Image Variables in Multi-Attribute Product Evaluations: Country-of-Origin Effects

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An empirical investigation is conducted to determine the effects of image variables on beliefs and attitudes in the multi-attribute model framework. Simultaneous equation regression is used to estimate a model linking a particular type of image variable, country of origin, to attitudes and beliefs obtained through a survey of evaluations of automobile alternatives. The results indicate that country of origin affects beliefs but not attitudes.

The relationship between affect and cognition in the formation of product evaluations continues to be an area of interest to researchers of consumer behavior. In particular, whether attitude is mediated by cognition is a subject that is open to debate. One view is that beliefs regarding a product's attributes precede and are responsible for the formation of attitude toward the product (Fishbein and Ajzen 1975). Various researchers (cf. Cohen and Houston 1972) have questioned this one-way view and have investigated the possible influence in the other direction (affect to cognition) as well. Zajonc (1980) argues that cognition may not even be necessary for the formation of affective judgments.

A related area concerns external influence on the formation of beliefs and attitudes. Various studies have shown the direct effects on perception of communication (Holbrook 1978; Mitchell and Olson 1981; Toy 1982) and of physical characteristics of the product (Holbrook 1981; Tybout and Hauser 1981). Other studies have been concerned with direct effects on attitudes—in particular, studies by Matlin (1971) and by Moreland and Zajonc (1979) have shown the influence on affect of subjective as well as objective familiarity.

The present study considers the influence of image variables on the formation of beliefs and attitudes. An image variable is defined as some aspect of the product that is distinct from its physical characteristics but that is nevertheless identified with the product. Examples of image variables include brand name, symbols used in advertising, endorsement by a well-known figure, and country of origin for markets in which imported brands have a significant presence. The present paper considers a particular image variable—country of origin—and analyzes its effects on the evaluation of automobile brands.

THE BELIEF-ATTITUDE RELATIONSHIP

Probably the most familiar model linking beliefs and attitudes is the Fishbein model, in which attitude is determined by beliefs (Fishbein and Ajzen 1975). Zajonc (1980) argues that this may not be the appropriate way to view the relationship. Zajonc cites a number of references to support his contentions that affective reactions are primary, basic, inescapable, irrevocable, and difficult to verbalize, and that affective judgments involve the self, can become separated from content, and need not involve cognition. Moreover, the possibility of a halo effect (Beckwith and Lehmann 1975; Holbrook 1983) suggests that causation could proceed in the other direction—i.e., from attitude to beliefs.

Empirical resolution of these issues requires an estimation procedure that allows for possible two-way causation between beliefs and attitude. If latent variables are not involved, simultaneous equation regression (Johnston 1972) is appropriate. (If it is important to assume latent variables, a technique such as LISREL is needed; see Jöreskog and Sörbom 1982). Simultaneous equation regression has been applied in previous research to help sort out the directions of influence. The empirical results of Beckwith and Lehmann (1975) and Holbrook (1983) show that beliefs may indeed influence attitude. These studies also show that attitude can have a halo effect on at least some beliefs. This empirical evidence suggests the need for simultaneous models in empirical research in-

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volving attitudes and beliefs—not models in which influence is directed only one way.

IMAGE EFFECTS

According to Fishbein and Ajzen (1975, Chapter 5), there are three kinds of beliefs: descriptive, inferential, and informational. These beliefs are formed in different ways, and all potentially contribute toward what a customer believes about a product’s attributes. Descriptive beliefs derive from direct experience with the product. The works by Holbrook (1981) and Tybout and Hauser (1981) relate to this kind of belief, in that they link physical characteristics with product perceptions. Informational beliefs are those influenced by outside sources of information such as advertising, friends, relatives, and so on. The research on communication effects (Holbrook 1978; Mitchell and Olson 1981; Toy 1982) is relevant here.

It is the remaining type of belief—inferential—that is of interest in this paper. This type of belief is formed by making inferences (correctly or incorrectly) based on past experience as this experience relates to the current stimulus (Fishbein and Ajzen 1975). For example, beliefs about a new family-branded product may be influenced by prior experience with other products possessing the same family brand. Or a person whose experience suggests that German cars are durable might infer that since an Audi is a German car, an Audi is a durable car.

As these examples indicate, image variables may have inferential effects on product beliefs. Little work has been done in this area. While Huber and McCann (1982) have shown that inferences can affect how people evaluate products, we need empirical work studying inferential processes. In particular, we need to know whether inferences are made based on country of origin, brand name, or other image variables.

