MARKET INFORMATION AND PRICE REPORTING IN THE FOOD AND AGRICULTURAL SECTOR

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EVALUATING THE IMPACTS OF FOOD PRICE REPORTING ON RETAIL FOOD MARKETS

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INTRODUCTION

We probably know more about market information processes and problems at the farm and wholesale food levels than at the retail level. Studies of thin markets, grades and standards, and market news have provided valuable insights into the effects of information in intermediate food and fiber markets. In contrast, we know surprisingly little about the role and effects of market information at the retail-consumer level of the food sector.

Purdue University's Department of Agricultural Economics and the Agricultural Marketing Service of the U.S. Department of Agriculture are cooperating in a study of the influence of comparative retail food price reporting systems (RFPRS) on competitive behavior, prices, and consumer choices in local food markets.[1] The purpose of this study is to examine the effects of retail food price reporting on market behavior, not to design or encourage prototype consumer food price reporting systems. The research will provide an opportunity to study such micro topics as individual firm pricing strategy at the item, department, and overall store level; price leadership roles; firm interdependence in marketing decisions and advertising strategy in the presence and absence of a RFPRS. The data will also allow the measurement of marketwide, or macro, impacts of a RFPRS on price level, inter-store variability, and advertising composition.

The impact of comparative food store price information on food retailers' competitive behavior has received limited research attention. In 1974, Devine provided consumers in a large Canadian city with weekly food price information for five weeks. (Devine [9], Devine and Marion [11], Devine, this volume). By comparing the pricing patterns in this city with a control city before, during, and after the reporting system, the impact of the information on marketwide food price levels and dispersion (inter-store price variability) was measured. The Purdue study was inspired by, and is in many ways a replication of, Devine's study. There is a major difference, however. While the Canadian study examined only one test and one control market and published food prices for only five weeks, the Purdue study is examining the effects of weekly food price reporting for 18 weeks in four test cities. Like the Canadian study, the Purdue study will monitor food prices before, during and after the publication of the RFPRS.[2] Although other retail food price reporting systems, both public and private, have been and are currently being operated, no careful analysis of their behavioral impacts has been undertaken.[3]

PRICE INFORMATION AND THE BEHAVIOR OF FOOD RETAILERS

Stigler [29] argues that unless exchange is totally centralized, buyers and sellers of even homogeneous goods will fail to be aware of all prices in a market. In the case of differentiated products, for which the food shopping experience (price, quality, and service) and its various components qualify interstore variability in prices would be expected under normal conditions. Additionally, with over 10,000 items in the modern supermarket, dispersion is assured despite some commonly shared store pricing rules.

Holdren [15] concluded that competition in food retailing does not, except in rare cases, produce uniformity of retail prices, because of mix pricing and the fact that retailers are free to respond competitively to a price move of a rival by reducing the price of another product. He also concluded that the more widely price differs from store to store, the more difficult it is for the shopper to choose, on a price basis, a single store at which to concentrate purchases. Padberg [24] noted that the use of mix pricing makes it almost impossible for the consumer to identify the lowest-priced store. Preston [25] observed that, with wide latitude in retail pricing, a grocery may respond to competition by developing a price structure and product assortment that enables it to maintain a place in the market, without uniformly matching the prices of its rivals.

It is evident from food ads that retail food competition does not drive all prices to the same level in local food markets. It is less obvious whether foodstores differ in price at the departmental and store marketbasket levels, and it is even less clear that price differences reflect buyer preferences and seller costs. There have been a number of foodstore price comparison studies over the years. Most have shown some departmental and store-wide price differences between foodstores in local markets. Some of this variation is due to the choice of the sample marketbasket selected for analyses,[4] the particular pricing tactics of individual retailers in the markets, and the timing of the market reporting.

There have been comprehensive studies of price similarity in local food markets. Holdren [15] found price differences within local markets and reported:

> Two stores with identical gross margins, product lines, price levels, and reasonably similar offers in other respects, could have quite different price structures with different welfare implications for any given consumer.

Similarly, Preston [25] found that, even among stores operating in the same market, food prices were not uniform, and there was no tendency for them to become so over time. More recently, Marion, *et al.* [19] examined departmental and marketbasket groupings at foodstores in selected cities. Like the National Commission on Food Marketing (NCFM) studies, they found that store prices varied considerably within the markets examined. Price variability and evidence of excess profits were attributed to the markets' structural characteristics.[5]

Price Level and Dispersion at the City Level

Devine attributed a 7 percent marketwide reduction in food price levels to his comparative price information. Statistically significant reductions in interstore variability were also reported.[6] The principal hypothesis of the present study is: The level and interstore variability of prices will decline for those items individually reported in a RFPRS relative to the control market (and relative to the test city during the pre-test period).

