenwald & Hursh, 2006; Hursh & Silberberg, 2008).

Accordingly, Equation 3 has been modified into Equation 4 by normalizing demand:

$$LogQ = LogQ_0 + k(e^{-aQ_0 C} - 1) \tag{4}$$

where variable *C* is the varying cost of the reinforcers. Hursh and Silberberg (2008) show that a is a single parameter that determines the slope of the demand curve. More importantly, a is capable of representing the essential value of a reinforcer. This equation has been tested in a range of closed settings with hens, pigeons, and rats (Christensen et al., 2008a; Christensen et al., 2008b; Christensen et al., 2009; Foster et al., 2009; Hursh & Silberberg, 2008). Foster et al. (2009) examined different behavioral-economic models (all proposed and defined by Hursh and Silberberg, 2008) for what they describe as "qualitatively different" reinforcers, meaning alternative formulations of cereal-based feedstuffs for hens. Hursh and Silberberg (2008) employed data for rats choosing different levels of food and drugs collected by Hursh in 1984 and 1988, and data from Elsmore et al. (1980) for baboons choosing from cocaine and food. Christensen et al. (2008a, 2008b, 2009) investigated food versus cocaine consumption in rats.

Although both behavioral-economic models succeeded in incorporating price effects and, therefore, established a ground for scaling reinforcer value, researchers have not yet absolutely agreed on the success of both equations. Foster et al. (2009) fitted both equations to the experimental data gathered from the same group of hens and found discrepant results. They argued that normalizing consumption and price applied in both equations had been advantageous in terms of concurrent schedule preference, but doubted the internal validity of Equation 4. They pointed out that *a* values vary significantly even within the same product due to selecting different values for *k*.

Furthermore, the less preferred foods were found to have the highest essential value, which is contradictory to the expectation that the less preferred foods have lower essential values. Nevertheless, Foster et al. (2009) defended it because the preferences of hens may change when price (i.e., how hard hens work for food) changes. Therefore, Foster et al. (2009) prefer Equation 2 to Equation 4 in terms of explaining preferences behavior in the laboratory setting. Moreover, Foster et al.'s (2009) contradictory findings inspire us to wonder, apart from price, whether additional attributes of reinforcers interfere with the quantity of consumption, even if differences are small (i.e., wheat, puffed wheat, honey puffed wheat).

Evaluation of demand curves

Given the presence of the traditional demand curve (Equation 1), three behavioral-economic demand curves (Equations 2–4), and alternative demand curves reported in a prior study (Allen, 1935), a natural question is which demand curve fits human economic consumption data best. We conducted an empirical study to compare nine demand models (Table 9.1) based on fast-moving consumer good (FMCG) food consumption data across 52 weeks (Yan et al., 2012a, 2012b).

In particular, we found three main trends in nine demand models (Table 9.1). First, as shown in Table 9.1, the log-linear model (i.e., the traditional demand curve, Equation 1) and Equation 5 do not fit real-world data that is normally presented in a curvilinear form. Second, it is clear that, with the exception of Equation 4, all demand curves suffer from the problem that elasticity of demand changes continuously with changes in price. Although demand analysis provides a promising way to measure reinforcer value (Foxall et al., 2004; Hursh, 1980; Hursh, 1984; Kagel et al., 1995), it has been criticized for its use of direct comparisons of demand elasticity among reinforcers (Hursh, 1984; Killeen, 1995). The rate of change of these demand curves varies among price points (Killeen, 1995), and comparing elasticity of demand across different price points becomes difficult among qualitatively different products. In addition, elasticity of demand for reinforcers is often mixed (inelastic at low prices and elastic at higher prices) when examined across a broad range of prices. The exponential model (Equation 4) is capable of indexing the elasticity of demand by one parameter, which represents considerable progress. Third, according to Table 9.1, not all equations have been applied to non-human and human data. Although Equation 4 seems more advantageous in many ways than Equations 1 and 2, it has not been tested in human economic consumption data. In addition, Equations 1, 2, and 3/4 have not been compared with Allen's Equations 1.5–1.10.

