

**Financial Management Literacy for American Youth
(Workshop Summary)**

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Experience with money by youth is no guarantee of adequate preparation for the challenges awaiting them as young adults--budgeting for a household, managing credit, saving and investing for financial security. Educators can have a positive impact on the financial management literacy of American youth. The workshop speakers, together with the participants, identified five keys to successful outreach for youth audiences.

The Challenge

Today's youth have economic power. A recent Rand Youth Poll estimated expenditures by youth age 7-18 to be \$56 million in 1990. This is up from \$36 million spent in 1979. During the same period the youth population dropped by 4 million. Jobs in the service sector and allowances from two-earner parents to fewer children are increased sources of income for youth.

Without responsibility for financing basic needs (e.g., food, housing, public education via taxes), most of youth's income, regardless of its source, is discretionary. This unrealistic consumption milieu, when coupled with peer pressure for immediate gratification and conspicuous materialism, often leaves youth ill equipped to manage financial resources in young adulthood.

The Response

Educators can positively impact the economic stability of tomorrow's young families by empowering youth with basic financial management skills today. The Cooperative Extension System (CES), a nationwide educational network linking the expertise and resources of the federal government, state land-grant universities, and 3,150 county offices, has a 77-year

history of equipping Americans with the research-based knowledge and skills needed to maximize financial resources.

To reach youth in New York, Extension teamed with the State Banking and Education Departments to produce "You're Accountable," a 50-minute dramatized video with teacher's workbook. The materials, designed to be used in the mandated one semester economics course for seniors, is in every public high school in the State. Another Cornell effort, "It All Adds Up," is a nine-unit curriculum on consumer and resource management for use in the schools by younger teenagers and preteens. Outside the formal classroom, Cornell uses the 4-H project "My Money, Myself." A similar "Consumer Education-Management" project is available to Tennessee youth.

Both Tennessee and Minnesota, together with nearly 20 other State Extension Services, have teamed with the College for Financial Planning, Denver, to deliver the High School Financial Planning Program. The six-unit course acquaints youth with basic financial planning concepts and illustrates how these concepts apply to everyday life. It is projected more than 60,000 youth will enroll in this program nationwide in the 1990-91 school year.

Keys to Successful Programming

The Extension programs cited, as with any community-based educational outreach to youth, exhibit some commonalities. The purpose of this workshop was to identify keys to successful financial management programming with youth audiences.

Key #1--Define Audience Narrowly

The method and content of programs will vary depending on the age of the youth involved. For example, a 5-year-old can begin to grasp the concept of money as a finite resource; the 12-year-old will be interested in saving to meet a short-term goal, such as buying designer jeans; and the 15-year-old will take note of budgeting skills to pay car expenses. The words youth, children, and adolescents, for example,

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have different meanings to different educators. Be specific.

Avoid limiting the audience to direct teaching of children. The audience may be parents, who significantly impact the values their children harbor regarding money, or teachers. The vice versa also is true.

Key #2--Expand Content Beyond Financial

Earning, spending, saving, and credit are common content components for pre-teen education. For teens, investing can be added. Knowledge, and perhaps even practices, can change as a result of educational programs in these content areas. But do not overlook change in the individual's orientation reflected by personal attitudes, values, and beliefs. Values shape decisions.

Financial management literacy goes beyond specific money use behaviors. Management allows the individual to achieve goals by using resources wisely. Effective decision-making is an important skill needed for consumer choices; identifying alternatives and their consequences help youth make better decisions in the marketplace.

Financial management educators are encouraged to team with human development and psychology experts in planning, developing, implementing, and evaluating programs reaching youth. Just as a financial plan is a lifetime endeavor, so is the development of an individual's attitudes about money. Financial, management, and individual orientation components are important content for teaching.

Key #3--Focus on Action-Oriented Education

Youth learn best through experience. Use of new technology (e.g., computers) can retain the student's interest. In any case, needs drive the educational method. For example, using the shopping mall as a classroom may motivate young teens. Involve youth in the planning process.

Key #4--Be Sensitive to the Learner's Environment

Environmental dynamics play a major role in a youth's level of knowledge and ability to learn about money management. Three factors apply.

- 1) Historical--where the youth's family of origin had effect, through modeling, on the values, beliefs, and

attitudes of the youth's parents;

- 2) Blending--where the mother and father, through communication and conflict resolution, further model behavior related to money management; and

- 3) Socialization--where the youth develops via influences from siblings, parents, other family members, peers, and the entire community.

Key #5--Network

Extension has achieved the greatest outreach for youth financial management education with school enrichment efforts. For example, in New York, Extension has cooperated with the State Education Department's Occupational Education Division and the Bureau of Social Studies, the New York State Banking Department, the Home Economics Teachers Association of New York State and the New York State Council on Economic Education.

Educators, including classroom teachers, community professionals, and volunteers, obtain from Extension the insights, ideas, and action plans needed for conducting educational activities and lessons for youth. Extension responds to requests for financial management educational assistance from community job training, and preparedness programs, adolescent group homes, independent living and other special youth community programs.

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**Incorporating Consumer Attitudes and Health Awareness in Demand Analysis:
The Case of Calcium Advertising on Dairy Product Demand**

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Dairy product consumption can be influenced by advertisement which increases consumer awareness of health related benefits. Market tracking data from a national survey of women show that sociodemographic variables as well as changes in consumer attitudes induced by advertisement affect the frequency of dairy product consumption.

Introduction

Advertising and promotion of generic food commodities have become more important in recent years. In the past, food manufacturing and processing industries have contributed the largest share of food advertisements through brand advertising (Rogers and Mathew, 1983). However, large stocks of agricultural commodities and the perceived opportunity to expand demand have spurred several agricultural commodity producer organizations to launch promotion of generic agricultural commodities. Currently there are about 300 producer funded "check off" programs authorized by federal or state legislation which generate more than \$530 million (Armbruster and Frank, 1988). Since a major portion of the check off dollars goes to advertising and promotion activities, effective advertising strategy and program management are essential to insuring that the publicly mandated producer money is spent wisely.

A special feature of these generic food promotions is that they often provide information about product quality or characteristics related to nutrition and health. The effectiveness of such commodity promotion programs, or related nutrition education, depends on consumers' information seeking behavior, the impact of such information on consumer perceptions and subsequent consumer behavior. It is, thus, important to identify both the process of acquiring information as well as how attitudes and awareness influence the consumer's decision

processes (see Khilstrom, 1974; McEwen, 1985; Wilde, 1980).

Several studies have focused on the methods and strategies of pre-purchase information seeking behavior (Jacoby et al., 1977; McCullough and Best, 1980; Feick et al., 1986), and on changes in consumers' perceptions resulting from nutrition information. Jensen and Kesavan (1987) adapted a recursive model to depict the consumers' decision making process including consumer attitudes towards calcium and consumption of dairy products. Most studies have not identified consumer nutrition information-seeking across information sources. One exception is Feick et al. (1986) who showed the importance of examining consumers' use of a variety of nutrition information sources by using a cost-benefit framework. Since generic agricultural commodity advertising is less directly attributable than the sources of information consumers consider, we take a behaviorally based approach that focuses on the process and effectiveness of nutrition related information on consumption decisions.

The purpose of this study is to investigate empirically the interplay among the sources of information, consumers' attitudes and awareness of calcium and health, and purchases of dairy products. The general framework used is an extension of Jensen and Kesavan (1987). We construct a direct measure for the unobservable attitude and awareness variable based on the observable responses to survey questions related to nutrition and health. The econometric approach treats the sources of nutrient and health information as separable from perceptions and behavior. That is, advertising information is determined in the first stage and then the changes in consumers' perceptions and purchase behavior are analyzed within a system framework in the second stage.

The paper includes a summary of the general model framework, a brief description of the calcium promotion campaign and the data used in the analysis, and a discussion of how the general model is adapted to the analysis of calcium advertising on dairy products. The empirical model is

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applied to Calcium Ad Tracking (CAT) data to evaluate the effectiveness of the different sources of generic information on consumer perceptions and behavior. The final section includes a discussion of the conclusions and limitations of the study.

A General Model Framework

Much of generic food advertising is informative in nature. Thus, the information acquisition process and its interplay with consumer attitudes are important to purchase decisions. The approach taken here recognizes that the process of acquiring information leads to changes in consumer perceptions and behavior. The structure of such a consumer decision making process is specified as follows:

$$\begin{aligned}AD_s &= f_s(X1, e1s) & (1) \\ATT &= g(X2, AD_s, e2) & (2) \\CON &= h(X3, ATT, AD_s, e3) & (3)\end{aligned}$$

where AD_s is an indicator of the recall and recognition of the information from advertising source s ; ATT is an index of attitudes and awareness towards nutrition and health; CON is a measure of consumption (or purchases); $X1$ and $X2$ are sets of socio-economic variables; and $e1s$, $e2$ and $e3$ are vectors of the disturbance terms.

The model structure provides a generalized framework for describing the way in which consumers would process information about nutrition and health in their consumption decisions. See Khilstrom (1974) and Krugman (1977) for more discussion of such structures. This model is particularly appealing for analysis of generic advertising because both the direct and indirect effects of the information on consumption of food products can be evaluated.

Calcium Information and the Data

In 1984/85, the National Dairy Board launched a campaign promoting dairy products by informing consumers about the calcium content in dairy products. The calcium promotion program began with print and TV media; in 1987/88 TV advertising was cut back significantly. The main objective of the calcium campaign was to inform consumers, particularly women, about health related attributes of dairy products, and that dairy products provide a good source of the nutrient calcium. The Dairy Board tracked the success of the promotion through a national "tracking" telephone survey.

Calcium Ad Tracking Study

Our study uses data from the Dairy Board's calcium ad tracking (CAT) survey. The CAT survey was conducted during the period November 1985 through October 1986, and again November 1986 through October 1987. This nationwide telephone survey was designed to gather information on dairy foods consumption, attitudes and beliefs related to calcium as well as recall awareness of advertising. The empirical sample was of 2996 women between the ages of 18 to 54, comprised of 1706 women for the period November 1985 through October 1986 and 1290 for the period November 1986 through 1987.

Variables for Analysis

The variables used in the analysis and descriptive statistics are listed in Table 1. Two types of variables were created for advertising information: whether the respondent recalled seeing an advertisement from TV (DADTV) or from other sources (DADTHER). These variables were binary in nature depending upon the source of information.

Since consumers' attitudes and awareness towards nutrition and health were not directly observable, they were measured through responses to specific questions related to nutrition in dairy products and other health related issues. The responses were combined to construct index measures of consumers' attitude and awareness using a scoring procedure. Two categories of questions formed the basis for developing such indices. The first category of questions was related to the response to questions about the importance of nutrients for consumers' health (referred to as the "importance" category). The second category of questions were related to responses to questions about whether consumers agreed or disagreed about the characteristics of dairy products (referred to as the "Agree/Disagree" category). These questions were selected on the basis of exploratory factor analysis.²

Some modification was made to the data in order to clarify the interpretation of the responses to the survey questions. Responses which were initially coded as "no response" (0), "yes" (1), and "no" (2) were converted to "no or no response" (0) and "yes"

²Only those factors which had a loading of 0.25 were retained for subsequent analysis. A copy of these results are available from the authors.

(1). Individual responses to agreement/disagreement questions were recorded on a scale of 1 to 10. In order to reflect consistently the positive attitudes about dairy products, some questions were reverse scaled. The importance questions were recorded on a scale from 1 to 4.

In general, the sum of the responses to questions was considered as a proxy to measure knowledge about nutrition and health. However, the structure of the questions in the survey was such that the modal values of the response to questions were at extreme values. This meant that an aggregate sum of the responses would always produce a high value for the consumers' knowledge index and would not include much variation. Since we were more interested in changes in consumer perceptions than the aggregate knowledge about nutrition and health, a new measure of attitude and awareness was constructed based on the modal values of the responses.

Specifically, a binary variable was created for each of the questions, taking a value of 1 if the response was at or above modal value, or zero otherwise. An attitude index towards nutrients was measured through the sum of these binary variables related to questions in the "importance" category (SCIMP3). Similarly consumers' awareness towards health was measured by the sum of the binary variables related to questions in the "agree/disagree" category (SCAGR3). An overall index of consumers' perceptions towards nutrients and health was measured as the sum of the importance (SCIMP3) and health (SCAGR3) indices, and referred to as SCIPAG.

The survey had limited information on the actual intake of calcium or dairy products. The consumption variable was measured through the frequency of consumption of specific dairy products (milk, cheese, other). Responses to questions on weekly consumption were weighted to derive data on a monthly basis.

The survey also had information about several socioeconomic and demographic characteristics. The variables included household income, race, age, employment status, marital status, the presence of children under 18 in the household, and respondent education.

Empirical Model and Estimation

The structure specified in equations 1 to 3 was adapted to analyze the effect of calcium and health

information on dairy products as follows,

$$DADTV = f_1(X_1, Z_1, e_{11}) \quad (4a)$$

$$DADTHER = f_2(X_1, Z_2, e_{12}), \quad (4b)$$

$$SCIPAG = g(X_2, DADTV, DADTHER, e_2) \quad (5)$$

$$CON = h(X_3, ASCIPAG, DADTV, DADTHER, e_3) \quad (6)$$

where DADTV and DADTHER are binary variables for ad recall based TV and other media sources, respectively; SCIPAG is the index for attitude and health awareness; Z_1 and Z_2 are seasonal dummies or trend variables; e_{11} , e_{12} , e_2 and e_3 are disturbance terms; the other variables are as defined before.

A two-stage procedure was followed in estimating the equations. Equations 4a and 4b were estimated first through a probit procedure and then equations 5 and 6 were estimated using two stage least squares after replacing the AD exposure variables with the inverse mills ratio instrumental variables (ADTVIMR and ADOTIMR). This provided consistent estimates for both the attitudes equations, (5) and (6), and the consumption equations and also allowed testing of hypotheses about the effect of different sources of information and attitudes in the model.³

Empirical Results

Advertising Information

The maximum likelihood probit estimates for the TV (DADTV) and other sources (DADTHER) of information are provided in Table 2. The two equations differed in the set of exogenous variables only in terms of the seasonal and trend variables. In the DADTV equation, dummy variables for the months during which the Dairy Board had the calcium campaign on TV were included. In the DADTHER equation, a time and squared time variable were included to reflect the cumulative learning or carryover effect in information seeking behavior. Other socioeconomic variables that were common to both equations included dummy variables for income, age, education, marital status, and employment.

The results reported in Table 2 showed that income and education were

³The inverse mills ratio is correlated with the corresponding dependent variable, but uncorrelated with the error terms in equations 5 and 6, and thus provides a consistent instrumental variable estimator for the AD exposure variables in equations 5 and 6 (Maddala and Lee, 1976).

important predictors of calcium advertising information from either media source. Being over the age of 35 had a negative effect on recall of TV advertisements. The monthly dummies in the DADTV equation were positive and statistically significant during the early periods of the calcium campaign, but were generally negative after November 1986. This suggests that the calcium campaign on TV was effective in the beginning but its effectiveness (in terms of recall) declined rapidly. On the other hand, the time trend variable had a positive marginal effect on DADTHER suggesting that there was some "learning" about calcium and health and this cumulative effect of increased information was through sources other than TV.

Attitudes and Dairy Consumption

The two stage results of the attitude index and dairy and milk consumption are presented in Table 3. Only the results based on the scored attitude and awareness index (SCIPAG) are reported here⁴. Preliminary results suggested that the AD exposure variables (ADTVIMR or ADOTIMR) did not have a significant effect on consumption, hence they were dropped from the consumption equation. These results were also consistent with the earlier finding that the advertising information interacts indirectly through attitude and awareness variables rather than directly (Jensen and Kesavan, 1987). The socioeconomic variables included in the attitude and awareness equation were income, race, age, employment; the consumption equation also included education, marital status, presence of children and seasonal dummies.

The results from Table 3 suggest that the advertising information, especially from other than TV media sources, had a positive and significant effect on consumer attitudes towards nutrients and health awareness. Although the effect of TV advertising information was positive it was not statistically significant. Older women were more likely to have positive attitudes and awareness of calcium and health, but fully employed women did

⁴Analysis was also carried out for the different types of attitude and awareness index, using SCIMP3 and SCAGR3. This resulted in adding one more equation in the model structure to separate out the two factors of attitude and awareness indices. The results are quite similar to the one reported in the study based on the aggregate index SCIPAG.

not. The attitude and awareness index was associated with increased purchases of dairy and milk products. As expected being black and older had a negative effect on dairy and milk purchases and having children had a positive effect. Being employed, whether full time or part time, also decreased the purchases of dairy products.

Conclusion

An econometric model linking advertising information from TV and other media sources, consumers' attitudes toward nutrition and health and consumption of dairy products provided the medium for analyzing the effect of calcium advertising on dairy products consumption. The results suggested that different sources of information about product nutrition and health are important determinants of consumer attitudes. Specifically, the information from both TV and other media sources had a positive and significant influence on the consumer attitudes and awareness towards calcium and health. Information from sources other than TV had a stronger effect on attitudes. This result lends support to the marketing decision to increase calcium promotion through print and other (non-TV) media.

Furthermore, the results indicated that the attitude and awareness index had a positive and significant marginal effect on purchases of dairy and milk products. Advertising itself did not have direct influence on the purchases. This corroborates earlier findings based on a different attitude and awareness index (Jensen and Kesavan, 1987). The analysis also pointed out a key limitation in using AD tracking survey data. Since the dependent variable which measures consumption frequency is not a very precise measure of consumption, it has limited potential for studying the effect of advertising on consumption, especially for frequently consumed commodities, such as milk and dairy products (see Jensen and Kesavan, 1991 for an alternative analysis). A need also exists to refine the types of survey questions on "attitudes" related to generic food commodities. Such foods are likely to be associated with well-ingrained consumption habits and food beliefs as opposed to the more traditionally tracked branded products.

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Table 1.
Variables and descriptive statistics, CAT data, 1985-87

NAME	Description	MEAN	VARIANCE	MINIMUM	MAXIMUM
	Importance of				
IMPPROT	--protein	3.63	0.436	0.00	4
IMPZINC	--zinc	2.35	1.742	0.00	4
IMPCARB	--carbohydrates	2.86	1.082	0.00	4
IMPCAL	--calcium	3.81	0.281	0.00	4
IMPRIBF	--riboflavin	2.21	2.103	0.00	4
IMPVITD	--vitamin D	3.11	1.254	0.00	4
IMPPOT	--potassium	3.22	1.061	0.00	4
	Agree/Disagree				
DPPNUT	--Dairy provides nutrients	8.38	4.752	1.00	10
DPTOOF	--Dairy too fattening	6.13	4.000	1.00	10
MNCDIET	--Not getting enough calcium	5.76	11.290	1.00	10
TABGCDP	--Too much bother from dairy	6.66	9.734	1.00	10
DPMNPC	--Dairy ..more nut/calories	5.73	5.954	1.00	10
AFNCFDP	--Females need dairy..				
	calcium	8.23	5.954	1.00	10
MSCAL	--Milk is a better source				
	calcium	7.22	7.618	1.00	10
DPHTMC	--Dairy have too much				
	calcium	6.69	7.673	1.00	10
BWCTAB	--Best not to take calcium				
	supplement	5.77	10.498	1.00	10
NONFCAL	--Never outgrow the need for				
	calcium	8.53	7.076	1.00	10
	Income				
DHHINC1	Under \$15,000	0.1622	0.136	0.00	1.00
DHHINC2	\$15,000-\$24,999	0.2190	0.171	0.00	1.00
DHHINC3	\$25,000-\$39,999	0.2947	0.208	0.00	1.00
DHHINC4	\$40,000 and over	0.2283	0.176	0.00	1.00
DHHINC5	Don't know	0.0958	0.087	0.00	1.00
	Age				
DUMAGE1	18-24	0.1582	0.133	0.00	1.00
DUMAGE2	25-34	0.3862	0.237	0.00	1.00
DUMAGE3	34-54	0.4556	0.248	0.00	1.00
DEDUCN	High school education	0.8942	0.095	0.00	1.00
DEMPFULL	Full time worker	0.5040	0.250	0.00	1.00
DEMPPART	Part time worker	0.1449	0.124	0.00	1.00
DMARSTAT	Not married	0.3121	0.215	0.00	1.00
DCHILD18	Presence of Children under 18	0.6085	0.238	0.00	1.00
DBLACK	Being Black	0.0975	0.088	0.00	1.00
DORACE	Other race	0.0584	0.055	0.00	1.00
SCIMP3	Importance index	4.3371	3.289	0.00	7.00
SCAGR3	Health awareness index	3.7273	3.644	0.00	10.00
SCIPAG	Attitude and Awareness index	8.0644	8.096	0.00	17.00
DADVCAL	Advertising exposure	0.7614	0.182	0.00	1.00
DADTV	TV ad exposure	0.4646	0.249	0.00	1.00
DADTHER	Other than TV ad exposure	0.3371	0.224	0.00	1.00
CCDAIRY	Dairy consumption	37.6730	323.74	0.00	90.00
CMILK	Milk Consumption	20.5020	145.32	0.00	30.00
CCHEESE	Cheese consumption	13.6170	92.998	0.00	30.00
	Seasonal dummies and trend				
TIME	time	11.1030	51.522	1.00	24.00
SUMMER		0.2423	0.1837	0.00	1.00
SPRING		0.2253	0.1746	0.00	1.00
FALL		0.2917	0.2067	0.00	1.00
WINTER		0.2407	0.1828	0.00	1.00

Table 2.
Maximum likelihood probit estimates for recall
of different sources of advertising information,
CAT data (1985-87)

VARIABLE	DADTV	DADTHER
	coefficient	coefficient
DHHINC2	0.1957**	0.1818**
DHHINC3	0.2051**	0.2768**
DHHINC4	0.2353**	0.3301**
DHHINC5	-0.0426	-0.0518
DEDUCN	0.3048**	0.3413**
DUMAGE2	-0.0245	0.0264
DUMAGE3	-0.2937**	0.0447
DMARSTAT	-0.1010*	-0.1024*
DEMPFULL	-0.0738	-0.0447
DEMPPART	0.0802	0.1600*
NOV85	0.1612**	
DEC85	0.3267**	
FEB86	0.2984**	
MAR86	0.3821**	
APR86	0.2814**	
MAY86	0.5689**	
NOV86	-0.0008	
DEC86	-0.2733**	
JAN87	-0.5637**	
FEB87	0.0242	
MAR87	0.0747	
APR87	-0.1815	
MAY87	-0.5000**	
JUN87	-0.1199	
TIME		0.0444**
TIMESQ		-0.0013**
CONSTANT	-0.3514**	-0.0251
LOG L	-1974.1	-1598.5
LR	190.06	95.76
R-Square	0.0615	0.0315
% of correct predictions	0.60	0.76

*denotes significant at 10% level.

