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Title: Measuring Brand Preferences Among U.S. Meat Consumers with Probit Models

Selected Paper prepared for presentation at the American Agricultural Economics Association Annual Meetings , Providence, Rhode Island, July 24-27, 2005

Summary Abstract:

Probit models based on household diaries show the likelihood for buying beef, fish, pork and poultry by brand. Brand preferences for each meat type are estimated and the impacts of a range of variables are ranked according to the likelihood of buying branded meats.

Extended Abstract:

Existence of brands among foods that have historically been reasonably homogeneous is an interesting phenomenon that reflects structural dimensions to an industry, the ability to achieve some level of differentiation, and consumer willing to act on their perceptions and preferences. U.S. demands for beef, fish, poultry and pork reveal considerable differences in the brand structure across these four competing products. Product innovations, preference differences and changes, safety concerns, and underlying structure throughout the vertical system for meats all contribute to the importance of (or lack of) brands. Any change in the prevalence of brands is particular important since it has implications for market power, marketing strategies, the need for generic promotions, product presentation, and competition among suppliers within each meat

sector. While firms may attempt to introduce brands, their ultimate success will depend on if the consumer is conscious of the brand (i.e., does he or she buy according to the brand?) Hence, the primary focus of this paper is to address brand awareness and identify and measure the impact of a range of variables expected to impact brand preference.

Using a data base of consumers' meat purchasing diaries, we have monthly household data over more than 10 years for a total of 775,881 observations. The data base is representative since it is balanced based on national and regional demographics. It includes a while range of measures about the individual households and each household identified if he or she made a meat purchase in a particular month based on brand awareness. That is, each household gave a binary response to the question if the meat purchase was a branded product or not? Our objective then is to estimate the likelihood of brand preference and measure what most likelihood influenced the brand selection. Probit models are estimated in order to show the range of impacts various components have on the brand preference. The four meats are first pooled and a probit model for the meat industry is estimated. Then similar probit models are applied to each of the four meat types. Through this method we can determine if a response to a variable is unique to a particular meat or common to the four. With the total database, there are several available variables essential to determining what influences brand preferences with the variables grouped into the following general categories: (a) outlet and in-store location; (b) household demographics; (c) time and geographic dimensions; (d) market size; (e) relative meat prices; (f) employment and occupation; and (g) seasonality. Each model also includes a time trend to capture any underlying change in the likelihood of buying meats by brand.

Probit models are estimated and then used to calculate the probability for brand selection for each meat type. Hence, for each variable we know the impact of the likelihood of buying by brand for each meat type. For some variable the impacts are quite similar across the beef, fish, poultry and pork. Furthermore we know the relative likelihoods among the four meats and if these probabilities have changed over the last decade. Finally, for each factor measured, the range of impact is shown and then the impacts are ranked from the largest to the smallest significant variable in the analysis.

Figure 1 shows the average brand preference across the four meat types. Then the range of impact on the likelihood of using a brand is simulated for each variable in the models. On average for each year around 80 percent of the households showed not brand preference for beef

during a typical year. However, the average brand preference for beef increased from 13 to 22 percent between 1992 and 2000. Figure 1 also reveals the considerable differences in brand preference among the four meat types. While these are averages for the year, the probit models provide insight into the range of probabilities across the variables noted above. Of particular interest is the change in brand preference among the four meats. Calculating the probabilities of brand preference for the average household and indexing the probabilities to the starting period, one can quickly the structural change taking place among beef, fish, pork and poultry. As shown in Figure 2, in relative terms brand preferences within the beef category have nearly doubled over the last decade and some grow is seen with pork. This brand growth in beef is driven by many factors that are to be discussed in the full analysis. Somewhat surprisingly, the demographics are shown to have relatively minor effects on the brand preferences.

Along with the probit results and simulations, policy implications are set forth particularly for the beef industry since that is where the major changes have occurred. Marketing and promotion implications are emphasized.

Measuring Brand Preferences Among
U.S. Meat Consumers with Probit Models

Ronald W. Ward and Oscar Ferrara

The U.S. meat industry beyond the farm gate has become more concentrated with vertical alliances, vertical integration, and processor and retail chain concentration. As part of the concentration, firms and/or groups within an industry strive for product identity often expressed in terms of brands. The extent of branding is substantially different across the four meat groups (i.e., beef, fish, pork and poultry) that comprise the meat industry. Branding is usually one indicator of some level of concentration within an industry via the ability of a firm or group of firms to achieve some degree of product differentiation and to support the marketing costs necessary to achieve a brand identity. It is clear that within the meat industry remarkable changes have deeply affected the demand for meat through time and the way meats have been marketed. Changes in relative prices, health concerns, demographics, lifestyles and preferences, as well as technological changes in quality and product packing, product preparation, storage, and distribution account for a large portion of this variability. These changes have provided consumers with a much larger set of options to satisfy their preferences.

Responding to an increasing demand of selected meat attributes, producers and retailers are marketing more store brands and "premium" high quality meat products. Branding of meat ultimately reflects how consumers view differences in actual and/or perceived meat attributes such taste, fat content, breed, feeding practices, consistency, reliability, availability, uses, and convenience to name a few. Meat brands that capture a meaningful share of the market represent an important transition from the generic idea of selling meat as a commodity to campaigns involving market segmentation and target marketing of specific consumer segments. Consequently, the meat industry is in transition from a traditional commodity-selling perspective to a more contemporary marketing approach in order to address those changes in market demand and consumers'

preferences. Such changes only occur if there are marketable differences and when those investing in the brands realize economic rents. As we will see, there are major differences in the ability to sell brands across the four meat categories.

Branding has been around for centuries as a means to distinguish the goods of one producer from those of another. Consumers have learned that branding in general suggests a premium product with better and more consistent characteristics. Brands appeal to consumers; they are easily recognized and provide assurance of taste, quality, satisfaction, and they simplify shopping. They often reduce the shopping cost and risk. The American Marketing Association defines *brand* as a " name, term, sign, symbol, or design, or a combination of them intended to identify the goods and services of one seller or group of sellers and to differentiate them from those of the competition." More specifically, what distinguishes a brand from its un-branded counterpart and gives it equity is the sum total of consumers' perceptions and feelings about the product's attributes. This includes how the products perform, the reputation of the brand name, what the brand stands for, and the company associated with the brand (Achenbaum, 1993 as cited by Keller, 1998). Branding of meat products implies so type of differentiation (i.e., possibly higher product quality) and represents an important transition from the generic idea of selling meat as a commodity to a campaign involving market segmentation and target marketing of specific consumer segments. Brand recognition is determined largely by product attributes, the perceived performance of the brand on these attributes, and the importance that consumers attach to them.

