4. Facts about trends developing in the consumer movement.

The Survey Method

Questionnaires and covering letters were sent to 483 individuals listed as "consumer editor" in the Working Press of the Nation, 1977 Edition, Newspaper Directory. A three-week deadline for responses was established.

While 160 questionnaires were returned, 135 served in our analysis (the balance being either incomplete or received after the deadline). By most research standards, the rate of return was unusually high.

Conclusions and Interpretations

The respondent profile comprised 135 respondents, ten of whom listed consumer writing as their only responsibility. One hundred twenty-five described such work as an adjunct to other duties--ranging from "lifestyle" editor and general assignment reporter to editor-in-chief. (While all respondents were directory-listed as "consumer editor," it is obvious that newspaper size has a direct bearing on scope of responsibilities.) Sixty-one respondents reported having regularly scheduled "consumer" columns. Seventy-four of the respondents answered "yes" to the question, "Do you consider yourself an advocate?" Sixty-one replied "no." This aspect of the profile came as a surprise. With a clear majority embracing advocacy, it would appear that (at least in consumer writing) the trend may be away from the classic role of journalistic objectivity.

Of seven agencies rated by respondents, these three were viewed most favorably: Consumer Product Safety Commission, Food and Drug Administration, Environmental Protection Agency. Each was called "effective in protecting consumer interests." The following three agencies were rated less favorably: U.S. Department of Agriculture, Federal Trade Commission, Occupational Safety and Health Administration. Here, however, it should be noted that a significant number of respondents (from 19% to 21%) did not know enough about the agencies to form an opinion. One of the seven agencies--Federal Energy Administration--received a decidedly negative rating from a majority of respondents.

A consensus was noted on five issues. The first of these issues related to private insurance companies. 73% of respondents agreed that the industry does not provide adequate coverage at reasonable rates to everyone. Consensus was strong on the energy question, too. Here, 89% of the responding journalists expressed belief in the reality of an energy crisis facing the nation. This question provoked the greatest consensus of any in the survey. A clear majority, 69% appears to view consumer irresponsibility as a factor contributing to rising product costs. At the same time, there

was consensus regarding the value of consumer boycotts as a means of redressing grievances--with 66% of respondents rejecting the notion that such boycotts are ineffective. 61% of the respondents agreed that advertising was an ineffective aid to consumers making wise buying decisions. (Disenchantment with advertising is underscored later in the study--ranked last as a credible source of information.) As to the future of organized consumer groups. the forecast was negative. 62% of responding journalists felt that there would be no growth in membership over the next twelve months.

Specific issues elicited a divided response. The first of such splits in opinion came when respondents were asked if consumers would support a ban on disposable containers, even if this should result in higher product cost. 46% agreed, 43% disagreed, 11% were neutral. On the question of solar heating systems' economic feasibility, 52% said yes, 38% disagreed. The split on the values of mandated national health insurance involved 36% favoring such a program, 45% opposed and 19% neutral. There was mixed reaction to the question of a cabinet level consumer agency being formed to provide consumer representation in government. 38% in favor of such an agency, 45% opposed. On the question of consumers' accessibility to information, 48% indicated satisfaction with the current situation and 48% looked for improvement.

The consumer journalists consistently identified themselves and consumer publications as the most reliable sources of information. By contrast, consumer leaders and educators, along with government publications, were rated as mediocre to poor...as were product user manuals and labels. Advertising was dismissed as a source of reliable consumer information.

We had asked survey respondents to indicate the subjects they had featured in recent months. The resulting list was compiled, using frequency-of-mention to establish rank:

1. Energy issues.
2. Government regulations.
3. Money management.
4. Conservation-environment.
5. Credit complaints.
6. New products.
7. Insurance complaints.
8. Consumer movements.

We had designed an open-ended question to determine what consumer-story subjects generate the greatest volume of reader response (letters or phone calls).

Listed below are the subjects with number of responses for each.

Energy issues...38
Government regulations...30
Inflation...23
Repair rip-offs...19

Money management...18
Deceptive business practices...17
Environment-conservation...16
Credit complaints...9
Health-care costs...9
New product information...8
Product complaints...7

Summary

In summary, responses from 28% of the 483 individuals listed as "consumer editor" in the Working Press of the Nation were the subjects of this survey.

Although the return rate is considered to be unusually high, one must caution against overgeneralization of the results. Respondents indicated their amount of confidence in federal agencies, concerns about several pertinent consumer-related issues, credibility of consumer information sources, and the consumer topics being covered in newspapers.

PRELIMINARY RESULTS FROM A STUDY OF THE ECONOMIC EFFECTS OF THE PROPOSED FLAMMABILITY STANDARD FOR UPHOLSTERED FURNITURE

Dr. Sylvia Lane and Ms. Leona Kocher*

Cost-benefit analysis of standards for durable goods presents special difficulties. The model here offered was used to estimate the maximum benefits of a proposed furniture flammability standard, the pattern of benefit and cost accumulation over time, and the period required to achieve given levels of benefit. Available data were used to estimate future demand, stock, and dollar cost as these would affect both cumulated costs and cumulated benefits of the standard.

The Consumer Product Safety Commission is considering an upholstered furniture (cigarette ignition) flammability standard. The objectives of the present study are twofold: (1) to develop a theoretical framework for determining the benefits and costs, to consumers, from flammability standards for upholstered furniture over time, and (2) to develop a model for estimation of the effects from an upholstered furniture flammability standard which can be used to estimate the maximum potential benefits of the standard the pattern of benefit and cost accumulation over time as it relates to future consumption of upholstered furniture, and the length of time necessary to achieve various levels of loss reduction (benefits) from the standard.

The Model

Costs

In this analysis, the emphasis is on costs to consumers of an upholstered furniture flammability standard. Compensating variation is the best choice for estimating costs, theoretically, because it evaluates changes in consumer welfare. It has been used as the measure of cost due to its relationship to utility and is defined as the amount that would be needed to compensate a consumer to keep that consumer on the same (original) utility level after a price increase in the product concerned. It is assumed the consumer's utility function does not include a flammability safety argument. This is justified by indications that nonflammability historically has not been a marketable characteristic for furniture items.[1] In this study compensating variation (CV) was approximated by looking at the change in consumers' surplus (CS). CS is estimated from ordinary demand, as indicated in Figure 1.