The RFPRS is expected to have different effects over time. The short-run expectation is that retailers' price response, if any, will be primarily the result of seller's *anticipation* of consumer reactions to the price report. The magnitude of this response will depend upon managers' surprise and concern at their rankings in the price report, their judgments about how consumers will respond to the report, and their desired position in the report. It is possible that the Devine study was dominated by these short-term, publicity effects of the RFPRS. They would not be expected to persist unless reinforced by consumers' behavior. Others' experience suggests that retailers may also attempt legal action against the report during this period.

The impact of the RFPRS on individually reported items is rather direct. It will also be possible to measure any indirect macro impacts of the reporting of department and overall marketbasket costs on overall price level and dispersion in the city. In other words, it is hypothesized: Overall city price level and inter-store price variability (as measured by a 100 item basket in up to eight stores) will be reduced by the reporting of departmental and marketbasket costs.[7]

Pricing Behavior At the Store Level

Beside city wide or macro impacts on price level and dispersion brought about by the RFPRS, the micro impacts of this structural change on particular stores need to be separately evaluated. It is hypothesized: The reduction in the level and inter-store variability of prices within a market will be greater among corporate chain stores than among independent stores. Nelson and Preston [23] found that chains make more price changes on individual items within a given store than do affiliated stores. In another study Devine and Hawkins [10] found individual stores within a chain revealed differences in price levels, and all showed pricing patterns distinct from those of independent outlets. Given this high volatility of prices within chain stores and typically dissimilar pricing patterns among stores, it is expected that there will be a wide variation in prices between stores of different chains. With this larger initial variability, it is felt that upon initiation of a RFPRS, inter-store variability will be reduced more between chains than between independent stores.

Nelson and Preston [23] found that price change behavior was largely a result of managerial discretion, independent of other short-run market variables. While a potential for greater pricing flexibility might exist among independent stores, it seems likely that chain stores' concern for sales volume

might dictate that they respond to the RFPRS through price competition and, therefore, exhibit a greater relative price level reduction than would independent stores. But differences between corporate chain stores and affiliated independents are presumably being eroded, and these two groups, in fact, may not respond differently to the RFPRS.

Store Pricing Interdependence

It is hypothesized: In the presence of a RFPRS, retail pricing interdependence will increase. Variability may decrease as stores recognize their heightened interdependence (except for cases where a high cost/service store observes that its prices are similar to less service-oriented stores). Interdependence can be studied directly and at a micro level by applying forms of the reacting oligopoly model.[8] This model was explored with advertised prices by Baumol *et al.* [2]. They found some evidence of pricing interdependence and price-followership behavior within four Philadelphia food store chains. Nelson and Preston [23] also found some evidence supporting this model, using both advertised and unadvertised prices. In the present study, it is expected that interdependence will be stronger, since the same set of goods will be "advertised" weekly for competing stores. Although earlier studies by Gossard, [13], Preston [25], and Holdren [15] suggest that interdependence in pricing decisions is difficult to document for most items, it is believed that the environment created by the RFPRS will intensify any pricing interdependencies. Therefore, it is not expected that the reacting oligopoly model will correspond as closely to observed behavior in control cities as in test cities.

Market Concentration

Local market concentration is the relevant criteria for judging the selling market power of food retailers. Marion *et al.* [19] observed that food store concentration followed a persistent upward trend from 1948-72. Based upon their conclusion that with a high four-firm concentration ratio (CR_4) and relative firm market share (RFMS) come abnormally high profits and prices and reduced price competition, it is hypothesized: As CR_4 increases in a city, the impact of a RFPRS on the level and inter-store variability of prices will increase. It is further hypothesized: As a firm's RFMS rises, the impact of the RFPRS on its price level (reported items and overall 100-item market-basket) will increase. Cities in the Purdue study fall into two CR_4 groups: Two test and control cities above a CR_4 of 55 percent, and two test and control cities below 40 percent. The pattern of RFMS will also vary between cities, but will be similar within test-control city pairs.

Pricing Behavior Within The MarketBasket

It is hypothesized: Following the implementation of a RFPRS, the reduction in price level and variability will differ between perishable and nonperishable foods, as well as between food and non-food items (staples and non-staples). Although no *a priori* direction can be given to these hypotheses, interviews with consumers and retailers may help us to establish reasons for the observed relationships.