An image variable could have direct influence on attitude, as well. For example, a brand name may provoke an emotional reaction which carries over to attitude toward the brand. Or a customer may have a bias against a foreign country that has affective implications for products from that country. An empirical study investigating the effects of image variables on the product evaluation process should allow for direct effects on attitude as well as on beliefs.

Previous research regarding image variables has generally involved their influence on perceived quality or some other overall evaluation. Jacoby, Olson, and Had- dock (1971) show that brand name can affect product quality ratings. Szybillo and Jacoby (1974) indicate that perceived quality can be influenced by store image. Both these studies control for actual product differences.

Various studies (Bilkey and Nes 1982 provide a review) reveal that a product’s country of origin can affect its evaluation, although generally only single-cue models have been used (Bilkey and Nes 1982, p. 93). Many studies have been concerned with price as an indicator of quality (see Monroe 1973 for a review). However, price appears to have a positive effect on perceived quality only when it is the single cue; other image variables, when included with price, become more important quality-cue indicators (Zaltman and Wallendorf 1983, Chapter 11). The present paper takes a more detailed look at the product evaluation process, investigating the existence of image effects within the belief-attitude relationship.

MODEL

Due to the possibility of two-way influence between attitudes and beliefs, a system of simultaneous equations is needed to represent the relationship, including one equation in which attitude is the dependent variable, and one equation for each attribute in which the belief rating for the level of that attribute is the dependent variable. Attitude is an explanatory variable in each belief equation, and the beliefs are explanatory variables in the attitude equation. Because of the possibility that image variables might affect attitude as well as beliefs, these variables become explanatory variables in each equation in the system.

Two other considerations enter into the development of the model. One is that beliefs about the level of a particular attribute for a product alternative should depend upon the true level for that alternative, the true level having its effect through direct experience or communication. For the product area chosen for study (automobiles), objective values for many of the attributes are available as published information. These objective attribute values are entered as explanatory variables in the belief equations. In this way, image influences on beliefs can be viewed as biases, since the effects of the true values are controlled for in the estimation.

Another consideration is that previous research on the attitude relationship (Matlin 1971; Moreland and Zajonc 1979) indicates that affect is influenced by both subjective familiarity (the subjects think they are familiar with the stimulus) and objective familiarity (actual exposure to the stimulus). Thus two variables representing these effects are included as explanatory variables in the attitude equation: self-assessed familiarity with the alternative, and actual ownership as a measure of objective familiarity.

The model can be stated symbolically:

\[ A_{ij} = \alpha_0 + \sum_{k=1}^{K} \omega_k B_{ijk} + \delta_0 F_{ij} + \delta_1 N_{ij} + \sum_{h=1}^{H} \lambda_{0h} I_{jh} + u_{ij0} \]

\[ B_{ijk} = \alpha_k + \beta_k A_{ij} + \gamma_k T_{jk} + \sum_{h=1}^{H} \lambda_{kh} I_{jh} + u_{ijk} \]

for \( k = 1, 2, \ldots, K \), where:

- \( A_{ij} \) is subject i’s \((i = 1, 2, \ldots, I)\) attitude toward alternative j \((j = 1, 2, \ldots, J)\)
- \( B_{ijk} \) is i’s belief about the level of attribute k for alternative j
- \( F_{ij} \) is i’s subjective familiarity toward j
FIGURE
BELIEF-ATTITUDE MODEL WITH IMAGE EFFECTS

\[ N_i = 1 \text{ if } i \text{ owns an alternative } j, \text{ 0 if not} \]
\[ I_{ih} = \text{value of image variable } h \text{ for alternative } j \]
\[ T_{jk} = \text{true value for attribute } k \text{ of alternative } j. \]

The terms \( u_{ij}, \omega_{ik} \) are error terms, assumed uncorrelated across equations and subjects, and the parameters \( \alpha_0, \omega_1, \beta_1, \gamma_1, \lambda_{0h}, \lambda_{1k}, \lambda_{2k}, \lambda_{3k} \) are to be estimated by simultaneous equation regression (Johnston 1972, Chapters 12 and 13). In particular, estimates of the \( \lambda_{0h} \) and \( \lambda_{1k} \) will help sort out where the influence of image variables is felt in the belief-attitude relationship. The model is exhibited graphically in the Figure.

DATA

To estimate the model, survey data were gathered from 96 MBA students at the University of Washington concerning their attitudes toward, beliefs about, and familiarity with certain automobiles. An advantage of using automobiles is that the country of origin has become an important factor in this market, with imports gaining a significant share. Also, country of origin is relatively easy to identify for this product class.