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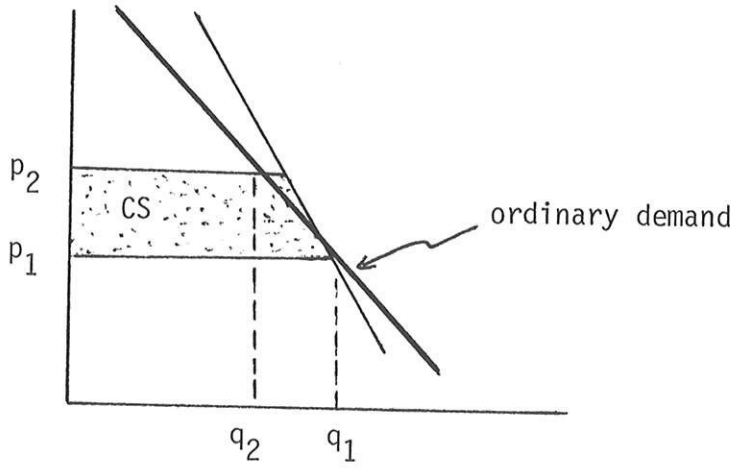


FIGURE 1. Reduction in Consumer's Surplus from a Price Increase of p_1 to p_2

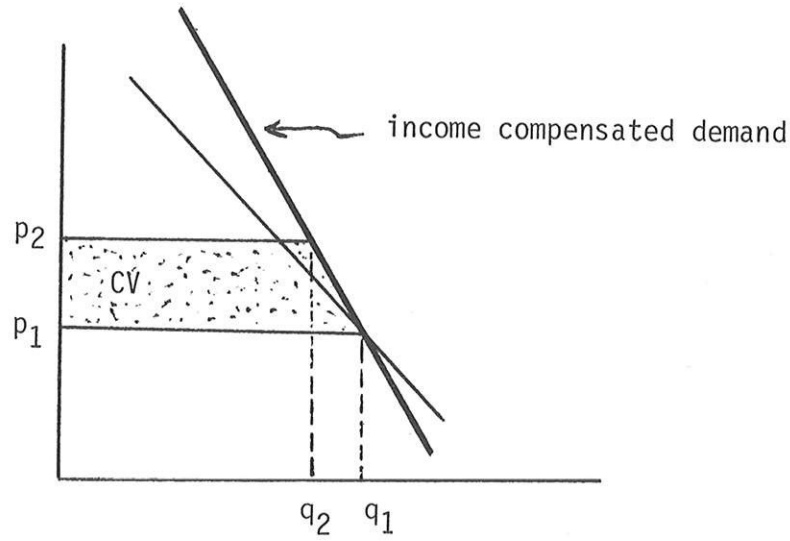


FIGURE 2. Compensating Variation for a Price Increase of p_1 to p_2

Figure 2 shows the compensating variation (CV). There is an "error" involved when CS is used instead of CV; its approximate magnitude is determinable. Another measure of cost used, for purposes of comparison, was actual dollar cost (ADC). By definition, this is the difference between dollar value of upholstered furniture purchases with and without the standard. It is represented by the difference between areas A and B in Figure 3. This does not take into account any changes in consumer welfare due to the price increase. The direct costs used to determine the amount of the price increase (as a percentage) were the increased manufacturing costs resulting from this standard, record keeping and testing costs, plus material treatment costs.

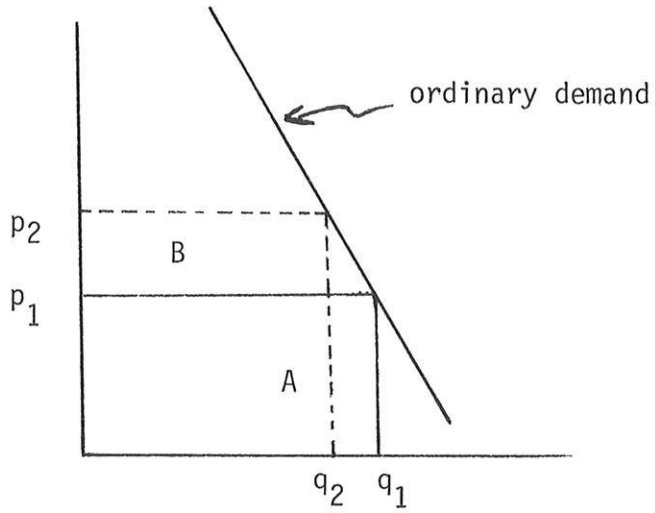


FIGURE 3. Actual Dollar Cost, ADC = A-B = $p_1q_1 - p_2q_2$

(Assuming increases in manufacturing costs are passed through to consumers.)

Benefits

In general, benefits to consumers from such a standard are derived from avoiding deaths, injuries, and property losses that would have otherwise resulted from upholstered furniture fires. Total benefits then would be the sum of the total value of deaths avoided plus the total costs of injuries avoided plus the total cost of property loss avoided:

$$TB = TDA + TIA + TPLA$$

Benefits from this standard will result from use of upholstered furniture which meets the flammability standard, post-standard upholstered furniture. Benefits then are a function of the amount of post-standard stock of upholstered furniture being used. The proportion of total benefits achieved in any one time period t (year) after institution of the standard was assumed to be the same as the proportion of post-standard stock in use:

$$\text{benefits in } t = m_t \, (TB)$$

where $m_t = \dfrac{\text{post-standard stock in use in t.}}{\text{total stock in use in t}}$

Time Profile of Effectiveness

Benefits in any one year (or time period) result from purchases of post-standard upholstered furniture in previous time periods

plus current purchases. Total cost of the standard in any one time period n, after the standard is promulgated, is the sum of the compensating variations up through that period; that is

$$TC_{T+n} = CV_T + CV_{T+1} + CV_{T+2} + \ldots + CV_{T+n},$$

where

CV_T is the compensating variation for the first year the standard is in effect. Net costs in any one time period, the nth period, are defined as the sum of the compensating variations for the periods preceding and including period n minus the proportion of total benefits that could be achieved in period n,

$$NC_n = [CV_T + \ldots + CV_{T+n} - m_n](TB).$$

Empirical Components of the Model

The basis of this preliminary analysis of costs of the proposed standard was the demand function for upholstered furniture. The demand function used was the Garcia dos Santos extension of the Stone-Rose model for durable goods demand.[2] This model expresses equilibrium purchases, q_t, as a linear function of prices, income, and a random disturbance, u_t:

$$q_t = B_0 + B_1 P_t + B_2 Y_t + u_t$$

where P_t is observed relative price and Y_t is observed real income both in time period t. The subsequent estimating equation, which contains components for depreciation and adjustment to equilibrium purchases, was

$$X_t = A_0 + A_1 Z_{1t} + A_2 Z_{2t} + A_3 X_{t-1} + E_t$$

where X_t was the per capita observed purchases of upholstered furniture in time period t,

Z_{1t} was a transformed observed relative price variable, Ψp_t, for time t,

Z_{2t} was a transformed observed real income variable, Ψy_t, for time t, and

E_t was an autocorrelated error term.[3]

Estimation of this demand function then resulted in (1) determination of a depreciation rate for upholstered furniture, and (2) information that could be used to predict per capita consumption of upholstered furniture for the time period following institution of the standard.

Compensating variation was approximated from ordinary demand consumers' surplus using market quantity and market price and price

elasticity of demand. The change in consumers' surplus, the cost of the standard, is given by

$$CS = (p)\ (q)\ \ w - 1/2\ n\ w^2$$

where p = price, q = quantity, w = percentage change in price, and n = price elasticity of demand.

