Outstanding Master's Thesis for 1985

An Econometric Analysis of the Effects of U.S. Sugar Policy on Domestic Sugar and High Fructose Corn Syrup Markets

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This is a study of the economic impacts of U.S. Sugar Policy on the domestic markets for sugar and high fructose corn syrup (MFCS) from 1961-82. Special emphasis is given to the effects of the policy on the market penetration of HFCS as a sugar substitute. The structure of these markets is estimated via the construction of an econometric model, and the results of this model are used in a dynamic simulation model.

Seven domestic supply regions are identified for cane and beet sugar. Additional U.S. sugar supplies are estimated via an equation for foreign imports of raw cane. Domestic sugar demand is estimated on a per capita basis. Finally, the section of the model representing the sugar sector is closed with a sugar price equation and by determining the level of carry-out stocks via a market clearing identity.

The production levels and per capita demands for HFCS are estimated directly. The wholesale price of HFCS is then determined by requiring total demand to equal total supply. The sample period for the HFCS market equations is from 1972-82.

A historical simulation is performed for validation purposes and as a benchmark for comparisons with additional simulations. Four additional simulations, which assume less protective sugar policies, are then performed to examine the economic effects of the actual restrictive sugar policy in force during the study period.

The simulation results suggest that consumers of sugar and products containing sugar would have benefited from a more open policy. Higher levels of raw cane imports, resulting from less restrictive policies, were reflected in lower sugar prices. The results also indicated that more open policies markedly slowed the decline in sugar demand, suggesting that past sugar policy has reduced the long run domestic demand for sugar. Finally, reductions in protection did not result in substantial exit by sugar producers, although this loss of protection may have resulted in depressed incomes.

While a number of impacts were seen in the sugar market, no evidence was found which indicated any major changes in the HFCS market under less protective policies. This result suggests that although lower sugar prices discourage the substitution of HFCS for sugar, the impact is relatively small. Thus, it appears that the government policies which have supported domestic sugar prices have not had a substantial impact on the market penetration of HFCS.

Master's Thesis Award of Merit

Electroplating Firm Response to Environmental Policy: A Process Analysis Approach

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It is hardly news that hazardous waste contamination of the environment and its control are environmental, health and economic problems of staggering dimensions. Perhaps in part because of the complexity of the issues and relationships involved, the legislation which has been engendered is still in a rather primitive state of evolution. One set of regulations often provides incentives for a set of behaviors which is in contradiction with the incentives of parallel legislation; the result oftentimes is unexpected impacts. The research reported here models electroplating firm operations and decisions as a mixed integer program and uses sensitivity analysis to simulate alternative policies such as: taxing or subsidizing sludge disposal costs, providing low cost financing for capital costs associated with treatment technologies, and penalties to discourage wastewater dilution. One of the interesting findings was the demonstration that RCRA-induced sludge disposal cost increases would subvert the intent of the Clean Water Act. In this case the medium of disposal changes from sludge to waste-water and the percentage of metals escaping to waterways increases from 15 to about 25 percent if these sludge disposal costs rise above 39 cents per liter.

Master's Thesis Award of Merit

An Evaluation of Alternative Decision Making Models: Case Study of a Fresh Market Vegetable Farm in Massachusetts

George Rizopoulos

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A method for helping farmers decide on cropping activities when faced with yield and price uncertainty is described and applied to a vegetable producer in Western Massachusetts. Results parallel those reported by Lin, Dean and Moore for a group of California farmers. Estimation of the decision maker's utility function did not enable his choices to be predicted any better than use of the profit maximization hypothesis. Considerations such as difficulties in organizing cultural and harvest activities for some specialty crops were not translated into subjective risk but were clearly important in explaining why the preferred cropping pattern was not on the efficiency frontier.

Master's Thesis Award of Merit

Productivity and Technological Change in U.S. Agriculture: A Decomposition Analysis, 1950-1980

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The growth in productivity has typically been measured as a residual, i.e., the difference between the growth in outputs and the growth in inputs. Because it is measured as a residual there are no properties or behavioral postulates assigned to it. The purpose of this study is to extract more structural information from an aggregate production function to try to explain productivity growth.

By employing the dual relationship between cost and production functions a cost function is estimated and decomposed to indicate the relative contribution of returns to scale, land and technical progress. A test for the existence of a permanent shift in the production function or a technological epoch is also performed. A translog cost function is used to estimate aggregate production parameters for U.S. agriculture for the years 1950 to 1980. Secondary data for three variable inputs, labor, capital and materials and one fixed input land as well as output are collected and used to construct the variables of the cost function.

The results indicate the three variable inputs are fairly unresponsive to price changes with capital the least elastic and labor the most. All three variable inputs are also somewhat inelastic substitutes. The average elasticity of scale was found to be relatively low indicating decreasing returns to scale. Also, the test for a technological epoch was accepted. Finally, by decomposing the cost function, it was found that while the returns to scale contributed 8.75% to productivity growth and land contributed 4.35%, technological change was most important, contributing nearly 87% to the growth in productivity.

This result is similar to past studies and confirms the significance of technological change for productivity and economic growth.