Two pilot studies were conducted on subsamples of the larger sample to elicit automobile makes and models which this group would generally include in a set for further consideration. Another purpose of the pilot studies was to identify an initial list of attributes that these people see as salient in their evaluation of cars. The final list of stimulus objects (automobile models) consisted of four U.S., two German, and four Japanese models. This meant that two country-of-origin dummy (0-1) variables were needed as image variables—one was created for German autos and another for Japanese cars. The 10 models selected for the final list were as follows: VW Rabbit, Ford Mustang, Honda Accord, Chevrolet Citation, Datsun 200 SX, Audi 4000, Mazda 626, BMW 320i, Toyota Celica, and Plymouth Reliant.

The final questionnaire began with a brief introduction explaining the purpose of the study. This was followed by a section asking the respondents for their beliefs about attribute levels for all 10 autos. Semantic differential scales were used for all rating questions throughout the questionnaire. Respondents were asked to record a rating with a slash through a horizontal line connecting the categories, to provide a continuous nature to the rating.

The questionnaire then elicited importance weights for the attributes to be used in the selection of a smaller set of attributes considered most important by the sample. The respondents were asked to rate their familiarity with each auto, after which they provided an overall rating of each auto on a five-point semantic scale (with continuous responses allowed between categories). The final questions involved autos presently owned and a few background variables. The time taken to complete the questionnaire averaged about 25 minutes.

As mentioned before, the self-reported importance weights were used to select a smaller set of important attributes. Those selected for the empirical analysis were: price, gas mileage, reliability, durability, and workmanship. True values were obtained when possible from published sources. Gas mileage and price were coded from Consumer Reports and Car & Driver. Reliability was identified in terms of predicted repair incidence, values for which were obtained from Consumer Reports. To define the attributes for which no available ratings could be obtained (durability and workmanship, and reliability for the Plymouth Reliant), we relied upon the mean re-

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\[ \text{One "German" car, the VW Rabbit, is actually assembled in Pennsylvania and was classified as a U.S. model in the data analysis. Alternative estimation was done, classifying the Rabbit as a German auto. The results, in terms of statistical significance of parameter estimates, showed no essential differences.} \]
COUNTRY-OF-ORIGIN EFFECTS

The responses of "experts" from the sample. For each auto, five respondents were chosen who were closest in their evaluations of price, gas mileage, and reliability (only the first two attributes for the Plymouth Reliant) to the published ratings.\(^2\)

**MODEL ESTIMATION**

Before estimation of the model, the responses were standardized within each individual. Since variations occur among individuals because of idiosyncratic scale use (e.g., differing zero points), standardizing was deemed appropriate. This is of course also the common strategy in work on multi-attribute models (cf. Bass and Wilkie 1973).

Since the plan was to pool the respondents for estimation, some care was required to justify this empirical approach. Fisher (1970) and Bass and Wittink (1975) suggest a single equation F-test for pooling based on comparison of parameter estimates from two different single equation regressions. This was applied in the present study by comparing ordinary least squares (OLS) estimates of the affect equation based on different subsamples. Individuals were separated from the rest of the sample, regressions were run with them excluded, and these regressions were compared with those that included the individuals.

The selection of individuals to test for exclusion from the sample was determined on the basis of the self-reported attribute importance ratings. The aim was to identify respondents whose importance ratings deviated most from the average. The importance ratings of each individual were correlated with the overall sample mean ratings. Low or negative correlations indicate "outliers" that perhaps do not belong with the rest of the group for the empirical analysis.

Tests were run sequentially, an individual being dropped for each run (the individual remaining with the lowest correlation). The exercise was stopped when non-significant differences, at the 0.05 level, were noted. The result of the sequential F-tests was that one individual was dropped from the analysis—the only individual whose importance ratings correlated negatively with the overall sample. This left a total pooled sample of 95 respondents. The data are summarized in Table 1, which lists means and standard deviations, and in Table 2, which shows Pearson product-moment correlations.

Strong multicollinearity exists among the belief variables, and this can seriously hamper the estimation. To correct it, a principal components analysis was used to identify uncorrelated factors. This analysis showed a distinct reduction in incremental variance explanation as the number of factors exceeded two. Eigenvalues were 2.49, 1.24, 0.55, 0.39, and 0.32; the first two components explained 74.6 percent of the total variance.