What is the current state of brand identity within the meat sector defined to include beef, fish, pork and poultry? One approach to measuring the importance of brand identity is to document consumers' buying habits according to brands versus non-brand purchases of each meat category. Differences in brand identity across the four meats as well as changes in the identity over time have major implications for the levels of competitiveness among these meats, the marketing requirements including the need for generic promotions, and the supporting infra-structure for distributing the

range of product forms such as fresh versus frozen. At this juncture in the paper, our primary goal is to document the relative importance of brands across the four meat categories and then attempt to measure the likelihood of buying by brand within each category. To address the brand identity, we will use a data base of consumers reporting their purchasing habits with monthly data extending over the 1992 -2001 period.

Household eating data from the National Panel Diary Group Company (NPD) documents purchasing levels by brand and non-brand along with a range of household demographics and outlet details. Household panel reports consist of eating diaries in which participating households document their purchasing routine within a two-week period or "wave." For the waves from September 1992 through August 2001, there is a total of 775,976 observations with thousands of households included in the panels over the waves. Both quantities and expenditures on each of the four meat categories were recorded in each wave along with the information about the reporting household. For each meat expenditure the household reported weather the purchase was or was not made by brand, thus giving a binary classification for brand identity when the buying decision was made. Using these data, one can estimate the likelihood of buying by brand across the meat categories and over time. Probit modeling is a logical way to estimate the likelihood for brand preferences.

Brand Identity by Meat Category

Using the panel reported purchases by both pounds and expenditures on each meat category and the level of brand identity, differences across the meats is clearly seen as shown in Figure 1. In this figure the first and second vertical bars show market shares by meat category based on volume and expenditures. By 2000, beef and poultry combined accounted for nearly 74 percent of the poundage and 67 percent of the expenditures on meats. In contrast, fish purchases consistently represent less than 10 percent of the total market while pork is ranked third among the four meats.

Whiles changes among the meat categories have occurred over the decade since 2000, this figure illustrates the fundamental differences among the meats. Poultry is a highly vertically integrated industry and consumers report that nearly 80 percent of the poultry purchases was based on brand identity (see the right bars in Figure 1). In contrast, beef accounts for the largest share of the meat market but has considerably less brand identity in comparisons to any of the other meats. Nearly half of the pork purchases are based on brand identity and approximately 41 percent of the fish demand carries a brand identification. The issue is what determines these differences and are they evolving over time? Most apparent from Figure 1 is that some brand identity exists among all four meat categories, thus pointing to degrees of product differentiation within each category. This differentiation is a reflection of the underlying market structure in each meat category as well as consumer preferences for identifiable product attributes. The likelihood of differentiation via brands has long terms marketing implications for the meat industry.

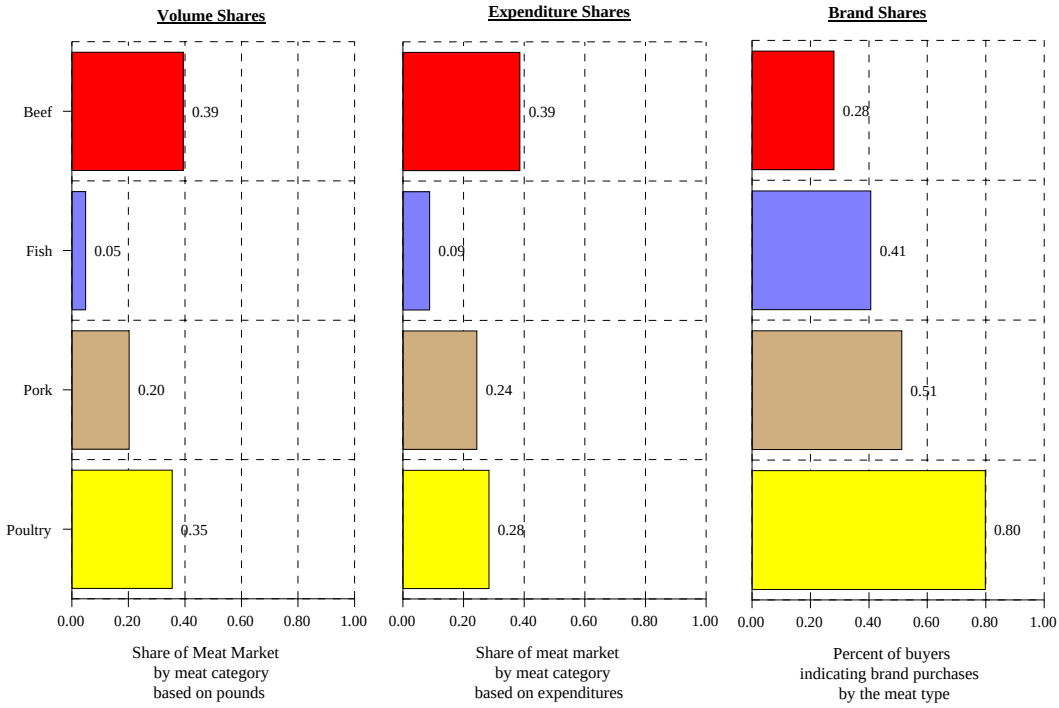

Figure 1. Market shares and brand identity by meat category as for 2000.

Probit Model for Brand Identity

As suggested above, households completing the eating diary indicated if a meat purchase was based on a branded meat, thus giving a binary classification for each purchase among the 775,976 observations in the data set. Let *"Brand"* represent the binary brand identification, then the probability of buying by brand is specified in equation (1) using the standard probit specification with $\boldsymbol{X\beta}$ denoting the variables expected to have some impact on the likelihood of buying by brand.

$$\begin{aligned} \Pr(Brand = 1 | X) &= F(X\beta) \\ \Pr(Brand = 1 | X) &= \int_{-\infty}^{X\beta} \frac{1}{\sqrt{2\pi}} \exp^{-z^2/2} dz \end{aligned} \tag{1}$$

Since a normal distribution is used, the likelihood function immediately follows as in equation (2):

$$\begin{aligned} Likelihood &= \prod_{i=1}^{n} \left[\Phi\left(X_i \beta / \sigma \right) \right]^{(Brand_i)} \left[1 - \Phi\left(X_i \beta / \sigma \right) \right]^{(1 - Brand_i)} \\ LogLikelihood &= \sum_{i=1}^{n} Brand_i \ln \Phi\left(X_i \beta / \sigma \right) + (1 - Brand_i) \ln \left[1 - \Phi\left(X_i \beta / \sigma \right) \right] \end{aligned} \tag{2}$$

Independent variables depicted with *X* can be both binary and continuous as suggested with equation (3) letting X_{ij} be a typical dummy variable with five classes for example and Z_j is a continuous variable. A convenience approach for dealing with a model having several dummy variables is to restrict the summary of the coefficients for the dummy class to zero as shown in the second part of equation (3). Using this approach, the model intercept represents the average household for whatever values are set for the continuous variable Z. For the brand model this approach is adopted for each dummy variable defined later.