It is further hypothesized: The reduction in the variability of prices will be greater for private label or generic brands than for national brands. Private or generic brands are used to create a low-price image for a store and build consumer loyalty to a line of exclusive products. Without the RFPRS, it is difficult for consumers to make comparisons across stores on private label brands. Because it appears that there is greater inter-store variation in prices for private label brands, (Marion *et al.* [19], Devine and Hawkins [10]) it seems reasonable to expect that they will exhibit a greater reduction in price variation following the initiation of a RFPRS. It is hypothesized: There will be a differential price-level response to the RFPRS between national and private label or generic brands. It is generally felt that private labels are more profitable to retailers than national brands—based on gross margins. But this is an incomplete indication of relative profitability (NCFM) and, therefore, it is uncertain which brand has the greatest potential price-level response to the RFPRS.[9]

The firm's market power (RFMS) would also be expected to affect the relative level of prices for private label vs. national brands. As RFMS increases, prices for national brands tend to increase more than for private label brands. Conversely, as city size increases, private label brand prices increase relative to national brands (Marion *et al.* [19]). There are also indications that the price difference between national and private label products is declining over time (Marion *et al.* [19]).

In this study, the potential exists for dividing the least expensive brand category into private label and generic brands and testing the effects of the RFPRS on their relative price level and inter-store variability. Generics represent a recent price-competitive tactic adopted by some retailers to supplement or replace the low-price image of private labels (Handy and Seigle [14]). There is reason to believe that private and generic labels will respond differently to the RFPRS.

Advertising Behavior

There is also reason to believe that retail food advertising in newspapers will be affected by the RFPRS. It is hypothesized: Individual items, for which prices are published in the RFPRS, will appear more often in paid newspaper advertisements in the test city than in the control city, especially for items demonstrating high inter-store variability. The effect should also appear in the form of item overlap (advertisement for the same item during the same time period by two or more stores) in aggregate paid newspaper advertising in test cities, as compared with control cities (Preston [25], Swan [31]).

Holdren argues that stores do not advertise those items on which they are out-of-line price-wise and on which they want to stay out-of-line. Although Preston disagrees, under normal advertising situations a RFPRS will result in publishing prices of the identical items at all listed stores, raising the cost of being out-of-line. If retailers perceive the RFPRS as a type of advertisement, it is expected that they will lower prices of out-of-line items and list these as specials in their newspaper ads to enhance the impact of their new, lower price. Since the RFPRS will expand their "advertising" to two fronts, stores may be unable, given gross margin constraints, to advertise low prices in newspapers on a large number of items not listed in the RFPRS.[10]

It is also possible that because of the RFPRS, newspapers will contain more non-price competition messages in test cities than in control cities. Given their desires for product differentiation, stores faced with a RFPRS may attempt to differentiate themselves by emphasizing quality, convenience, or service. Newspaper advertisements will be monitored during the entire experimental period in test and control cities. This will allow study of advertising behavior with respect to specific items in the RFPRS and the aggregate advertising package.

CONSUMERS AND RETAIL FOOD PRICE REPORTING

It is hypothesized: A RFPRS will encourage consumer search by increasing returns to search and reducing search costs.

Consumers are the intervening variable between a RFPRS and any change in market performance resulting from that system. In order for comparative food store price information to have any sustained, long-term influence on local food market prices (beyond a possible short-run publicity effect), consumers must be exposed to the price information, process the information, and act on it in some fashion. The RFPRS may fail to influence market behavior and performance at any stage of the consumer information and decision processes. Accordingly, the Purdue study is examining the influence of comparative food price information at each step of the consumer decision-making process.

It is possible, of course, that existing local market price variations accurately reflect consumers' preferences and sellers' costs. If they do, there is no justification for additional price information. However, our premise is that consumer preferences do not perfectly validate the relative prices found in local food markets. Consequently, we believe the provision of additional price information will alter some consumers' decisions. It is also possible that the RFPRS will alter consumers tastes and preferences for price information, increasing the saliency of prices for food consumers.

Consumer Behavior and Retail Price Reporting

The RFPRS could alter several dimensions of the consumer food-shopping and decision processes: (1) the frequency and timing of shopping; (2) pre-shopping preparation (list making, interpersonal communication, use of weekly food ads, etc.); (3) the number of store choice criteria and the distribution of the grocery dollar among alternative foodstores; and (4) store and brand loyalty.

Examination of retail price reporting includes consideration of the consumer psychology of prices. How do consumers perceive and interpret store, department, and item price differences? Are there price thresholds? Is there a halo effect for store prices, based on the prices of a few items? What is the relationship between perceptual and behavioral thresholds? Does risk-taking behavior enter into the response of consumers to relative price differences?

Consumer Search Costs and Returns

The degree of consumer search to be expected in food markets, with and without the RFPRS, is an open question. While the total food bill would seem to be sufficient to meet the Stigler-Mincer search rules, food information tends to be packaged with low-price, per-unit food items. Moreover, while the variability of individual food items would warrant frequent search, this variability also erodes the cumulative value of investments in food price information over time. It has also been suggested that consumers find it difficult to make well-informed store choices because of pricing and advertising strategies employed by retailers. Overall, it seems possible that food store shoppers might engage in a suboptimal amount of market search because of the cost of search and its short-lived returns.

