Determinants of Beef and Pork Brand Equity

Joe Parcell

&

Ted Schroeder

Department of Agricultural Economics Working Paper No. AEWP 2003-08

November 1, 2003

The Department of Agricultural Economics is a part of the Social Sciences Unit of the
College of Agriculture, Food and Natural Resources at the University of Missouri-Columbia
200 Mumford Hall, Columbia, MO 65211 USA
Phone: 573-882-3545 • Fax: 573-882-3958 • http://www.ssu.missouri.edu/agecon

Determinants of Beef and Pork Brand Equity

Dr. Joe L. Parcell
Assistant Professor
Department of Agricultural Economics
143A Mumford Hall
University of Missouri – Columbia
Columbia, MO 65203
parcellj@missouri.edu

Dr. Ted Schroeder
Professor
Department of Agricultural Economics
214 Waters Hall
Kansas State University
Manhattan, KS 66502
tschroed@agecon.ksu.edu

*Joe Parcell is an assistant professor with the Department of Agricultural Economics and Agribusiness Research Institute at the University of Missouri – Columbia. Ted Schroeder is a professor in the Department of Agricultural Economics at Kansas State University. We gratefully acknowledge the Beef Checkoff program for funding the acquisition of the National Panel Diary data used for this analysis.

Determinants of Beef and Pork Brand Equity

A set of consumer-level characteristic demand models were estimated to determine the level of brand equity for pork and beef meat cuts. Results indicate that brand premiums and discounts vary by private, national, and store brands; and brand equity varies across meat cuts carrying the same brand name. Other results are that product size discounts are linear, meat items on sale are significantly discounted to non-sale items, specialty stores typically do not garner higher prices than supermarket/grocery store, and warehouse/super center stores typically premium price to supermarket/ grocery stores.

Keywords: Brand Equity, Pork, Beef, Hedonic Modeling

Determinants of Beef and Pork Brand Equity

Over the past decade there has been tremendous interest in branding meat products. For instance, The National Cattlemen's Beef Association reports that some 472 new beef products were developed in 2001 compared to only 70 in 1997. A study commissioned by the National Pork Producers Association reported that up to 77% of the fresh pork marketed today carries a brand. Branded meat products and new product development have been heralded as important for developing customer loyalty (Motameni and Shahrokhi) and increasing consumer demand (Purcell). However, some have argued that branding and related product proliferation by large food companies could be used to discourage competition (Connor) and that national brands can especially dominate private labels (Cotterill; Putsis). Brand loyalty has a significant effect on retailer promotion strategy and profit (Tellis and Zufryden).

The purpose of this study is to determine to what extent beef and pork product brand affects prices (i.e. to measure brand equity) for individual retail products. With increased interest in meat branding little is known about the level of differentiated pricing branding allows and how differentiated pricing varies across firms branding products, across regions, between different store types, and across beef and pork products. This study uses retail purchase data to analyze branded beef and pork product differentiated pricing between product, geographic location, store type, sale items, composition (fresh, frozen, or cooked) and size of cut for beef steak, roast, and ground beef, and pork chops, ribs, roast, ham, and steak.

Branding may mean different things to different people, however, in basic terms Giddens and Hofmann (p.1) define branding as, ". . . the combination of name, words, symbols or design that identifies the product and its company and differentiates it from competition."[1] Branding is important for several reasons. First, branding allows one to try to differentiate their product.

This transforms the product from a commodity to a product that might be positioned for differentiated pricing. Second, brands convey value. Consumers perceive branded products to be more reliable, higher quality, and reduce the possibility for purchasing faulty products (Ailawadi, Nelsin, and Gedenk). Third, Branding also builds loyalty. Building brand loyalty can increase profitability (Tellis and Zufryden) and repeat sales can be up to 90% less expensive – advertising – than marketing to a new customer segment (Giddens and Hofmann). Thus, branding can impact profits for reasons other than simply receiving a higher price.[2]

The strategy for developing brand identity has varied. For instance, Farmland (a producer owned cooperative recently bought out by U.S. Premium Beef) developed a supply chain to deliver branded beef and pork products to consumers. Excel Corporation converted their Marshall, MO pork processing plant to a further processing plant in 2002. Excel also recently developed an alliance with Hormel to market some of their products under the Hormel brand name. Smithfield Foods has acquired a number of regional 'mom-and-pop' labels. Even on the individual or small group producer level branded meat products have emerged from small farming operations. Are national branded products garnering significant premiums to private labels? If so, this suggests producer alliances that are attempting to establish meat product brands in attempts to capture premiums relative to generic unlabeled products and get closer linkages to consumers may not be fruitful without national prominence of the brand.

From a consumer survey evaluating steak attribute importance, Lusk found consumers ranked (on a scale of 1 to 5 with 1= not important to 5 = very important) brand (label) lowest of six factors. Brand (label) was ranked a full point lower than the next attribute. This result is interesting given the increased efforts to brand meat products. If Lusk's results are correct, then branded products would not be expected to garner much of a premium price relative to similar

non-branded products. Or, it may be that a brand (label) conveys the product's tangible attributes as opposed to intangible attributes. Consumers may not rank branding as an important attribute, but are they willing to pay premiums for brand alone?

As consumers have become more discriminating in their purchasing decisions (Barkema), the beef and pork industries have responded by developing branded pork products. Furthermore, interest in farmer-owned brands is increasing rapidly (e.g., see Hayes and Lence for a discussion of this issue). If branding trends continue to expand to the beef sector, as recent evidence suggests they are (Denver Post), then more information on 'how much' and 'how to' abstract value from brands will be important as competition for market share increases.

Previous Branding Research

Motameni and Shahrokhi provide six methods for evaluating brand equity. One method of particular interest for the current study is the assessment of brand value through premium pricing. They note that by measuring the price premium between products one can assess the level of brand equity a product holds. Determining brand equity value is one objective of our study.

Van Osselaer and Janiszewski used consumer taste tests to investigate the associational linkages between brand name and attributes. Using chocolate cake they analyzed consumer association between flavor and moisture and brand. They found that consumers had strong associational linkages between chocolate flavor and brand. This result could provide insight into the current study. For instance, Lusk found consumers generally ranked brand identification below other beef product attributes. Van Osselaer and Janiszewski suggested that other attributes may be strongly associated with brand identification. Thus, using multivariate analysis

to assess brand premiums may reveal more precise relationships between brand and product value.

