Outstanding Master's Thesis for 1987

An Analysis of the Benefits of Improving Water Quality in Narragansett Bay: An Application of the Contingent Valuation Method

Karen Marie Hayes

University of Rhode Island
Advisor: Timothy J. Tyrrell

Narragansett Bay may be Rhode Island's most valuable natural resource, and the continued discharge of pollutants jeopardizes the environmental integrity of the Bay. High pollution levels result in frequent closures of fishing and shellfishing areas, limit the extent of water-based activities such as swimming and boating, and create an undesirable waterfront environment.

Although scientists have spent considerable time and money studying Narragansett Bay to determine the sources and extent of polllution, no significant research addresses the potential benefits of improving sewage treatment facilities. This study estimates the social value of improving water quality in Narragansett Bay by improving waste treatment facilities. Contingent valuation was used to estimate the potential benefits from water quality changes.

Preliminary results indicate a total willingness to pay for water quality improvements that allow safe swimming and shellfishing of up to $67.9 million and $79.3 million per year, respectively. This compares favorably to the estimated total annual cost of $2.9 million for water quality projects.

The results of this study are an important component in the determination of net benefits to society of pollution control when used in conjunction with cost information for existing water quality projects. The positive net benefits indicate that further expenditures in the area of pollution control are justified. These results also give an indication of compatibility of policy decisions with societies goals for environmental preservation.

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Master's Thesis Award of Merit

The Retail Value of Extending Shelf Life of Fresh Seafood

Priscilla Murray Brooks

University of Rhode Island
Advisor: James L. Anderson

The U.S. seafood industry's expansion of foreign and domestic markets is constrained by fresh fish of inconsistent and low quality, often manifested in a short retail shelf life. To date little research has addressed the economic value of extending shelf life or the problem of optimal fresh fish inventory management. The objectives of this research are:

1. To estimate store-specific demand for various seafoods exploring the effects of advertising, seasonality and prices of other seafoods.
2. To develop a seafood inventory management model that evaluates optimal inventory levels of fresh seafood subject to uncertain local demand, spoilage rates, wholesale cost and retail price.
3. To estimate the economic value of increased shelf life.

Retail demand for fresh cod fillets, flounder fillets, and bay scallops was estimated for each store using Seemingly Unrelated Regressions, corrected for autocorrelation. Results indicate that retail demand for each species is significantly influenced by retail price, retail prices of other seafood products, advertising, and seasonality.

These results were incorporated into a dynamic mathematical programming model of the seafood manager's inventory decisions, incorporating demand, various costs, shelf life constraints, and uncertainty into this decision process. The value of shelf life, calculated as the marginal increase in profit due to an extension of shelf life, was derived from a reduction in waste due to spoilage and in lost sales due to inadequate inventory.

Depending on the species, the marginal profit added by an extension of shelf life from 4.6 to 6.9 days ranges from 4.9 to 13.7 ¢/lb, with bay scallops realizing the largest marginal profit followed by flounder and then cod. Extensions of shelf life from 6.9 to 9.2 days adds an additional profit of 0.7 to 2.0 ¢/lb to profits. Shelf life value also increases with increases in demand variance, profit margin, or wholesale cost.

These estimated retail values of extending seafood shelf life do not include the cost of the technology needed to extend shelf life. The values of extended shelf life estimated should be weighed against the actual costs of technology in order to evaluate the benefits of such quality improvement.

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Master's Thesis Award of Merit

Determinants of Off-Farm Labor Force Participation and Income Distribution Among U.S. Farm Families

Venkateshwar Reddy

Pennsylvania State University
Advisor: Jill Findeis

U.S. farm families on average depend on off-farm income to provide a significant supplement to farm income. The principal source of off-farm income is off-farm employment. This research examines (1) factors affecting participation in off-farm employment for U.S. farm operators and spouses in 1979 and 1985, and (2) the effects of changes in off-farm income on the national and regional distribution of income among farm families.

Using probit analysis, the influence of individual, family location, and financial characteristics on participation in off-farm work are analyzed. Farm income, age, the off-farm employment of a spouse, the presence of children, and location variables are shown to significantly affect participation in off-farm work. Further, Gini coefficients and the relative marginal effects of alternative income sources are estimated. Increases in off-farm income are shown to increase inequality in the Northeast and South but decrease inequality in the North Central and West regions.

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