$$X\beta = \hat{\beta}_0 + \sum_{i=1}^{5} \hat{\beta}_i X_{ij} + \hat{\gamma}_1 Z_j + \hat{\varepsilon}_j$$
$$X\beta = \hat{\beta}_0 + \sum_{i=1}^{4} \hat{\beta}_i (X_{ij} - X_{5j}) + \hat{\gamma}_1 Z_j + \hat{\varepsilon}_j \quad (3)$$

Brand preferences are expected to be first influenced by the meat category simply because of the unique attributes of each meat category and the underlying differences in the industry structures. Household demographics, retail meat source and location within the outlet, geographical differences, seasonality, market size, and relative prices are factors expected impact the likelihood of brand preference. In equation (4), $\boldsymbol{X\beta}$ is explicitly specified to reflect these variables using the approached noted in eq. (3). Retail meat source and location within the store are defined by *(STTY)* and *(STWR)* respectively. Demographics include income *(INC)*, household size *(HWZ)*, age of the household head *(AGE)*, presence of children *(CHD)*, employment status *(EMF)*, education level *(EDU)*, and occupation *(OCC)*. Geographics are measured with regional variables *(STA)* and market size *(MSZ)* and adjustment across time are captured with season dummies *(MTH)* and a time trend *(TT)*. Finally, each meat category is denoted with *(PCAT)* and the corresponding relative prices are expressed with *(ZPRCP)*. While models were estimated separately for each meat category, the

$$\begin{aligned}
X\beta = {} & \beta_0 + \sum_{j=1}^{4} \beta_j (STTY_j - STYY_5) + \sum_{j=1}^{4} \beta_{j+4} (STWR_j - STWR_5) + \beta_9 ZPRCP \\
& + \sum_{j=1}^{3} \beta_{j+9} (INC_j - INC_4) + \sum_{j=1}^{3} \beta_{j+12} (HWZ_j - HWZ_4) \\
& + \sum_{j=1}^{3} \beta_{j+15} (AGE_j - AGE_4) + \beta_{19} (CHD_1 - CHD_2) + \sum_{j=1}^{2} \beta_{j+19} (EMF_j - EMF_3) \\
& + \sum_{j=1}^{11} \beta_{j+21} (OCC_j - OCC_{12}) + \sum_{j=1}^{3} \beta_{j+32} (EDU_j - EDU_4) \\
& + \sum_{j=1}^{8} \beta_{j+35} (STA_j - STA_9) + \sum_{j=1}^{5} \beta_{j+43} (MSZ_j - MSZ_6) \\
& + \sum_{j=1}^{11} \beta_{j+48} (MTH_j - MTH_{12}) + \sum_{j=1}^{3} \beta_{j+59} (PCAT_j - PCAT_4) \\
& + \sum_{j=1}^{3} \beta_{j+62} (PCAT_j - PCAT_4)(ZPRCP) + \beta_{66} TT \\
& + \sum_{j=1}^{3} \beta_{j+66} (PCAT_j - PCAT_4)(TT)
\end{aligned} \quad (4)$$

probit model reported in this paper is based on combining the four meat categories into one data set and then estimating a probit model for all meats while allowing for shifts by meat category. Drawing from the preliminary estimates from the individual meat models, the evidence suggested that adjustment over time and responsiveness to prices differed across the categories. Hence, in equation (4), both the time trend and price variables were interacted with the meat categories, thus allowing for slope differences over the categories. The last term in equation (4) is particularly important in that it gives a quick way to measure changes in the likelihood of brand preferences over the four meats for the average household or any combination of demographics. A complete description for each variable in equation (4) is presented in Table 1 along with the probit estimates and supportive statistics (Green, 1997; Long, 1997; McFadden, 1973; Medina, 1999).

All variables coefficients specified with equations (4) are reported in Table 1 along with the supporting statistics and descriptions. Excepting price and the time trend, all other variables are binary and the coefficients reflect the dummy variable estimates using the procedure noted with equations (3) with the sum of the coefficients for each dummy restricted to zero. Hence, in Table 1 the last coefficient for each dummy is the negative sum of the others coefficients for each binary variable (e.g. income, store, etc.). Given this procedure each t-value provides a test of the significant relative to the average household. Nearly all t-values are highly significant, indicating the statistical importance of each variable included in the probit model. Furthermore, the Likelihood ratio test in Table 1 clearly shows that all coefficients are statistically different from zero and that approximate 30 percent of variation is explained within the limits of the probit model interpretation of an R^2. The magnitudes of the coefficients in probit models have little direct meaning but must be used to show the probabilities of buying with a brand identity as expressed with equation (1). Generally, the sign and statistical significance have direct interpretation, then the nature of the response to each variable is estimated in terms of the probability of selection. Table 1 provides the model estimates which are in turn used in the subsequent sections to show these responses.

Table 1. Probit estimates for meat brand identity.