Ailawadi, Nelsin, and Gedenk analyzed consumer choice between store and national brand promotions. They researched how consumer demographic and pyschographic traits affect consumer purchases of store and national brand products. Pyschographic traits were categorized as economic (price, financial, quality), hedonic (shopping enjoyment, innovativeness, variety seeking, impulsiveness, mavenism, and motivation to conform), and costs (brand loyalty, store loyalty, planning, time pressure, thinking costs, and inventory build up). Economic psychographic traits price and financial constraints had statistically significant positive impacts on store brand usage. Cost phychographic trait store loyalty statistically and significantly positively impacted store brand usage, and brand loyalty significantly negatively impacted store brand usage.

Kinoshita et al. estimated own- and cross-price elasticities for Japanese dairy products. They used their empirical results to assess the level of differentiated pricing. Using a linear expenditure system of equations they estimated demand models by store for fresh and reconstituted milk products. They found substitution between milk products and concluded for the products analyzed that retail milk markets were competitive.

Nimon and Beghin investigated the value of eco-labeling. Using data collected from catalog advertising, they employed a characteristic demand model by regressing characteristics of the catalog advertisement, whether the product was organic, and demographic factors associated with target market of the advertisement on the natural logarithm of price, normalized by cotton fiber content in the product. They concluded that labeled organic cotton apparel

garnered a 33% price premium per unit of cotton fiber content relative to conventional cotton apparel.

Unnevehr and Gouzou used hedonic modeling to investigate retail premiums for branded honey products. Using scanner data, they regressed price as a function of size of bottle and size of bottle squared, type of container, flavor, and brand. Their model explained 77% of the variation in honey price. They concluded that honey products are highly differentiated. Honey products with unique floral sources demand price premiums. Generic and store branded products were discounted an average of $0.22 per container relative to branded honey products.

Binkley et al. examined price behavior in retail orange juice in 1989 and 1990 during the period of a serious freeze causing a sharp increase in retail price. They found that national brands had the least elastic demand relative to regional brands and private label. Overall, they concluded that national brands (e.g., Minute Maid, Tropicana, and Citrus Hill) were focused on competing with each other using advertising and price competition. But, they found no evidence that this competition was detrimental to smaller competitors.

Theoretical Model

The theoretical foundations for analyzing imputed values for consumer-level product characteristics lies with Dhrymes, Grilliches, Ladd and Suvannunt, Lancaster, Rosen, and Waugh. Measuring consumer demand for quality characteristics is not well researched in the agricultural economics literature, whereas, measuring input characteristic values is (e.g., Ahmadi-Esfahnai, and Stanmore; Brester, Lhermite, Goodwin, and Hunt; Ladd and Martin; Unnevehr and Gouzou; and Wahl, Shi, and Mittelhammer).

Consumers base food purchasing decisions on the expected utility derived from the product, or products, under consideration. Consumer decisions are made subject to budget constraints. Meat is one product that consumers have a choice in their consumption patterns; therefore, different beef or pork cuts provide consumers variety in their purchasing decisions. Consumer decisions on whether to purchase a product depend on the attributes of that product. Assuming consumers maximize utility subject to some budget constraint, the price (p_i) paid for a retail-level meat product *i* can be specified according to Ladd and Suvannunt as:

$$p_i = \sum_j S_j \left(\partial x_{j.} / dv_i\right) + E_i, \tag{1}$$

where *j* refers to a specific characteristic of product *i*, S_j is the rate of substitution between expenditures and the *j*th product characteristic (i.e., marginal implicit value) in purchasing decisions, $x_{j.}$ is the total quantity of the *j*th characteristic in the *i*th product, and v_i is the quantity of the *i*th product consumed by consumers. The term $(\partial x_{j.} / \partial v_i)$ is the marginal contribution of characteristic *j* in the consumer purchasing decision of the *i*th product for a given level of utility and income. For example, this value represents the marginal change in total pounds of beef purchased as the weight of the product changes. The final term, E_i, is total expenditures on meat product *i*.

Equation (1) specifies the price paid for product *i* equals the sum of the value of the *j* characteristics of the product. Following Ladd and Suvannunt, $\left(\partial x_{j.} / dv_i\right)$ is assumed constant and equal to x_{ji}. That is, increasing the expected weight of the product by one unit increases the expected total consumption by one unit. Also, following from Mendelsohn it is assumed that income (expenditures, E_i) is not a constraint for individual purchases, so we drop expenditures from the model. Therefore, equation (1) can be re-specified as:

(2) $$p_i = \sum_j S_j \cdot x_{ji} + \mathbf{U}_i + \tau_i ,$$

where $\mathbf{U}_i$ is vector of non-attribute factors impacting consumption decisions of product *i* and τ_i is an i.i.d randomly distributed error term. The marginal implicit value (S_j) need not be constant. Ladd and Suvannunt indicated that S_j could be specified using a nonlinear functional form where the marginal implicit price for an individual product is dependent on the level of the characteristic. For example the marginal implicit price of product weight may vary as the weight of the product changes (i.e., one may pay less in $/lb. for a 10 lb. beef roast as compared to a 6 lb. beef roast).

Empirical Model

To ascertain price premiums for branded pork products, we use characteristic demand modeling (hedonic modeling) to measure the impact of implicit characteristics and market factors associated with the particular beef or pork product. For the dollars per pound price (p_{zd}) of beef or pork of cut *d* (*d* = beef steak, roast, or ground and pork chops, ribs, roast, ham, and steak) for purchase *z* we specify a hedonic pricing model as:

(3) $$p_{zd} = f(Retail_z, Weight_{zd}, Weight_{zd}^2, \sum_{k=1}^{3} Composition_{zdk}, Sale_{zd}, Leanness_{z,groundbeef}, \sum_{e=1}^{3} Grade_{z,steak,e}, \sum_{l=1}^{6} Store\ type_{zdl}, \sum_{n=1}^{4} Location, \sum_{p=1}^{12} Month_{zdp}, \sum_{q=1}^{20} Brand_{zdq}) .$$

Where $Retail_z$ is the composite retail beef or pork price during the month when purchase *z* was made; $Weight_{zd}$ is the weight of cut *d* for purchase *z*; $Composition_{zdk}$ is a set of zero or one binary variables (*k* = refers to fresh, frozen, or cooked, *default* = frozen) relevant for pork only; $Sale_{zd}$ refers to whether purchase *z* of cut *d* was on sale (0 or 1; *default* = non-sale); $Leanness_{z,\ ground\ beef}$

refers to the leanness content of purchase *z* relevant for ground beef only; $Grade_{z,steak,e}$ is set of zero or one binary variables referring to USDA quality grade (*e* = Select, Prime, or Choice, *default* = Select) relevant for beef steak only; $Store\ type_{zdl}$ refers to six (0 or 1) store type dummy variables for store type *l* (*l* = supermarket/grocery, warehouse/super center, butcher/meat market, neighborhood/local deli, convenience store, or co-op, *default* = supermarket/grocery); $Location_{zdn}$ refers to four (0 or 1) geographic locations in the U.S. (*n* = East, Central, South, and West, *default* = Central); $Month_{zdp}$ is a series of monthly dummy variables to capture potential seasonal pricing patterns. $Brand_{zdq}$ refers to brand *q* of product *z* (*q* = supermarket/grocery store brand and angus for beef and *q* = 1, 2. . . 20 for pork, *default* = supermarket/grocery store brand).