Model comparison results (see Table 9.2) show that Equations 2, 4, and 7 are top performance models. More specifically, *R*-squared in Equation 4 was higher than those in Equations 2 and 7. Furthermore, the Root Mean Square Error (RMSE) in Equation 4 was lower than those in Equations 2 and 7. Moreover, the Akaike Informational Criterion (AIC) and the Bayes informational criterion (BIC) in Equation 4 were lower than those in Equations 2 and 7. Hence, the essential value model (Equation 4) has a higher predictive adequacy and is less biased than other behavioral-economic models in fitting consumer data in a natural setting based on a combined dataset. Hence, essential value has been identified as the best measure among other behavioral-economic measures according to the evaluation of the regression statistics based on a combined dataset.

Table 9.1 Pros and cons for available economic demand curves

Economic demand curves of indexing strength of reinforcers			
Equation	*Demand Curves*	*Pros*	*Cons*
1	$LogQ = b_0 + b_1 LogP$	Applicable to both non-human and human data. Elasticity of demand presents the strength of reinforcers.	Elasticity of demand varies constantly with changes of price points. Misinterprets the curvilinear shape of the real data. No application to aggregated human economic consumption data.
2	$LogQ = LogL + bLogP - aP$	Applicable to both non-human and human data. High predictive adequacy. Presents the curvilinear shape of real data.	Elasticity of demand is presented by two parameters. No application to aggregated human economic consumption data.
3/4	$LogQ = LogQ_0 + k(e^{-aQ_0C} - 1)$	Applicable to non-human data. High predictive adequacy. Presents the curvilinear shape of real data. Elasticity of demand is presented by only one parameter.	Applied only for animal data. No application to aggregated human economic consumption data.
5	$Q = b_0 - b_1 P$	All these equations confirm the monotonically decreasing trend. Proposed by Allen (1935) for consumption research. No experimental examination for non-human or human.	
6	$1/Q = b_0 - b_1 P$		
7	$Q = b_0 - b_1 P^2$		
8	$Q = b_0 - b_1 \sqrt{P}$		
9	$Q^2 = b_0 - b_1 P$		
10	$LogQ = b_0 - b_1 P$		

Table 9.2 Rank of predictive adequacy of behavioral economic models using combined dataset

Equation Sort	*R^2 Descending*	*RMSE Ascending*	*AIC Ascending*	*BIC Ascending*
4	1st (.3145)	1st (.5201)	1st (213740.9)	1st (213770.4)
2	2nd (.2906)	2nd (.5291)	2nd (218972.1)	2nd (219001.6)
1	3rd (.2709)	3rd (.5364)	3rd (222793.0)	3rd (222812.7)

Why is essential value important for the BPM?

Essential value is seen as the best measure of the value of reinforcers in behavioral demand studies and human economic consumption studies (Christensen et al., 2008a; Christensen et al., 2008b; Christensen et al., 2009; Foster et al., 2009; Hursh & Silberberg, 2008; Yan et al., 2012a, b).

This advanced measure can be applied to and integrated with the BPM to investigate consumers' demand response sensitivity across reinforcement types (utilitarian and informational), brand groups, and even behavioral settings (open vs. closed).

Essential value and type of reinforcement

Two reinforcement types are defined in the BPM as utilitarian and informational reinforcement. Utilitarian reinforcement is mediated by the product itself, deriving from its practical application, and inheres in primary reinforcement and influences the rate of both human and non-human performance. Hence, it represents the functional rewards that a consumer gains directly from the product itself in purchase and consumption (i.e., drinking a bottle of orange juice or eating a can of baked beans). The BPM predicts that the higher the relative utilitarian benefit provided by a brand, the greater the probability that this brand will be bought rather than substitutes. There is, moreover, evidence that this is the case.

For example, Oliveira-Castro et al. (2010) found in a behavioral economics study based on matching analyses that consumers increased the amount they spend to obtain a higher level of utilitarian reinforcement. Behavioral economics research with nonhumans indicates that a reinforcer with greater essential value has a greater probability of being consumed than reinforcers with lower essential value (Christensen et al., 2008a, b). By putting these two findings together it could be predicted that a brand that provides relatively more utilitarian reinforcement than other brands in its product category would exhibit a higher level of essential value than those brands. This prediction has been supported by our empirical findings (Yan et al., 2012a, b). The results support the view that essential value varies across different utilitarian brand groups. A clear pattern has been found which shows that increases of utilitarian benefits in brands are associated with increases of essential value. The results reveal that larger essential values exist in brand groups with higher levels of utilitarian benefits while smaller essential values exist in brand groups with lower levels of utilitarian benefits.