Variable	Description	Probit Coef.	t-value	Variables	Description	Probit Coef.	t-value
Intercept	Avg. Household	-0.22120	-22.41473	Education			
Store Type	(binary)			ZEDU1	High Sch./less	-0.03405	-11.30524
ZSTTY1	Supermarkets	0.14683	32.09044	ZEDU2	Some College	0.02481	7.52299
ZSTTY2	Warehouse/Club	0.25950	31.78620	ZEDU3	College Grad	0.01540	4.21594
ZSTTY3	Butcher/market	-0.54842	-59.79004	ZEDU4	Post Grad	–	
ZSTTY4	Supercenters	0.19849	17.05465				
ZSTTY5	All others store	–		Regions	(binary)		
				ZSTA1	New England	-0.00390	-0.64824
Where	(binary)			ZSTA2	Mid Atlantic	-0.01091	-2.70761
ZSTWR1	Fresh case	-0.28816	-48.13601	ZSTA3	EN Central	-0.06325	-15.93089
ZSTWR2	Deli/food bar	-0.32420	-25.23275	ZSTA4	WN Central	0.02467	4.13970
ZSTWR3	Gourmet	0.00209	0.11777	ZSTA5	S Atlantic	0.12079	31.74564
ZSTWR4	Freezer	0.67134	90.16716	ZSTA6	ES Central	-0.17138	-28.06583
ZSTWR5	All other	–		ZSTA7	WS Central	-0.00915	-1.77465
				ZSTA8	Mountain	0.05268	7.77187
Price	(Index=1.0)			ZSTA9	Pacific	–	
ZPRCP	Relative price	0.05400	18.31284				
				Market Size	(1000 pop)		
Income	(Annual $)			ZMSZ1	50-249	-0.00391	-0.76484
ZINC1	0 - $24,999	-0.01521	-4.50572	ZMSZ2	250-499	0.03523	8.29306
ZINC2	$25 - $49,999	0.04010	14.49878	ZMSZ3	500-999	-0.00857	-1.89928
ZINC3	$50- $74,999	0.00013	0.04165	ZMSZ4	1,000-2,499	-0.01390	-4.17442
ZINC4	$75,000 plus	–		ZMSZ5	2,500+	0.02302	6.86667
				ZMSZ6	Non-size	–	
Hwd Size	(members)						
ZHWZ1	one	0.02101	4.70795	Months	(binary)		
ZHWZ2	two	-0.01523	-4.79892	ZMTH1	Jan	-0.00921	-1.75305
ZHWZ3	three	0.00044	0.13663	ZMTH2	Feb	0.00812	1.51617
ZHWZ4	four plus	–		ZMTH3	Mar	0.05873	11.33161
				ZMTH4	Apr	0.01017	1.90521
Female Age	(Years of age)			ZMTH5	May	-0.00959	-1.81928
ZAGF1	under 24 yrs.	0.10134	11.18811	ZMTH6	Jun	-0.02043	-3.79020
ZAGF2	25 to 40 yrs.	-0.02644	-6.27465	ZMTH7	Jul	-0.02105	-3.94837
ZAGF3	40 to 65 yrs.	-0.03096	-8.31986	ZMTH8	Aug	-0.03793	-7.09436
ZAGF4	over 65 yrs.	–		ZMTH9	Sep	-0.01034	-1.95400
				ZMTH10	Oct	-0.00309	-0.58196
Children				ZMTH11	Nov	0.01108	1.96363
ZCHD	Children present	-0.01032	-1.87517	ZMTH12	Dec	–	
Employment	(binary)			Category	(binary)		
ZEMF1	Full time	0.00159	0.62298	ZPCAT1	Beef	-0.89330	-158.19035
ZEMF2	Part time	0.01354	4.44863	ZPCAT2	Fish	-0.12251	-13.30549
ZEMF3	Not employed	–		ZPCAT3	Poultry	1.04462	166.95453
				ZPCAT4	Pork	–	
Occupation	(binary)						
ZOCC1	Professional	-0.15859	-8.48606	Meat x Prices	(Indexed Price)		
ZOCC2	Proprietor	0.04083	7.90268	ZCATPR1	Beef ×Price	0.00062	2.09833
ZOCC3	Clerical	0.04145	8.03541	ZCATPR2	Fish ×Price	-0.00083	-2.30709
ZOCC4	Sales	0.09871	12.57888	ZCATPR3	Poultry ×Price	-0.00685	-14.09945
ZOCC5	Craftsman	-0.02216	-3.02236	ZCATPR4	Pork ×Price	–	
ZOCC6	Operative	0.00364	0.71144				
ZOCC7	Military	-0.00821	-1.43005	Time Trend	(Integers)		
ZOCC8	Service worker	-0.09359	-6.32814	TT	1-96	0.00199	28.67925
ZOCC9	Farm	-0.03301	-4.37264	TPCAT1	Beef ×Time	0.00313	33.22278
ZOCC10	Student	0.07294	4.96123	TPCAT2	Fish ×Time	-0.00132	-8.58871
ZOCC11	Laborers	-0.03974	-3.48388	TPCAT3	Poultry ×Time	-.00223	-21.38148
ZOCC12	Retired / Unemp.	–		TPCAT4	Pork ×Time		

Number of observations	= 775881	R-squared	= 0.30833	Period: 1992:7 - 2000:8
Num. of positive observations	= 327035	Log of likelihood function	=-399674.11189	
Scaled R-squared	= 0.3158	Likelihood ratio test for 0 slopes.	= 257047.92180	

Probability of Brand Identity by Meat Category

For the average household and base price during the last year, the likelihood of buying branded beef is 28 percent; branded fish, 41 percent; branded pork, 52 percent, and branded poultry is estimated to be 80 percent. As already indicated with Figure 1, the extreme between the beef and poultry industries is readily apparent. In order to show the impacts of each variables from Table 1 and equation (4), a useful approach is to express the likelihoods for each meat brand identity relative to the average household. One can show the direction and extent of the response relative to the average probability for each meat category. After showing the responses, then ranking the impacts is a useful way for expressing the importance of each variable in influencing the likelihood of buying by brand. There are several of these probabilities depending on the variables included in the probit model. Recall that the variable may be statistically significant buy numerically unimportant (Ward, 1993; Verbeke, 2000).

Relative Prices and Brand Identity

Since the model includes all four meat categories in the same equation it is impossible to include actual price levels because of the absolute differences among the meats. To compensation, prices for each meat category were expressed relative to the average price over the data set, thus giving a value of one when the actual price equaled the average. Prices above or below one indicate values above or below the averages. As illustrated in Table 1, prices were also interacted with the meat category to directly allow for different price responses among the meats (LMIC, 2005; USDA-ERS(2004).

Figure 2 shows the relative change in the probability of buying by brand for each meat category. In each case the response is positive showing that as prices increase the likelihood of buying the branded meat increases. For beef, the range is from .02 under to nearly .04 over the

average probability of 28 percent. Very similar prices responses are seen for fish and pork while the poultry response is lower. Recall that the price responses different by category using the interaction term and even with this flexible model the responses were generally very similar, especially in direction.

Outlet Source and Within Store Location

Within the data set meats are classified into one of the four categories without specially identifying the forms and other differentiating characteristics. Where the product is purchased and specific location within the store likely reflect a lot about the product attributes and the ability to establish brand identities. In Figure 3, the likelihood of buying by brand is estimated across five basic types of outlets. Consistently, more consumers indicated buying by brand when using the supercenters and warehouses. For beef, fish, and pork the probability of buying by brand through warehouses is nearly 10 percentage points above the averages. Whereas, the poultry percentage