**denotes significant at 5% level.

Table 3.
Coefficient Estimates for the Attitudes
and Consumption Equations, CAT Data,
1985-87

VARIABLE	SCIPAG	CCDAIRY	CMILK
	coefficient	coefficient	coefficient
DHHINC2	0.132	-0.347	0.116
DHHINC3	-0.048	0.089	0.113
DHHINC4	0.121	-0.022	-0.546
DHHINC5	-0.347*	0.647	0.356
DBLACK	0.462**	-7.645**	-4.276**
DORACE	-0.235	1.100	0.571
DUMAGE2	0.706**	-1.898*	-1.561**
DUMAGE3	1.242**	-5.355**	-2.811**
DEMPFULL	-0.376**	-1.605**	-2.098**
DEMPPART	-0.197	-2.184**	-1.705**
DEDUCN		1.742	0.529
DMARSTAT		0.086	0.085
DCHILD18		3.339**	2.393**
ADTVIMR	0.119*		
ADOTHIMR	0.296**		
SCIPAG		0.726**	0.314*
SPRING		-0.447	-0.500
SUMMER		-0.091	0.022
FALL		-0.372	0.249
R-Square	0.0395	0.0503	0.0383

*denotes significant at 10% level.

**denotes significant at 5% level.

Estimated Income, Age, and Selected Demographic Characteristics
Elasticities for Food Groups from USDA's 1985 and 1986
Continuing Survey of Food Intakes by Individuals

P. Peter Basiotis, U.S. Department of Agriculture ¹

Data on 2,551 women 19 to 50 years of age, from USDA's Continuing Survey of Food Intakes by Individuals 1985 and 1986, were utilized to estimate elasticities for income, age, household size, and other socioeconomic characteristics for several food groups, using the Tobit regression specification. The estimates suggest substantial changes in demand for several foods with the currently anticipated demographic shifts.

In recent years, predictions on the economic climate of the 1990's and the early part of the twenty-first century have focused on the aging of the population, as well as on other anticipated shifts in the demographic make-up of the U. S. population. In particular, these sociodemographic shifts are expected to have a major impact on the food chain. For example, in a recent article in *Choices*, Senauer (1989) discussed the "Major Consumer Trends Affecting the U.S. Food System." First on his list were the anticipated "Demographic Changes ... By the year 2000, the median age of the population will increase from 31.8 in 1986 to 36." Household size is smaller (and may continue to decline), ... six out of ten Americans will live in the Sunbelt," and the Hispanic population will increase by about 50 percent from 19 million currently to 30 million by the year 2000.

Clearly, it is important to assess the likely quantitative impact of these sociodemographic trends on food consumption in the United States. Several past studies have demonstrated the link between these factors and food consumption (Hama & Chern; Smallwood & Blaylock; Basiotis, Brown, Johnson & Morgan; Morgan; Capps & Havlicek; Morgan, Johnson, Lee & Goungetas). However, being economic studies, their primary focus has been on estimating and reporting income elasticities. In addition, most such studies utilized expenditures on food (Hama & Chern; Smallwood & Blaylock), nutrient

consumption (Basiotis et al.; Morgan), or highly aggregated food groups (Capps & Havlicek; Morgan et al.) as the dependent variable(s).

This study estimated income, household size, age, body weight, ethnic origin, race, and geographic region elasticities of 45 food group categories at various levels of aggregation. Data came from two nationally representative samples of women 19 to 50 years of age (USDA). To account for the limited dependent variables problem of zero reported food group intakes, the Tobit specification was employed (Amemiya; Fomby, Hill & Johnson; Maddala; Tobin). Selection of variables was guided mainly by previous applied economic research and data availability. The findings may be of interest to those at all levels of the food chain, nutritionists and nutrition educators, some government agencies, public health professionals, academics, and the public.

Theoretical Issues and Statistical Model

Applied econometric models of demand for food are typically guided by economic theory, usually either classical or household production theory. Choice of the appropriate theoretical framework can be very important for estimation because severe statistical biases may result if the researcher does not choose prudently. In practice, however, the researcher is usually limited by the available data. This has resulted in approximately the same set of available variables being included in such models regardless of theoretical framework.

A consequence of this is that, depending on choice of theoretical framework, a given available variable may be thought of as being a proxy for several unrelated and unobservable economic variables. For example, the observed variable "age" can stand as a proxy for human capital in the form of experience. It affects the demand for a food group through its effects on the household production function. It can also be thought of as proxy for preferences unique to cohorts. As such it would affect the demand for a food group through the utility function in either theoretical framework. As an additional example, the presence of children could be a proxy for

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preferences (affecting the utility function), availability of time (affecting the opportunity cost of time), or availability of household labor performed by older children.

Thus, interpretation of estimated coefficients will be affected by choice of theoretical framework. However, assuming that the same observable (proxy) variables are included in the analysis, the estimates themselves will not be affected by choice of theoretical framework.

These observations are relevant to the present study since the specification is essentially exploratory and no explicit theoretical framework was employed. Instead, it was guided mainly by past applied research and data availability. Since this study was intended to estimate the net impact of sociodemographic factors on food group consumption, an ad hoc reduced form specification was used.

Specifically, food group consumption was related to household income, household size, and a number of other sociodemographic characteristics. Because of the presence of zero reported intakes, econometric methods such as Ordinary Least Squares (OLS) could not be used since the resulting parameter estimates would be biased and inconsistent (Tobin; Fomby et al.). The Tobit regression model, on the other hand, yields consistent parameter estimates.

The Tobit model is defined as follows:

$$Y_i^* = X_i b + e_i \quad (1)$$

where X_i is a vector of explanatory variables, b is a vector of unknown coefficients, and the e_i 's are assumed independently and identically normally distributed with mean zero and variance s^2 . The Y_i^* 's are assumed unobservable or latent variables which are related to the observed dependent variables Y_i as follows:

$$Y_i = \begin{cases} 0 & Y_i^* \leq 0 \\ Y_i^* & Y_i^* > 0 \end{cases}$$

Properties of the Tobit model are discussed extensively elsewhere (Cox, Ziemer & Chavas; McDonald & Moffitt). The model was estimated by Maximum Likelihood using the Limdep version 5.1 statistical software package (Greene). Since the estimated tobit coefficients are not the marginal propensities to consume as in OLS, a Limdep subroutine written by the author was utilized to calculate elasticities appropriately.

Data and Variables Definitions

Data from USDA's 1985 and 1986 Continuing Survey of Food Consumption by Individuals (CSFII) were used in this analysis. The CSFII was the first nationwide survey to collect dietary and other information on U.S. households and individuals within sample households year by year. The samples consisted of women 19 to 50 years of age and their children ages 1 to 5 and were drawn anew each year. Even though information was collected from each participating woman and child for up to six times at approximately 2-month intervals, this study utilized information obtained through personal interview on the first day of the surveys. Food intake information was collected by a 24-hour dietary intake recall. In addition, other information on the socioeconomic characteristics of the household was collected from the person deemed most knowledgeable about the household food purchasing and preparation patterns. In order to avoid within-household correlations, data from only one woman per household was included in the analysis, the respondent, if age/sex eligible, or otherwise, the oldest eligible individual. The combined 1985 and 1986 sample contained information from 2,693 households with at least one eligible female member. Deletion of incomplete records resulted in 2,551 women being included in the analysis.

The food group categories utilized as dependent variables and reported here were:

beef, pork, frankfurters/sausages/lunchmeats, poultry, chicken, meat mixtures, total meat/poultry/fish/shellfish, total milk/milk products, total fluid milk, whole milk, fluid lowfat/skim milk, cream/milk deserts, cheese, eggs, legumes/nuts/seeds, total vegetables/fruits, total vegetables, white potatoes, tomatoes, other vegetables, total grain products, bread rolls/biscuits, other baked goods, total cereals/pastas, ready-to-eat cereals, grain mixtures, total fats/oils, table fats, salad dressings, total sugar/sweets, sugars, candy, total fruits, total citrus fruits/juices, citrus juices, total other fruit mixtures/juices, other fruits/mixtures, total alcoholic beverages, total nonalcoholic beverages, coffee, tea, total carbonated soft drinks, regular carbonated soft drinks, diet carbonated soft drinks, and total beverages. The following food group categories were also included in the analysis but the maximum likelihood algorithm did not converge and thus are not reported here: Lamb/veal/game, organ

meats/mixtures, fish/shellfish, yogurt, dark-green vegetables, deep-yellow vegetables, dried fruits, apples, bananas, noncitrus juices, beer/ale, total fruit drinks/ades, regular fruit drinks, and diet fruit drinks.

The independent variables included in the model were annual household income including the food stamp bonus income if applicable, tenancy status, food stamp program participation, household size, headship, presence of child one to five years of age, geographic region, urbanization, respondent's age, ethnic origin, race, education, self-reported weight, self-reported height, and self-reported health status, smoking status, pregnancy or lactation, intake of vitamin or mineral supplements, and the ratio of usual number of meals away from home to the usual number of meals at home per week.

Limitations

As in all applied econometric studies, several limitations must be borne in mind when interpreting the results reported here. To begin with, the nature of the study was exploratory. Past analyses on the demand for food guided model specification and selection of variables. Thus the possibility of committing gross errors was reduced.

Several problems remain, however. A major limitation was lack of a specific theoretical framework to guide the analysis and to help with interpreting the results. Analyzed data were limited to a subpopulation, women 19 to 50 years of age, even though the purpose of the analysis was to estimate likely impacts on the national food chain. The Tobit model may not be an appropriate statistical tool for analyzing disaggregated food group consumption (Cragg; Haines, Guilkey & Popkin; Lin). Analysis was done on an equation-by-equation basis, as opposed to a more appropriate systems approach. As market prices were not available, region/urbanization differences were used as proxies for price variation. Given the size and number of these limitations, results should be interpreted with caution. Until further confirmation, they should be considered preliminary.

Results

Estimated elasticities are shown in Tables 1 and 2. The tables show nine key independent variables; the median for age and household size (34.0 years and 3.0 members respectively), and the mean for income, or proportion of the sample in the ethnic origin, race and region categories, weighted to

reflect the population distribution. Estimated elasticities are not given if the associated parameter estimate was not significant at the 0.05 level. Table 1 shows that for most food group categories the independent variables under examination could not be shown to have a statistically significant impact. However, no attempt was made to assess the power of these tests.

Income had a moderate impact on the consumption of several food groupings. It had a positive impact on the consumption of meat mixtures, cream/milk desserts, total fruits, fruit mixtures/juices, alcoholic beverages, coffee, and diet carbonated soft drinks. Negative income elasticities were estimated for beef, frankfurters/sausages/lunchmeats, and white potatoes. The negative income elasticity for beef is possibly due to the aggregation of several beef products of heterogeneous quality and price, e.g. hamburger and steak. It may also be that income is serving as a proxy for such unobservable variables as nutrition education and awareness.

Household size had a positive impact on the consumption of only three food groupings: sugars, total sugars/sweets, and regular carbonated soft drinks. On the other hand, negative consumption elasticities with respect to household size were estimated for total vegetables/fruits, other vegetables, total fruits, total fruit mixtures/juices, other fruits/mixtures, total alcoholic beverages, and diet carbonated soft drinks.

Age of the female respondent was estimated to have a number of significant impacts. Some of the largest ($\geq .5$) positive estimated elasticities were for legumes/nuts/seeds, sugars, non-citrus fruits/fruit mixtures/fruit juices, and coffee. Some of the largest negative elasticities were for candy, other vegetables, and regular carbonated soft drinks.

Self-reported body weight, on the other hand, seemed to have numerous significant elasticities of the opposite sign to those of age. Large ($\geq .5$) positive elasticities were estimated for poultry, chicken, and diet carbonated soft drinks. Large negative elasticities were estimated for whole milk, total cereals/pastas, and total alcoholic beverages.

Table 2 shows the proportions and the estimated elasticities of the food grouping categories with respect to the discrete variables in the model. These elasticities would be interpreted as usual. For example, in column 1 of Table 2, the mean proportion of hispanic households was six percent. The corresponding estimated elasticity

Table 1. Estimated Income, Household Size, Age, and Weight Elasticities for 45 Food Group Categories, CSFII 1985, 1986 Data, Women 19-50 Years of Age, N=2,551

	INCOME (Mean= \$27,199)	HSHLDSZ (Median= 3 Indls)	AGE (Median= 34 yr)	WEIGHT (Mean= 64.4 kg)
TOT MEAT, PLTRY, FSH, SHLL	- a	-	-	0.16
BEEF	-0.19	-	-	-
PORK	-	-	-	-
FRANKS, SSGS, LUNCHMEATS	-0.2	-	-	-
POULTRY	-	-	-	0.83
CHICKEN	-	-	-	0.8
MEAT MIXTURES	0.22	-	-	-
TOT MILK & MILK PRODS	-	-	-0.22	-
TOT FLUID MILK	-	-	-	-0.35
WHOLE MILK, FLUID	-	-	-	-0.88
LOWFAT & SKIM MILK	-	-	-	-
CREAM & MILK DESERTS	0.19	-	-	-
CHEESE	-	-	-	-
EGGS	-	-	0.5	-
LEGUMES, NUTS, SEEDS	-	-	0.66	-
TOT GRAIN PRODUCTS	-	-	-	-0.25
BREAD, ROLLS, BISCUITS	-	-	-	-
OTHER BAKED GOODS	-	-	-	-0.41
TOT CEREALS & PASTAS	-	-	0.45	-0.66
READY TO EAT CEREALS	-	-	-	-
GRAIN MIXTURES	-	-	-	-
TOT FATS & OILS	-	-	0.34	-0.32
TABLE FATS	-	-	0.39	-0.41
SALAD DRESSINGS	-	-	-	-0.38
TOT SUGAR & SWEETS	-	0.19	-	-
SUGARS	-	0.24	0.58	-0.37
CANDY	-	-	-1.22	-
TOT VEGS & FRUITS	-	-0.12	-	-
TOTAL VEGGIES	-	-	-	-
WHITE POTATOES	-0.13	-	-	-
TOMATOES	-	-	-0.5	-
OTHER VEGGIES	-	-0.17	0.33	-
TOTAL FRUITS	0.14	-0.25	0.33	-
TOT CITRUS FRUIT&JUICES	-	-	-	-
CITRUS JUICES	-	-	-	-
TOT OTHR FRUIT, MIXT, JCS	0.17	-0.23	0.54	-
OTHER FRUIT & MIXTURES	-	-0.44	0.92	-
TOTAL BEVERAGES	0.06	-	-	-
TOT ALCOHOLIC BEVERAGES	0.57	-0.65	-	-1.31
TOT NONALC BEVERAGES	-	-	0.18	-
COFFEE	0.12	-	1.68	-
TEA	-	-	-	-
TOT CARB SOFT DRINKS	-	-	-0.89	0.66
REG CARB SOFT DRINKS	-	0.25	-1.25	-
DIET CARB SOFT DRINKS	0.27	-0.4	-	1.75

a Dash means corresponding Tobit coefficient not significant at .05 level

Table 2. Estimated Ethnic Origin, Race, and Region Elasticities for 45 Food Group Categories, CSFII 1985, 1986 Data, Women 19-50 Years of Age, N=2,551

	HISPNC (Mean= 0.06)	BLACK (Mean= 0.09)	OTHER (Mean= 0.05)	SOUTH (Mean= 0.33)	WEST (Mean= 0.22)
TOT MEAT, PLTRY, FSH, SHLL	- a	-	0.01	-	-0.02
BEEF	-	-	-	-	-
PORK	-	0.04	-	0.13	-
FRANKS, SSGS, LUNCHMEATS	-	-	-	-	-
POULTRY	0.02	0.06	-	-	-
CHICKEN	0.03	0.06	-	0.1	-
MEAT MIXTURES	-	-0.03	0.02	-	-
TOT MILK & MILK PRODS	-0.01	-0.04	-	-0.07	-
TOT FLUID MILK	-	-0.06	-	-0.14	-
WHOLE MILK, FLUID	-	-	-	-0.24	-0.15
LOWFAT & SKIM MILK	-0.04	-0.16	-0.03	-	0.08
CREAM & MILK DESERTS	-	-	-	-	-
CHEESE	-0.03	-0.05	-0.02	-	-
EGGS	-	0.04	-	-	-
LEGUMES, NUTS, SEEDS	-	-0.04	0.03	-	-
TOT GRAIN PRODUCTS	-	-	0.01	-	-
BREAD, ROLLS, BISCUITS	-0.01	-0.01	-0.01	-0.04	-0.03
OTHER BAKED GOODS	-0.02	-0.03	-0.01	0.06	-
TOT CEREALS & PASTAS	-	0.05	0.06	-0.08	-
READY TO EAT CEREALS	-	-0.05	-0.04	-	-
GRAIN MIXTURES	-	-	-	-	-
TOT FATS & OILS	-0.01	-0.03	-0.02	-0.04	-
TABLE FATS	-0.02	-0.04	-0.03	-0.12	-
SALAD DRESSINGS	-	-	-0.02	-	0.05
TOT SUGAR & SWEETS	-	-	-	-	-
SUGARS	-	-	-	-	-0.05
CANDY	-	-	-	0.15	0.09
TOT VEGS & FRUITS	-	-	-	-0.03	-
TOTAL VEGGIES	-	-	-	-	-
WHITE POTATOES	-	-0.04	-	-	-
TOMATOES	-	-	-	-0.1	-
OTHER VEGGIES	-	-	0.01	-	-
TOTAL FRUITS	-	-	-	-0.07	-
TOT CITRUS FRUIT&JUICES	0.03	0.03	0.02	-0.14	-0.05
CITRUS JUICES	0.03	0.04	0.02	-0.14	-0.01
TOT OTHR FRUIT, MIXT, JCS	-	-	-	-	0.05
OTHER FRUIT & MIXTURES	-	-	-	-	-
TOTAL BEVERAGES	-0.01	-0.03	-	0.05	-
TOT ALCOHOLIC BEVERAGES	-	-	-	-0.13	-
TOT NONALC BEVERAGES	-0.01	-0.04	-	0.06	-
COFFEE	-	-0.06	-	-0.11	-0.06
TEA	-0.03	-0.05	-	0.26	-
TOT CARB SOFT DRINKS	-	-0.03	-0.01	0.12	-
REG CARB SOFT DRINKS	-	-	-	0.16	-
DIET CARB SOFT DRINKS	-0.03	-0.08	-0.05	-	-

a Dash means corresponding Tobit coefficient not significant at .05 level

for poultry consumption was 0.02. Thus, hypothetically, a 100 percent increase in the proportion of hispanic households would result, *ceteris paribus*, in a 2 percent increase in the total consumption of poultry. Thus, even though there were numerous statistically significant estimated elasticities with respect to the ethnic origin, race, and regional variables (Table 2), in practical terms projected shifts in the population with respect to these variables were estimated to have relatively minor impacts on the consumption of the food group categories examined here. Some exceptions may be an expected decrease in the consumption of milk by blacks and of whole milk in the western region and an increase in tea and total carbonated and regular carbonated soft drinks in the south.

Summary and Conclusions

An exploratory model of food group consumption was estimated in an attempt to gain some insight about the likely impacts on food group consumption of commonly anticipated socio-demographic changes in the United States population. To this end a reduced-form Tobit regression model was fitted for each of 59 food group categories, of which 45 were successfully estimated. Although the analysis was guided by past research on food consumption, a number of limitations remained. Most notable perhaps were the absence of a well-defined theoretical framework and employment of data from a subpopulation (women 19 to 50 years of age). Thus, results should be viewed with extreme caution and considered preliminary, at least until the analysis is repeated using data from the 1987-88 Nationwide Food Consumption Survey, which is representative of the whole U.S. population.

Nevertheless, it was found that age and body weight (which would be expected to increase, on average, as the population ages) had the highest relative effects on food group consumption. Some expected trends due to the aging of the population might be increased consumption of fruit, coffee, and nonalcoholic beverages and decreased consumption of regular carbonated soft drinks.

The interpretation of the age effects was somewhat problematic since likely cohort effects could not be separated out from pure aging effects. An example could be coffee consumption. Its estimated age elasticity was high at 1.68. However, this probably reflected a cohort effect which cannot be expected to continue as the population ages. Perhaps some of the effects of the aging of the population

were better captured by the estimated body weight elasticities. Assuming that average body weight will increase with the predicted average population age increase, consumption of poultry, chicken, and diet carbonated soft drinks will increase. On the other hand, consumption of whole milk, cereals and pastas, other baked goods, total fats, oils in general, sugars, and alcoholic beverages will tend to decrease. If people migrating to the Sun Belt adapt their eating habits to those of the local residents, some increases in the consumption of pork, candy, tea, and regular carbonated soft drinks and decreases in the consumption of whole milk, table fats, citrus fruits, alcoholic beverages, and coffee may be expected, *ceteris paribus*.

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BOX-JENKINS FORECASTS OF PERISHABLE FOODS:
IS THERE POTENTIAL CONSUMER BENEFIT?

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The ability of supermarkets to forecast demand accurately for highly perishable products can help to minimize their operating costs. Lower costs can be passed on to consumers via the contestable nature of retail food markets. This paper reports on a preliminary analysis of the Box-Jenkins methodology for scan data for fresh ground beef and roasts. Forecast accuracy varies suggesting that supermarkets will need to employ more sophisticated techniques in order to control inventories to match demand more closely.

Food consumption continues to be an important component of consumer well-being. With respect to retail sales, food comprised 20.4 percent of the total in 1989, and only motor vehicle dealers had a larger share (22 percent) (U. S. Department of Commerce, 1990). Blissard and Blaylock (1990) have shown that food expenditures can serve as a means for measuring income distribution. Food retailing remains very competitive, not only within the food for home consumption category, but also, within the food away from home category and between these two categories. Despite the decline in the pounds per capita of red meat consumption per year, fresh beef is an important component of the consumer's food dollar. For example, in 1988, per capita pounds consumed of beef and poultry were 68.2 and 57.1, respectively (U. S. Department of Agriculture). Furthermore, the margins of supermarkets on fresh beef are relatively high in comparison to other departments (FM Business Publications, 1990). Not only is fresh beef a highly perishable product, it is a significant portion of consumers' food expenditures, and it is a major contributor to supermarket profits. To the extent that the demand for fresh meat can be predicted, there is potential for reducing operating costs and, possibly, to pass the savings on to consumers.