Another reinforcement type defined in the BPM is informational reinforcement, which is conveyed by the symbolic attributes of the product. It is socially mediated and reflects the status and esteem which are accorded by a group to members who display approved patterns of purchase and consumption. Therefore, informational benefits are conveyed by the brand but mediated by other people and, ultimately, by the consumer's self-approval. Increased informational benefit is a characteristic of brands that possess higher perceived quality and/or a more established and prestigious brand name and image.

Essential value is used to measure the value of products that convey attributes to elicit utilitarian and informational reinforcement. The question is whether essential value differs across products with different types of utilitarian and informational benefits. According to the BPM, a brand's sales are directly proportional to the informational benefits it confers on the consumer. It would be expected, therefore, that a brand conferring higher levels of informational reinforcement would have a higher essential value.

Consequently, we decided to examine this proposition. A clear pattern is present which shows that increases of informational benefits are associated with increases of the essential value or with decreases of the price elasticity of demand (Yan et al., 2012a, b). It has also been found that larger essential values exist in brand groups with higher levels of informational benefits while smaller essential values exist in brand groups with lower levels of informational benefits, which is in line with the findings in utilitarian products.

Essential value also varies across products with a combination effect of utilitarian reinforcement (UR) and informational reinforcement (IR). Each brand has its own distinctive characteristics and may have different utilitarian and informational reinforcement from its substitutive brands. Brands differing in the amount of informational and utilitarian benefits were classified into six groups based on the combination of two UR levels and three IR levels: (1) IR1, UR1; (2) IR1, UR2; (3) IR2, UR1; (4) IR2, UR2; (5) IR3, UR1; (6) IR3, UR2. Our results support the view that the distinction among essential values exists in different brand groups. This indicates that utilitarian and informational benefits have combined effects on influencing consumer buying behavior.

Overall, the findings seem to offer authentic support for the expectations from the BPM. Utilitarian and informational benefits have been found to have a combined and individual effect in determining consumer buying behavior. Furthermore, clear patterns have been found across the brand groups differing in utilitarian and informational benefit levels. These patterns show that increases of utilitarian and informational benefit levels in brands are associated with increases in the essential value of these brands. These patterns also corroborate the view that UR and IR are positive reinforcements of consumer buying behavior.

Essential value and consumer behavior settings

The BPM indicates that consumer buying behavior is also determined by consumer settings (Foxall, 2007). Consumer behavior settings are antecedents of buying behavior, defined in terms of discriminative stimuli and motivating operations that set the occasion for consumer behavior. These variables, primed by the consumer's learning history, determine the "scope" of the setting (i.e., the range of potential opportunities for behavior available to the consumer).

Consumer behavior thus conforms to the scope of the setting (Foxall, 2005). More open consumer settings can allow consumers more options for behavior, while more closed settings offer only limited choices. In the case of FMCGs, an important characteristic of the consumer setting is the size of the store. A convenience store, such as a garage forecourt mini-market, is considered a more closed setting because of its limited selection of products and the time available to the consumer to make their selection. In a relatively closed setting, consumers have fewer choices (e.g. a smaller range of brand substitutes). The consumers are more constrained by the choices available to them. A supermarket is a more open setting because it stocks a wider variety of product categories and brand alternatives. In a relatively open setting, consumers have a greater selection of products and more substitutable brands to select.

Hence, the continuum of consumer behavior settings posited by the BPM reveals additional influences on the elasticity of demand for food products, with the possibility that price elasticity varies with the degree of openness of the behavioral situation. The BPM suggests that consumers show less price responsiveness in a relatively closed setting (e.g. a convenience store) and more price responsiveness in a relatively open setting, (e.g. a supermarket). It is important to investigate whether the essential value of products varies across different behavioral settings.

Further analysis was also undertaken using the human economic consumption data points from different consumer settings. We found evidence showing that the essential value of brands presented in more open consumer settings is smaller than the essential value of brands presented in more closed consumer settings. Hence, it is confirmed that consumers in more open settings, like supermarkets, show higher price responsiveness in choice behavior than those in more closed settings, like convenience stores.