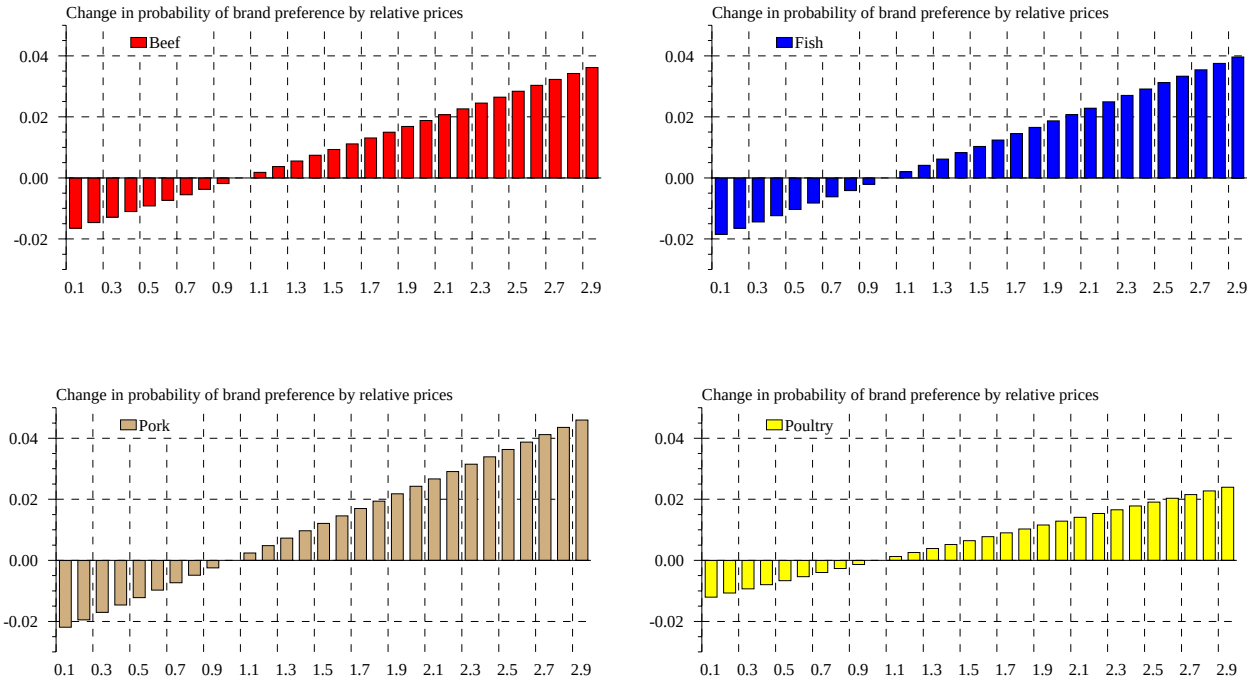

Figure 2. Changes in the probability of buying by brand over prices for each meat category.

increase is nearer 5 points. As would be expected, the least likely place for brands is through the butchers and meat markets. Almost all of the percentages drop from 15 to 20 percentage points below their respective average levels. In every case the range of change is substantial as will be shown again later.

Figure 4 identified the location within a store where the purchases was made. As most clear, product form is extremely important to the brand identification. For beef, fish and pork, the probabilities increase by nearly 20 percentage points when the meat is in the freezer section while poultry increases by about 12 points. On the down slide, meats from the deli or fresh section generally have a 10 percentage points less likelihood of buying by brand. Clearly, these extremes are expressing major differences in the product forms (i.e., fresh versus frozen).

Demographics and Brand Identity

Household demographics in equation (4) included age, education, income, household size,

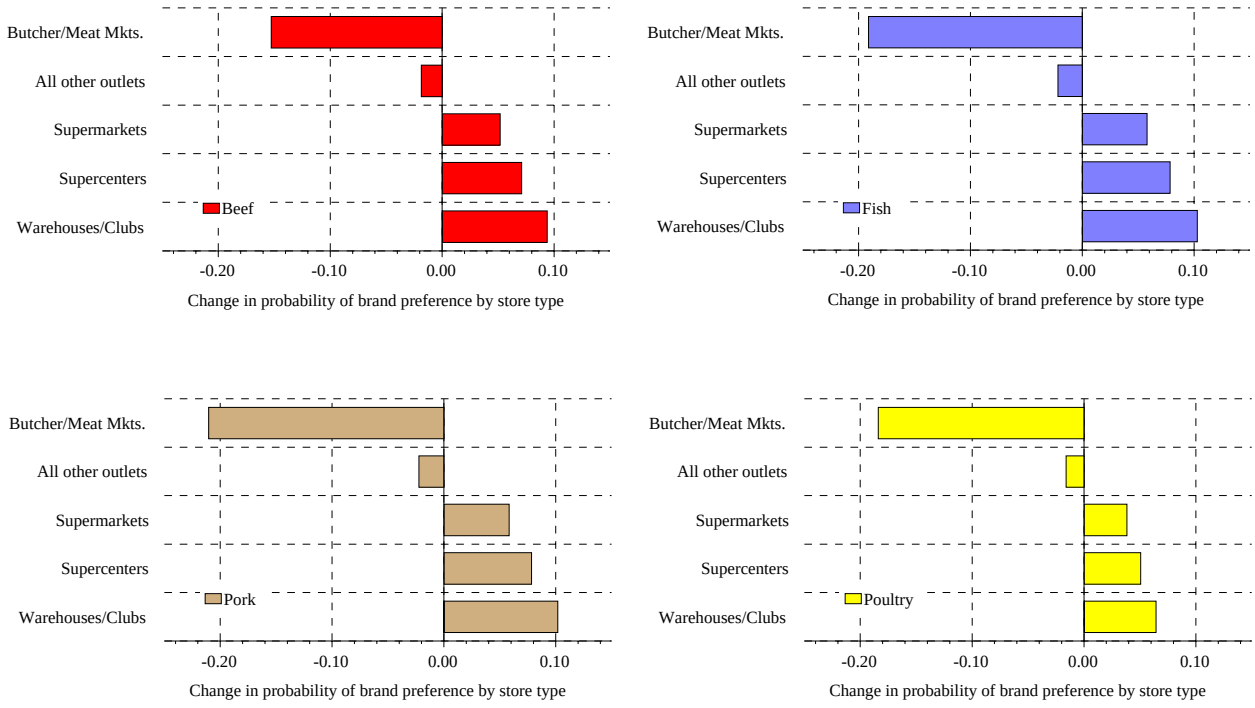

Figure 3. Changes in the probability of buying by brand according to the store type.

presence of children, employment status, and occupation. While all of the demographics showed statistically significant impacts, numerically the range of effects on the likelihood of buying or not buying according to brand were quite small, usually ranging from ± 2 percentage points from the average probabilities. Given the small responses, we will not show the distributions for each demographic but will later put them in perspective to all other variables. Among the demographics, age and occupation showed the most impact. Consistently the likelihood of purchasing each meat category by brand declined across the four age groups. Brand purchased among those buyers under 25 years of age were close to 4 percentage points above the average for each meat, whereas all other age groups were under the averages. The decline was almost linear with those over 65 years of age indicating about a 2 percentage points below the average probability of buying by brand. Another interesting response is the very small and non-linear changes across income groups with all ranges being under ± .02 points.