One way of accomplishing this could be through the use of scan data generated by computer assisted checkouts. This application of scanners was touted as the supermarket's management tool of the future. However, while

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some progress has been made, the industry lags behind others in using these data (McLaughlin and Lesser, FM Business Publications, 1989). There are several reasons for this. First, the volume of data is much larger than that of most other retailers (Capps, 1987). Second, many of the foods do not have Universal Product Codes (UPCs). Most are in the fresh produce, fresh meat, bakery, and deli departments. They comprise the most costly items to carry due to spoilage, and they generate a significant portion of revenue and profits (approximately 47 percent of supermarket sales) (FM Business Publications, 1990). These products are prepared in each store, so there is the additional complexity of assigning bar codes at the individual supermarket level. Furthermore, having to generate specific bar codes makes it more difficult to adapt external, UPC-oriented software to a specific chain. Third, variable weight items, which do not occur with other retail goods, add to the complexity (Eastwood, 1989).

Despite these problems, agricultural economists are beginning to use scan data to conduct demand analyses (e.g., Capps 1989; Capps and Nayga, 1990; Eastwood, Gray, and Brooker, 1990; Jensen and Schroeter, 1989; Kesavan, Jensen, and Johnson, 1989). These studies have centered on the structure of consumer demand, direct and cross-price responses, and advertising effects. While demand equations are based upon the economic theory of consumer behavior, most supermarket chains do not have extensive information on customers. This means that they do not have data on the requisite independent variables to estimate demand equations or to use them to make forecasts.

The Box-Jenkins Methodology

Box-Jenkins is an entirely different approach to forecasting than applied demand analysis. The latter assumes the quantity demanded is a function of prices, income, and demographic variables and uses estimated demand equations to forecast. Box-Jenkins, on the other hand, assumes that a time-series, such as the quantity demanded, contains the needed information to make projections. That is, rather than building a causal relationship (as with demand equations), time series of the variable of interest (demand) can be extrapolated into subsequent periods based on the historic record. Blends of the two approaches are beginning to be used.

The methodology uses the available time series to generate a relationship composed of a moving average of past values and/or an autoregressive error (Grainger and Newbold, 1986). Initially, the time series is analyzed

to determine if it is stationary. Stationarity simply requires there to be no trend in the data. Should one be present, then it becomes necessary to compute first differences, continuing until stationarity is achieved. Then, the technique involves experimentation with various lag structures of the stationary series. Identification of the best fit is based upon several criteria. These are the lowest Akaike Information Criterion (AIC) (Harvey, 1981), which is based on the log-likelihood function and the number of free parameters, the computed chi square of lagged autocorrelations, plots of the autocorrelations, and the significance of the autocorrelation coefficients.

Data

Scan data from five local supermarkets that are part of a multiregional chain comprise the data. These store level data represent weekly item movement. Item movement refers to the number of times scanners read respective bar codes. For variable weight items this does not translate directly into quantity or sales information. However, assuming that the distribution of package sizes does not change from store to store or week to week, variations in item movements represent variations in quantities and sales. Information from the retailer indicates that this is the case. For example, the distribution of package sizes of ground chuck does not change very much across stores or weeks.

A weekly time period has several advantages. Much of management's decision making is on a weekly basis. Advertising usually is by week. Consumers' shopping patterns generally follow a seven day period as well. A five store average of weekly item movement is used below.

The time period is May 14, 1988 through December 30, 1989. Missing data in two instances necessitated the use of estimates.

These are the averages of the immediately preceding and following weeks. Two subperiods were created to allow for a trial forecast period. The first comprised the historical record for estimating the relationships. It ended with September 30, 1989. This was to provide enough time to examine trial forecasts for several weeks prior to the extended holiday season. Two week forecasts were generated because this period is considered to be most appropriate for highly perishable items, reordering, and labor scheduling.

Two categories of beef were used in this initial work. One is fresh ground beef, and the other is beef roasts. The former could be characterized as a high volume product, whereas the latter displays more fluctuation (as shown below). Thus, two patterns of sales are involved. An additional consideration is that some inventory management programs, which include sales forecasting algorithms, are designed to work with UPC master files, thereby omitting nonUPC bar code foods. Figures 1 and 2 present the weekly item movements for ground beef and roasts.

Results

Diagnostics led to the inference that the ground beef series is stationary. However, the roast series autocorrelation pattern is wave-like and does not dampen, which is characteristic of a nonstationary series. First differencing produced a stationary series. Since the Box-Jenkins technique involves experimentation with various lag structures, several were tried. Identification of the best fit was based on the criteria outlined above. Both stationary fresh beef series have autoregressive forms.

Table 1 presents the estimated functions. The statistics lead to inferences of significant relationships. Inspection of Figures 1 and 2

Table 1. Box-Jenkins Results for Ground Beef and Roasts^a

$GB_t = 1 - .50B(1) + .26B(7) - .26B(8)$ <p style="text-align: center;">(-4.85) (2.01) (-1.98)</p>						
AIC - 1,112	Autocorrelation	Lag:	<u>6</u>	<u>12</u>	<u>18</u>	<u>24</u>
	Chi Square:		2.53	3.81	5.68	12.79
$R_t - R_{t-1} = 1.00 + .66B(1) + .43B(2) + .48B(3) + .33B(4)$ <p style="text-align: center;">(5.72) (3.33) (3.72) (2.89)</p>						
AIC - 942	Autocorrelation	Lag:	<u>6</u>	<u>12</u>	<u>18</u>	<u>24</u>
	Chi Square:		1.17	6.94	8.47	10.95

GB_t = ground beef item movement in period t .
 R_t = roast item movement in period t .
 $B(L)$ = backshift operator of length L .

^aComputed t values are below respective coefficients in parentheses.

Figure 1. GROUND BEEF ITEM MOVEMENT

May 14, 1989 - Sept. 30, 1990

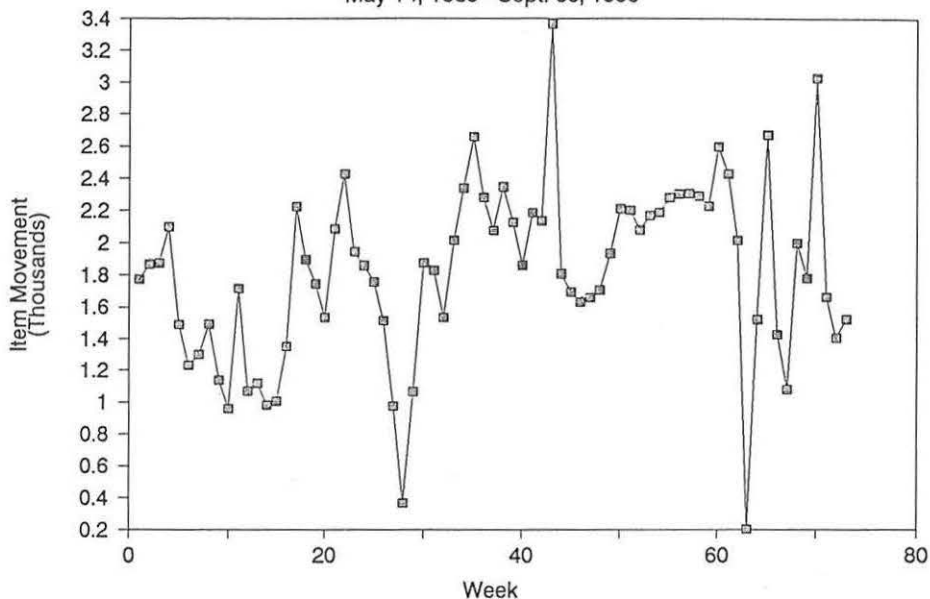
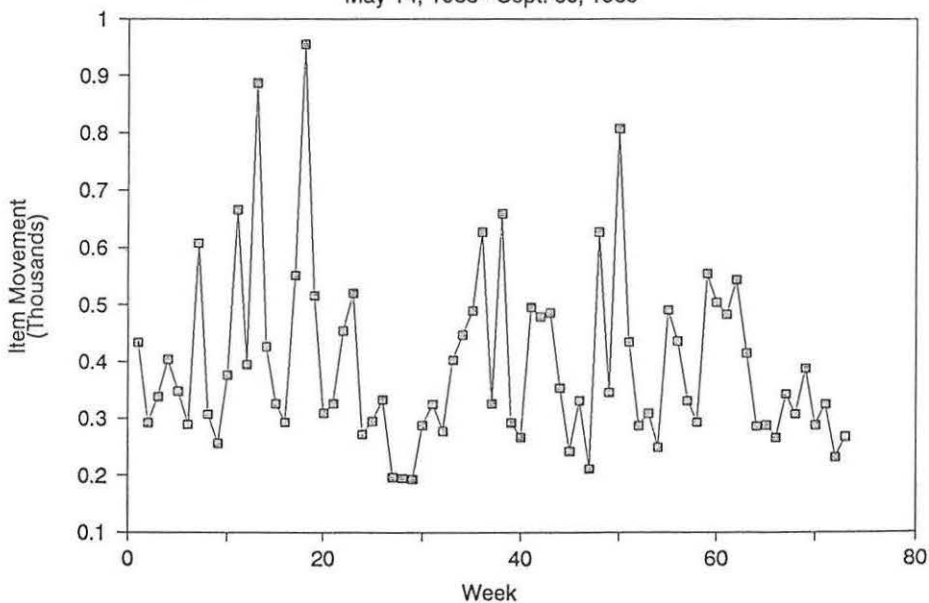


Figure 2. ROAST ITEM MOVEMENT

May 14, 1988 - Sept. 30, 1989



and Table 1 suggests that both ground beef and roasts have stock adjustment patterns. For fresh ground beef, the previous week's sales have a negative impact on the current week's, followed by seven and eight week lags that have positive and negative impacts, respectively. The roast beef relationship is a positive but declining influence over a four week period.

Forecasts

Figures 3 and 4 present the actual and predicted Box-Jenkins item movement forecasts for the estimation subperiod. The mean actual values are 1,815.8 and 395.6 for ground beef and roasts. Corresponding forecast averages are

1,814.8 and 397.0. Coefficients of variation for the respective actual series are .31 and .39, and those for the predicted series are .16 and .22. Average absolute errors are 355.5 and 121.1, respectively. These data indicate that the units of ground beef sold are approximately six times higher than those for roasts, and the variability is relatively higher for roasts. The Box-Jenkins forecasts have somewhat less variability and on average are close to the units sold.

Focusing on turning points, the actual ground beef series has 34 and that for roasts has 48. The respective values for the forecasts are 37 and 39. However, there are only three

Figure 3. BOX-JENKINS FORECAST

Ground (May 14, '88-Sept. 29, '89)

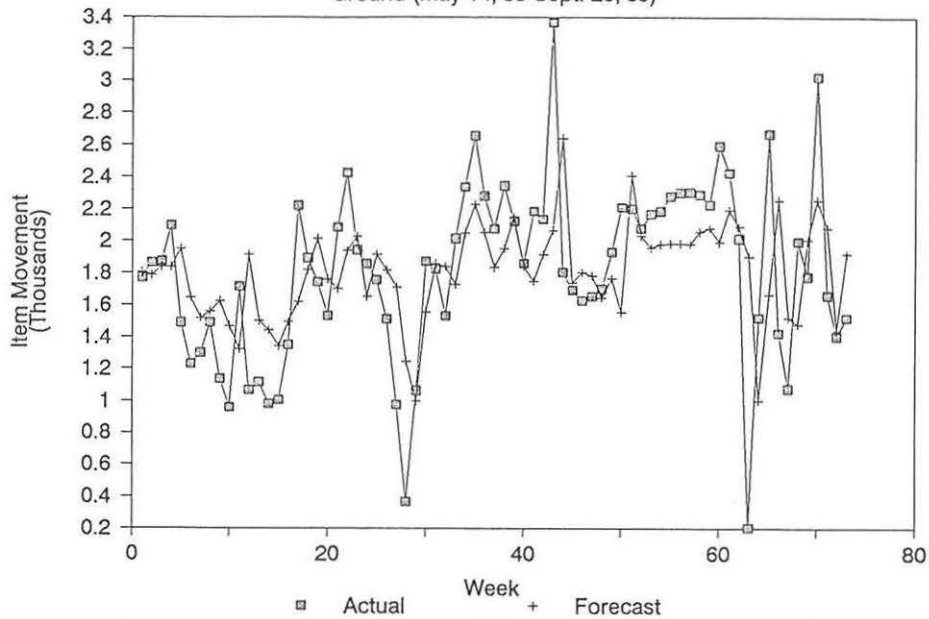
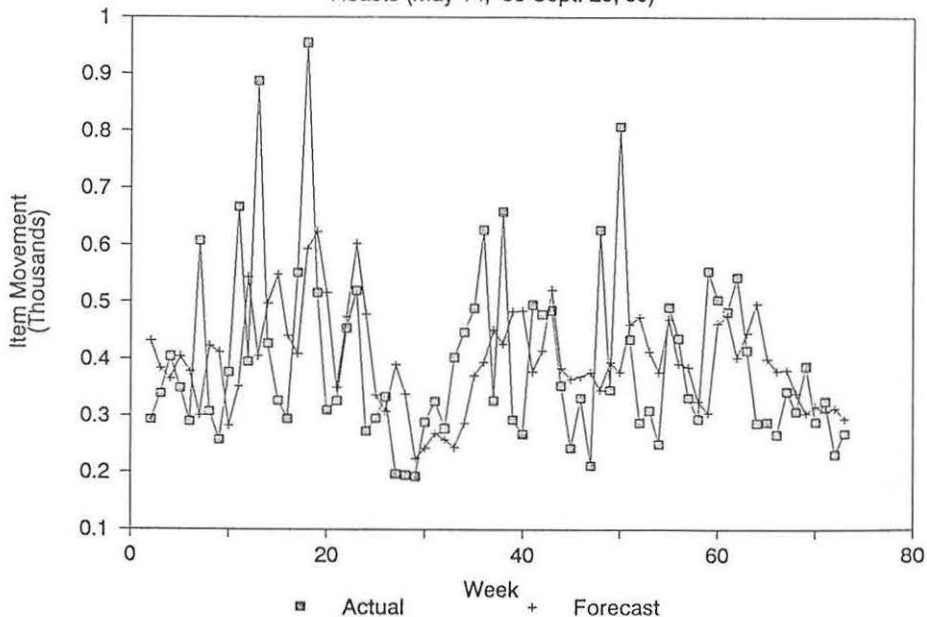


Figure 4. BOX-JENKINS FORECAST

Roasts (May 14, '88-Sept. 29, '89)



and nine matched turning points. The forecasted direction of change (positive or negative) is correct 27 and 29 times, respectively. This information suggests that the Box-Jenkins forecasts are relatively close to the actual values, especially for ground beef, but the functions do not consistently predict small week-to-week changes.

Theil's (1971) inequality coefficient provides a more objective measure of forecast accuracy. The computed I-squared values are .24 for ground beef and .74 for roasts. An inference is that the ground beef forecasts are far superior to no change forecasts, whereas those for roasts are only slightly better.

Decompositions of I-squared indicate that the forecast errors contain no bias and that most of the error is due to random fluctuations in both series. This is expected because the Box-Jenkins methodology is designed to pick up the systematic variation. Thus, these results suggest that an appropriate functional form has been identified. Furthermore, they indicate that the ground beef forecasts are quite accurate, whereas, those for roasts are not as good.

Tables 2 and 3 present the two week trial forecasts. This forecast period was chosen to reflect the normal amount of time available to management for forecasting. That is, the store

Table 2. Box-Jenkins Trial Forecasts: Ground Beef

Week	Actual	Trial Forecast				
		1	2	3	4	5
Oct. 7	3,090	1,754				
14	2,172	1,544	2,203			
21	1,823		2,073	2,058		
28	180			1,569	1,456	
Nov. 4	1,674				2,000	1,444
11	1,227					1,748

Table 3. Box-Jenkins Trial Forecasts: Roasts

Week	Actual	Trial Forecast				
		1	2	3	4	5
Oct. 7	661	296				
14	443	290	417			
21	312		420	429		
28	362			332	291	
Nov. 4	412				336	361
11	213					447

level scan data must be transmitted to corporate headquarters, analyzed, and forecasts generated. Starting with September 30, two week trial forecasts were obtained. Then the historic record was increased by one week, a new Box-Jenkins equation estimated, and another two week forecast generated. For ground beef the forecasts start at about half the actual value because of a doubling of the actual item movement over the preceding week. The predicted values correctly reflect the direction of change for the first three trial forecasts. Then there is an extremely low week of sales that the Box-Jenkins equation has trouble incorporating due to the lag structure. For roasts the forecasts also start out low because of an unusually high initial week, and the forecasts do not track item movement as well.

Implications

Scan data enable supermarkets to measure accurately customer sales of individual products. When scanners are connected to computer storage devices, time-series data can be generated. The perishable nature of many foods contributes to the marketing costs of these products. If supermarkets could forecast consumer demand for these foods, then inventories could be managed more efficiently, and losses due to spoilage could be reduced. Box-Jenkins attempts to use the historic data to generate forecasts. This is an advantage over forecasts generated by econometric models because supermarkets do not have detailed socioeconomic information on customers.

The results of the preliminary analysis lead to three important implications. First, food demand varies by product, so supermarkets will have to forecast by individual products, as

opposed to broader product groups. Second, because of these differences, it will be necessary to develop separate models for products and to revise the forecasting equations as the historic record grows. Third, it will be necessary to utilize more recent advances in Box-Jenkins that involve transfer functions to incorporate exogenous factors. Of particular interest would be advertising and in-store promotions. The potential is present for marketing departments to develop time-series data for advertising and promotions that dovetail with the scan data to accommodate these influences on demand.

To the extent that accurate forecasts can be generated, then purchasing and labor can be scheduled more efficiently. The ensuing cost savings would lead to higher margins. These would be passed along to consumers due to the contestable nature (Baumol, 1982) of local supermarkets. That is, through the competitive environment, or the threat of entry, supermarkets have the incentive to pass along savings to consumers. Given the importance of food in consumer well-being, the benefits could be substantial from reducing losses due to spoilage of perishable foods.

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**Labeling Milk from rBST Treated Cows:
Returns to Wisconsin Dairy Farmers from Product Differentiation**

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Robin Douthitt¹

A model is developed to estimate the returns to Wisconsin dairy farmers if product labeling of milk from cows that are not treated with recombinant bovine somatotropin is adopted.

Introduction

Bovine somatotropin (BST) is a naturally occurring protein hormone which regulates cows' milk production. The development of recombinant DNA technology, afforded scientists the means to develop a synthetic hormone (rBST) that when injected during the cows lactation cycle has experimentally been shown to increase milk production (Tessmann et al.). The Food and Drug Administration has ruled that treated herds' milk is safe for human consumption and they are currently reviewing rBST manufacturer evidence regarding the drugs efficacy and effects on animal health before granting final drug approval.

Although milk from treated animals has been deemed safe by the FDA, surveys indicate that for various reasons, consumers are hesitant to accept dairy products made from treated herd milk. Their apprehension is based not only on concern that future, ill-human health effects will be discovered (Douthitt, 1990), but also on concern that adoption of the technology may negatively impact the small farmer. Further, if the FDA were to approve the use of rBST, consumers have indicated that they would cut back their dairy consumption if they were unable to choose products from untreated herds (McGuirk and Preston, 1990).

Producers and retailers are also concerned about adverse consumer reaction. Survey work of dairy farmers indicates that their primary concern is

that this new technology will adversely affect milk prices by increasing production. Their second concern is consumer acceptance of milk from cows treated with rBST (Zepeda, 1988). In addition, some retailers and processors have refused to accept milk from farms involved in rBST experiments (Richards, 1989).

To prevent a decline in consumer dairy product demand resulting from rBST-use aversion, for whatever reasons, numerous options are being considered by policy makers. One option being considered, for example, by the state of Wisconsin is product labeling. By labeling Wisconsin dairy products, as to whether they are made with treated herd milk or not, concerned consumers would have the ability to choose untreated dairy products and thus would not need to reduce their dairy consumption. However, product labeling is not without cost, so the question becomes, if a "premium" were charged to concerned consumers to cover the cost of differentiation through product labeling, (1) what would happen to consumer demand for dairy products; (2) how would labeling affect returns to producers, (3) whether labeling is an economically viable policy alternative, and (4) what premium level would maximize producers' revenue.

Method

To analyze the effects of rBST product differentiation on both the consumer and producer it is first necessary to estimate consumer demand for dairy products. For simplicity, this analysis will focus only on the demand for fluid milk. Demand for milk (Q) is specified as a function of price (P), income (Y) and a vector of household demographic characteristics (X) i.e.:

$$Q = f(P, Y; X).$$

(1)

Given price elasticity estimates, consumer response to various unit price premiums ($PREM_i$) can be calculated. Given sample characteristics, and information regarding the proportion of consumers willing to pay different premium levels (a_i), it is possible to predict the changes in the quantities

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demanded by consumers (due to a premium assessment) and their effect on revenues for fluid milk.

Finally, it is possible to determine whether product differentiation will improve returns to producers. That is, the premium level, a_1 , consumers would be willing to pay for a labeled product is determined. This is accomplished by maximizing the product of weighted price (P_i) and quantity of milk (Q):

$$\text{Max } P_i * Q(P_i) \quad (2)$$

where:

$$P_i = [(1-a_1)*P_{\text{BST}} + a_1*P_{\text{NOBST}}] \quad (3)$$

is the weighted average of the market price paid for treated (P_{BST}) and untreated herd milk ($P_{\text{NOBST}}=P_{\text{BST}}+\text{PREM}_1$).

Data and Sample

Since Wisconsin is the leading dairy producing state in the nation, the issue of rBST has been widely covered by the media over the last two years. Having been exposed to information from all sides of the issue, Wisconsin consumers make an ideal population to study potential consumer response to the hormone's commercial use. As such, a telephone survey on these issues was conducted between February 26 and May 9, 1990. In each of 1,056 randomly selected households throughout the state, the adult person (18 years or older) who made most of the household's food purchase decisions was interviewed. The response rate of the survey was 69.2 percent. About 75 percent were women. The average respondent was 46 years old, had one year of education beyond high school, and lived in an urban county (population over 100,000).

Respondents were first asked if they were aware either of the recent Wisconsin controversies surrounding farmers' use of rBST or proposed legislation to label dairy products from treated herds. About 89 percent (n=940) of the respondents were aware of one or the other. Demographic characteristics of the unaware respondents were recorded and the interview concluded. Of the 940 "aware" respondents, 95 percent (n=890) usually purchased some milk each week. About 77 percent (n=687) expressed a preference for milk labeled as having come from either untreated or rBST treated herds.