The returns to consumers of a RFPRS seem straightforward. There are potential, private savings in search costs for both consumers and competing retailers. Another source of private benefits from improved market information is the returns to search in the form of lower prices for food — regardless of the influence of the RFPRS on store or overall market price levels or variability. A RFPRS may also bring some non-monetary benefits associated with a more satisfying food-shopping experience and psychic satisfaction of consumers from better-informed shopping decisions.

The measurement of these private benefits of additional food price information has been approached in various ways. Some studies provide inferences about the returns to improved food price information based on consumers' price consciousness. This has been measured by: (1) consumer judgement of the relative importance of prices in shopping decisions (e.g. Skinner [28], Burgoyne [4]); (2) the ability of consumers to recall prices paid for food (e.g. Gabor and Granger [12], Uhl and Brown [32], Progressive Grocer [26]); and (3) the accuracy with which consumers can rank competing food store price levels (e.g. Brown and Oxenfeldt [3], Anderson and Scott [1], Marion, Simonds, and Moore [20]). These studies of price consciousness and awareness provide a first approximation of the returns to a RFPRS.

In general, they lead one to be optimistic about, and probably exaggerate, consumers' receptivity to improved food price information. There are also studies examining the returns to multi-store shopping behavior, which might be encouraged by a RFPRS (Crowell and Bowers [8]) and the impact of retail price information on consumers' satisfaction (Devine [9]).

The potential social returns to a RFPRS are associated with increased competition, which holds the potential of reducing market wide prices for *all* consumers regardless of their exposure to or use of the RFPRS, as well as greater consumer trust in the food industry.

The social returns to a RFPRS suggest that comparative food price information may suffer from public good properties. These include preference revelation, exclusion, and free rider problems. It is not clear what proportion of consumers in a local food market must view and act on the RFPRS to produce the hypothesized price effects. This potential for market failure in public information services greatly complicates research and public policy in this area, and raises questions about the willingness of consumers to support a private information system.

Consumer reactions to the RFPRS are also being examined in terms of use and non-use benefits, a distinction that has proven useful in evaluating the effects of other consumer information aids. Non-use benefits concern the value consumers place on information not directly used in purchase decisions. Such information is thought to increase the accountability of the food industry, have value for other consumers, and generally increase consumers' trust and faith in the food industry. Non-use benefits increase the total value which consumers place on information aids and may compensate, to some degree, for the public good problems associated with consumer information.

The RFPRS may also foster a qualitiative change in consumers' search activity. The amount of search time and effort might actually increase for some consumers exposed to comparative food store price information, suggesting an educational return to a RFPRS. Other consumers, who had not previously searched, may be encouraged to do so in response to the RFPRS.

Welfare Effects

These social costs and returns pose interesting questions about the welfare effects of retail food price reporting. In the case of average price levels in a city, the conventional consumer surplus analysis can be performed. This is complicated, however. If the RFPRS affects items, groups of items, brands, and store types differently, the distributional impacts are potentially significant.

It is not at all clear whether the conventional welfare effects of price stabilization apply to the case of price homogenization among competing food firms. Would a system which reduces inter-store price variability benefit consumers? Would this benefit be offset by the costs of the RFPRS? What is the consumers' trade-off between price levels and price variability? Further, a reduction in dispersion may be detrimental, if prices are stabilized at a level greater than the lowest price that existed in that city prior to the RFPRS. Changes in price dispersion in a city may also have complex distributional impacts.

Another approach to measurement of benefits of a RFPRS involves user assessment of its worth. Devine used willingness to pay; however, this can be misleading, unless respondents are required to evaluate the opportunity cost of this expenditure. This would be expected to bias the valuation upward. The public good properties of a RFPRS cause still more problems for measuring willingness to pay through demand articulation. This would be expected to cause a downward valuation bias.

The costs of a RFPRS seem simple to calculate. The operating costs are easily measured. Other longer-term and more difficult costs or potential costs must also be considered. The potential exists to enhance competition to the point where firms exit, causing adverse effects on (1) employment, (2) market concentration, (3) consumer choice, (4) shoppers' travel requirements, and (5) a reduction in newspaper advertising revenues. Some existing, long-running RFPRS's (e.g. Racine, Wisconsin) provide an opportunity to study some of these potential costs.

CONSIDERATIONS IN ANALYZING HYPOTHESIZED IMPACTS

Several issues merit attention in any attempt to investigate the potential effects of a RFPRS. These considerations provided the rationale for the research design employed in the Purdue study.

Price Impacts

Three issues are pertinent here: (1) the importance of assessing interactions of independent variables; (2) the use of randomization or matching of test markets; and (3) the need for adequate replication.