Data Used

Demand Function: (1947-1976)

Upholstered furniture consumption was defined as per capita personal consumption expenditures for upholstered furniture in 1972 dollars. This was the consumption of all upholstered furniture including dual purpose furniture. The relative price variable, in 1972 dollars, was the ratio of the implicit price deflator for personal consumption expenditures for upholstered furniture divided by the implicit deflator for total personal consumption expenditures. The real income variable, in 1972 dollars, was per capita total personal consumption expenditures. The data for all of these came from the National Income and Product Accounts with additional information from the Department of Commerce. Population was the total population of United States including the Armed Forces overseas as provided by the U.S. Bureau of the Census.

Predicted Demand: (1977-2005)

The 1955-1976 trend for relative price was used to the year 1985 and then it was assumed there was no further change. Predicted real income was assumed to grow at a rate of 3.94 percent to 1980 and then at a rate of 3.64 percent through 1985 and beyond. These rates of growth agree with the Bureau of Labor Statistics' Basic Policy projections to 1985 after recovery from the 1974-75 recession. They are fairly optimistic, and it may well be that growth will take place at a slower rate.

Upholstered Furniture Stock Estimation

Quantities of U.S. upholstered furniture production for certain years is available from the Census of Manufacturers. Using these quantities, adjusting for exports, and using the proportion allocated to personal consumption expenditures, as suggested by the Department of Commerce, quantities for consumption were estimated for 1954, 1958, 1963, 1967, and 1972. Personal consumption expenditures for upholstered furniture for the same years were divided by these quantities to yield an average expenditure per piece. Quantities for the intervening years are interpolations. For the prediction period, quantities were estimated using the predicted personal consumption expenditures for upholstered furniture and the 1972 average expenditure per piece, $147.9 in 1972 dollars. Estimation of the stock of upholstered furniture in use in the U.S. was made using quantity information derived

from the prediction period and the earlier demand period. The yearly quantity sold (consumed) was used in conjunction with survival coefficients for a 25 year life.

Estimation

Demand for Upholstered Furniture, 1947-1976

The demand function was estimated using generalized least-squares since the error term was autocorrelated. Garcia dos Santos found satisfactory results could be obtained using an interative process where a numerical value of n is chosen to yield generalized least-squares estimates of equation coefficients. By choosing various values of n, the maximum likelihood estimations of n and the parameters were determined; n, then, determined the depreciation rate.

Generalized least-squares estimation produced the following coefficients for the estimating equation:

Intercept, $A_0 = 1.45$ (0.79)

Relative Price, $A_1 = -0.64$ (0.59)

Real Income, $A_2 = 0.78$ (0.22)

Lagged Purchases, $A_3 = 0.72$ (0.08)

$R^2 = .97$.

The numbers in parentheses are standard errors for the coefficients.[4] Signs of all coefficients were as expected. Transforming the estimating coefficients (A) yielded the coefficients (B's) for the long run demand equation:

$$q_t = 5.27 - 2.32\ p_t + 2.85\ Y_t.$$

The corresponding long run upholstered furniture consumption elasticities were -.211 for relative price and .673 for real income.

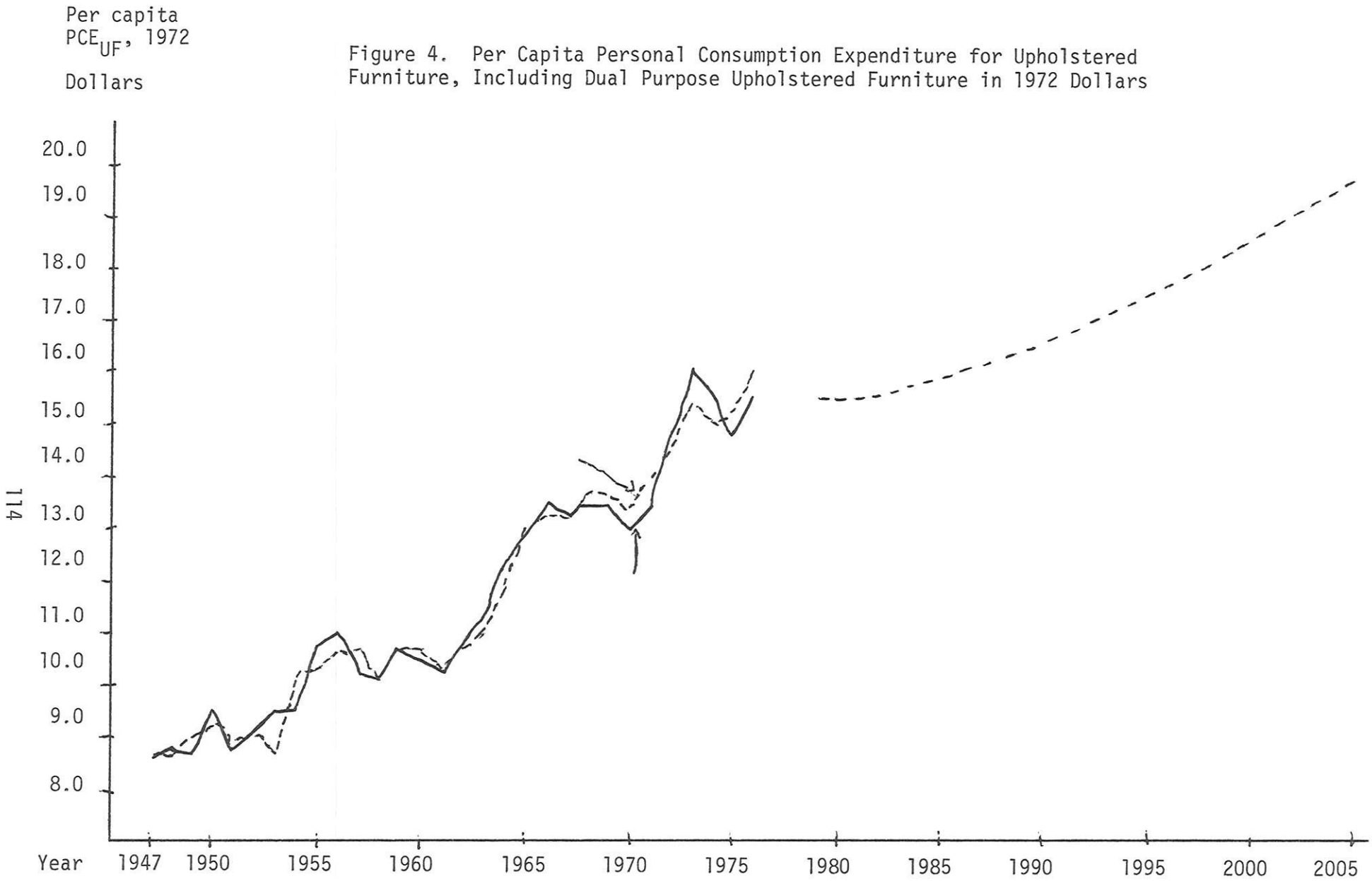
Projection of Upholstered Furniture Demand, 1979-2005

The predicted values for annual per capita personal consumption expenditures for upholstered furniture (in 1972 dollars) for the years 1979-2005 were estimated using the previously described estimating equation with an adjustment to the error terms as described by Theil (1971). Figure 4 shows actual and predicted per capita consumption of upholstered furniture. (Refer to Figure 4)

Upholstered Furniture Stock in Use for the Projected Period, 1979-2005

Projected personal consumption expenditures for upholstered furniture (in 1972 dollars) were divided by the 1972 average cost per unit to determine predicted quantities. They were consistent

Figure 4. Per Capita Personal Consumption Expenditure for Upholstered Furniture, Including Dual Purpose Upholstered Furniture in 1972 Dollars



with annual quantity consumption data per household determined for earlier years.