Consumers who expressed a preference for labeled milk, were asked how much they currently paid for milk,

and how much more, if any, they would be willing to pay to have milk labeled. Thus, among milk purchasers, only the 668 respondents expressing a preference (about 77 percent of all milk purchasers) recorded price information.

The sample of respondents used in this analysis are those (1) expressing an awareness of rBST issues, (2) belonging to a milk purchasing household, and (3) reporting complete data. Sixteen of the 890 milk purchasing respondents had missing data on one or more of the variables used in the analysis, thus the final sample size is 874.

The Demand Model

The first step in the analysis is to estimate a demand model for milk. The log of weekly quantities of fluid milk usually purchased is regressed on (1) the log of average price paid per gallon of milk, (2) an indicator variable equalling one if household income was over the state median of about \$30,000, and (3) a vector of demographic variables. Demographic variables included number of children under the age of 18 present in the household, respondents' age (logged), and an indicator variable if the respondent was a single individual. One would expect the presence of children to positively influence milk expenditures while respondent age and living alone to negatively influence milk expenditures.

Since the purpose of this analysis is to generalize across all milk purchasing households, it was necessary to correct for any sample selection bias that might be introduced by estimating milk demand only over the sample of consumers with a preference for labeling. Heckman's (1979) sample selection correction procedure was thus implemented. First, probit model parameters were estimated such that the respondent's preference for a labeled product (dependent variable equals one; zero otherwise) was regressed on respondent's age, education, and number of children present in the household. From those results the inverse of the Mill's ratio was calculated and included in the demand equation to correct for any potential sample selection bias. Although number of children present was a significant predictor of whether or not the respondent preferred a labeled product (See Appendix), sample selection bias did not prove important in estimation of the demand model (note Lambda insignificant in Table 2).

Table 2 presents results of the demand equation estimation. The model accounted for about 45 percent of explained variance. All variables are of the expected sign. The indicator variable, income greater than population median ($Y > M_d$), is the only insignificant variable. The policy variable of interest, \ln Price, would indicate that milk consumers display a nearly unitary price responsiveness. Specifically, if the price of milk increases by 1 percent, the quantity of milk demanded decreases by .97 percent.

Although their methods are not directly comparable to the present study, Heien and Wessells' (1988) estimated price elasticity of milk demand by U.S. consumers is used to conduct a sensitivity analysis. Using the 1977-78 household food consumption data set on food prices and expenditures, they estimated a price elasticity of demand of $-.63$ for milk. The differences between their estimates and the ours can be explained in part by changes in demand over time and differences in the two populations' characteristics. The demand for convenience has grown over time, and demographics have changed as well. In addition, Heien and Wessells data was for the U.S. not just Wisconsin, and their definition of milk included yoghurt, buttermilk and chocolate milk which were not included in this survey. Furthermore, their estimation methods utilized a system of food demand rather than a single equation. For all these reasons, their elasticity estimate is more inelastic. It will be useful as a sensitivity measure of the results in the next section.

Results

The price elasticity estimate is used to predict the impact of various premium structures on consumer demand and producer revenues. Table 3 presents results for the untreated cows milk demand under different premium structures. The proportion of consumers who prefer untreated milk for each premium level is calculated from the survey data. The total quantity of milk demanded, expressed in gallons per household per week, is calculated using the elasticity estimate and associated price for each premium level. Total revenue expressed in dollars per household per week is calculated for each premium level and weighted by the percent of consumers (those preferring versus not preferring a labeled product). The unweighted revenues for rBST treated and untreated herd milk is also given for each premium level.

With no price-premium assessed to the labeled product, 78% of the milk purchasers indicated they would prefer milk products from untreated herds. About 12 percent of milk purchasers indicated that they would still prefer milk from untreated cows if the labeling premium were as high as \$.80 per gallon. Total producer revenue is maximized at a premium of \$.10 per gallon.

Table 4 presents similar findings for consumers with no preference along with estimates of total market revenues. Producers treating their herds with rBST would maximize their revenues if a premium of \$.60 per gallon was assessed. Total market revenue would be maximized at the \$.10 per gallon level.

Table 5 presents a sensitivity analysis using Heien and Wessells price elasticity of demand estimate of $-.63$. Although the unweighted revenues of the untreated and treated cows' milk are maximized at \$.80 and \$.60, respectively, weighted total market revenues are maximized at a premium level of \$.20 per gallon.

Thus far, we have assumed that there will be no change in the market price for rBST treated milk. Manufacturer's of rBST claim that use of the synthetic hormone could increase production by 10-25 percent without an offsetting increase in production costs, implying an increase in supply. This supply shift could have the effect of decreasing the market price of treated herd milk. However, a federal price floor prevents wholesale milk prices from falling below \$10.10 per hundredweight. An increase in the milk supply due to rBST use could result in diverting more milk to federal support programs. If many consumers prefer milk from untreated herds and can choose which they buy, the resulting shift in demand would also drive prices down were it not for the federal support program. Thus, the assumption of no change in treated herd market price may be reasonable.

To summarize, the effect of a labeling premium on producer revenues depends on the assumption one makes regarding price responsiveness. Using the price elasticity derived from the demand model, $-.97$, producer (total market) total producer revenues are maximized at a 10 cent per gallon premium (Table 4). This indicates that product differentiation of rBST milk would slightly increase producer returns, depending on whether the cost of labeling can be held to less than 10 cents per gallon. Thus, even under

Table 2
Ordinary Least Squares Regression
Results.

Variable	Coefficient	Std. Error	T-Ratio
Constant	6.863	1.281	5.309
ln Price	-.973	.141	-6.884
Y > Md.	.044	.054	.803
# Kids	.309	.095	3.248
ln Age	-.221	.110	-2.020
Single	-.448	.073	-6.176
Lambda	-.916	1.679	-.546
Adjusted R - Squared			.452
F(6, 661)			92.777

Appendix
Sample Selection Probit Results.

Variable	Coefficient	Std. Error	T-Ratio
Constant	.859	.385	2.223
# Kids	.127	.050	2.530
Age	.998(E-03)	.322(E-02)	.310
Years of Education	-.021	.023	-.899
X ²		8.063	
Significance level		.045	

Table 3. Untreated Cows' Milk Price, Demand and Associated Total Revenue (Price Elasticity of Demand = -0.97)

No rBST				
Premium	% Preferring	Price	Quant. Demand	Total Revenue
\$0.00	0.78	\$2.28	2.47	\$5.63
\$0.10	0.68	\$2.38	2.37	\$5.63*
\$0.20	0.60	\$2.48	2.24	\$5.55
\$0.30	0.36	\$2.58	2.10	\$5.43
\$0.40	0.33	\$2.68	2.05	\$5.50
\$0.50	0.27	\$2.78	1.91	\$5.31
\$0.60	0.15	\$2.88	1.81	\$5.21
\$0.70	0.13	\$2.98	1.77	\$5.26
\$0.80	0.12	\$3.08	1.70	\$5.25

Table 4. Treated Cows' Milk Price, Demand and Associated Total Revenue (Price Elasticity of Demand = -0.97)

rBST Treated				
Premium	% Preferring	Quant. Demand	Total Revenue	Market Tot.Rev.
\$0.00	0.22	1.75	\$4.00	\$5.27
\$0.10	0.32	2.04	\$4.66	\$5.32*
\$0.20	0.40	2.16	\$4.93	\$5.30
\$0.30	0.64	2.28	\$5.20	\$5.28
\$0.40	0.67	2.26	\$5.15	\$5.26
\$0.50	0.73	2.29	\$5.22	\$5.25
\$0.60	0.85	2.31	\$5.27*	\$5.26
\$0.70	0.87	2.30	\$5.25	\$5.25
\$0.80	0.88	2.29	\$5.23	\$5.23

Table 5. Fluid Milk Total Revenue by Whether Cows Were Treated With rBST: (Price Elasticity of Demand = -0.63)

Premium	Untreated Total Revenue	Treated Total Revenue	Market Total Revenue
\$0.00	\$5.63	\$4.00	\$5.27
\$0.10	\$5.72	\$4.66	\$5.38
\$0.20	\$5.73	\$4.93	\$5.41*
\$0.30	\$5.71	\$5.20	\$5.38
\$0.40	\$5.90	\$5.15	\$5.39
\$0.50	\$5.82	\$5.22	\$5.38
\$0.60	\$5.84	\$5.27*	\$5.35
\$0.70	\$6.05	\$5.25	\$5.35
\$0.80	\$6.21*	\$5.23	\$5.34

these most stringent of assumptions, product differentiation might prevent a decline in demand since most Wisconsin consumers prefer untreated milk.

Conclusions

A model is developed to estimate the returns to Wisconsin producers from differentiating the milk from rBST treated cows from untreated cows. The results indicate that product differentiation through labeling would not harm revenues from fluid milk sales, and could actually increase revenues. Premiums from 10 to 20 cents per gallon for untreated fluid milk are supported by this research. This translates to \$1.16 to \$2.33 per hundredweight of milk, a substantial improvement in farm milk prices which would support product differentiation.

The actual impact of mandatory product labeling clearly depends on the actual price responsiveness exhibited by consumers when faced with the two alternatives. An inelastic price responsiveness combined with a preference for untreated herd milk, would have the greatest impact on producer revenues and consumer's pocketbooks. Unitary price responsiveness would have much less impact on both producer revenues and consumer prices.

Implementation of labeling regulations, however, is less than trivial. Currently, rBST is neither legal nor does a cheap or easy method of verification exist. In the event that the FDA does approve its use, development of a method of verification is desirable. The size of the premium for untreated milk would indicate a significant return to developing a detection method. Barring development of a cheap detection method for rBST use, licensing or registration of rBST use may be the only effective means of verifying labeling.

Since respondents indicated concerns about other dairy products produced with milk from rBST treated cows, similar conclusions may be drawn about labeling other dairy products. However, Wisconsin is a net exporter of milk and milk products to other regions of the U.S. This research clearly indicates that the majority of consumers prefer milk from untreated cows. What is not known is whether product differentiation outside Wisconsin might also generate positive returns to Wisconsin producers. Data is needed on the preferences of consumers outside Wisconsin to address this issue.

However, for the local fluid milk market, this analysis indicates that providing consumers with choice in the market place will also generate positive returns to the Wisconsin dairy industry.

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Table 1
Descriptive Statistics (n= 668).

Variable	Mean	Std. Dev.
Milk:		
Gal./week	2.39	2.03
Price/Gal	\$2.28	46.11
Income over state median	.49	.50
Number kids	.83	1.13
Age	45.77	15.97
Single person	.16	.36

**Consumer Perspectives on Food Safety Issues:
The Case of Pesticide Residues in Fresh Produce¹**

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This paper reviews three approaches to estimating consumer willingness to pay for reductions in food-borne risks. Contingent valuation methods compare favorably to market-based methods. Significant price premia for food safety improvements are found, regardless of the amount of food risk perceived by consumers. This finding suggests that uncertainty rather than risk perceptions may drive willingness to pay. Policy implications of this finding are developed.

Consumer choices about pesticide residues have been examined by several researchers using Lancaster's (1971) theory of the characteristics of goods (Hammit, 1986; van Ravenswaay, 1988; van Ravenswaay and Hoehn, 1991 b and c). The basic premise of the theory is that a consumer derives value from the characteristics of goods. A consumer is assumed to choose a combination of goods whose characteristics maximize utility subject to income and price constraints. An individual's purchases of a particular type of good are a function of prices, income, and perceived characteristics. Shifts in the demand induced by changes in a good's characteristics reveal consumer willingness to pay for those characteristics.

Observing consumers' choices of pesticide residue and pest damage characteristics is difficult because consumers are offered few choices in actual markets. Special market circumstances created by the Alar scare in 1989 have been used to estimate consumer willingness to pay for reduced

pesticide residues (van Ravenswaay and Hoehn, 1991c). A study has been conducted in organic markets (Hammit, 1986). Contingent valuation approaches are beginning to be used to simulate choices that consumers would make in an actual market setting (Hammit, 1986; van Ravenswaay and Hoehn, 1991a and 1991b).

This paper reviews the results of these studies to draw conclusions about food safety policy and implications for future research. The review is organized around the three different approaches to examining food safety tradeoffs.

**The Impact of Alar on
Fresh Apple Demand**

Van Ravenswaay and Hoehn (1991c) studied the impact of the Alar scare on fresh apple demand to examine willingness to pay for food safety improvements. The study used existing market data for the New York City/Newark metropolitan area to estimate what consumers would have been willing to pay for Alar-free apples and to reduce risks from pesticide residues.

A statistical model for estimating market demand for fresh apples incorporating prices, incomes, and seasonality was developed. The effect of the Alar incident was incorporated using a measure of media coverage of Alar over time. Willingness to pay for the removal of Alar was calculated estimating the difference in expected apple demand with and without the scare. The study found that consumers would have been willing to pay over 30% (or 21 cents) more for Alar-free fresh apples in 1989. On an annual basis, this finding implies that the average person would have been willing to pay about \$2.35 (in 1983 dollars) more that year to avoid the risks from Alar. Cancer risks reported in New York newspapers in 1989 indicated that annual risks were as high as .58 additional cancers per million persons. Dividing annual consumer willingness to avoid Alar by the reported annual cancer risk gives a willingness to pay of \$4 (in 1983 dollars) to avoid an annual cancer risk of 1 in a million--assuming that consumers believed the reported risks.

This finding is similar to the findings of studies of peoples'

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responses to occupational risks, seat belt use, and smoke detectors. A critical review of those studies (Fisher et al., 1989) estimates that people are willing to pay between \$1.6 and \$8.5 in 1986 dollars (i.e., \$1.44 to \$7.65 in 1983 dollars) for a one in a million reduction in annual mortality risks. This similarity in willingness to pay estimates suggests that consumers reacted to Alar much as they do to other risks.

The study of the impact of Alar gives an indication of what consumers are be willing to pay for reduced pesticide residues. However, it is unknown what people actually thought risks were. Consequently, strong assumptions were required to estimate willingness to pay for reduced risks.

Organic Food Consumers

Hammitt (1986) used both hedonic and contingent valuation methods to estimate consumer willingness to pay for reduced pesticide residues from organic food. His hypothesis was that the organic version of a product will be chosen if the premium paid per marginal benefits received (i.e., risk avoided plus or minus other attributes) is less than or equal to willingness to pay to avoid risk. Assuming that conventional and organic produce differ only in terms of risk--a strong assumption since they may differ in location sold, quality, and size--a consumers' choice between organic and conventional versions of a product was hypothesized to reveal bounds on marginal willingness to pay to avoid risk.

The hedonic study used market data to estimate incremental willingness to pay for organic over conventional produce. The incremental willingness to pay was computed from price premia estimated from weekly organic and conventional produce prices at five stores in the Los Angeles and Santa Monica area in 1985.

The price premia were estimated via linear regression assuming perfectly elastic supply. However, contrary to Hammitt's interpretation, this assumption implies that the price premia represent incremental costs of supplying, not incremental willingness to pay for, organic food. The resulting estimates of the incremental cost of organic produce (in 1985 dollars) were \$80 per year or \$1400 per lifetime, assuming a 5% discount rate and 50 years of purchasing.

Assuming that consumers perceive risks as scientists do, Hammitt used government data on residues and toxicity to estimate lifetime cancer risks avoided to be 14 in 1 million. Dividing lifetime incremental organic

costs by this estimated risk reduction yields an estimate of willingness to pay of \$100 for a 1 in a million reduction in lifetime cancer death risks.

Annualizing the data Hammitt used to derive lifetime estimates yields a willingness to pay of \$400 (in 1985 dollars) for a 1 in a million reduction in annual mortality risks. This estimate is much higher than the annual estimates of \$1.6 to \$8.4 (in 1986 dollars) contained in the review of value of life studies by Fisher et al. (1989).

One reason why the hedonic estimates are so high is that the estimated organic price premia actually represent incremental costs of supplying organic produce rather than incremental willingness to pay. If willingness to pay for organic produce is similar to what would be expected on the basis of the studies reviewed by Fisher et al. and the findings of the Alar study (van Ravenswaay and Hoehn, 1991c), then Hammitt's study suggests that the costs of supplying organic produce exceed average willingness to pay for organic produce by a factor of 10.

A second possible reason why the estimates of willingness to pay for risk reduction are comparatively high is that consumers may perceive the risks of pesticide residues avoided to be greater than the estimates based on scientific residue and toxicity data. Higher risk perceptions would lead to a lower per unit willingness to pay for risk reduction.

Since hedonic methods have drawbacks, Hammitt conducted a pilot contingent valuation study using focus groups with organic and conventional food consumers. A brief questionnaire was administered to assess willingness to pay for organic produce and risk perceptions, yielding 45 usable responses.

The questionnaires revealed differences between the two groups in terms of risk perceptions. The median estimate of the conventional food consumers was that the risk of eventually dying from consuming conventional fresh produce was 8×10^{-7} . The median for organic consumers was 8.5×10^{-4} , or three orders of magnitude greater, and they identified a number of different adverse health effects of concern including cancer, sterility, allergies, asthma, and premature senility. Both groups estimated the risks from consuming organic food to be negligible.

Reported willingness to pay for organic food differed between the two groups. The median response of conventional food consumers was that they would be willing to increase their

expenditures on fresh produce by 5% to purchase the safer produce (almost always the organic version). The median response for organic consumers was 50%, which is similar to median organic price premium of 45% estimated using market data.

Implicit values of life were calculated using annual incremental willingness to pay for organic food divided by annual perceived risk avoided. Because organic food consumers' perceived greater risks from consuming conventional food, their implied value of life was lower than it was for conventional food buyers. The median estimate for organic consumers was \$.75 per 1 in a million annual risk reduction. The median estimate for conventional consumers was \$6.62 (in 1985 dollars). These focus group estimates are much closer than the hedonic estimates to the range expected from the studies reviewed by Fisher et al. (1989) and the Alar study.

Contingent Valuation Survey

Van Ravenswaay and Hoehn (1991a and 1991b) designed a mail survey of consumer perceptions and valuations of pest damage and pesticide residues on fresh apples. Photographs portrayed four red delicious apples, identical except that the percentage of surface area with pest damage was 0%, 2.5%, 6%, and 24%. Three red delicious apples were presented as being labeled as being certified and tested to have "No Pesticide Residues," "No Detectable Pesticide Residues," and "No Pesticide Residues Above Federal Limits." One apple was presented without a label.

Respondents were asked their perceptions of the chance that a member of their household would experience health problems someday because of pesticide residues in foods. Respondents were then asked to assess the percent reduction in risks if all foods were labeled. To compare fresh apples to all foods, respondents were asked about their perceptions of food safety issues and the chance of pesticide residues being in different types of foods.

Respondents were asked how many apples they would buy at different prices during a typical shopping occasion in the fall if the quality of apples were like each of the photos and if all apples were labeled. Prices ranged from \$.39 to \$1.49 per pound. Respondents were instructed to assume that all apples had the same price, quality, and label, that only apples would be labeled, and that all other fresh fruits were available at normal prices. To extrapolate from the purchase questions, respondents were asked about their normal apple

purchases throughout the year and the demographic characteristics of their household.

The surveys were mailed in September of 1990 to a nationwide random sample of 2,200 households with 1,888 of the surveys actually delivered. Completed questionnaires were returned by 48% of the households (906/1,888). The normal range of household sizes, incomes, education levels, and ages were represented.

Respondents reported that they believed pesticide residues are much more likely to be present on fresh fruits and vegetables than other foods. However, only fifty to sixty percent of all fresh fruits and vegetables and fifty to sixty percent of all apples were perceived to have any residues. This figure is very similar to the percentage of fresh fruits and vegetables on which the Food and Drug Administration (1987) detects residues.

Respondents' perceptions of the chance their household may experience health problems someday due to the current level of pesticide residues in food varied considerably. About a quarter of respondents (23.6%) perceived risks from pesticide residues to be one in a million or less. About 45% reported moderate risks (between 1 in 100,000 and 1 in 1,000). About a quarter (25.8%) perceived very serious risks (1 in 100 and above). These results indicate that over half of food consumers perceive risks from pesticide residues to be less than the worst case estimates of the Environmental Protection Agency (1987).

Perceptions of risk included concerns about a wide range of health effects. Cancer and allergies were perceived to be the greatest risk, but most respondents also perceived moderate risks of heart disease, nervous system disorders, and impaired immune system. Lower risks were perceived for impaired child development, birth defects, and mental illness.

The label for "no pesticide residues" was perceived to reduce risks by about a half to two thirds, the label for "no detectable pesticide residues" was perceived to reduce risks by about a half, and the label for "no pesticide residues above federal limits" was perceived to reduce risks by about a third to a half. Note that few respondents felt that risks would be completely reduced by any of the labels.

Willingness to pay for a label was estimated as the price consumers will pay for the no-label apple minus the price they will pay for the labeled apple at a given level of consumption. The prices consumers will pay for the different apples at given levels of

consumption were estimated econometrically using the data from purchase questions (van Ravenswaay and Hoehn, 1991b).

The estimate of the average added price per pound for apples certified and tested to have "no residues above federal limits" was 23.6 cents. Apples certified and tested to have "no detectable pesticide residues" also have an estimated average added price of 23.6 cents per pound. The estimate of the added price per pound for apples certified and tested to have "no pesticide residues" was 37.5 cents per pound.

The measurement of risk perception explained little of the willingness to pay for the labels. There was less than a penny difference in the estimates of willingness to pay for the labels for people seeing no risks and people who perceived large risks. The perceived change in risk must be 1 in 100 or greater to add a penny to the estimate of willingness to pay for the labels.

The estimates of acceptable pest damage for each label, given no difference in price, were measured by the amount of pest damage that offsets the added willingness to pay for a labeled apple. The estimates for the "federal limit" and "no detectable residue" labels were both 7.5% of the apple photo surface. The estimate for the "no pesticide residue" label was 11.9%.

The estimates require careful interpretation. Pest damage was measured as the amount of surface area on an apple in a photograph. The photograph, of course, is only two dimensional, whereas a real apple is a sphere. Thus, in reality, surface area would be measured over the entire apple surface. This means that the estimates of surface area in this study are at least twice as large as what would be acceptable on a real apple.