As noted, it is anticipated that the impact of the RFPRS upon price levels depends upon: (1) product characteristics (notably, generic brands/private labels vs. national brands, perishable vs. non-perishable, reported vs unreported in RFPRS); (2) store characteristics (chain vs. independent); (3) market concentration; and (4) time (length of time a RFPRS has been operating). Many of the hypothesized impacts, therefore, concern interactive (non-additive) effects of the independent variables. Thus, a study should permit adequate tests of these interactions. A design is needed that would allow a complete test of all interactions among independent variables

and provide comparable precision in tests for the existence of the various higher-order interactions. One design that would do so is a factorial combination of independent variables with equal cell sizes (n's) in all between-store variables. Basically, the design would be treated as a split plot, rather than a complete randomized block, with repeated measures on the time factor (Winer).

Second, to calculate the impact of the RFPRS clearly, it is desirable to have a series of "experimental" (with RFPRS) and "control" (without RFPRS) conditions. If randomization were used in assignment to these conditions, the impact of the RFPRS could be estimated in tests of the degree to which differences between the two conditions were greater than anticipated by chance. A step in the direction of randomization might be made if one developed a pool of markets which could readily (e.g., due to demonstrated newspaper cooperation) serve in the experimental conditions. From this pool, markets would then be randomly assigned to experimental and control conditions. When the market as a whole is the unit of analysis, this randomization technique should be adequate. When the store or the product is the unit of analysis, however, it is questionable whether "true" randomization would be achieved by assignment of entire markets to the two conditions.

Practical problems, however, may preclude the construction of a pool of markets for randomly assigning to each condition. Under such circumstances, the researcher may feel compelled to use a matching rather than a randomized design. Illustratively, one might opt to first secure the cooperation of "experimental" (test) markets, and then ensure that the control markets are comparable in respect to the other independent and control variables of the study. It is imperative that the researcher keep in mind that this design is actually a rather elaborate quasi-experimental design rather than a "true" experimental design. Such designs leave uncontrolled many potential confounds—notably, a variation of the well-known, self-selection bias (Campbell and Stanley [11]). This design can not directly control a confound that would occur if there is a qualitative difference between those markets with a cooperating newspaper and the "rank-and-file" markets. This is a difference along a dimension, which, in turn, directly alters the impact of the RFPRS. Hence, self-selection, as well as other complexities of this quasi-experimental design, would possibly limit both the "internal validity" (i.e., the degree to which hypotheses can be accurately tested with the actual data gathered) and the "external validity" (i.e., the degree to which study results can be generalized) of the study. When using a matching rather than a randomized design, then, the researcher should systematically assess whether these potential artifacts plague the data generated (Campbell and Stanley [7]).

Finally, it is obvious that spurious effects can readily lead to mistaken conclusions if a single experimental market is compared to a single control market. For example, during the length of a study, various political, economic, and other events irrelevant to the operation of the RFPRS could occur within the markets under study (or at regional or national levels), which would lead to price differences between the experimental and control markets. In the final analysis, the use of single experimental and control markets has all the problems of an n = 1 design, no matter how many stores or products within a market are investigated. Consequently, a replication factor must be included in the design to provide at least two independent tests of all hypothesized between-market effects. Similar reasoning indicates that differences obtained among product classes, or among items within a product class, could spuriously reflect the impact of irrelevant variables and so generate misleading conclusions, unless those differences were replicated. Incorporation into the design of a separate between-market replication factor and a between-product replication factor would greatly alleviate possible problems.

The above considerations dictated the design of the Purdue study. First, a factorial combination of independent variables was used, with equal n's in each cell of the between-store section of the design. Second, difficulties in securing newspaper cooperation demanded the use of a matching design. The approach used in the Purdue study was a quasi-experimental design in which test and control variables, most notably population size, local newspaper penetration, and concentration level. Third, the inclusion of two test and two control markets provide two independent tests of all hypothesized between-market effects. A separate between-product replication factor was also included to permit repeated tests of hypothesized between-product effects.

Consumer Impacts

The basic objective here is to assess the impacts of a RFPRS upon certain consumer orientations and behaviors. A sample of consumers is required, then, to reflect market conditions with and without a RFPRS. The procedures selected must represent several considerations. First is the need for a "pre-test/post-test control group" to undergird the procedures. Needless to say, the use of one or more experimental markets studied before, during and after introduction of a RFPRS would be inadequate; history, regression, and other confounds, long known (Campbell and Stanley [7]) to haunt the internal and external validity of this "single-group time series" design, would be uncontrolled.