The upholstered furniture stock in use for each year was determined using historical quantity data so that one could sum the surviving stock purchased in previous years and current purchases. Table 1 contains a portion of the stock information in tabular form by years. (Refer to Table 1)

The year 1979 was selected for instituting the proposed upholstered furniture flammability standard. The horizontal line on Table 1 indicates the separation of pre-standard and post-standard stock in use. The proportion of post-standard stock to total stock in use for any one year was then easily determined by summing the portions of the column above and below the line.

Consumers' Surplus--Compensating Variation

Consumer's surplus values for price increases of 10 percent and 30 percent were calculated using the predicted per capita personal consumption expenditures and relative prices for each year.[5] Consumers' surplus was then aggregated to reflect the effect for the total population. Since, theoretically, consumers' surplus underestimates compensating variation in the case of a price increase, an estimate of the approximate amount of this error was estimated.

Actual Dollar Cost

The actual dollar cost of the change in price and resulting change in quantity was estimated for each year of the prediction period using the quantity predictions and the average per unit price in 1972 dollars. Actual dollar costs were determined for both 10 percent and 30 percent price increases.

Findings

This preliminary study of potential effects of the proposed upholstered furniture standard concentrated on costs of the standard over time. The following graph (Refer to Figure 5) illustrates the time profile for upholstered furniture stock in use during the prediction period. The bar for each year indicates total quantity of stock in use, with the top segment representing quantity purchased that year.

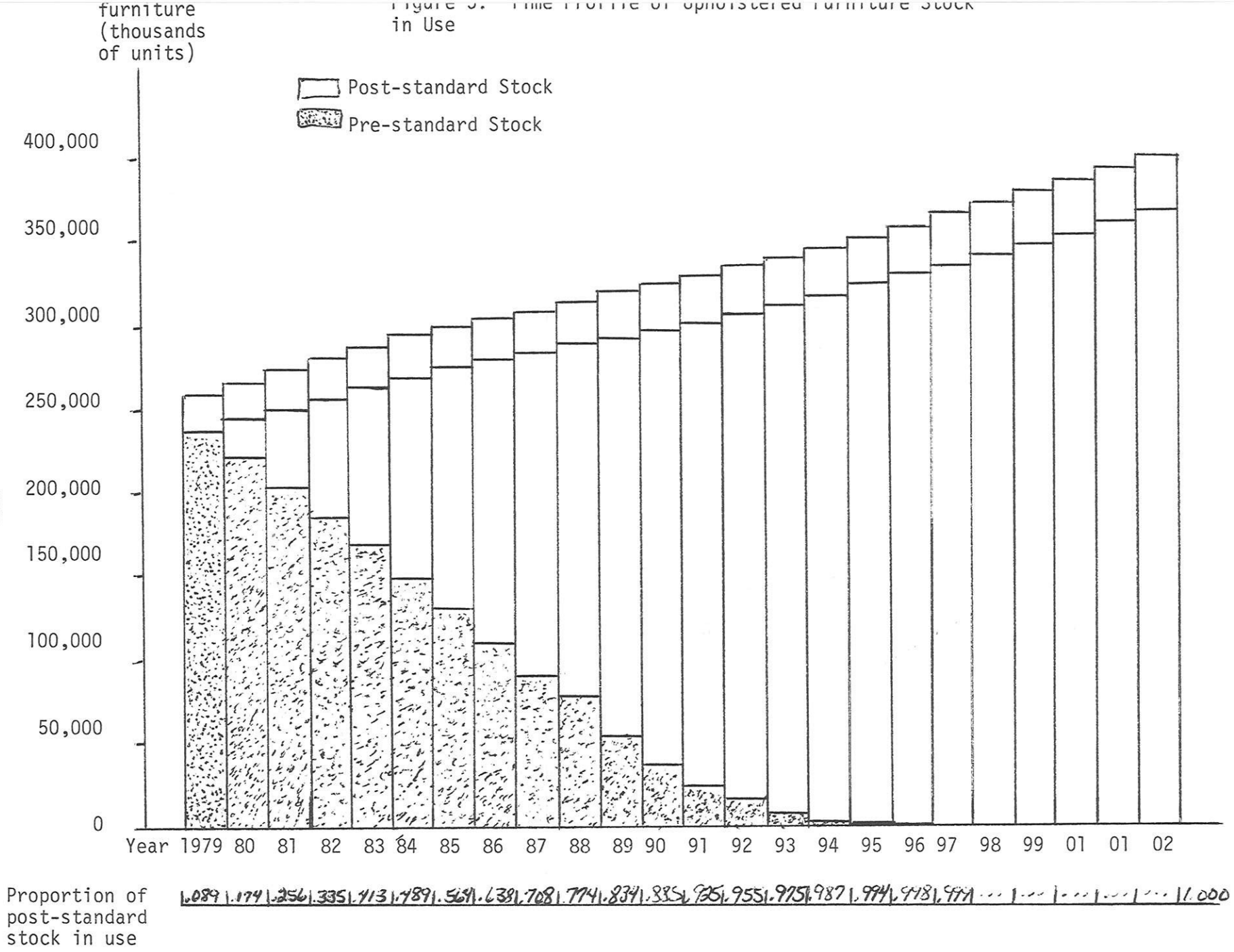
The question then is: are predicted quantities reasonable? The quantities purchased per household in five benchmark years were:

Year	Units per household
1954	.22
1958	.26
1963	.26
1967	.25
1972	.31

TABLE 1 Stock Inventory

	1979	1980	1981	1982	1983	1984	1985
1947	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1948	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1949	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1950	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1951	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1952	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1953	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1954	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1955	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1956	1.19	0.00	0.00	0.00	0.00	0.00	0.00
1957	3.75	1.25	0.00	0.00	0.00	0.00	0.00
1958	14.45	3.94	1.31	0.00	0.00	0.00	0.00
1959	46.76	14.69	4.01	1.34	0.00	0.00	0.00
1960	130.43	47.55	14.94	4.08	1.36	0.00	0.00
1961	328.75	132.60	48.35	15.19	4.14	1.38	0.00
1962	738.56	334.18	134.79	49.14	15.45	4.21	1.40
1963	1481.02	750.50	339.58	136.97	49.94	15.69	4.28
1964	2640.73	1488.91	754.49	341.39	137.70	50.20	15.78
1965	4248.43	2654.91	1496.90	758.54	343.22	138.44	50.47
1966	6213.41	4270.82	2668.90	1504.79	762.54	345.03	139.17
1967	8327.01	6245.99	4293.21	2682.89	1512.68	766.54	346.84
1968	11143.91	9026.98	6771.02	4654.09	2908.41	1639.83	830.97
1969	13889.07	12008.02	9726.94	7296.06	5014.98	3133.93	1766.99
1970	16352.96	14887.73	12871.43	10426.34	7820.66	5375.57	3359.27
1971	18447.77	17450.81	15887.20	13735.55	11126.30	8345.70	5736.45
1972	20204.41	19608.34	18548.65	16886.68	14599.66	11826.27	8870.73
1973	20954.88	20654.44	20045.09	18961.80	17262.81	14924.85	12089.68
1974	21580.20	21448.10	21140.59	20516.89	19408.11	17669.13	15276.14
1975	22022.75	21969.84	21835.35	21522.28	20887.33	19758.52	17988.15
1976	22582.22	22564.15	22509.94	22372.15	22051.38	21400.82	20244.26
1977	22539.75	22535.24	22517.20	22463.10	22325.60	22005.50	21356.29
1978	22495.00	22492.75	22488.25	22470.26	22416.27	22279.05	21959.62
1979	23067.00	23067.00	23064.69	23060.08	23041.63	22986.27	22845.56
1980	0.00	23352.00	23352.00	23349.66	23344.99	23326.31	23270.27
1981	0.00	0.00	23651.00	23651.00	23648.63	23643.90	23624.98
1982	0.00	0.00	0.00	24034.00	24034.00	24031.60	24026.79
1983	0.00	0.00	0.00	0.00	24453.00	24453.00	24450.55
1984	0.00	0.00	0.00	0.00	0.00	24886.00	24886.00
1985	0.00	0.00	0.00	0.00	0.00	0.00	25323.00
1986	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1987	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1988	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1989	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1990	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1991	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1993	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1994	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1995	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1996	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1997	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1999	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2001	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2002	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Figure 5. Time Profile of Upholstered Furniture Stock in Use



and, predicted purchases were

1980	.30
1985	.30
1990	.31

For the period used in the prediction the number of units estimated to be in use, per household, were as follows:[6]

Year	Number of units per household
1979	3.37
1980	3.41
1985	3.52
1990	3.59

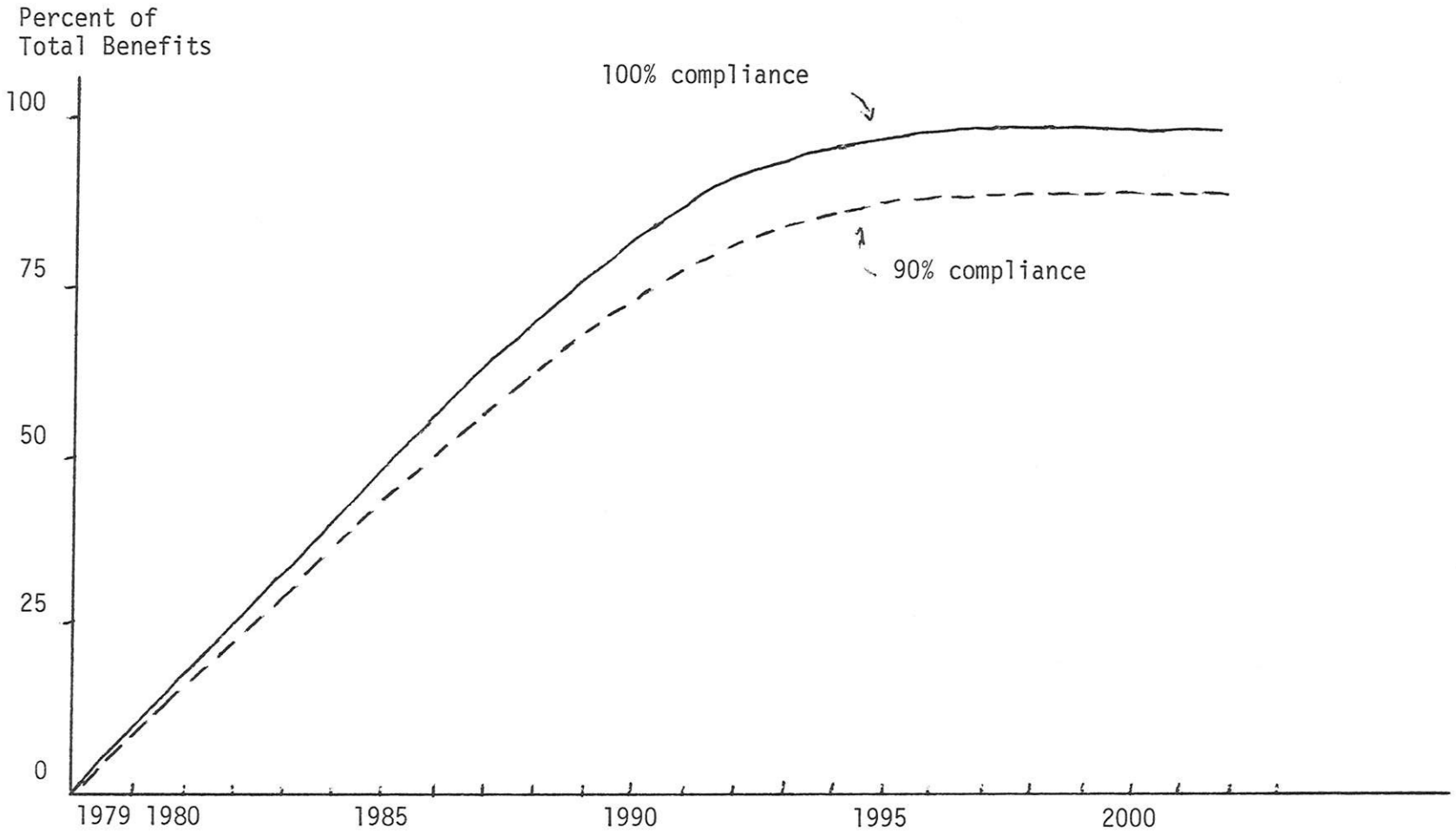
The prediction for the number of units or pieces of upholstered furniture in use resulted largely from the length of life chosen and the corresponding coefficients used to estimate the surviving stock of upholstered furniture. The 25 year life used accorded with the depreciation rate determined in the demand analysis: 0.1. Such a depreciation rate implies 90 percent of the item's initial value is depreciated in 22.2 years. Results of an earlier survey also tended to corroborate the 25 year life span (Furniture Flammability Committee, 1974). The survey indicated the average length of time before upholstered furniture is first replaced is between 11 and 14 years. At that time, 85 to 90 percent of the pieces continued in use in some fashion, while the remainder were actually discarded. This suggests we are only counting items in current use, not those in storage. Moreover, furniture prices were considered as being at the average level. Inexpensive pieces may be fully depreciated sooner. Expensive pieces may be much more durable. Antiques are an extreme case in point.

Figure 5 shows the results of putting the proposed standard into effect in 1979. The shaded area in the graph depicts pre-standard stock, the top portion, newly purchased stock, and that plus the middle section, which is the surviving post-standard inventory, the post-standard stock.