Because retail prices may fluctuate over time due to factors outside of the scope of this analysis (e.g., aggregate supply and demand), the composite retail beef or pork price in included as an explanatory variable. There should be a positive relationship between the individual cut prices and retail composite price. Weight and Weight-squared are included in the empirical model to enable price to vary nonlinearly with portion size. Pork cut composition is included because fresh products are often sold at a premium to frozen products and cooked products (e.g., deli) are often sold at a premium to frozen and fresh products. Further prepared products will garner premiums reflecting their higher manufacturing costs that displace consumer effort in preparing foods. All beef products in our sample are of fresh composition.

The sale variable is included as a dummy variable to assess the impact on per unit product price from a sale item. Products on sale should sell for a lower price because sale items often represent products that are either being featured to draw customers into the store or nearing the end of their shelf life. Ground beef leanness is included to assess premiums associated with an increase in lean percent. Prime and Choice grade steaks are expected to garner premiums

relative to Select steaks. Because different stores cater to different consumer profiles, store type is included to assess how product pricing differs between store types. The limited sample size for branded beef products reduced the store type to supermarket/grocery, warehouse/super center, and butcher/meat market. A geographic location variable is included to determine whether regional pricing differences are present across the U.S. Because of cost of living and income differences, products sold in coastal areas are expected to be priced higher. Brands with broader national prominence, greater advertising, and having a longer presence in the industry are expected to receive premiums over more localized store brands.

Data

Data were collected from the Meat Panel Diary (MPD) database, obtained through the Retail Meat Purchase Diary research conducted by the NPD Group on behalf of the Beef Checkoff program. MPD data are collected at the household level. Data are collected for all meat purchases. Approximately 2,000 households are surveyed twice per month. Specific information collected includes: type of meat purchased, package weight, dollars spent, whether purchased on sale, brand, store type, product composition, grade, lean content, and demographic factors of the household. For this study beef cuts were aggregated to ground chuck, roast, and steaks (the only beef products with sufficient brands contained in the data set). Pork cuts used in this study include ham, chop, roast, rib, and steak. Information on processed meats and frozen prepared dinner/entrees is not collected in the MPD.

The Meat Panel Diary beef and pork data represent more than 350,000 and 120,000 total point-of-purchase observations over the 1992 through 2000 period, respectively (an observation is an individual product purchase by a particular household). Observations where either

dependent or independent variables were missing or not reported were dropped. For instance, numerous observations for beef and pork brand were reported as "other brand" or "not reported." Because we had no way of knowing what brands, if any, these products represented, these observations were deleted (this represented the vast majority of the deleted observations). Approximately 2,500 usable transactions with complete data were retained for the beef analysis and 30,000 usable transactions with complete data were retained for pork analysis. Over this time period, numerous national pork product brands existed. In contrast, the only beef brand of substance contained in the data set was Angus beef. This "brand" is likely primarily Certified Angus Beef®, but because other Angus beef brands also are present in the market, the Angus brand analyzed here could include some of these other Angus branded beef product lines.

Three beef products (steak, roast, and ground beef) and five pork products (chops, ribs, ham, roast, and steak) were selected for analysis. These categories represent products with the highest number of purchases during the 1993 to 2000 time period for which complete information was available. Table 1 provides aggregate summary statistics for the MDP beef and pork data. Most of the summary statistics have been aggregated – weighted average – to conserve space.

Results

Parameter estimates from the estimation of equation (3) are reported in tables 2-4. Because of the specificity of purchasing decisions, multicollinearity between explanatory variables may be a concern. Visual inspection of correlations yielded no worrisome relationships between the selected explanatory variables. Models were initially estimated using Ordinary Least Squares. Residual non-normality is a common concern with hedonic models. Therefore, the Jarque-Bera

tests of the null hypothesis of residual normality were performed. For each of the three retail-level beef and each of the five retail-level pork characteristic demand models the null hypothesis of residual normality was rejected. Models were re-estimated using the multivariate-*t*-errors robust estimation in *SHAZAM* 9.0 with three degrees of freedom and assuming independent residuals (Judge et al., Zellner). A similar procedure was performed by Dhuyvetter et al. In interpretation of results special care is taken to differentiate between statistical significance and economic significance. When dealing with such large samples the number of observations can make a coefficient statistically significant but it may not be economically significant (McCloskey and Ziliak; McCloskey).

The multivariate-*t* characteristic demand models estimated explained between 17% and 53% of the variation in retail-level beef prices and between 25% and 41% of the variation in retail-level pork prices.

Beef

Branded beef estimates are reported in table 2. In general, statistically significant coefficients had the expected signs. The composite retail beef price was statistically significant and of the expected sign, positive, for ground beef and steak. The weight variable for ground beef and steak was negative and statistically significant, and the weight-squared variable was positive and statistically significant. Graphical inspection of the combination of the weight variables had a nearly linear relationship over the relevant weight range suggesting the weight-squared term is not economically significant for ground beef or steak equations. Roast price per pound was not related to product weight. As expected, the sale variable is negative and significant ranging from around -$0.35/lb for ground beef and roasts to -$1.17/lb for steak.