The two most important factors show distinct patterns of correlation with the belief variables. One factor is strongly and positively correlated with four of the belief variables—reliability, durability, workmanship, and price—and consequently could be referred to as a "quality" factor. The other significant factor shows strong positive correlation with gas mileage and negative correlation with price, so that it appears to be an "economy" factor. The two factors were defined specifically by combining the appropriate subsets of belief variables, standardized and weighted by factor score coefficients:

\[
\text{Quality factor} = 0.247 \times \text{Price} + 0.313 \times \text{Reliability} + 0.344 \times \text{Durability} + 0.350 \times \text{Workmanship}
\]

\[
\text{Economy factor} = 0.727 \times \text{Mileage} - 0.483 \times \text{Price}
\]

These factors were then used in place of the five original belief variables in the estimation of the system of equations. Of course, to estimate this system by OLS regression results in estimates that are inconsistent (Johnston 1972, p. 351). Because of this, the system was estimated by two-stage least squares (Johnston 1972, p. 380 ff). The TSLS estimates are shown in Table 3, with asymptotic t-statistics.

A number of interesting results are noted. For one, a strong mutual relationship between attitudes and beliefs emerges. There appears to be both a forward effect of beliefs on attitudes as well as a strong halo effect of attitude flowing back to beliefs. And as expected, the estimation results show significant effects of exogenous variables. Familiarity—although not ownership (a weak measure of exposure)—affects attitude directly. Also, true attribute

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\(^2\) An alternative method of obtaining the missing ratings was to ask those who expressed high levels of familiarity with particular models. This resulted in values that differed in many cases from those obtained through the use of "experts" for the durability and workmanship ratings. These ratings produced less desirable results than those reported in the subsequent section. In particular, "true" durability based on familiarity showed a negative effect on beliefs (significant at the 0.10 level). As a consequence, these results are not reported further. Contact the first author for details, if desired.
levels influence beliefs. (Only the appropriate attributes, based on the components of each factor, were included in each belief equation.) Note in particular the dual function of actual price—a positive determinant of belief regarding an auto's quality, but a factor that contributes negatively to perceptions of a car's economy.

Finally, the effect of the image variable, country of origin, appears to have direct effects on beliefs and not on attitudes. An interesting conclusion is that quality perceptions are not affected; these are quite well explained by true price and durability as well as by the affective halo bias. Yet beliefs about a car's economy apparently are biased by the country-of-origin image, Japanese cars having somewhat more of an advantage than German autos.

It must be emphasized that these conclusions about the relative effects of image variables on beliefs and attitudes should be viewed in proper perspective. Only one particular product class (automobiles) and one image variable (country of origin) have been investigated. There may be other situations in which image affects attitude directly.

### TABLE 3

**PARAMETER ESTIMATES**

<table>
<thead>
<tr>
<th>Equation/variable</th>
<th>Coefficient estimate</th>
<th>t-value</th>
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<td></td>
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<tr>
<td>Attitude</td>
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</tr>
<tr>
<td>Quality factor</td>
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<td>10.74*</td>
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<tr>
<td>True price</td>
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<td>True reliability</td>
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<td>-.92</td>
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<tr>
<td>True durability</td>
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<tr>
<td>True workmanship</td>
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<td>.10</td>
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<td>Germany</td>
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<tr>
<td>Constant</td>
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<tr>
<td><strong>Dependent variable:</strong></td>
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<tr>
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</tr>
<tr>
<td>Attitude</td>
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<td></td>
</tr>
<tr>
<td>True price</td>
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<tr>
<td>True mileage</td>
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<tr>
<td>Germany</td>
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<tr>
<td>Constant</td>
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<td>3.07*</td>
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</table>

* Significant at the 0.05 level.
  a Significant at the 0.10 level.

### CONCLUSION

This study of the influence of image variables on the product evaluation process indicates that an image variable does not appear to be affective in nature: the empirical results show that such variables influence belief formation rather than attitude. While previous work has shown that physical characteristics and communication—as well as overall attitude—affect beliefs, the present study shows that image variables also affect beliefs through inferences made by consumers. It also indicates that the effect of

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3 It may also be that the distinction between an image variable and a belief is not especially clear. The image variable itself may satisfy a need (e.g., labels on designer jeans), or there may be uncertainty regarding the true nature of the image variable. In the present study, it is assumed that beliefs relate to physical performance characteristics only, and that the countries of origin of the alternatives are widely known. Automobiles were selected for the study with these conditions in mind.
image variables on attitude is not direct; any influence they have appears to be a secondary one acting through beliefs.

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REFERENCES


Fishbein, Martin and Icek Ajzen (1975), Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research, Reading, MA: Addison-Wesley.