A proportion of the post-standard stock in use in the various years appears at the bottom of Figure 5. The benefits in any one year are keyed to this projection. Therefore, if there is 100 percent compliance with the standard, the top line of Figure 6 is relevant. (Refer to Figure 6) If there is 90 percent, the lower line is relevant. With 90 percent compliance a 50 percent reduction in losses due to upholstered fires is achieved in 1985.

Two types of costs were addressed in this study as indicated earlier: those that could be measured by the reduction in consumers' surplus and the actual dollar costs associated with the standard. Actual dollar costs are always lower than the loss

Figure 6. Percent of Total Benefits Achieved with Two Rates of Compliance



in consumers' surplus since consumers' surplus includes the loss in consumer welfare. An important factor in estimating these costs lies in the price elasticity of demand which shows how much quantity changes when the price of the good changes. In this case, price elasticity of demand = -.211. Therefore, the demand is rather inelastic in the long run (if price would increase one percent, quantity purchased would decrease by .211 percent).

What do these costs look like? The time profile of costs for selected years appears in the following chart (Refer to Figure 7).

As mentioned earlier, there is an error involved when using consumers' surplus rather than compensating variation to measure the loss in consumer welfare. Consumers' surplus is an underestimate, but the error is very small if income elasticity and the proportion of the budget spent for the item is very small. In the 10 percent case the error was approximately .01 percent.

The cost of the standard in any one year includes costs for the year in question and costs for previous years since they have already been borne by consumers for upholstered furniture in use. Table 2 shows the accumulated costs of a 10 percent price increase for selected years.

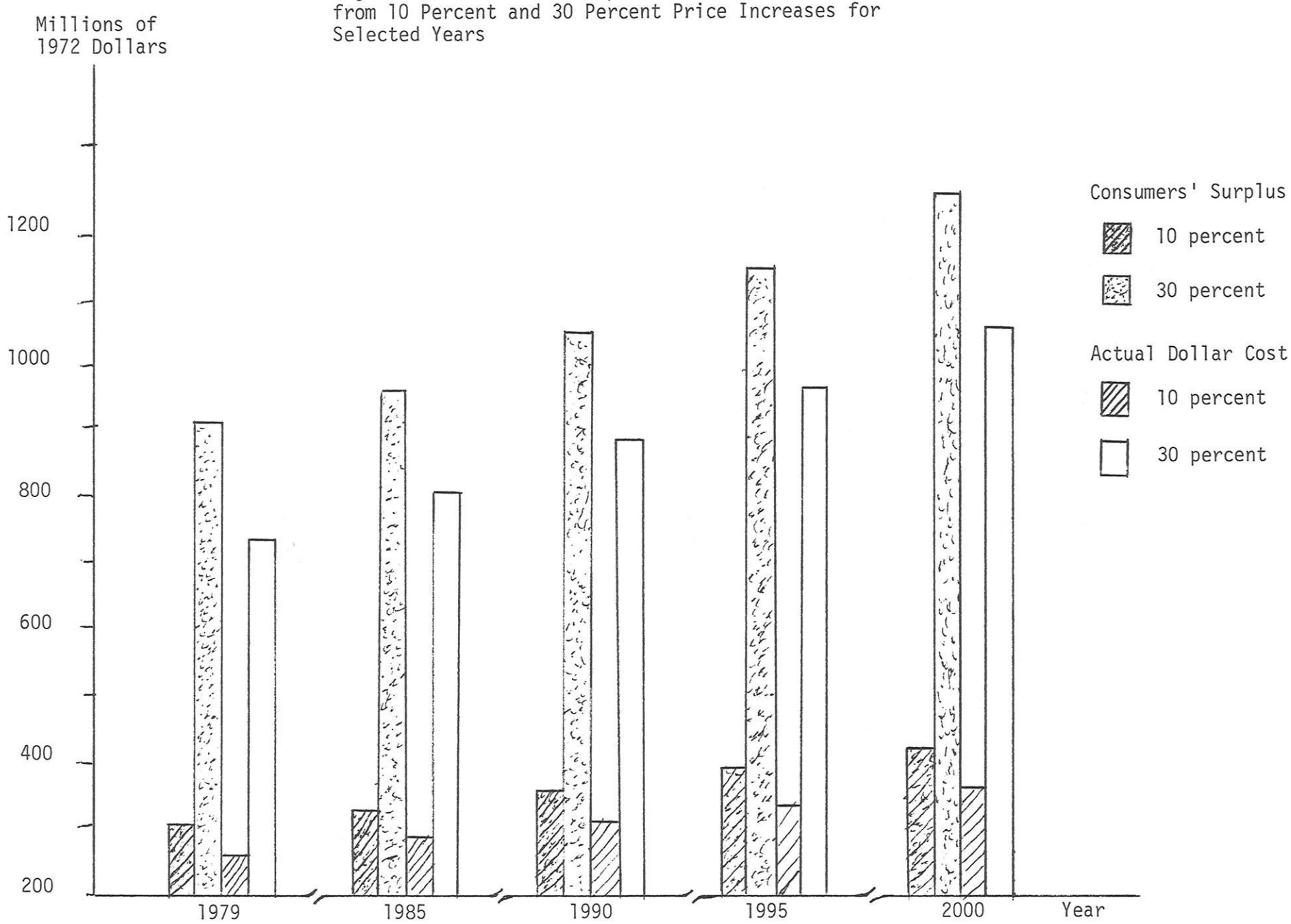
TABLE 2. Total Cost and Proportion of Total Benefits of the Proposed Standard for Selected Years

Year	Total cost (consumer's surplus) for 10 percent price increase (in millions of 1972 dollars	Proportion of total benefits with 90 percent compliance
1979	315	.080
1980	632	.156
1985	2250	.508
1990	3991	.796
1995	5896	.895

Summary and Conclusions

Consumer demand analysis has shown upholstered furniture to be a relatively price inelastic good in the long run. Quantity of upholstered furniture purchased is more responsive to income changes than to price changes. The estimated time profile of stock in use showed the reduction in the level of losses due to upholstered furniture fires reached 50 percent by the end of 1985 if the standard was instituted in 1979. However, if the growth rate of GNP were slower it would take longer to achieve the 50 percent loss reduction level as the change in quantities sold each year would be less than predicted herein.

Figure 7. Consumers' Surplus and Actual Dollar Cost from 10 Percent and 30 Percent Price Increases for Selected Years



Assuming a 10 percent increase in price, costs are estimated as being $315 million annually for the first year after the standard is instituted and rise to $455 million per annum by 2003. It is interesting to compare these estimates with earlier economic impact estimates for the proposed standard. Previous annual estimates for increased costs to producers were $1,073 million according to the Bureau of Domestic Commerce,[7] $127 million according to the National Bureau of Standards,[8] and $279 - $590 million according to the Consumer Product Safety Commission.[9] These were merely costs to producers, not increased costs to consumers at retail. Our estimates corroborate the Consumer Product Safety Commission estimates, but the assumptions used in arriving at the estimates were not the same.