For the *Leanness* variable in the ground beef retail primal equation there was a positive and statistically significant impact on ground beef price from each percentage point increase in leanness. This result is as would be expected, as health conscience consumers are willing to pay a premium for leaner meat. The coefficient estimate was $0.04/lb. for a one-percentage point increase in lean percentage. Thus, ground beef with a 5% higher lean percentage would garner a $0.20/lb premium. For the *Beef Grade* variables in the steak equation Prime steak received a statistically significant premium of $1.21/lb. relative to Select beef. However, Choice steak price was not statistically different from Select steak.[3]

No Statistically significant differences between store types were observed. Yet, the impacts reported are large enough to matter economically. Surprisingly, beef sold through warehouse/super center garned premiums to supermarket/grocery store marketed beef. For location, ground beef receives a higher price in the east, south and west relative to the central, and steak is sold at a premium in the south relative to the central region.

The *Brand* variable in the retail beef equations steak and roast was positive and statistically significant. Angus brand ground beef had no statistically significant premium. This is not surprising given that the primary factor that differentiates ground beef is percent lean which is not uniquely associated with any particular brand. Angus brand roast had a premium of $0.33/lb and steak a premium of $1.13/lb., relative to store brands. Although the beef branding results reported here are narrow in scope, there is strong evidence to suggest that the Angus beef brand garners considerable brand equity. This result provides support for increased branding of Angus beef, which is consistent with the trend in Certified Angus Beef®.

Certified Angus Beef® (CAB) accounted for 5.7% of 2001 fed cattle slaughtered (Ishmael). CAB began as a brand in 1978 and the time it takes to market one million pounds of

CAB meat has dropped from 22 months to 22 hours over the past 25 years. In addition, a higher proportion of the carcass is now marketed under the CAB brand (about 20% of carcass in 1978 to over 50 % today, Ward and Hildebrand) as evidence by brand line extensions, e.g., Certified Angus Steak. Growth in CAB marketings can be partially attributed to the American Angus Association's supply development branch, which provided a third-party verification for quality and consistency (Schroeder and Kovanda). This allowed for vertical linkages in the supply chain to help develop the brand.

Pork

Results of the pork models estimated are reported in table 3. The composite retail pork price was statistically significant and of the expected sign, positive, for all retail-level pork cuts except pork chops. For each of the pork cut models weight was negative and statistically significant and weight squared was positive and statistically significant. However, graphs of the marginal implicit pricing schedules revealed that none of the cuts had a significant non-linear relationship between implicit price and portion size for the relevant ranges of portion sizes (i.e., the weight-squared term is not economically significant in any of the models).

Fresh ham, pork chop, and rib products garnered statistically significant price premiums relative to frozen product. This result was as expected. Fresh pork chops garnered a $0.39/lb. premium over frozen pork chops, and fresh hams garnered a $0.14/lb. premium over frozen hams. For cooked products, ribs garnered a $1.55/lb. premium over frozen ribs and cooked hams garnered a $0.17/lb. premium over frozen hams. These values likely partially reflect the cost of creating, handling, and storing either fresh or cooked products. For instance, pre-cooked ribs would include preparation and ingredient costs, so the $1.55/lb. premium consumers are willing

to pay reflects the opportunity costs and ingredient costs from creating cooked ribs from frozen ribs.

In general, when the store type variable was statistically significant, the coefficient signs tended to be different than expected. The default category is supermarket/grocery store. For ribs, roast, and pork chops warehouse/super center stores have positive and statistically significant coefficients ranging from $0.47/lb. to $0.71/lb. This suggests that consumers shopping at warehouse/super center stores pay a premium for pork relative to purchases at supermarkets/grocery stores. This result is unexpected because warehouse/super center stores are promoted as selling products at discounts. Huang et al. found that during the first few months following the opening of a Wal-Mart Supercenter in Athens Georgia Wal-Mart sold red meat for roughly 18% lower than six supermarkets. Whether this would persist in the long run once the new store matured is unknown. Our results suggest that on a national basis Supercenter type stores did not sell pork products more cheaply than grocery stores. An additional interesting result is that local deli, butcher shops, and cooperative stores do not significantly price pork differently from supermarket/grocery stores.

Stores located in the south, east, and west priced ribs and pork chops at premiums of $0.15/lb. to $0.36/lb. relative to pork products sold in the central region. This was expected, as income and cost-of-living are higher outside the central region. For pork roast and hams, higher prices were only observed in the east. For pork steak, location premiums of about $0.25/lb. were observed in the east and west.

Only for pork chops and hams was seasonality statistically significant for more than a couple of months. December was the default month so coefficient values are relative to December prices. During the summer months pork chops were around $0.14/lb. higher relative

to December (after adjusting for aggregate retail pork price changes). This is consistent with when pork chops are in greatest demand, during the summer grilling season. For hams, statistically significant negative coefficients tended to be present during the first quarter of the year. This is consistent with the purchasing pattern of hams around the Thanksgiving and Christmas holidays (during the default month).

Coefficient estimates for the individual pork brands by cut are reported in table 4. All brand premiums and discounts are relative to supermarket/grocery store brands. For instance, the value 0.806 for Hillshire Farms pork ribs indicates that Hillshire Farms pork ribs were priced $0.806/lb. higher than supermarket/grocery store brand ribs, *ceteris paribus*.

In general, national brand pork products tend to have higher prices than products with private label or other type store brands. For instance, warehouse/super center store brand ribs and roasts are discounted $0.19/lb and 0.36/lb. relative to similar products with a supermarket/grocery store brand.

For hams, brand premiums were observed for private label and specialized store type brands. Some national brand hams had premium prices relative to supermarket store brands and others were at a significant discount. For example, Hillshire farms, Hormel and Thomas E. Wilson brands had greater than $0.40/lb. premiums relative to supermarket store brands. This indicates that for the highly branded ham market, there is brand equity value to having an established name or purchasing an existing brand name (e.g., Sara Lee Corp. owning the Hillshire Farms brand). However, other brands (Corn King, Farmland, and Oscar Meyer) had discounts of $0.29/lb. or more relative to store brands. Apparently these brands are targeting more price conscious consumers.

Hillshire farms obtained price premiums for pork products it is known for (ham and ribs). Hormel branded products have a substantial brand premium to supermarket/grocery store brand products. This indicates a high level of brand equity for the "Hormel" national brand name. The only other national pork brand that appeared to have wide spread equity was the Thomas E. Wilson brand which interestingly is being replaced by the Tyson brand.

Conclusions

Branding is used to differentiate products to attract consumers to buy a firm's products, to convey value in order to command price premiums, and to build brand loyalty. In order for existing businesses to better understand the value of branding strategies and for new businesses to determine how to develop a brand pricing schedule more information on the value of retail-level branding price differentiation is needed. Empirical estimates of retail-level branded beef and pork price premiums were made using characteristic demand modeling. Results shed light on the level of branded beef and pork pricing premiums and determinants of the level of pricing premiums.