The estimates of this study are comparable to those found in the Alar study. In the Alar case, it was estimated that people would have been willing to pay 31.3% more for the Alar-free apples--approximately 28.7 cents more per pound in 1990 dollars. This is well within the estimated obtained in the contingent valuation survey. The estimates of price elasticity for fresh apples were also very similar in the two studies. In contingent valuation survey, the price elasticity was estimated to be -1.86. In the Alar study, elasticities ranged from -1.95 to -2.09.

Because most consumers do not purchase organic apples, the estimates of willingness to pay for the no pesticide apple should be less than the price premium actually paid for organic

apples in the market. Using data collected in 1985, Hammitt (1986) estimated a market premium for organic apples of 37 cents over an average price for regular apples of 79 cents per pound. In 1990 dollars, that premium would be about 50 cents. As expected, the estimate of willingness to pay for the no pesticide apple from the contingent valuation survey is less than this premium.

The authors also show that their results are consistent with studies of willingness to pay for risk reduction. Their estimates ranged from \$.59 to \$2.20 in 1990 dollars for a one in a million reduction in annual health risk. The Fisher et al. (1989) annual estimates in 1990 dollars are \$1.95 to \$10.37. The Hammitt estimate based on the focus group data translated into 1990 dollars is \$8.83 for conventional food consumers and \$1 for organic consumers. The survey estimates of willingness to pay for risk reductions should be lower since they reflect perceptions of any type of health risk while the estimates from other studies are based on mortality risks.

Conclusions

Contingent valuation methods compare favorably to market based methods. They eliminate the need to make unrealistic assumptions about risk perceptions. They also offer flexibility in examining tradeoffs between pesticide residues and other important food characteristics such as quality.

Future research should aim at refining contingent valuation methods and comparing their results to estimates based on market data. Ways of incorporating the effect of price and quality changes in substitutes and complements need to be developed. Alternative methods for measuring risk perceptions also need to be developed.

The empirical results indicate that consumers are willing to pay significant price premia for food safety improvement. The finding that consumers are willing to pay for foods certified and tested to meet federal limits suggests that consumers believe federal standards give them significant risk reductions, but they are uncertain that federal standards are being met. The implication is that consumers would obtain significant value from learning that virtually all foods do meet federal standards.

While consumers may see value in learning that residue standards are being met, information about the percentage of foods with detectable levels of residues would be unlikely to improve the confidence of consumers. The average consumer perceives the

percentage of foods with any residues to be similar to what is actually detected by the FDA's monitoring program.

Consumers are willing to pay even higher price premia for apples certified and tested to have no pesticide residues, but not for apples with "no detectable" residues. This finding suggests that consumers believe that federal standards do not eliminate all the risks from pesticide residues.

However, the additional willingness to pay for a "no pesticide residue" apple may not be high enough to cover the costs--both in terms of higher food prices and pest damage--of eliminating all pesticides. This is an important point because consumers appear unwilling to accept more than a minor amount of pest damage. Even if apples were certified and tested to have no pesticide residues and were no higher in price, the amount of pest damage that would be accepted would be very small.

People's perceptions of the likelihood of someone in their household becoming ill from pesticide residues vary tremendously. About half of consumers view the chance of illness as fairly low, but a quarter see very high risks. Moreover, many types of illnesses are associated with pesticide residues in food--not just cancer. This finding has important policy implications because federal policy and risk communication has tended to focus exclusively on cancer.

Despite the variation across people, perceptions of the likelihood of illness from pesticide residues explain little of the estimated willingness to pay for the different residue levels presented in this study. It is possible that it is people's uncertainty about what the risks could be that may better explain why people were willing to pay significant premia for guarantees that residues meet federal standards. If so, risk communication aimed at reducing people's perception of the average risks from pesticides may have little impact on consumer concerns. What may be needed instead is information about the safeguards in place that reduce the chance of mistakes--mistakes which result in contamination problems or the need to revise tolerances for pesticide residues in food. This type of information would increase trust and reduce uncertainty about risks.

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The Consumer Interest and the Regulation of the Title Insurance Industry

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Title insurance is a source of major consumer problems, thriving in a market that is uncompetitive and largely unregulated, with low benefits compared to cost. Market failure exists because of limited information and a structure that provides little incentive for brokers and lenders to encourage competition. Previous regulatory efforts such as RESPA have failed to significantly improve the situation. This paper proposes changes both in the structure of incentives and in information disclosure requirements.

Title insurance is a major closing cost in the purchase of a home, yet it receives little critical attention. Every year consumers hand out millions of dollars, without question, for insurance that most know nothing about. In 1989, about 175,000 homes were sold in Ohio, with a median value of about \$70,000.¹ As part of these sales, consumers paid more than \$63,000,000 for title insurance premiums.²

The cost of title insurance is not in itself a problem, as the issue is whether the benefits justify the cost (Johnstone, 1988) and whether a lower cost alternative is possible. An examination of the loss ratio information for title insurance reveals that it is very expensive when benefits are considered. In 1987, only 6 percent of the premium dollar was paid in losses, while for property and casualty insurance in general, 76 percent of the premium dollar was paid in losses.³

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The loss ratios in Ohio are typical for industry wide loss ratios, as national estimates range from 3 to 10 percent (Dukminier and Krier, 1988).

The title insurance industry defends the low loss ratios by saying that the premium covers the expenses incurred before the policy is written - the title search, document preparation, and maintenance of records (Plotkin, 1978, p. 29). This defense is not appropriate in Ohio, however, as the industry has stated that the premiums in Ohio are for risk only. Thus, the loss ratio in Ohio is a true loss ratio (Competitive Practices, 1988, p.74).

To examine the complex problem of title insurance, this paper employs a combination of legal research and field research to analyze the system in which title insurance operates and the impact of that system on consumer choice. The author analyzed statutory and case law to determine the legal context, and went through the files of the Ohio Insurance Commission, which included letters, reports, and financial statements, to gather information on title insurance costs and practices. The paper presents proposals for legislative reform that would prohibit price fixing in title insurance, require disclosure of information to consumers, and improve the market for title insurance. While the paper focuses on Ohio, the problems presented are typical for most states in the U.S.

Background Information

Title refers to a property owner's bundle of rights, including possession, use, control, enjoyment, and the power to transfer the property (Cribbett, 1975; Werner, 1988). Encumbrances on the title jeopardize these rights and could result in a loss of a right or a monetary loss. Encumbrances include liens on the property, transfers through divorce, easements, wills, defective probate procedures, and

other court proceedings (Greene, 1973).

Title insurance is a means of protecting the lender and the property owner from financial loss if a defect in the title is found. Title insurance is an alternative to the more traditional method of an abstract of title and a title opinion, in which an attorney searches the public records and offers an opinion on the title, indicating what, if any, problems are found. Partly due to the requirements of the secondary market (Uri, 1989), lenders now routinely require title insurance (Werner, 1988). In most home purchases, two policies are required - one to cover the lender for the mortgaged amount and one to protect the owner up to the amount actually spent in reliance of a valid title (Pedowitz, 1983).

Title insurance is retrospective in that it only insures against problems existing before the insurance is issued, and is paid for with a one time fee (Johnstone, 1983). The title insurance premium is actually two distinct premiums in one. The first is for services provided by the title insurance company, including the maintenance and search of records to find encumbrances. The second is the "risk" premium - covering the insurance portion of the transaction.

The idea of a "risk" premium is somewhat of a misnomer, however, as the cost of title insurance is not related to the amount of risk (Greene, 1973) but is based entirely on the price of the home. Factors relevant to risk, such as the length of time since the last title search, the location of the home, and the quality of the local records, are not considered. In fact, a "national rate", recommended by the National Insurance Underwriter's Association, is generally used. These rates have not changed since their adoption in 1957 (Uri, 1989).

In Ohio, as well as most of the U.S., in addition to using the national rate, a national standard policy is also used. The policy is recommended by the trade association of the industry - the American Land Title Association.⁴ The standard policy does not insure against losses due to any problem that a search finds existed prior to the issuance of

the insurance, nor does it cover any defect that is discovered later but does not appear in the public records. Thus, there is very little that the policy covers beyond what a careful search of the records would disclose (Johnstone, 1983, p.509).

Title insurance is regulated by each state through its insurance department. Insurance is not considered commerce but a contract between two parties and thus is not governed by the federal government under the Commerce Clause of the Constitution (Paul v. Virginia, 1868). A 1972 HUD study concluded that title insurance received little attention from state insurance commissions, and found uniform filing rates common (U.S. Department of Housing and Urban Development, 1972).

State Regulation

In Ohio, title insurance is regulated by the Department of Insurance. The statutory basis for the regulation is ORC Chapter 3953 - Title Insurance, passed in 1967. The statute requires all rates, forms, and policies to be filed with the Department before they may be issued. There is no requirement that the Department approve the rates, but unless the rate is disapproved within 30 days, the filing is deemed to be approved.

All companies in Ohio use the national rate.⁵ The rate for owners insurance is based on the value of the home, starting at \$5 per thousand of value up to \$100,000 while lenders insurance is a flat \$25 when purchased with owners insurance.⁶

There appears to be neither competition nor regulation of title insurance in Ohio. The title insurance companies file rates, but in essence operate independent of any oversight, setting prices that are approved without a chance for comment. This is contrary to the concept of optimal pricing of products, which is generally achieved either through market competition or government regulatory procedures.

Chapter 3953 has no provision for disclosure of information to consumers, no provision for consumer redress, and no general consumer protection, except for the requirement of a reserve fund to assure financial solvency of the

company.

Federal Actions

A major reason for the lack of competition in title insurance is the protection it receives from the scrutiny of the anti-trust laws by two major doctrines - the "business of insurance" doctrine and the "state action" doctrine. Both allow prices to be set by state authority instead of by the market.

The "Business of Insurance"

The McCarran-Ferguson Act (1945) exempts the "business of insurance" from the anti-trust laws, and allows a federal role in insurance only if there is no state regulation. Thus, the Clayton and Sherman Acts were deemed inapplicable to insurance of any type as long as the state has some form of regulation.

In the early 1970s, however, several cases raised the question of whether title insurance was entirely within the definition of "business of insurance". The title insurance industry asserted that the search and the insurance portions of the premium could not be separated⁶ and since part of the fee is for insurance, the entire premium should receive a "business of insurance" exemption from competition. However, in Goldfarb v. Virginia State Bar (1975) the Supreme Court held that attorneys could not engage in price fixing by setting fixed fee schedules for conducting title examinations and title searches. The logic was extended from attorneys to title insurance companies - why should title insurance companies be exempt from anti-trust scrutiny when conducting title searches while attorneys conducting title searches were liable for antitrust violations.

The separation of the insurance and search portions of the fee for anti-trust scrutiny seemed strengthened with the Group Life and Health Insurance Co. v. Royal Drug Co. (1979). The Court determined that only the "business of insurance", not the business of insurers, would be exempt from competition, and the purpose of the insurance exemption was to allow for cooperation in rate making for the actuarial purpose of spreading risk. Under the thinking of Royal Drug, since title insurance searches and abstracts do not encompass the spreading of

risk, the search activities should not be exempt from anti-trust laws by McCarran-Ferguson. There is a further question of whether even the insurance portion should be protected, since title insurance rates are not based on actuarial information.

The State Action Doctrine

Parker v. Brown (1943) established the State Action Doctrine under which businesses regulated by the state are exempt from anti-trust requirements. Although the State Action Doctrine has been limited, it still is possible for title insurance companies to take refuge under it.

RESPA

In 1974 Congress passed the Real Estate Settlement Procedures Act (RESPA) to help standardize settlement procedures, to provide for better and more timely consumer information, to prohibit kickbacks and unearned fees, and to assure the right to comparison shop for settlement procedures (RESPA, 1989).

The high costs and lack of knowledge about title insurance contributed to the passage of RESPA. In a study conducted prior to the passage of the act, HUD found that title insurance received little attention from state insurance departments, citing uniform rates, and commissions being given to real estate agents and other professionals making referrals (U.S. Department of Housing and Urban Development, 1972).

RESPA provides that no seller of property shall require either directly or indirectly that the buyer use a particular title insurance company. The common practice of the real estate agent having the seller purchase from a particular company may be a violation of this act. In addition, any unearned fees by lenders or real estate brokers could be a violation of RESPA.

Truth In Lending

The Truth in Lending Act of 1968 (Consumer Credit Practices, 1989) focused on the information consumers need to more readily compare financing alternatives. A major component of TIL is the use of the Annual Percentage Rate - a consistent method to interest and costs. While theoretically, title insurance costs should be included

in the computation of APR if they are required by a lender, the Truth in Lending Act exempts it from inclusion.⁷

The FTC Challenge

In 1987 the FTC filed a complaint against six title insurance companies charging them with fixing prices of title searches and settlement services in 13 states, including Ohio (FTC, 1990). The complaint alleged that the companies were setting prices through a rating bureau. Based on the then recent developments in case law regarding McCarran-Ferguson exemptions and State Action requirements, the FTC claimed that the settlement services were not within the "business of insurance" and thus the costs could not be fixed.

While the case was in progress, the Supreme Court handed down its decision in Southern Motor Carriers, which expanded the state action doctrine, making it difficult to challenge price fixing. Under Southern Motor Carriers, states needed to show only a clear policy supporting the state regulation of an industry and active supervision of the industry (Initial Decision, 1986, p. 90).

The FTC presented information that indicated that there was not active state supervision, but Ohio claimed that the rates filed with the Insurance Superintendent (which were admittedly fixed by a rating bureau) constituted only the Risk portion of the total premium, and that no portion of the filed fee was for title search or related costs. The FTC claimed that the Ohio fees included hidden costs for title search and examination, but the FTC was unable to prove its case against the companies as they operated in Ohio (Competitive Practices, 1989, p. 96).

The Administrative Judge ruled that the title insurance companies should "cease and desist from discussing, proposing, setting, or filing any rates for title search and examination services through a rating bureau" in Connecticut and Wisconsin (Competitive Practices, 1989, p. 103). After an appeal by the title insurance companies, the final order, issued on September 19, 1989, allowed price setting for "title search and examination services in any state where the collective activity is engaged in

pursuant to clearly articulated and affirmatively expressed state policy and where such collective activity is actively supervised by a state regulatory body" (Final Order, 1990).

The Ohio Response

For many years, rates and policies in Ohio were filed by a rating bureau. The Ohio Title Insurance Rating Bureau began operating in 1972 and filed policies and rates for all companies in Ohio⁸ (Competitive Practices, 1989, p. 63). Deviations from these rates were not permitted.⁹

A rating agency is still legal in Ohio if it serves a specific state policy goal. The major members withdrew, however, in the mid 1980s when the FTC began its investigation of price fixing and rating bureaus¹⁰ (Federal Trade Commission, 1990). The rating bureau ceased operation in 1989, and now companies file their own rates and policies. The title insurance companies continue to charge the rates established by the bureau. An investigation of the files of the Superintendent of Insurance in March 1990 revealed that all of the 25 Title Insurance Companies registered in Ohio charged the identical rates and provided the same policy.¹¹

Market Failure

The title insurance industry in Ohio is an example of market failure, and the housing consumer pays a high price for a product in which there is absolutely no chance to comparison shop. There is a complete divorce between the person making the decisions and the person paying the bill, and the burdens do not fall on the appropriate parties. The real estate agent chooses the title insurance company, the seller pays the fee, and the buyer must live with the decision. There is no incentive for the real estate agent to comparison shop for a more efficient supplier or to keep costs down.

Consumer economists agree that the consumer of the product has the most incentive to make optimal decisions (Sexton, 1981, Sensauer, Kinsey & Roe, 1984). When the ultimate consumer does not choose the product, competition will likely be based on non-price factors such as fringe benefits

provided to the decision maker, increasing the cost with little or no benefit to the consumer.

Research has shown that the primary source of information for housing consumers is the real estate agent (Burke, Belch, Lutz & Bettman, 1979). If the real estate agent does not inform the seller, the seller will not likely know the cost or the company until the closing of the home (Eskridge, 1984).

When it is difficult for consumers to obtain price and quality information, more efficient suppliers cannot inform consumers of their lower prices or take a larger share of the market (Ippolito, 1986). Even after the fact, most purchasers of title insurance know so little about the product they have purchased that they have no idea of whether they have received an adequate value for their money.

Proposed Remedies

Consumer Information

Consumers must be informed and must be the parties making title insurance decisions if there is to be any incentive for companies to become competitive (Wilkie, 1974). Further, consumers must be informed in order to recognize a problem. If consumers are not aware of a problem, legislators will not be likely to make changes, especially in light of the title insurance lobby. Only if there is a high level of awareness and general recognition of a problem will changes be possible.

State Actions

State governments could require the State Department of Insurance to prepare consumer information related to title insurance and the home buying/selling process. This information should focus on both the buyer and the seller, and should be available through the Department of Insurance as well as through mandatory distribution by real estate agents.

The legislature could also require that loss ratios for title insurance be comparable to those required for other types of regulated insurance, and spell out the way in which title search costs are separated from the risk portion of the premium.

States could also develop computerized abstract systems so that expensive duplication of efforts by many title insurance companies would not be necessary. A small tax on each home sale could fund such a program at a fraction of the cost presently incurred by title insurance companies for record maintenance. Title insurance companies could use these files, and in concert with the other proposed regulations, the savings would be passed on to consumers.

Revision of RESPA

The Real Estate Settlement Procedures Act (RESPA) was aimed at informing consumers about settlement costs. RESPA should be amended to include sellers as well as buyers. RESPA assumed that the market was more competitive, as the RESPA booklet given to buyers says shop for the best coverage, the best price, and the level of risk that they are willing to absorb. Shopping for title insurance is not possible under the current system. HUD needs to support the efforts of the FTC in scrutinizing the price fixing aspects of the title insurance industry if the competitive market that HUD foresees is to be possible.

Revision of Truth in Lending

Title Insurance was exempted from the calculation of APR by the Truth-In Lending Act. Including the cost of both buyer's and lender's title insurance in the APR calculation would give consumers better information on which to compare the true cost of a lender's mortgage package. Lenders would also have incentive to consider how much risk they are willing to take in order to lower interest rates and be more competitive. By making title insurance a competitive part of the lending package, the lender has an incentive to offer the consumer alternatives or to take on the risk (Eskridge, 1984).

Repeal of the McCarran Ferguson Act

There have been several efforts in Congress to eliminate the McCarran Ferguson Act so that insurance would be liable to anti-trust charges. Included were HR 2727 (1987) and the "Insurance Competition Improvement Act" (1980). In 1986, the National Association of Attorneys General adopted a resolution recommending repeal of the McCarran Ferguson Act (Mattox, 1989, p.15). The

elimination of McCarran Ferguson would be particularly helpful in Ohio, where there is little oversight and where the label of "business of insurance" is questionable.

Conclusions

The structure of the title insurance industry exists in its present form because federal and state actions have failed to protect the consumer interest. Changing the structure of the industry to protect consumers requires several types of actions. Consumer education is necessary, but not sufficient to bring about substantial changes. Most consumers make few home purchases, and both sellers and buyers are often lacking in time at the point at which title insurance decisions are made.

Regulation would be an efficient method of controlling costs. Regulation could include application of the antitrust laws to the title insurance industry, mandatory information disclosure, and state regulation of loss ratios. Repeal of the McCarran Ferguson Act and revisions of RESPA and TIL are needed to encourage competition and improve the ability of consumers to make informed choices.

End Notes

(1) Information from Sue Davis, Ohio Board of Realtors, February 1990.

(2) Calculated by the author based on price information in the files of all of the Title Insurance Companies doing business in Ohio. Files are maintained in the Property and Casualty Division of the Ohio Department of Insurance, Columbus, Ohio.

(3) Ohio calculations made by the author based on information filed at the Department of Insurance, March 1990. Property/Casualty loss ratios are calculated from data in Best's, 1988.

(4) The policies of companies doing business in Ohio are on file in the Department of Insurance. The author went through the files and determined that all companies use the ALTO recommended owner and lender policies.

(5) Determined by author, based on

investigation of files at the Department of Insurance. March 1990.

(6). Lower court cases supporting this argument include Commander Leasing C. v. Transamerican Title Ins. Co. 477 F 2d 77, McIlhenny v. American Title Ins. Co., 374 F. Supp 564, and Schwartz. v. Commonwealth Land Title Insurance Co., 374 F. Supp. 584.

(7). Public Law 90-321, the Consumer Credit Protection Act (Truth in Lending is the short title of Title I-Consumer Credit Cost Disclosure) stipulates in S106(a) that all costs required by a lender be included in APR calculations, but S106(e) exempts title insurance.

(8) Letter on file with Ohio Department of Insurance from Norman T. Smith, Executive Director of the Rating Bureau, dated March 1, 1989.

(9) Letters on file at the Ohio Insurance Commission indicate a few occasions of a company trying to charge less or to have, for example, a builders policy count towards an owner's policy. Other companies would report violations to the superintendent so that action could be taken to prevent any competition.

(10) Smith letter, March 1, 1989.

(11) Investigation by the author, Department of Insurance, Ohio.

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**Liability Insurance and Family Day Care Providers:
A Review of the Issues**

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The liability insurance crisis of the mid-1980's threatened to cripple the day care industry. Concern continues that providers may still be unable to find affordable liability insurance. This paper includes discussions of family day care providers' perceptions of the availability of liability insurance, an informal review of the insurance products available to providers, and state regulatory attempts at market intervention. It also identifies the role of family and consumer economics professionals in improving the current situation.

Introduction

Today, over one-half (57 percent) of all women with preschool age children are in the labor force (U.S. Department of Labor, 1989). Increased employment of women has meant increased demand for quality, affordable child care. Family day care (FDC) homes are important in meeting child care needs, especially for infants and toddlers. In 1987, 16 percent of children under age five were in FDC (U.S. Bureau of the Census, 1990). One estimate is that 80 to 85 percent of all infant care is in FDC homes (Gellert, 1988). A 1989 estimate of 200,071 regulated FDC homes in the U.S. (The Children's Foundation, 1989) was projected to be a mere fraction of the total; 50 to 90 percent of all FDC homes are unregulated (Hofferth, 1989). Parents may select FDC rather than center care because of the home-like environment (Fuqua and Labensohn, 1986), the convenience (Steinberg and Green, 1979), and/or the lower cost (Cheskis-Gold, 1988).

The liability insurance crisis of the mid-1980s threatened to cripple the day care industry (Pave, 1985). Concern continues that the crisis has had a lasting negative impact on child care providers, and especially FDC providers. One outcome of the insurance crisis may be that FDC providers are operating without liability insurance. Also, unavailable and/or unaffordable liability insurance may have reduced the amount of day care

available. Yet there is little clear evidence that liability insurance today IS unavailable and unaffordable. Therefore, the purpose of this paper is to review the issues related to the availability and affordability of liability insurance for family day care providers.