Benefits appear to have been achieved somewhat more quickly than might have been anticipated, probably due to increasing personal consumption expenditures on upholstered furniture and to the increasing population. Cumulated costs mount very rapidly. It is cumulated costs that must be looked at in this context not annual costs for one year alone; the latter were used in the other studies. Upholstered furniture is a durable good. Benefits are therefore also the result of the accumulation of stock which is still is use. Further estimation of the benefits will have to be made before any judgment can be rendered as to whether the proposed standard will be economically feasible.

FOOTNOTES

1. Russell L. Abolt, "A Perspective on the Bedding Industry and Flammability", Journal of Fire and Flammability/Consumer Product Flammability, II (December, 1975), 230-247.

2. Jayme Garcia dos Santos, "Estimating the Durability of Consumers' Durable Goods", The Review of Economics and Statistics, LIV (Nov., 1972), 475-478.

3. Ψ is equal to $[1 + (n-1)\Delta]$, where n is the inverse of the rate of depreciation and Δ is a first difference operator.

4. A_0 was significantly different from 0 at the .10 level, A_1 at the .30 level, and A_2 and A_3 at the .001 level (based on t-tests).

5. Various sources suggested manufacturers' cost increases between 12 and 35 percent. (U.S. Bureau of Domestic Commerce, 1975; U.S. Consumer Product Safety Commission, May 1976; Beck, 1975; Upholstered Furniture Action Council, 1976).

6. 1972 = 3.05 units per household.

7. U.S. Bureau of Domestic Commerce, Office of Business Research and Analysis, Consumer Goods and Services Division, Upholstered Furniture: Impact of Consumer Product Safety Commission's Proposed Flammability Standard, (November 25, 1975).

8. U.S. National Bureau of Standards, Center for Fire Research. Comments on the Bureau of Domestic Commerce's Report on the Impact of the proposed Standard for the Flammability of Upholstered Furniture, (February, 1976).

9. U. S. Consumer Product Safety Commission, Bureau of Economic Analysis, Upholstered Furniture Industry Profile and Preliminary Assessment of the Possible Impact of a Proposed Cigarette Ignition Standard, (Working Paper), by Warren J. Prunella (May 28, 1976).

THE ROLE OF COST AND BENEFIT ANALYSIS THE SELECTION OF CONSUMER PRODUCT SAFETY PROGRAMS

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The purpose of this research was to apply cost-benefit analysis to an evaluation of consumer protection programs in the area of flammable fabrics and to compare the cost effectiveness of various flammability standards. Various cost-benefit parameters such as the degree of protection provided by the standard, demand conditions in the marketplace, and the discount rate were varied in order to assess the sensitivity of cost-benefit ratios to such variations. The results indicated that the 0-6X and 7-14 Children's Sleepwear Standards were cost effective. Extension of the flammability standards to children's clothing would have resulted in unfavorable cost-benefit ratios even under the assumption that no reduction in consumer choice would occur due to the standard. It was concluded that specific rather than generic standards are likely to be more cost effective.

Introduction

Cost-benefit analysis may be used to estimate the economic gains and losses from consumer product safety programs and to compare alternative protection strategies. The purpose of this research was to apply cost-benefit analysis to an evaluation of flammability standards for children's sleepwear and clothing and to demonstrate the role of cost-benefit analysis in selecting the most cost-effective consumer product safety program.

Direct Costs of Standards

Estimation of costs of safety standards depends on whether the regulated industry is in long-run equilibrium once the standard becomes effective.[1] If the industry is in long-run equilibrium, then it is only necessary to estimate the loss in consumer welfare since there is no loss in producer welfare in the long-run.[2] This is due to the fact that the firm may engage in other productive enterprises.

Consumer costs are based on the consumer's willingness to pay for the product which is measured by the area under the demand curve.[3] The difference between the consumer's willingness to pay and actual consumer expenditures comprises the benefits from consumption. In Figure 1 the benefits from consumption of Q_1 units for a price of P_1 are given by the shaded area cP_1a. Product banning or the imposition of a standard which results

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in product removal due to compliance failure, means that the entire benefits are foregone, thus the shaded area cP_1a represents the consumer loss due to product removal. If the safety standard results in a price increase from P_1 to P_2 then the benefits from consumption decrease and the loss in consumer welfare is equal to P_2P_1ab. As the diagram indicates, the loss in consumer welfare from a price increase is less than the loss from product banning or product removal.

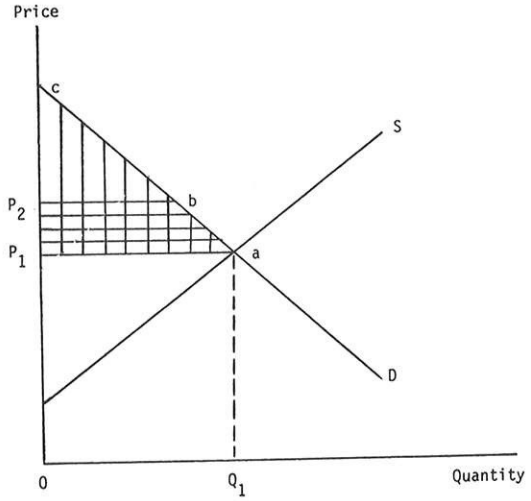

Figure 1. Costs of Safety Standard in the Long-Run

Other direct costs in the long-run include the costs of standard development and compliance and standard enforcement costs. The costs of standard development should be amortized over the expected life of the standard.

Indirect Costs of Standards

The indirect costs of product regulation include:

(a) changes in competitive conditions

(b) changes in innovative activity, and

(c) hazards to health or the environment created by the regulation.

Changes in competitive conditions are due to a reduction in the number of firms due to unfavorable cost conditions and the quality control requirements of the regulation. Imports may also be affected since the foreign supplier may not wish to establish a separate production line for a single export market. The impact of product regulation on innovation may be positive or negative depending on whether new products are developed to meet the regulation or are inhibited due to the unforseen hazard to the consumer, worker, or the environment when products are modified to meet a safety standard.

Benefits from Standards

Benefits are based on the direct and indirect costs of consumer product accidents and the degree of protection provided by the safety program. The direct costs of accidents include property damage, medical costs, legal costs, and accident investigation costs. The indirect costs are the output losses resulting from accidents and the pain and suffering incurred by the victim and his family. Measurement of output losses takes into consideration valuation of output including services of housewives, labor force participation and employment rates, and the appropriate rate of discount. Output is generally measured by the mean wage earnings of members of the labor force with imputed values for the services of housewives.

Cost Benefit Analysis of Flammability Standards for Children's Sleepwear Sizes 0-6X

Two different models were used to estimate the costs of flammability standards in 1974. In the first instance it was assumed that FR garments were equivalent to non-FR garments, with the exception of price and flammability characteristics, so that no reduction in consumer choice occurred (Model I). In the second instance it was assumed that some reduction in consumer choice also occurred due to the displacement of cotton products by synthetic products (Model II).