Several important implications developed from this research. First, product size discounts are linear, i.e., retail price per pound decreases at a nearly constant rate as product weight increases. Second, meat items on sale are sold at significant discounts to non-sale items. This result provides additional motivation for why USDA needs to collect scanner data to better approximate retail meat values. Third, specialty stores typically do not garner higher prices than supermarket/grocery stores, while warehouse/super center stores typically premium price to supermarket/grocery stores.

Our analysis of branded beef and pork products, and to a greater degree the difference between national, store, and private brands, provides interesting implications for the meat industry and future research. The level of brand premiums differed across beef and pork cuts. Private label brands only garnered significant premiums for specific labels and specific cuts. A farmer-owned brand, Farmland, tended not to have a brand premium associated with it, except for pork steak. Some brands clearly command considerable brand equity whereas others appear to be targeting price sensitive consumers by selling lower priced products.

The Angus beef brand equity value varied across beef cut with, as expected, steak having the largest premium. Ground beef had no brand premium. One interesting finding is that the brand premium for a Angus steak relative to store brand is estimated to be $1.13/lb, which is one-half the premium consumers indicated they are willing to pay for Certified Angus Beef® relative to generic steak (Feldkamp, Schroeder, and Lusk). Thus, a brand name like Certified Angus Beef® that can attain national prominence may garner even greater premiums than the broader Angus type brand category analyzed here.

Our findings offer insight for producer-owned businesses looking to develop brand identity. First, some national brands enjoy considerable equity. Second, a variety of brand premiums and even discounts for some brands exist across meat cut. Also, there appears to be considerable value in the producer-owned Angus brand, as evidence by Certified Angus Beef®. However, it took several years to grow this brand to its current presence. Producers interested in branding products should focus on building consumer trust through quality and consistency. Having a third-party verification process, e.g., ISO-9000 certified, in addition to capturing economies of size through building a national branded program may be necessary. Producers pursuing product branding must also recognize that brands that enjoy considerable value in the

market place have been around for a long time and/or have invested considerable dollars into brand development and recognition by consumers through extensive promotional activities. For this reason, forming alliances with existing brands that have brand equity is one strategy producers wishing to capture branded premiums on a national basis may wish to consider.

Footnotes

1. There are four types of branding strategies: new product branding, flanker branding, brand line extension, and brand leveraging. New product branding is where a firm creates a brand for a new product line that is outside the firm's normal product line. Introducing new brands can be extremely expensive (Motameni and Shahrokhi). Flanker branding refers to a firm marketing a separate product for a similar product line in which the firm already has a brand name presence (i.e., serve separate market segments). Brand line extension is where a firm uses a current product name in the introduction of a new product (e.g., Coke and Diet Coke). With brand leveraging the firm utilizes an existing brand name to penetrate a new product category (e.g., George Foreman and the George Foreman Grill). Any combination of these strategies can be used in branding a product.
2. The value to labeling other than premium pricing could be measured by analyzing the extent of customer repeat purchases.
3. A separate model was estimated for only observations graded Select, Choice, and Prime. Results indicated no significant change in premiums associated with Choice or Prime, relative to Select, compared to the model results presented here.

Works Cited

Aaker, D.A. *Managing Brand Equity*: *Capitalizing on the Value of a Brand Name*. The Free Press New York, NY, 1991.

Ahmadi-Esfahani, F.Z. and R.G. Stanmore. "Values of Australian Wheat and Flour Quality Characteristics." *J. Agribusiness*. 10(1994): 529-36.

Ailawadi, K.L., S.A Neslin, and K. Gedenk. "Pursuing the Value-Conscious Consumer: Store Brands Versus National Brand Promotions." *Journal of Marketing* 65(January 2001):71-89.

Barkema, A. "Reaching Consumers in the Twenty-First Century: The Short Way around the Barn." *Amer. J. Agr. Econ.* 77(1995):309-18.

Binkley, J., J. Eales, M. Jenkanowski, R. Dooley. "Competitive Behavior of National Brands: The Case of Orange Juice." *Agribusiness* 17(2001):139-60.

Bowman, K.R., and D.E. Ethridge. "Characteristic Supplies and Demands in a Hedonic Framework: U.S. Market for Cotton Fiber Attributes." *American Journal of Agricultural Economics* 74(November 1992):991-1002.

Brester, G.W., P. Lhermite, B.K. Goodwin, and M.C. Hunt. "Quantifying the Effects of New Product Development: The Case of Low-Fat Ground Beef." *Journal of Agricultural and Resource Economics* 18(1993): 239-50.

Brown, J.N., and H.S. Rosen. "On the Estimation of Structural Hedonic Price Models." *Econometrica.* 50(1982): 765-68.

Connor, J.M. "Food Product Proliferation: A Market Structure Analysis." *American Journal of Agricultural Economics* 63(1981):607-17.

Cotterill, R.W. "Jawboning Cereal: The Campaign to Lower Cereal Prices." *Agribusiness* 15(1999):197-206.

Denver Post. "Meat Branding – Shoppers see New Labels Everyday Beef Becoming Rare Area Stores Tout Specialized Brands." *The Denver Post, Final Edition*, June 16, 2003.

Dhrymes, P.J. "Price and Quality Changes in Consumer Capital Goods: An Empirical Study."

Dhuyvetter, K.C., T.C. Schroeder, D.D. Simms, R.P. Bolze Jr., and J. Geske. "Determinants of Purebred Beef Bull Price Differentials." *Journal of Agricultural and Resource Economics* 21(1996):396-410.

Epple, D. "Hedonic Prices and Implicit Markets: Estimating Demand and Supply Functions for Differentiated Products." *J. Polt. Econ.* 95(1987): 59-80.

Feldkamp, T., T.C. Schroeder, and J.L Lusk. "Consumer valuation of steaks with different Quality attributes." Report of Progress 908. In: Cattlemen's Day 2003. Manhattan (KS): Kansas State University Agricultural Experiment Station and Cooperative Extension Service; 2003. p.1-4

Gedenk, K. and S.A. Neslin. "The Role of Retail Promotion in Determining Future Brand Loyalty: Its Effect on Purchase Event Feedback." *Journal of Retailing* 75(1999):433-59.Griliches, Z. Introduction: Hedonic prices revisited, in *Price Indexes and Quality Change* (Griliches, ed.), Harvard University Press, Cambridge, Mass. (1971).