The first section of the paper reviews the impact of the mid-1980s liability insurance crisis on the day care industry. The second section examines the crisis' continuing impact on FDC providers today. Specific aspects discussed include providers' perceptions of the availability of liability insurance and an informal review of the products available in both the homeowners insurance and the commercial insurance markets. This section also reviews and evaluates the validity of the reluctance of the insurance industry to insure FDC liability. The third and final section of the paper reviews state regulatory attempts at market intervention and identifies ways that family and consumer economics educators can make positive contributions to the FDC liability insurance situation.

The Liability Insurance Crisis of the Mid-1980s

Two highly publicized events contributed to the liability insurance crisis of the mid-1980s. In the McMartin child abuse case, employees of a California day care center faced multiple charges of sexually abusing children in the center's care. The second event was the dissolution of Mission Insurance Company, a major insurer of child care providers. Other factors which contributed to the liability insurance crisis included drastic growth in the child care industry and a lack of actuarial data on liability risks in day care (U.S. Department of Labor, 1989).

During the insurance crisis, liability policies for child care were either cancelled or premiums were dramatically increased, often with virtually no warning (Pave, 1985). An estimated five to 20 percent of child care centers did not have liability coverage during the crisis and two percent of centers closed, at least in part due to insurance problems (U.S. Department of Labor, 1989).

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A Market Review of FDC Liability Insurance

Industry responses to the liability insurance crisis have been to place greater restrictions on the available coverage, to develop stricter underwriting guidelines, and/or to increase premiums. For example, few policies today extend coverage for day care to include claims related to child abuse. One company now has seven pages of underwriting criteria which are to be reviewed before writing a day care policy (Colorado Division of Insurance, 1989). Reports of premium increases during and immediately following the insurance crisis were widespread (Pave, 1985).

One explanation for much of the industry's response to the liability insurance crisis is the "long-tail liability problem." The long-tail problem means the insurer must decide how much premium to charge keeping in mind that some premium must be set aside in reserves for claims which may not be filed for many years. In most states, an individual injured as a child could file suit at any time up until age 20 since the statute of limitations (often two years) does not take effect for a child until he or she reaches the age of majority (U.S. Department of Labor, 1989).

Another result of the liability insurance crisis is that liability insurance for FDC providers is increasingly difficult to locate. Providers may turn to two markets. Virtually all homeowners insurance companies exclude liability coverage for FDC from the homeowners insurance policy, but some offer a rider to the policy which adds back the coverage. FDC providers may also purchase insurance from the commercial liability insurance market.

Data from the industry are generally unavailable to determine whether purchasing FDC liability insurance through homeowners insurance coverage is widespread. A Department of Labor Liability Insurance Task Force report (U.S. Department of Labor, 1989) indicated that the number of insurers writing child care liability insurance has decreased since the mid-1980s. However, the report did not distinguish between homeowners insurance and commercial liability insurance.

The report also noted that admitted carriers² do not comprise a large market share in the commercial child care liability insurance market. In fact, the report estimated that one nonadmitted carrier controls an even larger market share today than it did in 1985. If a

²An admitted carrier is one licensed to sell insurance in a particular state.

market for liability insurance for FDC providers were growing, the market shares of nonadmitted carriers should decrease, not increase.

Domination of the market by nonadmitted carriers does present some problems for consumers. Nonadmitted or surplus lines carriers are sometimes not regulated as closely as admitted carriers and may not be regulated at all. In some states, they are not allowed to participate in the state's insurance guaranty fund, which would pay the claims of consumers if an insurance company became insolvent. Also, most consumers are unlikely to be familiar with nonadmitted companies.

Another lasting impact of the insurance crisis is that fewer states now require liability insurance as a prerequisite for child care licensing or registration.³ Some states dropped the requirement when insurance became unavailable or unaffordable since an insurance requirement might drive FDC providers to the underground economy or out of the business entirely. Liability insurance is now a requirement for FDC homes in only 10 states; however, three states limit the requirement to transportation, one to homes with more than six children, and one to licensed providers (The Children's Foundation, 1989). States that require insurance generally do not specify a minimum amount of coverage (Morgan, 1987).

Liability Insurance for FDC Providers: What's Available Today

To determine the range of products available to a FDC provider seeking liability insurance, the researcher conducted an informal telephone survey of both the homeowners and commercial liability insurance markets. The researcher contacted a total of 20 property/casualty insurance companies as well as five companies⁴ that write commercial liability insurance for FDC providers. The property/casualty insurance companies were selected from those ranked among the top ten property/casualty insurers nationwide and the top 15 property/casualty insurers in Illinois. The commercial

³In the 26 states that license FDC homes, an agency sets standards and conducts inspections. In the 16 states which register FDC homes, an agency sets the standards and the caregiver conducts a self-study. Some states plan random rotating visits to a percentage of FDC homes (Morgan, 1987).

⁴The researcher contacted at least five other companies that write liability insurance for child care centers but not for FDC providers.

Commercial liability insurance companies also restricted coverage through underwriting guidelines. However, among the five companies surveyed that wrote commercial FDC policies, none restricted the number of children in care. All five did, however, require the provider to meet any applicable licensing or registration requirements. Those requirements generally limit the number of children any one provider can accept. Four of the five policies extended liability coverage to defense costs related to sexual abuse claims; however, the liability limit for such coverage was lower in three of the four policies. For example, one policy with a \$300,000 liability limit set the limit for claims related to sexual abuse at \$25,000. Coverage was usually extended to accidents that occurred away from the FDC home.

Premiums for commercial liability insurance were much higher than for homeowners insurance endorsements. Premiums for the five policies reviewed ranged from \$350 to \$675 for a \$300,000 liability limit. However, commercial policy premiums were generally not directly comparable to each other. For example, the \$350 premium included no accident insurance while the \$675 premium included \$20,000 in accident insurance. Some policies had deductibles (usually \$250). Other factors that sometimes affected the amount of the premium included the number of children in care, the size of the day care home, and the presence of pets or a swimming pool. In one policy, providers with a pool automatically added \$75 to the annual premium.

Is the Insurance Industry's Cautious Approach Justified?

There is some evidence that the insurance industry has overestimated the liability risks associated with FDC, at least in states that regulate day care. All states have a minimum age requirement for FDC providers and 28 states have training requirements for providers. Most states (37) now require criminal record checks. All state regulations specify a maximum number of children in a FDC home and 38 states have some type of space requirements (The Children's Foundation, 1989). Most states (32) clearly prohibit corporal punishment (Morgan, 1987). Inspection of child care facilities for compliance with established standards is usually an essential part of state licensing programs (U.S. Department of Labor, 1989). However, in some states, inspection is infrequent, suggesting that even licensed FDC homes may not always be in compliance with the standards (Morgan, 1987). Also, as mentioned earlier a large proportion of FDC homes are unlicensed and unregulated. Sixteen states exempt some FDC homes from regulation - most often those caring for

liability insurance companies were identified based on information supplied by the Illinois Department of Insurance and the Surplus Lines Association of Illinois. When possible, the researcher also interviewed a local insurance agent for each of the selected companies.

Of the 20 property/casualty insurance companies contacted, five did not write an endorsement for FDC; three wrote the endorsement only if the provider already had homeowners insurance with the company. Two other companies extended liability coverage only to the most limited of day care operations. One would accept a client only if care was provided to at most two children; a second company excluded the business from the homeowners insurance coverage if the total annual day care income was less than \$5,000.

The remaining ten property/casualty insurance companies offered an endorsement to cover FDC; however, all set restrictions on the number of children in care. Four were willing to write the coverage if the provider cared for three or fewer children; one would write coverage for up to four children. One company would insure FDC if no more than five children were in care. Four companies were willing to write insurance as long as the number of children did not exceed six.

None of the homeowners insurance policies extended coverage to sexual abuse claims. Most were at best vague about coverage for accidents that occurred away from the provider's home (on a field trip, for example). The premiums charged usually depended on the liability limits selected as well as the number of children. For example, for a \$300,000 liability limit and \$5,000 in medical payments coverage, premiums with a company that allowed only three children in care were less than \$30 per year. Companies that wrote the insurance for up to six children generally had two premium schedules; one for providers who cared for three or fewer children and another for providers with four to six children. For example, one company charged \$55 to providers with three or fewer children; providers who cared for more children paid \$120 for the same policy (a \$300,000 liability limit and \$1,000 in medical payments coverage).

Underwriters were universally cautious about writing liability insurance for FDC providers. Although only one of the insurance companies required providers to be licensed or registered, most did indicate that an agent would visit the home and the company might refuse to write the coverage if unsafe conditions (usually defined as pets, pools, wood burning stoves, and playground equipment) were present.

Table 1
FDC Providers' Experiences With Liability Insurance

Variables	n	Percent of Total
Have Liability Insurance:	(112)	
Through homeowners insurance	26	23.2%
Through endorsement to homeowners	36	32.1
Through special policy outside homeowners	50	44.6
Reasons Why Don't Have Coverage	(94)	
Can't afford premiums	61	64.9%
Market problems	16	17.0
Not required for licensing	8	8.5
Procrastination	6	6.4
Don't need coverage	3	3.2
Problems When Tried to Buy Insurance	(53)	
Restrictions on policies or underwriting guidelines	25	47.2%
High premiums	24	45.3
Difficulty getting information	4	7.5

fewer than three or four children (The Children's Foundation, 1989).

Several surveys have reported that few child care facilities have filed liability claims, further evidence that the industry may have overestimated the liability risks. However, much of the evidence is reported only for child care centers; experiences in child care centers may or may not parallel those in FDC homes. A 1986 New Jersey survey (New Jersey, 1986) found that 97 percent of the child care centers surveyed reported no liability claims had been filed against them in the past five years. Among the claims that were filed, none were attributable to child abuse or neglect. In a Department of Labor survey of child care directors and professionals, 78 percent reported no liability claims or litigation despite having been in the business an average of almost 15 years. Most of the claims that were filed were for minor expenses (U.S. Department of Labor, 1989).

In 1989 the Department of Labor (U.S. Department of Labor, 1989) analyzed information about over 1,000 claims submitted to one carrier by 2,941 child care facilities; family day care represented as much as 10 percent of the group. The vast majority (94 percent) of the claims were \$2,500 or less; the average size claim was less than \$1,000. The six largest claims represented less than one percent of the claims but more than 30 percent of the actual dollars paid. Almost all (over 99 percent) of the facilities had never been sued or had a child abuse complaint filed against them.

The lone dissenting note is a study by the Colorado Division of Insurance (Colorado, 1989). That report suggested that insurance companies have **underestimated** the day care liability risks. Twenty-one insurance companies were asked to report statewide and nationwide data over the last five years. Based on those data, the report estimated that insurers incurred a \$28.87 million nationwide underwriting loss in child care liability insurance; indeed, the companies suffered an underwriting loss in each of the five years.

However, the results of the Colorado report have been questioned. The report does not describe the types of facilities insured and consequently child care centers may have been grouped with such high-risk facilities as youth halfway houses (U.S. Department of Labor, 1989).

FDC Providers' Experiences With Liability Insurance

A survey of FDC providers was conducted in summer 1990. Surveys were mailed to approximately 1100 FDC providers who receive a monthly newsletter from the Cooperative Extension Service. About 18 percent or 196 providers completed and returned the survey. All of the providers who responded were licensed (required in Illinois for providers who care for three or more children).⁵

⁵Illinois' licensing standards require only that a provider have auto liability insurance before transporting children; all auto owners in Illinois are required to have liability coverage.

A total of 113 or 58 percent of the sample reported that they had liability insurance for their FDC business. However, when asked to describe the type of coverage they had, 26 providers indicated they were insured through their standard homeowners insurance policy (Table 1). The market survey suggests that these providers may well believe they have coverage when they do not. Therefore, it is possible that the total proportion of the sample with coverage may be as low as 44 percent. A survey of FDC providers by the Illinois Department of Insurance reported similar results (Illinois, 1989). Approximately 56 percent of the 244 respondents had insurance to cover liability. However, over one-half (54 percent) of those with insurance indicated that they insured their FDC business on their current homeowners insurance policy.

A total of 36 providers reported they had purchased an endorsement or rider to their homeowners insurance policy. Fifty providers had purchased additional insurance outside their homeowners policy (either a commercial liability policy or an umbrella liability policy).

FDC providers who did not have liability insurance were asked why they did not have the coverage. The eighty respondents who answered the question gave a total of 94 responses. Nearly 65 percent of the responses related to the providers' perceptions that they were unable to afford the premiums. Seventeen percent of the responses described market problems — providers who were denied coverage, had been unable to locate the coverage they need, had been advised by an insurance agent that they didn't need the protection, and providers whose homeowners insurance could not be extended to the FDC liability. About six percent of the responses were "never thought about it" or "keep putting it off." Only 8.5 percent of the responses attributed failure to buy insurance to the fact that Illinois licensing standards do not require it.

A total of 94 providers reported that they had attempted to buy liability insurance in the past year. Fifty-one of those providers or 54 percent reported a total of 53 problems in making a purchase. Restrictions on policies or strict underwriting guidelines accounted for 25 of the problems; the majority of the rest of the problems related to cost. Other problems described the difficulty in getting information or in communicating with an insurance agent. The Illinois Department of Insurance survey (Illinois, 1989) reported that 47 percent of their respondents had encountered problems in purchasing or renewing liability insurance.

Marketplace Intervention by State Regulatory Agencies

Most states have responded in some way to the marketplace problems now associated with liability insurance for FDC providers. Some states formed task forces during or immediately after the liability insurance crisis; in some cases, the task force was disbanded after the completion of a report. Other states have actively sought solutions. Those solutions include Market Assistance Plans, Joint Underwriting Associations, mandatory caps on premiums, and mandatory policy renewal regulations.

Market Assistance Plans or MAPs were formed in 28 states. A MAP was usually defined as an unincorporated association of insurance companies formed to provide a given line of insurance. However, MAPs have generally not been seen to be effective and most have been disbanded (U.S. Department of Labor, 1989).

Joint Underwriting Associations or JUAs were formed in Minnesota and New Mexico for child care. JUAs are basically mandatory versions of MAPs, with carriers required to join if they want to continue to write coverage in the state. The insurance industry considers JUAs "a disaster," largely because they were mandatory (U.S. Department of Labor, 1989).

At least seven states have placed mandatory caps on premium increases. However, the impact may be negative if insurance companies that are forbidden to increase premiums choose to cancel the policy instead. One-half of the states impose mandatory policy renewal regulations to protect child care providers from cancellation. Some other states require notification and a hearing before a policy can be canceled (U.S. Department of Labor, 1989).

Many states have grant and revolving loan funds. These funds can be used to assist child care facilities in start-up and operation, including paying insurance premiums. However, in some states funds may be available only to assist operators of child care centers and not to FDC providers.

The Role of Family and Consumer Economics Educators

The review of the market indicates that commercial liability insurance is available to family day care providers and that insurance through a homeowners insurance policy is available from some companies. However, some providers may find it difficult to meet the underwriting guidelines of some companies. Homeowners insurance underwriters were especially cautious about insuring FDC providers. Comments such as "we only

write the insurance if it isn't a 'real' business" were common. Other underwriters expressed concern about the unpredictability of children, explaining that "in the eyes of a judge and jury, children are never responsible for what they do." Many FDC providers would find a homeowners insurance endorsement unavailable because they exceed the company's children-in-care limit. Eighty-eight percent of providers in the survey cared for more than three children; the 44 percent that cared for more than six children would be ineligible for all homeowners endorsements. Whether liability insurance is affordable depends on several factors including the income generated by the day care operation and the risk-taking attitude of the provider. However, even if a provider considers the insurance affordable, there are several significant barriers that could prevent even the most conscientious provider from seeking coverage.

One important barrier is the perception that liability insurance is generally unavailable to family day care providers. Most of the recent publicity about liability insurance has focused on the negative aspects - increasing costs and decreasing availability. A second barrier is the perception that a family's homeowners insurance policy automatically extends coverage to the family day care business.

A third important barrier is the limited knowledge of insurance agents and the insurance industry in general concerning family day care homes. Agents and underwriters interviewed for this research sometimes did not know what a family day care home was. Even the executive director of an Illinois trade association for insurance agents professed ignorance concerning the availability of liability insurance for family day care providers. Contacts at the Illinois Department of Insurance were similarly unproductive; the list of providers supplied included only companies that write commercial policies and most were available only to day care centers, not to family day care providers. No printed information was available about obtaining liability coverage through homeowners insurance; nor was there a list of companies that write such endorsements.

Thus, family and consumer economics educators can play an important role at four levels. The first is to provide education to family day care providers. A review of the insurance options available to providers would also need to include definitions of basic terms (rider, admitted companies, exclusion). Providers could read sample endorsements from homeowners insurance policies, a clause in a homeowners policy that excludes liability coverage for FDC, and sample

commercial liability policies. Unless the information is available elsewhere, the educator may also need to do a market survey to learn what options are available.

Programming opportunities might be identified through child care associations in the state. Examples include associations affiliated with the National Association for Family Day Care, the National Association for the Education of Young Children, and the National Association of Child Care Resource and Referral Agencies.

Educators can also play an important role by working with child care professionals to educate the insurance industry. Involving local insurance agents in educational programs would enable the agents to learn more about child care providers. Educators may also be able to provide information for newsletters or programs to state trade associations for professional insurance agents or independent insurance agents.

Family and consumer economics professionals can also influence state policy. While marketplace intervention in many states has not proven to be very successful, educators might work with the state insurance department to increase the amount of information and assistance available to FDC providers seeking to buy insurance. Options for a risk retention group might also be explored; individual providers or provider organizations could form a group self-insurance pool and/or purchase a group insurance policy.

Finally, family and consumer economics professionals can provide much-needed research. Family day care homes are often not included in reports of accident or claim rates in child care facilities; when they are included, they are not reported as a separate and distinct group. Research is also needed to explore providers' knowledge of insurance options and actual insurance purchases. Researchers might also investigate whether the insurance industry's cautious approach to insuring FDC homes is justified. Another research area is the effectiveness of various types of marketplace interventions. Finally, researchers are challenged to learn more about the insurance knowledge and practices of providers who operate unregulated FDC homes.

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Efficiency and Equity in the Delivery of Public Education

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This paper uses existing evidence in the production of public goods literature to analyze the efficiency and equity with which public education is delivered under the usual school financing schemes. It also examines proposed school "choice" options. It is concluded that implementation of such options will have equity drawbacks mostly related to land value erosion.

The entering of the "baby-boomers" into their parenting life cycle stage has provided great impetus for the demand of goods and services related to child-rearing. One such service is education. The purpose of this paper is to frame public education in the context of consumer demand and to address some efficiency and equity considerations that arise from the way in which it is produced and allocated.

Education is a good with private and public characteristics. When a child is educated, he benefits directly. But so also do other members of society. Thus positive externalities arise from education. Because consumers do not take into account the value of this external effects when deciding how much education their children should obtain, in the absence of social intervention, less than the socially desirable amount of education will be consumed. Following the above reasoning, the case has been made for the need of publicly supported education (Heyne, 1987). It has been argued, however, that while the justification exists for publicly supported education, there is no reason why such support must translate into the current system of public education (Lieberman, 1989).

Considerable controversy exists as to the form that support for public education should take. The current debate about the equity and efficiency with which public education is allocated comes from two basic issues: school financing and the monopoly that local public schools are given over the supply of publicly funded schooling.

Public School Financing

The government is the major supplier of education in the United States with about 90 percent of primary and secondary school students attending public institutions. Total educational expenditures are almost \$250 billion per year (Hyman, 1990), a figure corresponding to 6.1% of the Gross Domestic Product. After national defense, education is the largest government

expenditure; however most of this is by state and local governments, with the federal government playing a minor role (Rasell and Mishel, 1990).

School districts are financed primarily by local real estate taxes. But, at the same tax rates, districts with affluent populations (more expensive real estate) can collect more in taxes than districts with poorer residents, so wide disparities are often observed in the level of public expenditure per student. To help offset this disparity in financing, most states will subsidize poorer school districts. Some states use a "foundation" plan in which local districts are guaranteed a minimum level of expenditure per student provided that the district meets a minimum property tax rate schedule. Other states use a "district power equalizing system", which guarantees a given level of revenue from each percentage point of property tax. If the district does not collect the guaranteed amounts from each percentage point of tax rate, the state makes up the difference. While both systems ensure a minimum level of funding, neither prevents the wealthier districts from spending substantially more than the minimum, nor forces local electors to raise tax rates to meet state requirements.

School districts, the sole providers of publicly funded elementary and secondary school education, rarely allow their constituents to either choose a school to attend or influence curriculum. Children are generally assigned to a particular school on the basis of home address. Since neighborhoods tend to be segregated on the basis of wealth, race, ethnic origin, etc., the result has been segregated schools. Segregation that follows racial patterns has long been successfully challenged in the courts as being unconstitutional and has resulted in a patchwork of remedial programs, the most notable of which is busing.

Busing is a program to transport children across neighborhood lines so that public schools reflect the racial composition of the community at large rather than that of particular neighborhoods. This has, however, resulted in discrimination against low income students. In most states, children are required to attend school, private or public, up to a certain minimum age, usually 16. If families cannot afford either private education or a move to another school district, busing results in the forced transportation of children to schools they would not choose to attend. This has resulted in emigration from school districts that are socioeconomically and demographically heterogeneous to those that are more

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homogeneous. Thus, the perverse result of busing has been the homogenization of whole school districts (Clotfelter 1975, Coleman 1975).

The Production of Public Education:

Local school districts typically play no role in determining the level of expenditures, which is usually set at the state and/or local budgeting process, so, it can be safely assumed that school districts maximize a social output function $F(\cdot)$ subject to their state-determined budget. Notice that the arguments in $F(\cdot)$ need not be restricted to scholastic achievement, some communities will place a value in social/racial integration, in the performing arts, or in high school athletics. School boards are usually elected and so to some degree they must answer to their constituencies.