Nor would the popular "post-test only" design be effective. Comparing a sample of consumers under RFPRS conditions with a sample of consumers in the control condition after the RFPRS has been installed may be quite insensitive to RFPRS effects, and could easily be misleading. Under the best of circumstances, a comparison of consumers in one market with consumers in another market would reflect many variables beyond simply the operation of a RFPRS, even though both groups were matched in the aggregate on a series

of important variables. Aggregating across markets and comparing a combination of several RFPRS markets with a combination of several control markets would not solve the dilemma; a multitude of confounds would still make the comparisons difficult to interpret (Campbell [5]). This ambiguity in interpreting results would be particularly troublesome, whenever true randomization in assigning markets to test and control conditions is a practical impossibility. Among others, the self-selection confound (discussed with respect to the price data) would make it difficult to draw firm conclusions about the impacts of a RFPRS. On the other hand, interpretive ambiguities would be lessened, although not eliminated, by requiring that an impact of the RFPRS be displayed over time. That is, to be judged as an impact of a RFPRS, the change in the experimental markets from before to after the introduction of the system must be different than the change appearing in the control condition during that same period.

Second, direct questioning of consumers at two points in time raises the specter of a pretest bias (Lana [18]). Could the differences obtained between the experimental and the control markets be traceable, at least in part, to pretest sensitization to the upcoming RFPRS among respondents in the experimental condition, thereby altering their reactions to the experimental treatment? If so, external validity of the study would be reduced; results could be generalized only to those consumers who previously were sensitized to the system. For such pre-test bias to occur in a study of a RFPRS is not beyond the realm of possibility. Those circumstances that apparently can enhance the magnitude of such a bias are to be found in the consumer surveys. For example, retail product prices and other issues in the survey are "emotionally hot," the data gathering interviews are unusual in the daily routine of respondents, etc. Interpretative difficulties attendant upon the use of a pretest would be reduced if the differences obtained between experimental and control samples among pretest respondents were comparable to differences found between experimental and control conditions among those not administered a pretest.

Based on these considerations, the Purdue study employed a modification of the "Solomon four group" (Campbell and Stanley [7]), shown in Table 1. Consumers in the experimental markets were randomly assigned to A and B conditions; only those in A received the pretest. Again in the control markets, respondents were randomly assigned to A and B conditions, and only the former received the pretest. A pretest survey was conducted during Time 1, the period before installation of RFPRS. Time 2 was the period during which only the experimental markets received the RFPRS. At Time 3, the period after cessation of the RFPRS, all four groups were recontacted and administered the post-test survey.

Table 1. Solomon Four-Group Design

Group	Time 1	Time 2	Time 3
1) Experimental A	Pretest	RFPRS	Post-test
2) Experimental B	No Pretest	RFPRS	Post-test
3) Control A	Pretest	No RFPRS	Post-test
4) Control B	No Pretest	No RFPRS	Post-test

The classical Solomon four-group design requires random assignment to experimental and control conditions. As previously noted, however, difficulty in securing newspaper cooperation precluded randomized assignment to experimental and control conditions. The design, then, was more a quasi- than a true experimental design, and has those strengths and weaknesses in testing the impacts of a RFPRS discussed with respect to the quasi-design used to gather price data (Sherwood, Morris, and Sherwood [27]). Randomization was possible in assigning respondents to A and B groups, however. Hence, this was a true experimental design in regard to assessing the existence of pretest bias within a condition. Comparability between groups 1 and 2 and between groups 3 and 4 indicates the absence of a pretest bias, increasing confidence in the generalizability of the data. Conversely, an interaction between the treatment groupings (i.e., experimental vs. control conditions) and pretest groupings (i.e., A vs. B conditions) on the dependent variables at Time 3 would suggest caution in generalizing study results.

In any study of RFPRS impacts, the major theme in the hypothesis tests should be "cross-validation." The number of response biases that can contaminate self-reports of beliefs and behaviors is legion (e.g., Sudman and Bradburn [30]). Hence, it is important that hypothesis tests be cross-validated, i.e., be assessed in independent tests using different procedures. One format for these methodological replications is the now commonly accepted multi-trait multi-method approach initially described by Campbell and Fiske [6]. A somewhat similar thrust in the consumer analysis could be to explore various nuances in the assumptions underlying the formal hypotheses.

Beyond using alternative measures to test principal hypotheses, the Purdue study investigated alternative conceptualizations of many of the major constructs. For example, it was hypothesized that one effect of a RFPRS would be to increase the sensitivity of consumers to product prices at the retail level. Yet, what is "sensitivity"? Is sensitivity best seen as alertness to price information, as measured by the respondent's accuracy in identifying the lower price stores among those included in the RFPRS? Or is sensitivity better seen in terms of the perceived importance of price in comparison to product attributes, as indexed by expressed preferences for various product attributes? Or, again, is sensitivity best conceived as the extent to which product price can alter the readiness of consumers to purchase a product, as measured by the degree to which known changes in store prices can predict changes in the frequency of purchases in those stores? The degree to which these alternative tests of a hypothesis converged was used to support the validity of the theoretical constructs investigated in the study (Campbell and Fiske [6]).

REFERENCES

1. Anderson, C.R., Scott, R.A., "Supermarkets: Are they Really Alike?" *Journal of Retailing, Fall,* 1970, pp. 228-36.

2. Baumol, William L., Richard E. Quandt, Harold T. Shapiro, "Oligopoly Theory and Retail Food Pricing," *Journal of Business,* Vol. 37, 1964, pp. 346-363.