Giddens, N., and A. Hofmann. "Building Your Brand." *VAntAGe*, University of Missouri – Columbia Value Added Center 2(November 2001): 2p.

Hayes, D.J., and S.H. Lence. "A New Brand of Agriculture: Farmer-Owned Brands Reward Innovation." *Choices* (Fall 2002): 6-10.

Huang, C.L., J.E. Epperson, B.J. Cude, and B.J. Woo. "Wal-Mart Supercenter: The New Low Price Food Retailer in Town." *Choices* Summer 2002, pp. 6-9.

Ishmael, W. 2002 Beef Alliance Yellow Pages. *BEEF Magazine* (August, 2002).

Janiszewski, Chris; Osselaer, Stijn M. J., "Two Ways of Learning Brand Associations," *Journal of Consumer Research*, 28(September 2001), pp. 202-223.

Jarque, C.M. and A.K. Bera. "Efficient Tests for Normality, Homoskedasticity, and Serial Independence of Regression Residuals." *Econ. Letters* 6(1980):255-59.

Judge, G., R. Hill, W. Griffiths, H. Lutkepohl, and T. Lee. *Introduction to the Theory and Practice of Econometrics*, 2nd ed. New York: Wiley, 1988.

Kinoshita, J., Nobuhiro, S., T. Kawamura, Y. Watanabe, and H.M. Kaiser. "Estimating Own and Cross Brand Price Elasticities, and Price-Cost Margin Ratios Using Store-Level Daily Scanner Data," 17(4), 2001, pp. 515-525

Ladd, G.W. and V. Suvannunt. "A Model of Consumer Goods' Characteristics." *Amer. J. Agr. Econ.* 58(1976):504-10.

Lancaster, K. "A New Approach to Consumer Theory." *Journal of Political Economy* 74(1966):132-57.

McCloskey, D.N., and S.T. Ziliak. "The Standard Error of Regression." *Journal of Economic Literature* (March 1995):97-114.

McCloskey, D.N. "The Loss Function Has Been Mislaid: The Rhetoric of Significance." *American Economic Review* 75(May 1985):201-5.

Meredith, L. and D. Maki. "Product Cannibalization and the Role of Prices." *Applied Economics* 33(2001): 1785-793.

Motameni, Rezsa; Shahrokhi, Manuchehr, “Brand equity valuation: a global perspective,” *Journal of Product & Brand Management,* 7(4), 1998, pp. 275-290.

National Cattlemen’s Beef Association, http:///www.beef.org

Nimon, W., and J. Beghin (1999) "Are eco-labels valuable? Evidence from the apparel industry," *American Journal of Agricultural Economics*, 81 (4), 801-811.

Parcell, J.L. and K. Stiegert. “Factors Affecting Wheat Protein Premiums.” *American Journal of Agricultural Economics*, 81(1999): 1292.

Purcell, W.D. “A Primer on Beef Demand.” Research Institute on Livestock Pricing, Virginia Tech University, Blacksburg, VA, Research Bulletin, April 1998.

Pustis, W.P. Jr. “An Empirical Study of the Effect of Brand Proliferation on Private Label-National Brand Pricing Behavior.” *Review of Industrial Organization* 12(1997):355-71.

Rosen, S. "Hedonic Prices and Implicit Markets: Product Differentiation in Pure competition." *J. Polit. Econ.* 82(1974):34-55.

Schroeder, T.C. and J. Kuvanda. “Beef alliances: motivations, extent, and future prospects.” *Vet Clinic Food Animal Journal* 19(2003) 1-21.

SHAZAM. *Econometrics Computer Program Users Reference Manual, Version* 9.0. New York, NY, McGraw Hill, 2001.

Tellis, G.J. and F.S. Zufryden. “Tackling the Retailer Decision Maze: Which Brands to Discount, How Much, When, and What?” *Marketing Science* 4(1995):271-99.

United States Department of Agriculture. *Red Meat Yearbook*: retail price spreads. Economic Research Service, Various Issues, 1993 – 2000.

Unnevehr, L.J., and F.C. Gouzou. “Retail Premiums for Honey Characteristics.” *Agribusiness*: *An International Journal*. 14(1998)49-54.

Wahl, T.I., H. Shi, and R.C. Mittelhammer. "A Hedonic Price Analysis of Quality Characteristics of Japanese Wagyu Beef." *Agribusiness* 11(1995): 35-44.

Ward, C.E., and J.L. Hildebrand. "A Comparison of the Certified Lamb and Certified Angus Beef Programs." *Sheep Goat Research Journal* 10(1994): 173-7.

Waugh, F.V. "Quality Factors Influencing Vegetable Prices." *J. Farm Econ.* 10(April 1928):185-96.

Zellner, A. "Bayesian and Non-Bayesian Analysis of the Regression Model with Multivariate Student-t Error Terms." *Journal of American Statistical Association* 71(1976):400-4005.

Table 1. Description of variables and summary statistics.

Variable	Description	Expected Impact on Price	Avg.	S.D.
d	Retail cut *d*, where *d*= beef steak, roast, or ground and pork chop, rib, roast, ham, or steak			
Z	Individual consumer purchase *z* for cut *d*, *z* =			
	Beef (number of observations)			
	Steak		1,107	
	Roast		353	
	Ground		729	
	Pork			
	Chop		10,775	
	Rib		4,206	
	Roast		3,701	
	Ham		9,944	
	Steak		1,124	
p_{zd} (Dependent variable)	Retail price of cut *d* for purchase *z*. ($/lb.)			
	Beef			
	Steak		3.44	2.00
	Roast		2.02	0.88
	Ground		1.70	0.57
	Pork			
	Chop		2.67	0.98
	Rib		1.88	0.80
	Roast		2.08	1.06
	Ham		1.61	0.63
	Steak		2.00	1.00
$Retail_z$	Composite retail pork price for the month when purchase *z* was made ($/lb.)			
	Beef	(+)	2.91	0.11
	Pork		2.38	0.18

Table 1 (continued). Description of variables and summary statistics.