Since occupation produced greater variations about the average probabilities, they are illustrated in Figure 5 with the impacts scaled from the most negative to the most positive

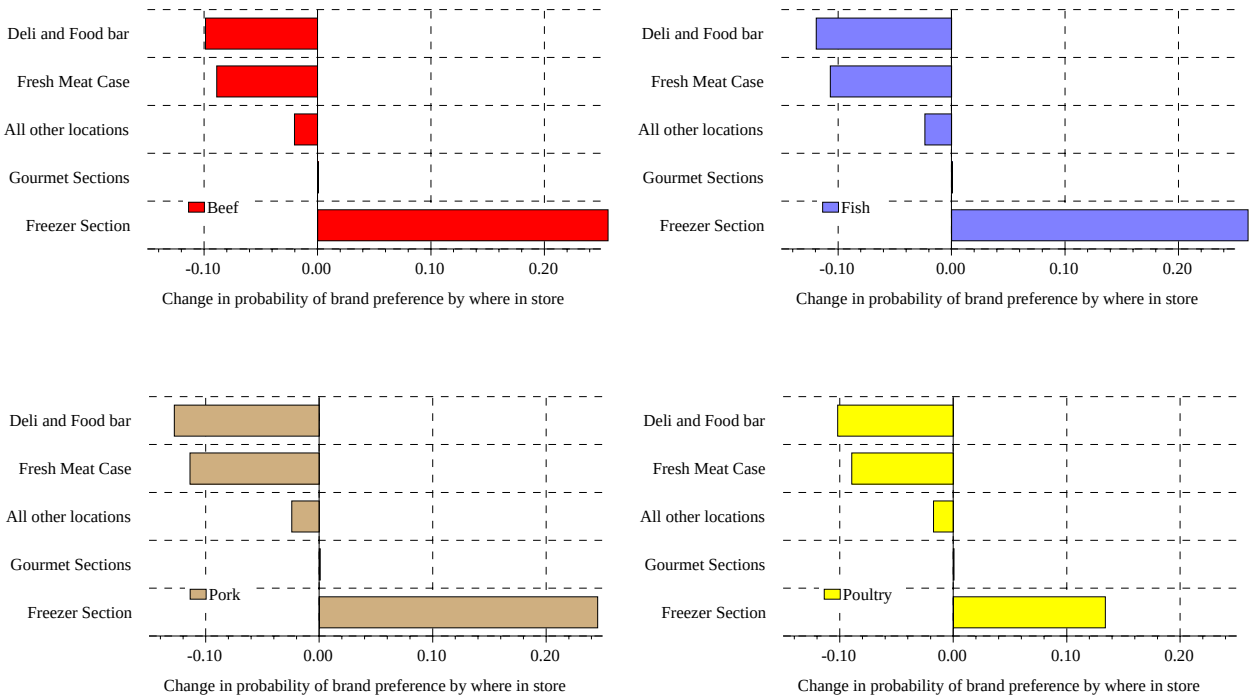

Figure 4. Changes in the probability of buying by brand according to location in store.

differences. Occupation is of particular interest since it is one of the demographics that can be readily targeted with advertising, promotions and various marketing schemes. The professional group showed the least response to buying by brand while those grouped in the sales occupation gave the largest. Professional occupations are usually 6 percentage points under the household average probabilities of buying with a brand identified. As seen in Figure 5 a number of the occupations were quite similar, showing little sensitivity to brand when buying the meats. For example look at craftsman, military, operative occupations with values very near the average. Somewhat surprisingly, the retired and unemployed indicated brand identity considerably above the average probabilities. The extent of the responses differ by meat category as would be expected given the wide range of average probabilities among the four meats. Clearly, to achieve gains in buying by brand the greatest potential is probably targeting the professional group since that is where the largest negative values are seen.

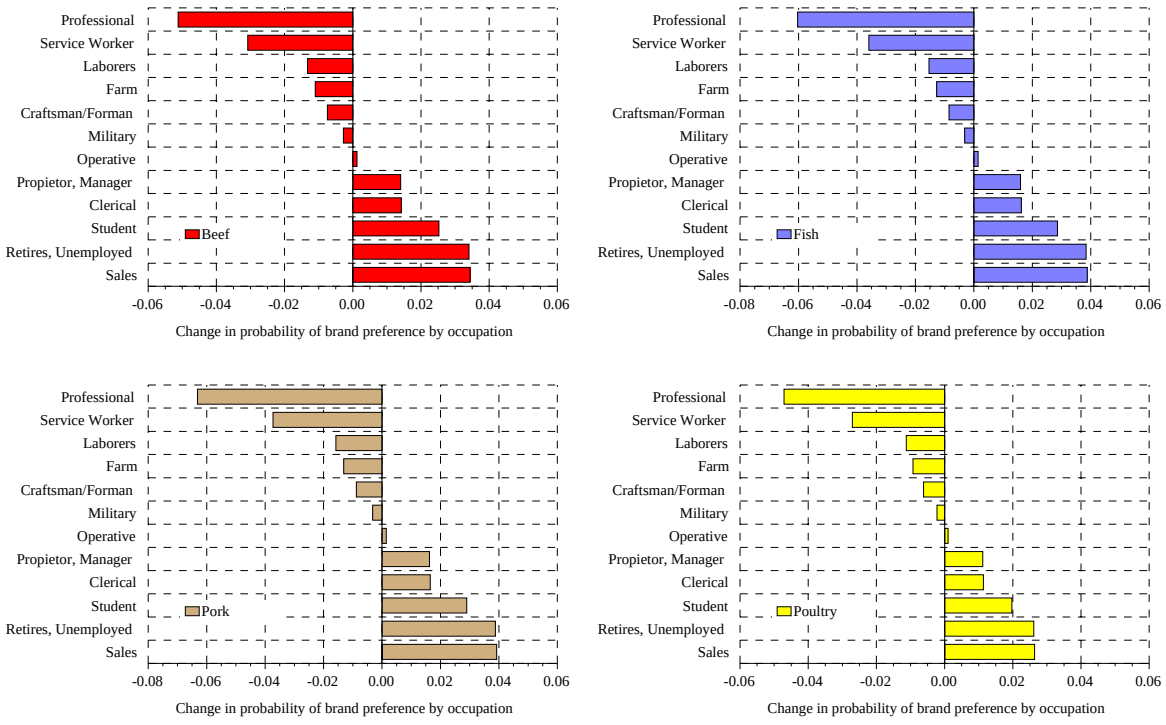

Figure 5. Change in probabilities of buying branded meat across occupations.