More formally let ω be a vector of community characteristics in $F(\cdot)$, π a vector of nonpurchased inputs (child's own learning potential, own parents, etc.), ρ a vector of factor prices for purchased inputs, ζ a vector of purchased inputs, ϵ the budget, and q a measure of achievement, given by:

$$(1) \quad q = F(\omega, \zeta, \pi)$$

which is maximized subject to:

$$(2) \quad \epsilon = \rho \cdot \zeta$$

the solution to the above maximization problem is given by:

$$(3) \quad \max L = F(\omega, \zeta, \pi) - \mu(\rho \cdot \zeta)$$

following Dynarski, et.al.(1989) the solution to (3) yields the demands for purchased inputs as a function of the levels of community characteristics, nonpurchased inputs, factor prices, and the school's budget, so:

$$(4) \quad \zeta^x = \zeta(\rho, \omega, \pi, \epsilon)$$

where ζ^x is the demand for purchased inputs at optimum. Thus the production function can be written as:

$$(5) \quad \theta(\omega, \rho, \pi, \epsilon) \equiv F(\omega, \zeta^x)$$

Dynarski, et.al. (1989) have empirically estimated the above model and concluded that the income elasticity of education achievement may be much larger than the income elasticity of education expenditure. Thus suggesting that economic differences in student-body background can only be compensated by large variations in spending because expenditure in purchased inputs has a small impact on achievement as compared to community characteristics. Thus the impact of equalizing spending across districts is likely to be minor. Most interestingly, they found that "expenditure is marginally more productive in districts whose local characteristics work against achievement".

Additional evidence suggests that the attainment of a desirable level of quality in public education for a child is a function of characteristics of the student himself (intellectual potential), his or her familial background, the characteristics of peers or other students, and the level of public expenditures (Hanushek 1986, Project STAR 1990). Furthermore, there is strong empirical evidence that suggests that a child with personal and familial characteristics that puts him at risk of academic failure, greatly enhances his chances of achievement, if he or she is placed in the company of children with personal and

familial characteristics that marks them for success. The reverse is not true however, the bright child with caring parents will achieve regardless of peers (Hanushek, 1986).

What the above mentioned findings suggest is the existence of positive consumption externalities generated by bright children and caring parents, which can only be captured by society through the presence of children without such characteristics. In the absence of such children the positive externality is lost. Total product can only be maximized if the proper mix of children exists. M. de Bartolome (1990) suggests that the captured value of the externality is maximized when "peer effects" are neither "too strong" nor "too weak".

The Consumption Of Education:

The consumption of education can be analyzed from the perspective of the community or from the perspective of the individual household. I will first examine the community perspective.

Education has the characteristics of a public good, which can be defined as a good such that no individual's consumption of such good leads to no subtraction from the consumption of the same good by any other individual. Notice that the term consumption is broad, meaning that the consumption of the public good can take different forms for different individuals. In the particular case of public education, individual x_i may consume it by enjoying a reduction in criminal activity, while individual x_j may consume it by converting it into human capital. The collective demand for public goods is obtained by vertically adding the demands of the individuals in the collectivity. The problem of deriving such demand is that rational consumers find it in their best private interest not to disclose their own demands for collective goods. Thus a private market allocation would fail to provide the socially desirable amount of the good (Heyne, 1987).

It has been argued in the Public Finance literature that the provision of some public goods such as: education, police and fire protection, emergency medical services, etc. is best handled at the local community level where market mechanisms will operate to insure that expenditures on these public goods approximate the optimal. Tiebout (1956), in a seminal paper on the markets for public amenities, concluded that:

"For a substantial portion of collective or public goods, this problem (a decentralized price system determining optimally the levels of collective consumption) does have a conceptual solution. If consumer-voters are fully mobile, the appropriate local governments, whose revenue-expenditure patterns are set, are adopted by consumer-voters."

The implication thus, is that as long as consumers "vote with their feet" by moving to the community that best meets their demands for publicly supplied goods, the market will supply the correct amount of such goods. In Tiebout's

model, local communities with homogeneous tastes for public goods rather than individuals, make the markets for such goods.

Tiebout's hypothesis which has been the cornerstone of the theory of local finance (Schwab and Oates, 1990) has recently become the target of some criticism (M. de Bartolome 1990, Dynarski, Schwab, and Zampelli 1987). This criticism arises because, while it is possible that homogeneous communities may lead to efficient consumption, efficient production may require heterogeneity. Overall efficiency may thus require a balance between the two objectives (Schwab and Zampelli 1987). In the previous paragraphs I have addressed how the household's utility function enters into the social utility function, in the following section I address issues related to the household's utility function itself.

As a private good the analysis of the demand for public education is closely tied to the demand for housing, because in the great majority of instances the allocation of public inputs and peers is largely determined by the location of the housing unit. At the same time the location decision faced by a consumer is likely to be influenced by the quality of alternative public schools.

Housing is generally viewed as a package of consumption goods in which things such as shelter, congenial neighbors, public services, and prestige are bundled. Consumers can not, in general, adjust their housing decision to exactly meet their tastes for each of the components of the bundle, because in some cases the property rights to such components are not alienable. Property rights are thus capitalized in the value of the house itself. In the case of public education for instance, homeowners cannot sell the right to attend the neighborhood's public school to people living in a different neighborhood to a household that might value it more. If a household wishes to send his children to a public school other than the one that has been designated for it on the basis of the house's location, the household would have to move. Such move would entail the payment for an entire bundle of neighborhood-dependent amenities, some of which he may not care for. Also transaction costs (moving) are relatively high and work against optimal adjustment.

Soberon-Ferrer and Verma (1990) have presented evidence in support of the capitalization theory presented above. They found a simultaneous relationship between property prices and the quality of public education. Higher property prices were found to be conducive to better public schools. And better public schools were found to lead to higher property prices. Their findings also support the notion that an individual's education has an important externality which is capitalized in land prices. A higher median level of education in a neighborhood results in higher property prices. Consequently, children in more affluent neighborhoods have peers whose parents are more educated.

This marginal effect of the of public schools on housing prices lends support to the argument that the probability of receiving a quality public education is tied to the capacity of the family to invest a monetary premium in a house, and that the larger the premium the better the quality of the public education.

Policy Considerations and Implications

The equity implications of the prevalent scheme of public education allocation are serious, because a system emerges that discriminates against the poor when families cannot send children across school/neighborhood lines. Furthermore, the tug-of-war that one normally finds between efficiency and equity is not at play in this instance.

Consumption inefficiencies result when the consumption of education cannot be marginally adjusted, because under the usual school assignment scheme, education comes in a bundle of neighborhood amenities. Some of these amenities may not be wanted at the asking price, but if a given quality of education is desired, such amenities must be purchased to avoid forgoing the desired quality of education. This indivisibility hampers the capacity of lower income families to consume the desired quality of public education because their capacity to marginally adjust their consumption is limited by their income.

Other examples of publicly-supplied goods with intensity of use restricted by income are not uncommon (airports and marinas are two such examples). Yet many people find discrimination in public education objectionable, as it is perceived to further enlarge the endowment gap between the rich and the poor. A recent study on school financing issues (Salmon and Versteegen, 1990) points out that: "For children living in less affluent school divisions, an equal educational opportunity remains a cruel illusion reserved for those who begin life with greater economic advantage".

Additional inefficiencies result when the positive externalities due to "peer effects" are wasted due to the student body homogeneity that results when school and peer assignments are made based on place of residence.

Recently, this economic discrimination has been successfully challenged before the courts as being unconstitutional. As a consequence, school financing schemes have been overturned in Montana, Kentucky, and Texas (P. Baker 1990, D. Moranis 1990).

So far remedies suggested by the courts address only the issue of school financing and suggest different redistribution schemes by which poorer districts will get a more equitable share of monies. However, the issue in education concerns the quality of output rather than the amount of input. It is not clear from the literature on the production of education whether more money will translate into a better education; the empirical evidence on this point is contradictory (Hanushek 1986, STAR project

1990). Furthermore, based on Dynarski, et.al. one would have to conclude that equalizing expenditures across districts will not equalize access to quality, because as they found expenditures have a small impact on achievement as compared to community characteristics. The issue of discrimination, as I think it should be addressed, refers to children having access to schools that provide a satisfactory level of output without regard to family economic capacity.

Additional equity considerations stem from the effects that changes in current policies would have on property values. The existing evidence clearly suggests that the privilege of attending a public school which engenders a high degree of satisfaction is capitalized into the value of real property. However, policy changes could disallow such capitalization either by: (i) opening up the school to any child regardless of where this child lives, (ii) taxing the amenity, or (iii) a system of vouchers or tax credits that could be used to pay for schooling in either public or private schools.

A policy change that gives the opportunity to attend the school of choice to any child will decapitalize the existing exclusive right from the value of real estate. A dilemma similar to the one posed by McKenzie² is present. On the one hand, continued regulation of access to public schooling means higher effective prices for consumers of public education and a lower total social product. On the other hand, deregulation enhances total social product and eliminates discriminatory barriers, but it also means a capital loss for current homeowners in neighborhoods where the "good" schools are. Additionally, to the extent that homes in different neighborhoods are substitutes, we would expect real estate prices to decrease.

Currently, nine states allow families to send their children to any school in the state. To my knowledge, no systematic study has been undertaken to compare the level of satisfaction with public schools in such states with the level of satisfaction with public education in states where such choice does not exist. It would also be of interest to quantify the impact of "choice" on property prices.

A variant to the open access policy would result in the creation of more schools in the neighborhoods with the "good" characteristics, and opening access to limited numbers of

² McKenzie (1980) found that the exclusive right to a natural gas connection, which was necessary in order to allocate scarce natural gas supplies due to regulated prices, had been capitalized into the value of the homes that had such exclusive right. When natural gas prices were deregulated and the right to connect to natural gas was extended to every homeowner the capitalized entitlement disappeared thus reducing not only the value of homes with existing connections, but of other homes as well.

children from the disadvantaged neighborhoods. This policy would then be in keeping with M. deBartolome's finding (1990), that the optimal mix exists where the "peer" effect is neither too strong nor too weak³. This variation to open access somewhat resembles the admission process at selective colleges. While it has the advantage that property prices are not severely affected, it has the disadvantage of limiting the number of children receiving equal opportunity.

Under the alternative policy (ii), the capitalized quality of a neighborhood's public school would be taxed away by the government by making property tax rates a function of the quality of the amenity. This tax could be then spent in other less desirable school districts. This would be justified on two grounds: (i) spending the tax monies back into the neighborhood would offset the effect of the tax as the expenditure would be capitalized back into the property, and (ii) it would increase the perception of fairness. Oates (1969) found evidence that "for an increase in property taxes unaccompanied by an increase in the output of local public services, the bulk of the rise in taxes will be capitalized in the form of reduced property values". So, just as with the open access policy, the taxing alternative results in a decrease in property values. However, to the extent that the collected taxes in the educationally better-off neighborhoods would be transferred to the other neighborhoods, property values could probably rise in the latter.

Also, in keeping with the findings of Dynarski, et.al.(1989), that the major influence in academic achievement seems to be related to community composition, this transfer, if it is to result in equality of opportunity, would need to be large enough, so that the expenditure per student in the worse-off districts would be superior to the expenditure per student in the better-off districts. This transfer would result in the improvement of the quality of public schools in the subsidy receiving districts. In keeping with Soberon-Ferrer and Verma (1990) the increased desirability of the public amenity in the previously worse off district would also result in an increase in property values in such districts.

A policy of vouchers or tax credits has been discussed extensively elsewhere (Lieberman, 1989). Under this policy, parents who preferred a private school would receive a tax credit or a voucher which could then be used to send their

³Oates and Wallace (1990), suggest that when heterogeneity in consumption is desirable from a wider perspective (state, national), the central authorities would have to "bribe" the local communities possesses "good" externality generating characteristics into accepting members of other communities to share their services. This would then internalize the externality on the supply side. Under the alternative being proposed, this could translate into higher subsidies to the community for local services.

children to the private school of their choice. The voucher or tax credit would not need to cover the full cost of tuition, so in the event of a shortfall, the parents would have to cover it. This option, while allowing for a more competitive use of resources, has some drawbacks, among them: (i) There would still be a negative effect on real estate prices as with the former two options. This would happen as parents wishing for an alternative to their neighborhood public school would not have to bid for a house in a preferred school district if a private school exists that satisfies their wants; (ii) Private schools that participate in these programs would almost surely have to be non-sectarian, as legal issues involving the use of public monies to further religion would first have to be resolved; (iii) It might have an impact on the issue of fairness. The amount of the voucher or subsidy, as has often been proposed, would be the same to everybody; thus, wealthier parents could supplement the voucher/credit to pay for tuition at "expensive" schools. Again, it is not a case of the public being opposed to parents spending as much as they wish on their children's education, but of using public monies to do so. A voucher with its value inversely related to taxable income would also seem unfair, as the government would not be providing equality of access, though in this instance the discrimination would be against the high income students. To the extent that high income is correlated to the familial characteristics which are conducive to academic success, such reverse discrimination would result in the poorer students being denied the positive externality that results when the higher income student becomes their academic "peer". This is an inefficient result.

Frank (1985) raises an interesting objection to a voucher system, he argues that such a system would unleash an educational rat race of unprecedented proportions. He points out that currently the price difference between the public and private school choice is wide enough so that middle and low income parents are insulated from competitive pressures, as parents can provide their children with numerous other advantages with the money saved from the payment of tuition. With so many good students being induced to remain in public school, being a student in public school has not become synonymous with failure. Also, I would add, when enough good students remain in public school "peer" effects become significant. Under a voucher system, on the other hand, there would be advantages of spending slightly more to give one's child a slight advantage. But one student's advantage is another's disadvantage. The parent of now disadvantaged student would feel forced to spend more in education just to keep his child even. Thus Frank's rat race would get going.

Concluding Remarks:

The current system of allocating public education is inefficient and inequitable. Much of the problem arises from the connection between property prices and the quality of public schools. This relationship largely prevents poorer children from having access to a

quality public good. However, solutions that have been explored to remedy such perception and to equalize educational opportunities within the public schools have drawbacks.

Current efforts to improve the quality of public schools which have been pursued by the educational establishment have focused on the level of inputs that relate to higher expenditures (lower student/teacher ratios, more equipment, higher salaries) even though extensive research has failed to conclusively show that higher levels of such inputs will result in better quality schools.

The "choice" option that would allow families to send children to schools of their choice, public or private, at the government's expense has recently received more attention as it has been advocated not only by the current presidential administration but by parental organizations as well. "Choice" policies, however are not without drawbacks as they would probably result in a massive transfer of wealth away from real property. Voucher/tax credit policies could also negatively affect the perception of fairness and equity in education.

A policy to transfer resources from the better-off educational districts to the disadvantaged districts by taxing the quality of public schools was discussed. It is proposed that such a policy would result in a more efficient allocation of public resources, as the public rather than property owners would be capitalizing on the quality of the schools. This policy would also increase the perception of fairness as resources would flow from the haves to the have-nots.

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**A Dialogue Among Users and Producers of CEX Microdata:
A Summary of the Workshop from the Producers' Viewpoint**

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The purpose of the workshop was to discuss with researchers their use of the Consumer Expenditure Survey public use tapes and their problems with the tapes. Possible solutions were outlined. The workshop included five economists who have used the Consumer Expenditure Survey public use tapes extensively in their research: Janet Wagner, University of Maryland, Pamela Norum, University of Missouri, Jeanne Hogarth, Cornell University, and Mark Lino, U.S. Department of Agriculture. Jane Kolodinsky, University of Vermont, was unable to attend but sent her remarks which Pam Norum presented.

The workshop was informative to the producers of the tapes in that it provided many ideas for improving the format and variables on the tapes. These comments can be summarized into three main categories: 1) changes we can investigate for implementation on the 1991 tapes, 2) changes that require further research by BLS and may take longer to implement, and 3) changes that would require questionnaire design or sample changes.

Possible 1991 changes

Offer the option of purchasing the data files as SAS datasets.
Preliminary feedback from our systems staff indicates that this format would actually be easier to produce than the current format. We will test this option during the production of the 1990 tapes. If this format is satisfactory, we will offer it as an option for the 1991 tapes.

Variable changes on the family file.
The "single parents with children under 18" category of the family composition variable could be separated into three groups—those with children under age 6, those with children ages 6 to 17, and those with children age 18 and over. This would match the breakdown of the "husband-wife with children" categories. The sex of the single parent can be determined by the sex of reference person variable.

We will investigate dividing the origin (ethnicity) variable into as much detail as the Census confidentiality rules permit. The same is true for reinstating more detailed occupation codes, as were on the 1980-81 tapes.

Changes that require research

Weighting. Discussions have begun concerning the development of longitudinal weights. These weights would account for consumer units being in the survey from one to four times.

Income. Currently, research is being undertaken that may lead to a procedure to impute missing income values. The definition of complete income reporters is also being analyzed.

Changes that require modification to the questionnaire and sample

BLS is currently investigating many ways to improve the accuracy of the expenditure reports, in particular, those that deal with recall issues. The goal is to shorten the questionnaire so that more time can be spent probing for accurate answers. Therefore the possibility of asking more questions is slight. The idea of a longitudinal sub-sample that covers more than five quarters is interesting, but faces funding problems. Letters to BLS that state your needs are encouraged and are considered during each revision of the survey instruments.

Patterns of Saving and Dissaving in Retirement Aged Households

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This paper explores retirees' patterns of saving and dissaving and the characteristics of savers and dissavers using the Social Security Administration's Retirement History Survey data. Five patterns are identified and the determinants of each pattern are explored.

Introduction

Demographic trends for the proportion of persons 65 and over, for labor force participation rates of persons 55 and over, and for life expectancies portend strains on both public and private resources supporting retirees. On average, assets generate about one-fifth of the income retirees receive. These assets, and the income they generate, are essential to the economic security of retirees in their ability to buffer retirement incomes against the effects of inflation. Savings and dissavings during retirement affect asset levels and the potential income from these assets. However, as dissavings has not been regarded as "income," its importance in the "income portfolio" is unknown.

The primary purpose of this research is to explore patterns of savings and dissavings among retirement aged households and the determinants of those patterns. In the process, characteristics of savers and dissavers will be identified. Specifically, this research will identify and describe patterns of savings and dissavings over a number of years among retirement aged households and explore determinants of these patterns.

Previous Work

The vast majority of retirees (93%) have some sort of financial assets (Sherman, 1985); 92% have a checking or savings account and over half (52%) report holdings in money markets or CDs. Smaller proportions hold securities (30%) and IRA/Keogh accounts (16%). Relatively few retirees (25%) hold any real assets beyond an owned home; 87% of retired couples are homeowners, with one-third of these still paying on a mortgage.

The asset portfolio of older households changes with age; as

households grow older, they seem to grow more conservative, shifting funds to low risk, highly liquid holdings (Hogarth, 1987). There is some evidence that households contemporaneously consider their entire portfolio as then liquidate, dissave and re-arrange assets.

Radner (1989) reported that net worth holdings of persons 55 and over shifted from other assets (primarily real estate and income properties) to home equity and financial assets. Over time within the same household, larger proportions of financial assets were held in savings accounts with decreases in nearly all other financial asset holdings (Hogarth, 1987).

The life cycle hypothesis of savings specifies a profile in which persons borrow in early stages of their lives, save in middle stages and dissave in later stages. Empirical evidence shows some support for this dissaving-at-retirement hypothesis, however the dissaving occurs at lower than expected rates. Davies (1981) found persons aged 65 to 85 dissaved at a rate of 2.9 to 3.7% per year, a rate significantly lower than the rate of 7 to 9% predicted by the life cycle hypothesis. Similarly, Mirer (1980) found a median dissavings rate of 1.2%, using the saving/wealth ratio as the dependent variable and cross sectional data.

Bernheim (1987) used Longitudinal Retirement History Study (LRHS) data to focus on bequeathable wealth; he determined that bequeathable wealth declined rapidly (3 to 4% per year) for single individuals. Among couples, wealth of early retirees declined slightly (1 to 2% per year) or remained fairly constant over retirement. He also found that a fairly stable proportion of wealth was held as owner-occupied housing. He concluded that retirement aged individuals and couples did not dissave any significant fraction of their total resources.

Using the same data, Hogarth (1988) found that nearly half of retirees (46%) had higher financial asset holdings 8 years into retirement. Although over half the sample had some dissavings, nearly one-fifth (18.5%)

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dissaved at rates faster than predicted by actuarial life expectancies.

In summary, empirical results provide somewhat weak support with regard to life cycle effects and existing models provide limited information on patterns of asset decumulation. While the life cycle hypothesis indicates that dissaving should occur during retirement, rather low levels of dissaving have been found in empirical studies. Few of the studies provide any information on patterns of saving and dissaving during retirement and/or information on determinants of such patterns.

Methodology

Data for this project come from all six waves (1969 to 1979) of the Longitudinal Retirement History Survey (LRHS). The LRHS surveyed nearly 10,000 households with heads aged 58 to 63 in 1969 and every other year over the next 10 years. The design of this study requires that households be in the study for at least 3 waves so that savings and dissavings patterns can be followed. Therefore, the first step in sample selection was to identify households in the 1973 survey and match backwards (to 1971 and 1969) as well as forwards (to 1975, 1977 and 1979). Results of this study are based only on households which survived to and remained in the 1973 wave.

To identify the determinants of the various savings patterns, the model posited is:

Saving Pattern = $f(\text{LCE}, Z, \text{Mar}, S)$
where LCE is a vector of life cycle and/or critical events in the life of the household, Z is a vector of socio-economic and demographic characteristics of the household, Mar is a vector of market factors which affect portfolio value apart from savings practices, and S is a vector of survivor/Mills ratios associated with the probability of surviving from one period to the next.

Variables

Constructing the Dependent Variables. Of interest in this study are the the survey-to-survey changes in the amount of total financial assets. Asset holdings were calculated by summing respondent and spousal asset holdings from: market value of house less outstanding mortgage; market value of farm less outstanding debts of farm; market value of business less outstanding debts of business; market value of other property less outstanding debts/mortgages on other property; value of US bonds held; value of stocks and bonds held; balances in

checking and savings accounts; value of annuities; value of loans and mortgages held; value of life insurance. The sum of these holdings was defined as the total financial asset variable (A). The difference between survey year t and $t+1$ was the gross measure of savings/dissavings. This gross measure was refined by netting out the proceeds from the sale of owned housing as needed:

$$\text{Save/Dissave} = (A_{t+1} - A_t) - \text{House(if sold)}$$

It is important to note that only 7% of homeowners in the RHS actually liquidated their housing assets (sold their homes and became renters) between 1971 and 1979.

Change was measured as the difference in real values of total financial assets from one survey to the next (i.e., from 1969 to 1971, 1971 to 1973, and so forth). The reference year for real dollar values was 1969; the CPI was used to adjust to real terms. Any change under \$100 or 0.5% was deemed to be no change. This procedure allows the tracking of real changes in financial assets. It is also possible to track the nominal changes in financial assets. This would be of interest if households operated under "money illusion," but the real value of assets in terms of preservation of purchasing power is perhaps more relevant to retirees.