3. Brown, R.E., A.R. Oxenfeldt, *Misperceptions of Economic Phenomena,* Sperr &,Douth, Inc., New York, 1972.

4. Burgoyne, Inc., *National Study of Supermarket Shoppers:* 1977, Cincinnati, Ohio, 1978.

5. Campbell, D.T. "Reforms as Experiments," In E. Struehring and M. Guttentag (eds.), *Handbook of Evaluation Research* Vol. 1, London, Sage Publications, 1975, pp. 71-100.

6. Campbell, D.T. and D. Fiske, "Convergent and Discriminant Validation by the Multitract Multimethod Matrix," *Psychological Bulletin,* Vol. 56, 1959, pp. 81-105.

7. Campbell, D.T., and J. Stanley, *Experimental and Quasi-Experimental Designs for Research,* Chicago, Rand McNally, 1963.

8. Crowell, P.M., J.S. Bowers, "Imports of Time and Transportation Costs On Food Shopping" *Journal of Consumer Affairs,* Summer 1977, pp. 102-109.

9. Devine, D.G., *An Examination of the Effects of Publishing Comparative Price Information on Price Dispersion and Consumer Satisfaction,* unpublished Ph.D. Thesis, Ohio State University 1976.

10. Devine, D.G. and M.H. Hawkins, "An Empirical Study of Metropolitan Market Conduct in Food Retailing," *Canadian Journal of Agricultural Economics* XVIII, No. 2, 1970, pp. 41-51.

11. Devine, D.G., B.W. Marion, "The Influence of Consumer Price Information on Retail Pricing and Consumer Behavior" *American Journal of Agricultural Economics,* May 1979, pp. 228-37.

12. Gabor, A., C.W.J. Granger, "On the Price Consciousness of Consumers" *Applied Statistics,* Nov. 1961, pp. 170-88.

13. Gosard, A.B., *Analysis of Alternative Sampling Procedures for Measuring Difference in Food Store Price Levels,* M.S. Thesis, Purdue University, 1975.

14. Handy, C. and N. Seigle, "Marketing: Generic Labeling," *National Food Review.* September 1978, pp. 17-20.

15. Holdren, B.R., *The Structure of a Retail Market and the Market Behavior of Retail Units,* Iowa State University Press, 1968.

16. Holton, R.H., "Price Discrimination at Retail: The Supermarket Case," *Journal of Industrial Economics,* October 1957.

17. Kish, L. *Survey Sampling,* New York, Wiley, 1967.

18. Lana, R. "Pretest Sensitization," in R. Rosenthal and R. Rosvow (eds.), *Artifact in Behavioral Research,* New York, Academic Press, 1969.

19. Marion, B.W., W.F. Mueller, R.W. Cotterill, R.E. Geithman, J.R. Schmelzer, *The Profit and Price Performance of Leading Food Chains,* 1970-74, Joint Economic Committee of the Congress, April 12, 1977.

20. Marion, B., L. Simonds, H. Moore, *Food Marketing in Low Income Areas,* Ohio State University, Cooperative Extension Service, 1969.

21. Mincer, J., "Market Prices, Opportunity Costs, and Income Effects," *Measurement in Economics,* Stanford Univ. Press, 1963, pp. 67-82.

22. National Commission on Food Marketing (NCFM), *Organization and Competition in Food Retailing,* NCFM Technical Report No. 7, June 1966.

23. Nelson, P.E., L.E. Preston, *Price Merchandising in Food Retailing: A Case Study,* University of California Institute of Business and Economic Research, 1966.

24. Padberg, D.I., *Economics of Food Retailing,* Cornell University, 1968.

25. Preston, L.E., *Profits, Competition and Rules of Thumb in Retail Food Pricing,* University of California, Institute of Business and Economic Research, December 1963.

26. Progressive Grocer, *The Colonial Study,* New York, 1962.

27. Sherwood, C.C., J. Morris, and S. Sherwood, "A Multivariate, Non-randomized Matching Technique for Studying the Impact of Social Interventions," in E. Struehring and M. Guttentag (eds), *Handbook of Evaluation Research* Vol. 1, London, Sage Publications, 1975, pp. 183-224.

28. Skinner, R.W., "Hidden Consumer Motives in Supermarket Selection," *American Journal of Agricultural Economics,* Dec. 1969, pp. 1154-58.

29. Stigler, G., "The Economics of Information" *Journal of Political Economy,* June 1961, pp. 213-25.

30. Sudman, S., and N. Bradburn, *Response Effects on Surveys: A Review and Synthesis,* Chicago, Aldine Publishing Company, 1974.