Structural Change in the Brand Identity

Beyond the demographics and other variables identifiable variables in Table 1, has there been a structural change among household preferences by brand? The last part of equation (4) and in Table 1 provides a proxy measure for brand preference change. As seen with the t-values each time adjustment is statistically different from the average trend noted with TT. For beef the trend coefficient is .0051; fish, .0007; poultry, -.0002; and the pork coefficient is .0024. While the probabilities still have to be calculated, it is quickly apparent that the largest preference changes are with branded beef and then pork. In Figure 6 the probabilities for selecting each meat category by brand is estimated by each time period for the average household characteristics specified in equations (4). These probabilities are very revealing in depicting the relative brand importance and the relative change since the early 90's. Between 1992:9 and 2000:8 beef brand identity increased from 14.6 percent to 28.5 percent for slightly over a 1.5 percentage point increase per year. At that rate it would take many decades for branded beef to be near what poultry is today. Clearly,

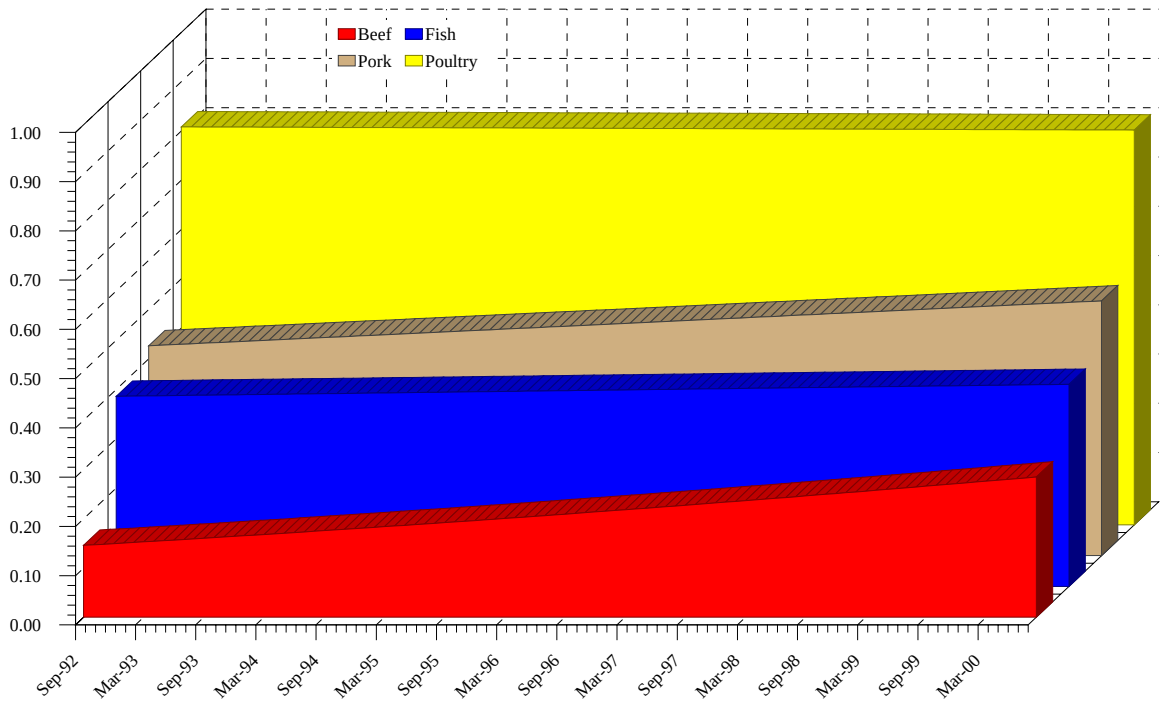

Figure 6. Change in the probability of brand identity over time for each meat category.

consumers identified beef brands when buying but still nearly 72 percent of the beef is purchased without a brand identity. Given this still reasonably low level of branded beef, the importance of information programs such as the beef's generic advertising efforts appear to have considerable long term life. That is, even with the brand growth, most of the commodity is still non-branded.

Since poultry is already highly branded, little growth would be expected. Numerically, the likelihood of buying brand poultry showed very little change over the period since 1992:9. Very similar results are shown for fish with the brand identity remaining around 41 percent. Pork's brand identity increased from 42.6 to 51.7 percent over the same period. Brand pork use is almost 80 percent greater than beef even with the growth in branded beef shown in Figure 6. Finally, throughout the period since 1992, the brand ordering from the least branded to the most remained the same with beef being the least followed with fish, pork, and then poultry with the highest level.

Ranking the Brand Identity Factors

In Figure 7 the ranges of probabilities for each meat are ranked according to the estimated impacted of each variable in equation (4) and Table 1. Recalling from above, the range is the difference between the most negative effect to the most positive for each variable group such as income, age, etc. For each meat, the importance of source within the store and actual store type are overwhelming in terms of the impact on brand selection. The ranking between store and location within the store are the same except for poultry where the two are switch. Adjustments over time for beef is most apparent, ranking third among the variables while for the other meats this is considerably less . Regional differences and occupation of the household head generally account for the next levels in the rankings. Beyond occupation, the relative low levels of importance of all other demographics and seasonal changes are very small in every meat case. As a rule, targeting demographics to achieve higher brand purchases is likely to generate little change based on the results from this figure.

Pricing, based on the index used, points to a relative low levels of impact when making brand purchases. Even though the price effects were significant and positive for each meat (see Figure 2), the range of the impact is still relatively small compared to the other non-demographic factors. Finally, one can also compare the extent of the negative and positive impacts for each variables across the four meats by comparing the full range of change as illustrated with Figure 8. Location in the store can product a 35 to 38 percentage point differences in the likelihood of buying by brand for beef, fish, and pork but only a 24 percentage range for poultry. Next the outlet selected can impact the brand probability from 24 to 31 percentage points, depending on the meat considered. for beef, the time trend gives a 14 percentage point range but drops off considerably for the other meats. The range for regional differences and occupation are very similar across the four meats.