Only the direct costs of the standards were estimated. It was assumed that there had been no reduction in competition since price increases in the long-run for sleepwear corresponded to price increases for apparel in general. The effects on innovation were probably positive since flammability research was stimulated in all sectors of the textile industry (fibers, yarns, fabrics, apparel). However, it was not possible to quantify this effect. The remaining indirect cost component, the hazard to the health of the individual or the environment, could not be measured at this time due to insufficient data.

Price data indicated that a situation of long-run equilibrium had been reached when the standard became effective so that only standard development and compliance costs and the long-run loss in consumer welfare were estimated. In the case of Model I consumer losses were based on the impact of a price increase due to FR treatment while the impact of both a price increase and product displacement were considered in Model II. Two price elasticities of demand--0.5 and 1.0--were used in the estimation of consumer losses in order to examine the impact of demand conditions on the costs of protection.

Benefits were based on the number of burn injuries and deaths which would have occurred in 1974 in the absence of the standard, the direct and indirect costs of such injuries and deaths,

and the degree of protection provided by the standard. Foregone earnings were used in the estimation of indirect costs. High benefit estimates were based on the assumption of 100% protection while moderate benefit estimates were based on the assumption that the flammability standard would only provide 50% protection for burn injuries in the 0-10% body surface burn category.

Cost-benefit ratios for Models I and II are given in Tables 1 and 2.

TABLE 1 COST-BENEFIT RATIOS FOR 0-6X CHILDREN'S SLEEPWEAR STANDARD IN 1974

MODEL I

Degree of Protection	Price Elasticity of Demand	Discount Rate 5%	10%
Moderate	0.5	0.83	0.90
	1.0	0.78	0.84
High	0.5	0.75	0.81
	1.0	0.70	0.75

TABLE 2 COST-BENEFIT RATIOS FOR 0-6X CHILDREN'S SLEEPWEAR STANDARD IN 1974

MODEL II

Degree of Protection	Price Elasticity of Demand	Discount Rate 5%	10%
Moderate	0.5	2.15	2.32
	1.0	1.21	1.31
High	0.5	1.94	2.08
	1.0	1.10	1.17

Cost-benefit ratios are higher for Model II than for Model I reflecting higher consumer losses due to product removal. Cost-benefit ratios for Model I range from 0.70 to 0.90 which is relatively close. Demand conditions (i.e., price elasticity of demand) have a small impact on the results. This contrasts with the results for Model II, where cost-benefit ratios range from 1.10 to 1.31 for a price elasticity of demand of one and from 1.94 to 2.32 for a price elasticity of demand of one-half. The latter ratios reflect the fact that the cost of product banning or displacement is affected by the availability of substitutes. The more inelastic the demand for the product the fewer the number of available substitutes and the higher the cost of product removal.

The two elasticity values were used primarily to examine the impact of demand conditions on consumer losses. However, statistical analysis and consultation with retailers indicated that a price elasticity of one was the more appropriate value. It might be concluded, therefore, that the 0-6X sleepwear standard

was cost effective, in particular since pain and suffering costs were omitted in the estimation of benefits.

Children's Clothing, Sizes 0-6X

Cost-benefit ratios were also obtained for a hypothetical 0-6X children's clothing standard assuming that such a standard would (a) entail a price increase similar to the sleepwear standard, (b) provide the same degree of protection as the sleepwear standard, and (c) entail no change in product quality. Cost estimates based on these assumptions are conservative in view of the importance of cotton and polyester/cotton products in children's clothing. The resulting cost-benefit ratios are considerably lower than those that could be achieved with existing technology.

Cost-benefit ratios range from 3.59 to 4.88 reflecting variations in the price elasticity of demand, the degree of protection and the discount rate. (Table 3)

TABLE 3 COST-BENEFIT RATIOS FOR HYPOTHETICAL 0-6X CHILDREN'S CLOTHING STANDARD IN 1974

MODEL I

Degree of Protection	Price Elasticity of Demand	Discount Rate 5%	10%
Moderate	0.5	4.40	4.88
	1.0	4.09	4.53
High	0.5	3.87	4.23
	1.0	3.59	3.93

The most interesting result is the relationship between cost-benefit ratios for sleepwear and clothing. Cost-benefit ratios for clothing are more than five times greater than cost-benefit ratios for sleepwear (Model I). If the more realistic Model II were used it seems likely that an even greater discrepancy between the two standards would occur in view of the greater impact of a clothing standard on consumer choice. The results indicate that the sleepwear standard is cost effective in contrast to a hypothetical clothing standard.

Cost-Benefit Analysis of Flammability Standards for Children's Sleepwear, Sizes 7-14

The analysis of actual and hypothetical flammability standards for sizes 7-14 was identical to the analysis for sizes 0-6X.

Two models were again used to estimate the costs of flammability standards. In Model I only the impact of a price increase was considered while provision for both a price increase and a reduction in consumer choice was made in Model II. The direct costs of the sleepwear standard included the loss in consumer surplus and standard development and compliance costs since price data indicated that a situation of long-run equilibrium existed once the standard became effective. Benefits were based

on the number of projected burn deaths and injuries in 1975, the costs of such deaths and injuries, and the degree of protection provided by the standard.

The results for both models are given in Tables 4 and 5.

TABLE 4 COST-BENEFIT RATIOS FOR 7-14 CHILDREN'S SLEEPWEAR STANDARD IN 1975

MODEL I

Degree of Protection	Price Elasticity of Demand	Discount Rate 5%	10%
Moderate	0.5	1.43	1.50
	1.0	1.27	1.33
High	0.5	1.29	1.35
	1.0	1.15	1.20

TABLE 5 COST-BENEFIT RATIOS FOR 7-14 CHILDREN'S SLEEPWEAR STANDARD IN 1975

MODEL II

Degree of Protection	Price Elasticity of Demand	Discount Rate 5%	10%
Moderate	0.5	2.59	2.72
	1.0	1.60	1.68
High	0.5	2.34	2.44
	1.0	1.44	1.51

Cost-benefit ratios range from 1.15 to 1.50 for Model I. Cost-benefit ratios range from 2.34 to 2.72 for a price elasticity of demand equal to one-half and from 1.44 to 1.68 for a unitary elasticity of demand in the case of Model II. Again the latter results are more realistic in view of elastic demand conditions for children's sleepwear. Since the omission of paid and suffering costs permits cost-benefit ratios greater than one it might be concluded that the 7-14 Children's Sleepwear was also cost effective.

Children's Clothing, Sizes 7-14

Cost-benefit ratios were also obtained for a hypothetical clothing standard. It was assumed that such a standard would (a) entail a price increase similar to the sleepwear standard, (b) provide the same degree of protection as the sleepwear standard and (c) entail no change in product quality. The results are given in Table 6.

TABLE 6 COST-BENEFIT RATIOS FOR HYPOTHETICAL 7-14 CHILDREN'S CLOTHING STANDARD IN 1975

MODEL I

Degree of Protection	Price Elasticity of Demand	Discount Rate 5%	10%
Moderate	0.5	11.23	11.84
	1.0	9.98	10.52
High	0.5	10.15	10.64
	1.0	9.02	9.46