31. Swan, J.E., "Patterns of Competition for Differential Advantage in Two Types of Retail Institutions" *Journal of Retailing,* Spring 1971, pp. 96.

32. Uhl, J.N., H.L. Brown, "Consumer Perception of Experimental Retail Food Price Changes" *Journal of Consumer Affairs,* Winter 1972, pp. 171-85.

33. Weiss, C. "Interviewing in Evaluation Research," in E. Struehring and M. Guttentag (eds.), *Handbook of Evaluation Research* Vol. 1, London, Sage Publications, 1975, pp. 355-96.

34. Winer, B.J. *Statistical Principles in Experimental Design* (2nd ed.). New York, McGraw Hill, 1971.

FOOTNOTES

[1] Comparative food store price information or a retail food price reporting system (RFPRS) provides current information on the price of individual food items, and/or marketbasket costs (expressed as $/unit, index numbers, or rank orders) at several fully identified supermarkets on a regular basis to a large proportion of the households in a SMSA.

[2] The Purdue study features a three-part weekly price report in the four test cities:
(1) the weighted marketbasket store costs of 100 items (BLS value weights);
(2) weighted store departmental costs for produce, meats, dry groceries, etc.; and
(3) comparative store prices of 25 frequently purchased food and non-food items.

[3] The New York State Department of Agriculture and Markets has conducted a RFPRS since 1966. Numerous newspapers have operated reporting systems on a temporary and longer-term basis. Since 1972 Vector Enterprises, Inc. of Santa Monica, California has privately produced a local, weekly, automated comparative food price information program to which cable TV companies can subscribe. In 1979, their system served at least nine U.S. cities. There are also several State Departments of Agriculture and private agencies that provide ranges of food prices in local markets, but do not identify individual store prices.

[4] Gossard explored the effects of marketbasket size, weighting and composition on departmental and store price levels in Indianapolis in 1975. He found that most studies of foodstore price differences employed too small a sample to reveal anything other than sampling error differences.

[5] Cities used by Devine appeared to exhibit reasonably stable store cost ranks for a representative marketbasket during the pretest period. That is, stores did not seem to change ranks frequently. The NCFM, however, identified unstable patterns within a city as well as hybrid types. Unfortunately, no explanation for the existence of different patterns has been offered. It is expected, *a priori,* that the pattern that exists prior to initiation of a RFPRS will affect the pricing responses observed. Specifically, the impact of a RFPRS on pricing behavior in unstable markets may be less than in markets characterized by more stable store ranks prior to the new information system. In unstable markets, retailers may be engaged in more price competition, ex ante, such that the RFPRS has a diminished effect in those cities. In stable markets consumers may, ex ante, be less price conscious, having had time to identify preferred stores based on stable price-service-quality criteria. Upon imposition of a RFPRS, however, price may become more salient, thereby forcing a major price response in those cities.

[6] Taking advantage of a 16-item, 5-store comparative food price survey published monthly by a Lafayette, Indiana newspaper in the second half of 1978, we found a less significant decline in average food prices than in the Canadian study. If the first week of the price report is used as a base (no control city existed), the average marketbasket cost in the Lafeyette area decreased 3.5 percent over 13 weeks, while nationwide food prices were on the rise. Over the same period, the average price of a non-published 14-item substitute marketbasket in Lafayette declined 2.9 percent, suggesting that in Lafayette the effect was not as large as in the Canadian study. Unlike the Canadian findings, no significant decrease in interstore price variability was found in Lafayette.

[7] Retailer response to the RFPRS is expected to result from retailers' enhanced awareness of competitors' prices (a form of price signalling) and consumers' disciplinary shopping behavior.

8 For the reacting oligopoly model, price reaction curves can be estimated by ordinary least squares procedures for each firm and each commodity for which price data are available. The function is described by

$$P_{i,k}^{t} = f(P_{1,k}^{t-0}, P_{2,k}^{t-0}, P_{i-1,k}^{t-0}, P_{i+1,k}^{t-0}, \ldots)$$

where $P_{i,k}t$ is the price of the kth item (or marketbasket) in store i at time t.

Industry experts have suggested that item mix, space, and price are simultaneously determined, which might explain why Baumol *et al.* found only limited success with the reacting oligopoly model. In this research, additional arguments may be added to the function, e.g., store's rank in a particular department at t–0, to increase its explanatory power. At the present time, however, no plans exist to explore item mix or space relationships.

9 Profitability alone does not determine responsiveness to a RFPRS. The importance of the item in consumers' store choices may manifest itself in rapid and significant retailer response, despite the item's profitability.

10 The effect may be less than anticipated, however. Holdren found that variable price merchandising, marketbasket pricing, and week-end specials consisted of lowering prices of items with high transfer effects. Since some of the reported items in our marketbasket are considered to have high transfer effects, many items in the RFPRS may already appear in newspaper specials.