Variable	Description	Expected Impact on Price	Avg.	S.D.
$Weight_{zd,}$	Average weight (lbs.) of beef or pork cut *d* for purchase *z*.			
$Weight_{zd}^2$	Beef			
	Steak		1.92	1.64
	Roast	(?, vary	3.71	4.96
	Ground	by cut)	2.78	3.19
	Pork			
	Chop		2.31	2.81
	Rib		3.29	3.00
	Roast		4.24	3.42
	Ham		5.23	5.59
	Steak		2.37	1.60
$Composition_{zdk}$	Composition (*k*) of cut *d* for purchase (% of purchases) *z*, *k* =			
	Fresh	(+)	89	
	Frozen	*default*	5	
	Cooked	(+)	6	
$Sale_{zd}$	Whether cut *d* for purchase *z* was on sale (*default* = non-sale)			
	Beef (% on sale)	(-)	26	
	Pork (% on sale)		37	
$Store\ type_{zdl}$	Store type (*l*) binary variables for store type where purchase *z* was made for beef or pork cut *d*, *l* =			
	Beef (% of purchases)			
	Supermarket/grocery and other (*default*)	*default*	96.5	
	Warehouse/super center	(-)	1.5	
	Butcher/meat market	(+)	2.0	
	Pork (% of purchases)			
	Supermarket/grocery (*default*)	*default*	93	
	Warehouse/super center	(-)	5.5	
	Butcher/meat market	(+)	1.3	
	Neighborhood/local deli	(+)	0.35	
	Convenience store	(+)	0.05	
	Co-op	(?)	0.2	

Table 1 (continued). Description of variables and summary statistics.

Variable	Description	Expected Impact on Price	Avg.	S.D.
$Leanness_{z,hamburger}$	Average lean content (%) of ground beef for purchase *z*.	(+)	82.82	6.46
$Grade_{z,steak,e}$	Steak grade of for purchase *z*.			
	Select and other (% of observations)	*default*	75.3	
	Choice	(+)	21.4	
	Prime	(+ +)	3.3	
$Month_{zdp}$	Separate 0 or 1 binary variables for month *p* when purchase *z* was made for pork cut *d* (*p* = 1, . . . 12; *default* = December)	(?)	n/a	
$Location_{zdn}$	Geographic location (*n*) purchase *z* was made for beef or pork cut *d*, *n* =			
	Beef (% of observations)			
	East	+	22	
	Central	*default*	27	
	South	+	31	
	West	+	20	
	Pork			
	East	+	22	
	Central	*default*	24	
	South	+	34	
	West	+	20	
$Brand_{zdq}$	Brand (*q*) of beef or pork cut *d* for purchase *z* (*q*= angus, default = store brand for beef and *q* = 1, 2. . . 20, *default* =store brand for pork).			
	Beef (% of observations with a brand)			
	Steak		35	
	Roast		35	
	Ground	(?)	15	
	Pork			
	Chop		24	
	Rib		31	
	Roast		27	
	Ham		53	
	Steak		19	

Table 2. Results of characteristic demand model for retail beef cuts

	Dependent Variable: Retail Price of Beef Cut ($/lb)		
	Ground Beef	Steak	Roast
$Retail_z$	0.446***	1.476**	0.141
	(0.183)[a]	(0.647)	(0.612)
$Weight_z$	-0.079***	-0.568***	-0.044
	(0.012)	(0.094)	(0.034)
$Weight_{zd}^2$	0.001***	0.003***	0.001
	(0.001)	(0.008)	(0.004)
$Sale_z$ (*default* = non-sale)	-0.352***	-1.166***	-0.382***
	(0.046)	(0.159)	(0.132)
$Leanness_{z,hamburger}$	0.041***	n/a	n/a
	(0.003)		
Beef Grade$_{ze}$*(default= Select)*			
Prime		1.212***	
	n/a	(0.399)	n/a
Choice		0.081	
		(0.186)	
Store type$_{zl}$ (*default* = supermarket/grocery)			
Warehouse/super center	-0.025	0.582	0.101
	(0.174)	(0.591)	(0.685)
Butcher/meat market	-0.396***	-0.131	0.293
	(0.163)	(0.818)	(0.429)
$Location_{zn}$ (*default* = Central)			
East	0.277***	0.302	0.118
	(0.069)	(0.217)	(0.188)
South	0.179***	0.364*	-0.104
	(0.064)	(0.216)	(0.167)
West	0.268***	0.102	0.013
	(0.064)	(0.215	(0.193)

Note: Three, two, and one asterisks refer to coefficients statistically significant at the 1%, 5%, and 10% levels, respectively.
[a]Standard errors in parenthesis under parameter estimates.

Table 2(continued). Results of characteristic demand model for retail beef cuts

	Dependent Variable: Retail Price of Beef Cut ($/lb)		
	Ground Beef	Steak	Roast
$Month_{zp}$ (*default* = December)			
January	0.387***	-0.361	-0.347
	(0.139)	(0.378)	(0.291)
February	0.204	-0.358	-0.384
	(0.134)	(0.383)	(0.326)
March	0.099	-0.228	-0.652**
	(0.135)	(0.390)	(0.317)
April	0.168	-0.502	-0.648**
	(0.130)	(0.367)	(0.305)
May	0.096	-0.367	-0.419
	(0.127)	(0.377)	(0.296)
June	0.009	-0.449	-0.438
	(0.128)	(0.357)	(0.314)
July	0.206	-0.777**	-0.393
	(0.126)	(0.364)	(0.327)
August	0.310***	-0.149	-0.811**
	(0.138)	(0.369)	(0.318)
September	0.269***	-0.034	-0.525*
	(0.126)	(0.376)	(0.315)
October	0.248	-0.236	-0.260
	(0.156)	(0.407)	(0.353)
November	0.109	-0.102	-0.551
	(0.139)	(0.475)	(0.357)
$Brand_z$ (*default* = supermarket/grocery store brand)	0.003	1.126***	0.328**
	(0.066)	(0.173)	(0.151)
Constant	-2.998***	7.089***	2.361
	(0.614)	(2.493)	(1.716)
R-squared	0.530	0.334	0.166

Note: Three, two, and one asterisks refer to coefficients statistically significant at the 1%, 5%, and 10% levels, respectively.

[a]Standard errors in parenthesis under parameter estimates.