In addition, the results also reveal that increases of essential value are positively related to increases of the quantity of consumption. Hence, we may conclude a tentative finding that brands with larger essential values are likely to be purchased in a larger quantity on one shopping occasion, or are purchased more frequently.

Integrating essential value into the BPM

As aforementioned, Foster et al.'s (2009) findings raise the question whether additional attributes of reinforcers have an impact on the quantity of consumption. Moreover, additional attributes would influence a brand's own "value." A brand varying in quality and reputation would impact its "value" as well. The pattern that informational and utilitarian benefits affect consumer buying behavior is mainly focused on the change of quantity of consumption. Hence, it is important to use essential value examining the detailed demand response pattern of utilitarian and informational reinforcement on the quantity of consumption. An exponential model is generated based on the essential value model with additional predictors – UR and IR.

$$LogQ = LogQ_0 + k(e^{-a_1 Q_0 C + a_2 IR + a_3 UR} - 1) \quad (4a)$$

where Q, Q_0, and k, respectively, denote consumption, the maximum consumption at zero price, and the range of the dependent variable in logarithmic units. C is the standardized price (e.g., 1 penny/gram would have $C = 1$). UR and IR are informational and utilitarian reinforcers, respectively.

Our main purpose is to compare the goodness of fit between Equation 4 and 4a. Based on 10,000+ FMCG consumption data points from 1,600+ consumers, our results support that Equation 4a has higher adjusted R-square and lower RMSE, AIC, and BIC values than Equation 4, which indicates that Equation 4a has a better predictive adequacy than Equation 4.

Incorporating UR and IR into demand curves takes brand-related characteristics and thus managerial marketing into consideration in the prediction of the quantity of consumption. The influence of UR and IR on the quantity of consumption is confirmed by separate analyses of the full dataset and the split-sample datasets. Additionally, the fact that $LogQ_0$ and the a value vary within a small continuum across Equations 4 and 4a and across different time periods indicates the internal reliability of the data set. Hence, increases of IR are associated with increases of the quantity of consumption, while UR does not show this pattern consistently since its influence depends on product category.

Overall, the additional predictors derived from the BPM explain a greater proportion of the variance in the quantity of consumption than does price alone. This finding holds true across different product categories and different time periods. It reveals how essential value can be used to measure different strengths of brands' value when UR and IR are incorporated into the essential value model.

Conclusions

Based on demand analysis, the essential value model indexes the price elasticity of continuously changing demand curves using a single parameter of the exponential equation. Hence, it overcomes the shortcoming of alternative demand curves in which the price elasticity changes continuously with changes in price. Moreover, it maintains high predictive adequacy as well as the linear-elasticity equation. Therefore, the essential value model is evaluated as the most promising equation for its potential contribution to consumer behavior research.

According to the BPM (Foxall, 1990/2004), we apply the essential value model across brand groups differing in utilitarian/informational reinforcement and in closed/open consumption settings. We find that (a) essential value varies across different brand groups within the same products; (b) brands with higher levels of utilitarian reinforcement show larger essential value; (c) brands with higher levels of informational reinforcement show larger essential value; and

(d) the essential value of brands varies inversely with the degree of openness of consumer settings. Furthermore, we generate a new model incorporating utilitarian and informational reinforcement into the essential value model to ascertain the influence of these variables on demand. The new model has greater predictive capacity than the essential value model, suggesting utilitarian and informational reinforcement are influential in consumers' economic consumption.

We have shown that the depiction of the contingencies of reinforcement portrayed by the BPM (i.e., the pattern of utilitarian and informational reinforcement and the scope of the consumer behavior setting) provides a new understanding of the complexities involved in human choice behavior occurring in natural settings for a variety of reinforcers and combinations of reinforcers. Moreover, the settings investigated reflect a variety of competitive market situations, contingencies that cannot be reproduced in animal and human addiction studies; consumer behavior settings also entail controlling factors such as advertising, distribution, and product and brand differentiation which are not present in traditional behavior analytic studies, as these are generally confined to considering price effects and necessarily ignore the remainder of the marketing mix.

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