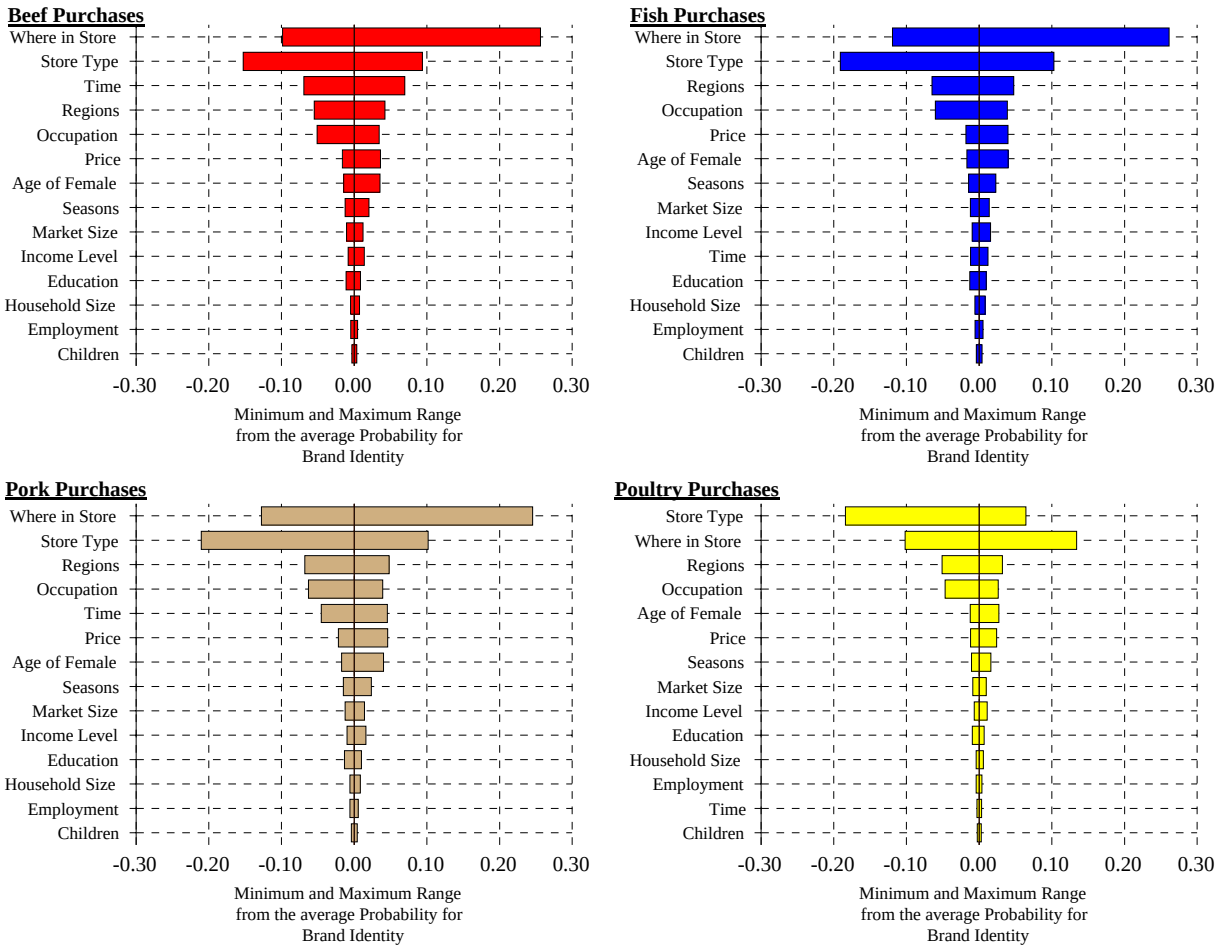

Figure 7. Ranking all factors impacting the probability of buying by brand identity.

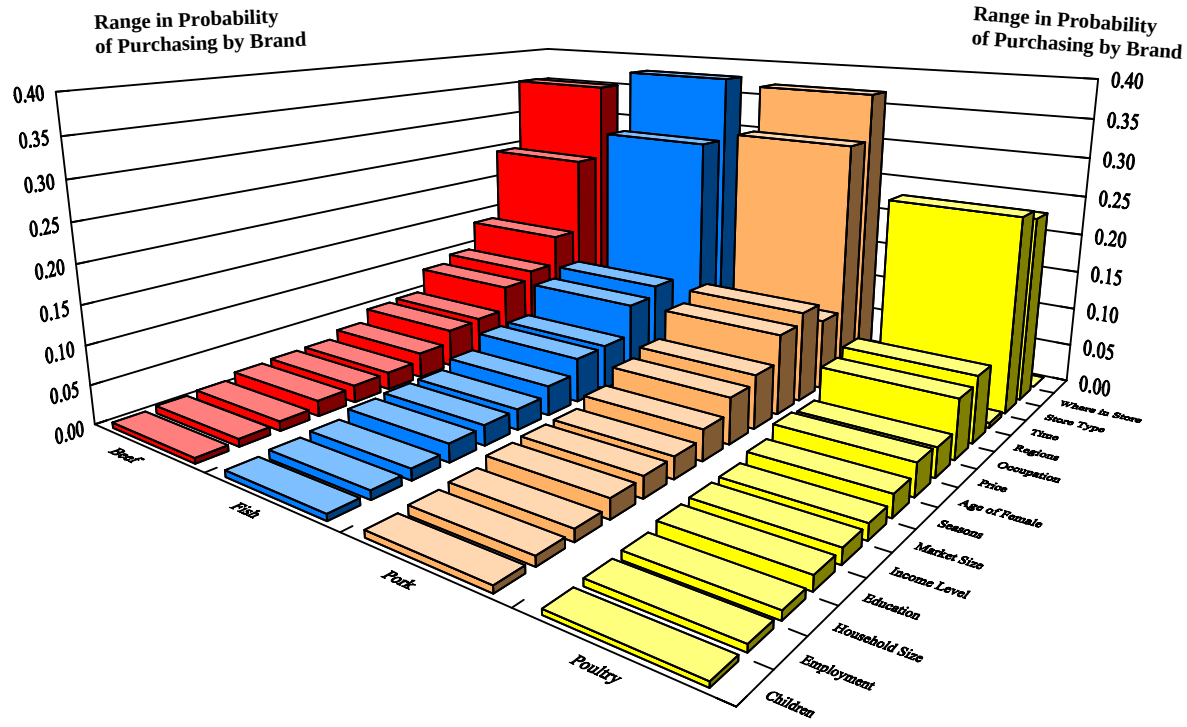

Figure 8. Range of change in the likelihood of buying by brand across the four meats.

Beyond these, the range for all other variables is generally under 7 percentage points with most of the demographics even being considerably less (e.g., in the 2 percentage point range).

Brand Identity Implications

Why the interest in brand identity for meats? Brands are a direct measure of the both concentration in an industry and/or the ability to achieve levels of product differentiation with the concepts being interrelated. Differentiation may reflect value added through product form, product guarantees, and even food safety and security. Potentially, some of these attributes could enhance the total demand if the brand implies safer foods. However, there is nothing inherit in a brand to guarantees safer food than a non-brand. Brand versus non-brand has important implications for how the value of the raw product is passed through the distribution system. Do growers realize the same relative gains (or loses) for the liveweight animal with and without brands? Or do the processors capture a greater portion of the gains with the transformation process associated with the brand?

What are the implications for competition among the meats when one sector is highly branded and the other is not as seen with beef versus poultry?

Using the probit estimates the analysis clearly shows the differences in brand identity among the four meats. Likewise household show an increase in the level of beef purchases by brand. Yet the level is still low compared to the other meats. Each meat sector funds programs to support the demand for their commodity. For beef, the primary program has been through the generic promotion of beef through a national checkoff. A similar program exists for pork, but not for fish and poultry. Industries with major brands may have competing objectives between firms supporting brands and generic programs supporting total industry growth. One can turn to the citrus industry, however, to show the situation where both brands and generic programs jointly exist. The implications for longer term support of a generic program must be tied to what is happening with the brands. While brands have growth for beef, the evidence still points to over 70 percent of the beef being bought as non-branded purchase. The implications for sustaining a workable generic program is clear for beef.

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