Table 3. Results of characteristic demand model for retail pork cuts

	Dependent Variable: Retail Price of Pork Cut ($/lb)				
	Chop	Rib	Roast	Ham	Steak
$Retail_z$	0.056	0.429***	0.400***	0.157**	0.464***
	(0.067)[a]	(0.085)	(0.117)	(0.070)	(0.127)
$Weight_{zd}$	-0.279***	-0.126***	-0.170***	-0.155***	-0.281***
	(0.008)	(0.008)	(0.009)	(0.004)	(0.041)
$Weight_{zd}^2$	0.004***	0.003***	0.003***	0.002***	0.023***
	(0.001)	(0.002)	(0.001)	(0.001)	(0.005)
$Composition_{zdk}$ (*default* = Frozen)					
Fresh	0.388***	0.106*	0.174	0.137**	-0.130
	(0.048)	(0.062)	(0.107)	(0.062)	(0.133)
Cooked	-0.065	1.550***	0.063	0.169**	-0.007
	(0.164)	(0.118)	(0.223)	(0.068)	(0.733)
$Sale_{zd}$ (*default* = non-sale)	-0.613***	-0.403***	-0.274***	-0.423***	-0.313***
	(0.025)	(0.032)	(0.042)	(0.026)	(0.045)
$Store\ type_{zdl}$ (*default* = supermarket/grocery)					
Warehouse/super center	0.468***	0.498***	0.713***	-0.104	0.135
	(0.080)	(0.061)	(0.091)	(0.069)	(0.257)
Butcher/meat market	0.518***	-0.052	0.250	-0.372**	0.133
	(0.146)	(0.111)	(0.183)	(0.102)	(0.323)
Neighborhood/local deli	-0.039	0.065	-0.121	-0.053	-0.212
	(0.375)	(0.243)	(0.376)	(0.228)	(0.511)
Convenience store	0.226	n/a	n/a	0.319	n/a
	(0.529)			(0.579)	
Co-op	-0.172	-0.137	0.658	-0.638	n/a
	(0.398)	(0.244)	(0.508)	(0.407)	
$Location_{zdn}$ (*default* = Central)					
East	0.151***	0.383***	0.355***	0.126***	0.233**
	(0.036)	(0.050)	(0.064)	(0.034)	(0.092)
South	0.216***	0.196***	0.014	-0.076**	0.079
	(0.032)	(0.043)	(0.058)	(0.033)	(0.056)
West	0.263***	0.259***	-0.024	0.062	0.274***
	(0.039)	(0.046)	(0.065)	(0.039)	(0.060)

Note: Three, two, and one asterisks refer to coefficients statistically significant at the 1%, 5%, and 10% levels, respectively.

[a]Standard errors in parenthesis under parameter estimates.

Table 3(continued). Results of characteristic demand model for retail pork cuts

	Dependent Variable: Retail Price of Pork Cut ($/lb)				
	Chop	Rib	Roast	Ham	Steak
$Month_{zdp}$ (*default* = December)					
January	0.042	0.011	-0.108	-0.135**	-0.035
	(0.058)	(0.083)	(0.093)	(0.054)	(0.122)
February	0.037	0.001	-0.165*	-0.133**	-0.122
	(0.057)	(0.083)	(0.094)	(0.056)	(0.120)
March	0.047	0.005	-0.095	-0.085*	-0.016
	(0.057)	(0.081)	(0.095)	(0.049)	(0.119)
April	0.092	0.083	-0.083	-0.097**	-0.810
	(0.058)	(0.080)	(0.096)	(0.044)	(0.125)
May	0.068	0.119	-0.068	-0.074	-0.022
	(0.057)	(0.075)	(0.098)	(0.055)	(0.120)
June	0.136**	0.071	-0.085	-0.092	0.223***
	(0.058)	(0.076)	(0.104)	(0.085)	(0.113)
July	0.141**	0.056	-0.052	-0.038	0.078
	(0.057)	(0.076)	(0.099)	(0.058)	(0.126)
August	0.141**	0.137*	-0.159	-0.062	0.011
	(0.057)	(0.078)	(0.100)	(0.055)	(0.115)
September	0.089	0.104	-0.109	-0.088*	0.034
	(0.057)	(0.081)	(0.096)	(0.052)	(0.119)
October	0.040	0.026	-0.060	-0.089*	-0.502
	(0.057)	(0.080)	(0.094)	(0.054)	(0.120)
November	0.045	0.130	-0.161*	0.008	0.330
	(0.060)	(0.087)	(0.094)	(0.049)	(0.130)
$Brand_{zdq}$ (*default* = supermarket/grocery store brand)	See Table 4				
Constant	2.656***	0.857***	1.43***	2.440***	1.070***
	(0.170)	(0.216)	(0.298)	(0.177)	(0.338)
R-squared	0.278	0.266	0.250	0.419	0.360

Note: Three, two, and one asterisks refer to coefficients statistically significant at the 1%, 5%, and 10% levels, respectively.
[a]Standard errors in parenthesis under parameter estimates.

Table 4. Results of characteristic demand model for retail pork cuts – selected brands (*default* = supermarket/grocery store brand)

	Dependent Variable: Retail Price of Pork Cut ($/lb)				
	Chop	Rib	Roast	Ham	Steak
National Brands					
Hillshire Farms	0.051	0.806*	-0.631	0.557***	n/a
Hormel	n/a	0.188**	0.686***	0.587***	0.418***
Oldham's (Farm)	n/a	n/a	n/a	0.755	n/a
Thomas E. Wilson	0.241***	0.544*	0.438	0.414***	-0.002
Jimmy Dean	0.004	0.349	n/a	-0.980	n/a
Johnsonville	-0.229***	0.170	1.822	n/a	0.528
John Morell	-0.150	-0.011	0.589***	-0.086	0.166
Cook's (Ham)	n/a	0.160	-0.042	-0.055**	1.008***
Corn King	-0.067	n/a	n/a	-0.416***	n/a
Farmland	-0.169	0.055	0.103	-0.291***	0.140*
Hamilton	n/a	0.102	0.256	0.067	n/a
Oscar Mayer	-0.148	0.084	1.150	-0.462***	n/a
Private Brands					
Ossian	n/a	n/a	0.233	0.771**	n/a
Rose's	n/a	2.704***	0.685***	0.013	n/a
Taylor	-0.193	n/a	n/a	-1.310	n/a
Farmer John	-0.643	0.188	0.220	0.064	0.136
Store Brands					
Warehouse/super center	-0.243	-0.185*	-0.363***	0.486***	0.038
Butcher/meat market	-0.560	-0.100	0.392	0.659***	n/a
Neighborhood/local deli	n/a	0.108	0.299	0.367	n/a
Co-op	0.051	n/a	1.480	2.040***	n/a

Note: Three, two, and one asterisks refer to coefficients statistically significant at the 1%, 5%, and 10% levels, respectively. Standard errors are available upon request from the authors.