After assessing the series of changes in financial assets, a set of mutually exclusive saving patterns was developed as the set of dependent variables.

Independent Variables. Variables in the life cycle and/or critical events vector are onset of retirement, change in marital status (including death of a spouse), death of respondent during the survey period (the spouse remained in the survey), and migration as measured by change in home ownership.

Variables in the vector of socio-economic and demographic variables are household size and number of children at various points in the surveys, education of respondent and spouse, health, sex, and real income in various years. The combination of age, sex, and health variables acted as proxies for life expectancy. Health was measured subjectively as health compared to others.

Household income was measured as the sum of money received from social security benefits, pensions, workman's

compensation, unemployment benefits, public assistance, earnings, rental property, interest and dividends, and business and/or farm income. Previous experience with this set of variables indicates that some missing and non-response values could be appropriately coded as zeros, while others were estimated using a set of predictor variables in a Heckman procedure.

Market-related variables were included to control for changes in portfolio values not due to savings practices. Year of retirement and net real values of assets in various years proxied some of the macro-economic events which could have affected savings/dissavings patterns.

A vector of survivor variables was added to the model. The probability of remaining in the survey from one period to the next was estimated and these probabilities were included in the model to control for sample attrition.

Results of Multi-Variate Analysis

There were no households who experienced no change in assets, nor any who experienced continuous savings nor continuous dissavings. Two-fifths of the households had combinations of savings and level periods and one-fourth had a local maximum (Table 1). One out of six households had a local minimum, and another one out of 12 had a pattern of alternating saving and dissaving. Finally, one out of 25 households had a pattern which combined dissaving and level periods.

Table 1
Savings and Dissaving Patterns.

	% of Households with Pattern
1. Alternating Saving & Dissaving	8.5%
2. Local Maximum	26.9
3. Local Minimum	17.0
4. Some Saving & Some Level Periods	43.5
5. Some Dissaving & Some Level Periods	4.2

The objective of this project was to find the set of determinants which best fit each pattern of saving/dissaving. Although measures of various household characteristics across all survey years were included in the original models, variables from the early survey years (1969 through 1975) proved to be the best performing. Each pattern was modeled separately with a 0-1 dependent variable, which can be roughly interpreted as the probability of having each pattern.

The OLS specification was chosen over a probit specification for ease in interpreting the coefficients.

In general, life cycle, socio-economic, market related and survivorship variables all were determinants of the savings patterns exhibited by households (see Table 2), although different sets of determinants emerged among the different patterns.

Alternating Periods of Saving and Dissaving. Among the life cycle variables, persons who experienced a change in marital status were more likely to have this pattern, which makes some sense. Becoming widowed may mean that insurance policies are paid out and savings may increase or that some sources of income are lost (e.g. pensions) and savings must be tapped to replace some income. Divorce also changes asset holdings, depending on the division of the estate. Persons who owned their home in 1973 were less likely to have this pattern. This may be reflective of the shifting of assets from real assets to financial assets with the sale of the house. However, there was no support for the homeownership variables in other years.

The probability of having this pattern was affected by having higher incomes in 1971 and higher net real asset holdings in 1971, representing socio-economic and market-related variables. It is interesting that income and assets from the same year achieved significance while income and assets from other years were not significant.

This pattern may reflect household responses to more macro variables, such as inflation rates, changes in Social Security policies, rising energy prices, and the like. Rising energy prices led to double digit inflation in 1974 (11.4%) and again in 1979 (11.5%). These periods of high inflation may have resulted in persons needing to dip into savings to maintain their level of living. At the same time, Social Security retirement benefits were made available to people at an earlier age (62) and thus some households may have found themselves "better off" and able to save over some years. In the future, it would be of interest to know if the periods of saving and dissaving lag or lead macro economic changes and how they related to people's expectations about the immediate past and foreseeable future.

Local Maximum. The local maximum pattern is one in which household save for some consecutive periods and then maintain asset levels or dissave for

Table 2
OLS Regression Coefficients on Savings Patterns
(t values in parens)

	Alternating Saving & Dissaving	Local Maximum	Local Minimum	Some Save Some Level	Some Dissave Some Level
Intercept	10.231 (1.38)	37.772 (3.31)	5.940 (1.10)	-.227 (.03)	2.909 (.71)
<u>Life Cycle Variables</u>					
Ret. Age	.003 (.65)	-.022 (2.65)	-.003 (.84)	.001 (.34)	-.002 (.90)
Change in Marital Status 1969-71	.013 (.36)	-.084 (1.47)	.081 (3.03)	.061 (1.84)	.000 (.01)
Change in Marital Status 1971-73	.060 (1.85)	-.007 (.14)	.002 (.10)	.048 (1.67)	.002 (.16)
Death (during survey period, 1969-1979)	.037 (1.52)	.014 (.37)	-.013 (.72)	.005 (.23)	.017 (1.26)
Own home, 1969	.055 (.74)	-.115 (1.00)	.055 (1.01)	-.049 (.74)	-.019 (.47)
Own home, 1973	-.108 (1.75)	.155 (1.62)	-.099 (2.20)	.066 (1.20)	.031 (.92)
<u>Socio Economic Variables</u>					
Household size, 1969	.000 (.04)	-.016 (1.14)	.011 (1.65)	.020 (2.42)	.004 (.81)
Household size, 1973	.001 (.13)	.000 (.01)	.001 (.14)	.001 (.08)	-.008 (1.35)
Number of children, 1969	-.004 (.62)	.025 (2.12)	-.003 (.63)	-.004 (.63)	-.002 (.67)
Number of children, 1973	.005 (.87)	-.016 (1.67)	.002 (.48)	-.002 (.41)	.001 (.55)
Resp. Educ.	-.000 (.22)	.007 (1.40)	.001 (.05)	-.004 (1.46)	.002 (1.35)
Spouse Educ.	.004 (1.22)	-.009 (1.58)	.002 (.72)	.004 (1.19)	-.002 (1.18)
Health in 1969 (compared to others)	.015 (.67)	-.027 (.79)	.005 (.34)	-.008 (.44)	.009 (.76)
Respondents Sex (1=male, 2=female)	-.008 (.34)	.006 (.18)	.001 (.06)	-.040 (1.80)	.000 (.02)
Income, 1969 (10,000s)	-.001 (.39)	.012 (.42)	.016 (1.23)	-.000 (.04)	.016 (1.59)
Income, 1971 (real, 10,000)	.031 (1.69)	-.036 (1.28)	-.000 (.23)	-.000 (.25)	-.025 (2.52)
Income 1973 (real, 10,000)	-.020 (1.48)	.025 (1.19)	-.011 (1.19)	.011 (.95)	.000 (.06)
<u>Market-related Variables</u>					
Year of retirement	-.005 (1.43)	-.018 (3.19)	-.002 (1.07)	.000 (.01)	-.001 (.68)
Net real assets, 1969 (10000)	-.000 (.15)	-.026 (5.58)	.016 (7.55)	-.000 (1.39)	.022 (13.12)
Net Real Assets, 1971 (10000)	.005 (1.95)	.015 (3.47)	-.011 (5.50)	-.000 (1.36)	-.012 (7.42)
Net Real Assets, 1973 (10000)	-.002 (.29)	-.018 (1.80)	.000 (.46)	.022 (3.88)	-.000 (1.31)
<u>Suvivorship</u>					
Prob. Alive in 1975	.002 (.10)	.046 (1.36)	.046 (2.93)	.045 (2.34)	.024 (2.06)
R ²	.03	.06	.08	.06	.17
F value	1.62	3.33	4.28	3.00	9.73
Prob (F)	.03	.00	.00	.00	.00

the remaining periods. Retiring at an older age was associated with a reduced probability of having the local maximum pattern. This is as might be expected, since persons retiring later may have saved up more during their working years and begin spending down sooner. Owning a home in 1973 increased the probability of having a local maximum pattern. This might be expected if the sale of the home were associated with an inflection point.

A larger number of children in 1969 was associated with an increased probability of having a local maximum pattern, while a larger number of children in 1973 was associated with a lower probability of having a local maximum pattern. This may be a reflection of loans, subsidies, and gifts made to children as part of estate planning.

Retiring later over the 10 year survey period was associated with a decreased probability of having a local maximum pattern. As with the alternating pattern discussed above, this may be due, in part, to the cumulative effects of inflation over the period from 1969 to 1979, where the purchasing power of the dollar decreased by nearly one-half (using 1969 as 100, the CPI in 1979 was 198).

Higher real values of assets in 1969 and 1973 were associated with a decreased probability of having a local maximum pattern, while higher levels of assets in 1971 was associated with an increased probability of having a local maximum. Again, market factors may be at work here, resulting in people shifting from a savings to a dissavings mode in the face of higher-than-planned-for rates of inflation.

Local Minimum. With the local minimum pattern, households dissave over some consecutive surveys and then begin to level off or begin to save over the remaining periods. Experiencing a change in marital status between 1969 and 1971 was associated with an increased probability of having a local minimum pattern. In the case of widowhood, this change in marital status may mean that medical bills must be paid and/or some sources of income are lost (e.g., pensions) and savings must be tapped to replace some income before insurance policies are paid out and savings increases. Owning a home in 1973 is associated with a reduced probability of having a local minimum. This seems somewhat counter intuitive, since the longer one holds on to a non-earning asset, the more one would have to draw down other financial assets,

thus increasing the probability of having a local minimum.

Larger household sizes in 1969 were associated with increased probabilities of having a local minimum. This is somewhat as expected, since larger households require higher levels of resources to keep them running, which in turn may indicate a need to draw down assets early in retirement.

Higher levels of net real assets in 1969 were associated with an increased probability of having a local minimum pattern, while higher levels of assets in 1971 were associated with a decreased probability of having the same pattern. It is possible that some households implement a dissaving plan early on, but then realize that they cannot continue dissaving at current rates and expect their assets to sustain them throughout their expected lifetimes, especially in the face of higher inflation rates. Thus, these households shift from a dissavings to a maintenance or increased savings plan.

Some Saving and Some Level Periods. This pattern is characterized by some periods (not necessarily consecutive) of savings and some periods of no changes in assets. There are no periods representing any dissavings in this model (contrary to the life cycle hypothesis) and that the majority of the respondents (43.5 percent) fall into this pattern. A change in marital status between 1969 and 1971 or between 1971 and 1973 was associated with an increased probability of having this pattern. In part, this may be a reflection of access to insurance resources available to widowed persons.

The larger the household size in 1969, the greater the probability of having this pattern. It may be that larger households have more workers and thus more earners and/or more retirement benefits resulting in higher incomes and less need to dissave. Also, there may be some economies of scale in larger households which permit lower per capita expenditures and reduced need to dissave. Being a female respondent reduced the probability of having this pattern. Since the only female respondents were either not married in 1969 or the widows of male respondents, this finding is as expected. Older females tend to have lower levels of income and assets and thus may be more likely to have a pattern with some periods of dissaving.

Higher net real assets in 1973 were associated with an increased

probability of having this pattern. Higher levels of resources mid-way through the survey may be a reflection of careful asset management (especially in the face of inflation) and thus consistent with some saving and some level periods.

Increased probability of surviving to 1975 was associated with an increased probability of having this pattern. In part, it may be that surviving to 1975 is a reflection of good health and lower health care costs (with no need for dissaving). It may also be that persons who "made it" to 1975 also re-assess their life expectancies and adopt a set of savings and expenditure behaviors consistent with longer life expectancies; that is, they continue to save as a precaution against longevity and future health care costs.

Some Dissaving and Some Level Periods. This pattern is characterized by some periods (not necessarily consecutive) of dissavings and some periods of no changes in assets. There are no periods representing any savings in this model (contrary to the previous pattern) and that the smallest proportion of the respondents (4.2 percent) fall into this pattern. An increase in income in 1971 was associated with a decreased probability of having this pattern. This is as expected, since higher income levels might mean less need to dissave or draw down assets.

Higher levels of assets in 1969 were associated with an increased probability of having this pattern, while higher levels of assets in 1971 were associated with a decreased probability of having this pattern. The finding with respect to 1969 assets is consistent with the life cycle hypothesis; that is, households save up during working years in order to spend down in retirement. Thus, one might expect households with higher levels of assets to be able to afford to draw down assets and have some periods of dissaving during retirement. The result with respect to 1971 assets may be more a result of precautionary moves of households as they consider inflation, employment rates, and other market factors.

Increased probability of surviving to 1975 was associated with an increased probability of having this pattern. In part, this may be a reflection of living long enough to have time to spend down some assets.

Conclusions and Implications

The data present some mixed messages about households' savings behaviors. For example, in some cases household size seems to be associated with economies of scale and higher levels of resources (i.e., more persons bringing income to the household), but also a need for higher levels of resources to maintain their level of living. Also, while nearly three-fifths of the households exhibited some behaviors in support of the life cycle hypothesis of dissaving during retirement, other households (43 percent) continued saving, perhaps as a precaution against longevity and future health care costs, desires to leave a bequest, or persistence of habit.

It is likely that there are cohort effects operating with this sample. Dissaving behaviors of other generations of retirees may be very different from this group, who may be influenced by their experiences of the 1930's Depression. For example, the effects of a change in marital status, primarily becoming widowed, may have been mitigated somewhat by legislation providing for survivors' benefits from most pensions. It may be desirable to extend the requirement of the provision of survivors benefits to all retirement plans and systems, including state-run pension funds.

There is a need to know more about the behaviors of the "older-old" population (persons 75 and over). For example, health variables were not significant in this study, consistent with the expectation that the "younger-old" are healthier. It is necessary to learn more about older retirees to determine if changes in Medicare/Medicaid and other health policies are warranted.

Some consideration needs to be given to how owner occupied houses can be used as an asset. Policies which facilitate the availability of reverse annuity mortgages (such as the current Housing and Urban Development pilot projects) should be explored. Similarly, an examination of the limited capital gains exclusion for households aged 55 and over may be worthwhile, given current real estate values in some sections of the country.

Educational efforts via the Cooperative Extension System should be made to help households understand subjective probabilities, realistically estimate longevity, and plan their retirement savings program accordingly. Furthermore, efforts to help retired households plan an appropriate dissavings program are needed.

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The Consumer Expenditure Survey: A Commentary

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The Consumer Expenditure Survey (CEX) of the Bureau of Labor Statistics (BLS) is one of the richest national household economic surveys available to researchers today. It contains a wealth of information on household characteristics, income, and particularly, expenditures. Although the CEX has many merits, there are issues regarding the data that BLS may want to consider and data users may want to keep in mind.

The CEX has two parts, an interview component and a diary component. The interview component covers overall expenditures, whereas the diary component primarily covers food and small item purchases. Expenditure data from the interview portion of the CEX are collected from approximately 5,000 consumer units each quarter over five consecutive quarters. Since the first interview is used for bounding purposes, expenditure data available per consumer unit are actually for four quarters. The sample is rotating so approximately one-fifth of consumer units interviewed are replaced by new units each quarter. Each quarter is deemed an independent sample by BLS bringing the total sample for a year to 20,000 consumer units for estimating aggregate expenditures.

To obtain annual expenditure estimates for consumer units, a researcher can employ one of two methods. Quarterly expenditures can be multiplied by four or households that participated in the survey for all four quarters could be selected and their expenses totalled. Researchers would find it helpful if BLS evaluated these methods and recommended which would be suitable for descriptive and multivariate analysis.

Lower income households are a segment of the population that deserves particular research attention. Data on these households from the CEX may contain severe underreporting of income or overreporting of expenditures. In 1989, the lowest income quintile of consumer units reported total expenditures of \$12,119 and annual

before-tax income of \$5,720, indicating they spent over twice their annual income. BLS is currently examining this potential problem with lower income consumer units in the CEX. Until BLS makes specific recommendations, CEX users should apply findings for low income households with caution.

In the CEX, one household member reports on overall family expenditures. This reporting method may produce accurate results for expenditures paid by that member. However, reports for purchases made by other family members, particularly children, may be less accurate. Many parents may not be aware of how their teenage children spend allowance money or earnings. Data users should be aware of this when analyzing CEX data on expenditures typically made by someone other than the person reporting expenses.

CEX asset and debt data for consumer units differ from Survey of Consumer Finance asset and debt data (Federal Reserve Board). This information is gathered in a few overall global questions on the CEX. BLS needs to examine their data on assets and debts, and perhaps extend their questions on these variables.

Lastly, although cross-sectional data are appropriate for many research questions, other questions require longitudinal data. For example, how does the economic status of households change due to family composition changes such as divorce or the birth of a baby? To help answer such questions, BLS may wish to consider installing a longitudinal subcomponent to the CEX. A group of households interviewed in a year could be tracked over a multi-year period. Such a longitudinal component, combined with the cross-sectional component, would allow researchers to answer many more questions with the CEX.

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A Dialogue Among Users and Producers of CEX Microdata

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I have had the opportunity to work with the Consumer Expenditure Survey on two occasions. The first was for a project completed while I was a doctoral student at Cornell. The research was titled "Female Labor Force Participation and Expenditures on Food Away from Home" (Kolodinsky 1987). It utilized the 1980 diary portion of the CEX. The second, and more major use of CEX data was for a project supported by the Andrus Foundation, "Effects of Prices, Income, and Labor Force Participation on Expenditure Patterns of the Aged" (Kolodinsky and Walsh 1990). A portion of this project has been presented at these ACCI meetings as "Estimating Price effects in the Absence of Price Data: A Comparison of Elderly and Non-Elderly Households" (Kolodinsky and Walsh 1991). This research utilized the interview portion of the 1986 CEX and included use of the individual, family, and MTab files.

The following outlines a list of pros and cons of using the survey based on my experience.

PROS

1. Relative ease of using the survey if only one file at a time is necessary;
2. Relative completeness of variables necessary to compute a wage rate for individuals; and
3. Variety of expenditure categories for which data is available.

CONS

1. Incompleteness of income reporting;
2. Lack of continuity in the family composition variable;
3. Inability to isolate price effects; and,
4. Lack of regionality for the rural sample.

When I first chose the CEX for a project while in graduate school, I was impressed and relieved at the relative ease with which the data could be accessed and utilized. It was easy to become acquainted with the data. The codebook was also straightforward. When only one file is required, use of the survey entails reading the data and pulling off the variables needed. I

would recommend the survey to novice researchers as in introduction to large scale, cross-section data sets.

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For consumer economists who use the household production approach in their work, the CEX contains all variables necessary to compute a wage rate, or price of time, for those who work. It also contains variables associated with household productivity. This means that one is also able to estimate a reservation wage for persons not employed in the labor market when such a variable is necessary. Unfortunately, this pro of the data set is only as good as the con of incomplete income reporting.

The last pro concerns the number of expenditure categories. A researcher is able to examine expenditures on aggregate expenditure categories, such as food at home, as well as disaggregate categories including such items as bakery items and the like. One can either build an aggregate category for the several individual items for which data is available or use categories already aggregated before the data is released.

A problem that arises time and time again, and is discussed at all of the sessions I have ever attended about the CEX at ACCI conferences in the past, is incomplete income reporting. For many respondents, income information simply isn't available. And, for many others, even a complete income reporter may have incomplete income reporting in total, given the definition of complete income reporter by the Bureau of Labor Statistics². When using a household production approach, where the price of time is separated from non-wage income, incomplete "complete income reporters" may be included. Results of estimation using such respondents may be biased since either wage or non-wage income sources may not be reported for some persons. A common way to deal with this problem, and the manner in which we handled it in our research using an elderly sample, was to utilize total expenditures as a proxy variable for total income during a period. Our rationale was three fold: first, this approach takes care of discrepancies between reported income and spending. Second, income reported in a given year may be an inaccurate representation of

²A complete income reporter is one who has provided values for at least one of the major sources of income, such as wages and salaries, self-employment income, and social security income (U.S. Department of Labor 1987, p.7).

income over time. Thus, total expenditures may be a better indicator of permanent income. This has implications for estimated consumption coefficients. Though not a perfect solution, there is some justification for using total expenditure.

We were interested in various family types in our research: single and two adult households, as well as the presence of younger and older children in a household. These factors are important when one uses the household production approach as adult time may be substitutes or complements for one another, and the presence of younger or older children should have an impact on household productivity. We found, however, that reports of the presence of children of different ages was not comparable for single versus two adult households. The question in the family file (Consumer Unit Characteristics and Income) indicating family type is coded as follows:

1. husband and wife only;
2. H/W, own children only, oldest child under 6;
3. H/W, own children only, oldest child >5, <=17;
4. H/W, own children only, oldest child >17;
5. All other H/W families;
6. One parent, male, own children, at least one age < 18;
7. One parent, female, own children, at least one age < 18;
8. single consumers; and,
9. other families.

As we separated single and two adult households groups, we were unable to include comparable variables for children when we corrected for the sample selection bias that would occur if we included persons without a wage rate in our estimation of labor supply of the elderly.

A third problem with the data set, and another one which has been brought up repeatedly in sessions such as this one, is the inability to isolate prices from total expenditures on individual items. This problem was the impetus to our research in the project, "Effects of Prices, INcome, and Labor Force Participation on Expenditure Patterns of the Aged." However, the approach we took imposed many restrictions, including the assumption of additivity of a consumers utility function, and is only viable when one considers broad aggregates of commodities, as all goods are normal and substitutes for one another. The price effects are calculated and are not driven directly by the data. If there are biases in

estimates obtained along the way to calculating price effects (including estimation reduced form labor supply functions, obtaining structural coefficients of the labor supply function, and estimation of expenditure functions), then the reliability and validity of the price effects obtained are questionable. Still, given the limitation of the data as far as prices paid are concerned, these price estimates are the best we can do at the present time.

Finally, if a respondent resides in an urban area, region of residence is reported. However, if a respondent resides in a rural area, no such region is given. Thus, one is able to include urban/rural dummy variables in estimation, or can use region only for the urban sample. It is understood that given the size of the rural sample, region can not be reported to conserve confidentiality. However, for our purposes, especially in future work, urban/rural, and region will become increasingly important. At the University of Vermont, College of Agriculture, we are taking on a mission in the 1990s to look at rural economic development. Use of large scale data sets such as the CEX lose some of their usefulness when one can not account for both region and urban/rural status.

Because the CEX has such abundant data about expenditures and economic and socio-demographic variables useful to consumer economists, I believe researchers tend to overlook some of the downsides of the CEX. We manage with what we have because there is nothing better. Results of reserach using the CEX tend to be quite robust in many instances. Being aware of potential problems is one way of overcoming any limitations of the data.

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