Economic Factors Affecting Sales of U.S. Nursery Stock[1]

Larry A. Johnson[2] and Kim H. Jensen[3]
Institute of Agriculture,
University of Tennessee
Knoxville, TN 37901-1071

Abstract

The impacts of economic forces on the sales of U.S. nursery stock were identified and measured with graphical and statistical methods. Results demonstrate the effect of general economic conditions on the sale of domestically produced nursery plants. The sale of nursery stock tracks closely with changes in the Gross National Product (GNP), negatively with inflation, and positively with the share of private residential construction allocated to home renovations and additions. Results suggest that growers can use these economic indicators to gauge the outlook for their industry.

Index words: Economic analysis, sales, nursery stock

Significance to the Nursery Industry

Results from this study show the importance of economic conditions on the sale of domestically produced nursery plants. The sale of U.S. nursery stock tracks closely with changes in GNP, and negatively with inflation, and positively with the share of residential construction spent on home additions and renovations.

The dependence of nursery plant sales on general economic conditions set it apart from sales of other agricultural products which are generally much less dependent on these conditions. Also, the demand for nursery stock may well change during the course of the business cycle as consumers switch from new home purchases to home renovations and additions. Hence, nursery growers would be well advised to stay abreast of changes in the health of the economy and adjust plantings, sales, inventories, and marketing strategies accordingly.

Introduction

The nursery industry is among the fastest growing industries in the U.S. with a recorded 8.6 percent growth rate during the 1980's following a 12 percent rate of growth during the 1970's. Nursery stock sales for 1990 were estimated at $4.5 billion (Figure 1). The production of nursery stock and greenhouse plants now claim 10 percent of all agricultural crop cash receipts and ranks seventh among all agricultural crops (2).

Greenhouse products increased by an annual average of 20 percent during the same period. The market share of the nursery classification has declined from 78 percent in 1966 to 59 percent of all nursery and greenhouse sales as more households and businesses are now purchasing indoor and other greenhouse plants (1). While this study did not specifically address changes in the market share of greenhouse versus nursery stock, the share changes are highly correlated with a number of economic and demographic factors. These include measures of changes in the demographic structure of U.S. households, such as average household size and the percentage of women in the workforce.

The objective of this study was to identify and measure the economic factors that impact the sales of U.S. nursery stock. The analysis should provide growers insight into the macroeconomic forces impacting the sales of U.S. grown nursery stock and assist growers in forecasting nursery stock sales.

Materials and Methods

Research methodology includes a graphical presentation of trends in U.S. nursery stock sales and accompanying economic variables along with a statistical analysis of the data. Regression analysis was used to determine the influence of economic variables on the sale of nursery stock.

Annual sales estimates for greenhouse and nursery plants were obtained from the U.S.D.A.'s *Floriculture and Environmental Horticulture Products* (1). Updates and revisions of the data were obtained through consultations with U.S.D.A. analysts. Greenhouse and nursery products were defined as cut flowers, cut cultivated greens, potted flowering and foliage plants, bulbs, sod, groundcovers, nursery crops and other greenhouse and nursery products. The variable which served as a proxy measure for nursery stock sales included nursery stock and other environmental crops, both annual and perennial, not reported separately such as bulbs, sod, and other greenhouse and nursery products. Economic variables hypothesized to impact the sale of nursery stock were collected from the *Statistical Abstract* (3). All data expressed in dollar values were adjusted by the Implicit Price Deflator where (1982 = 100).

A number of economic factors were hypothesized to impact domestic sales of nursery plants. These factors include general economic conditions, measured by Gross National Product and changes in the inflation rate, and growth or decline in construction. The value of construction specifically targets the link between nursery sales and construction activity including commercial construction, home additions and renovations, and construction of private residences. Nursery stock sales were expected to increase with growth in GNP and construction expenditures. Inflation was expected to have a negative impact on nursery stock sales.

[1]Received for publication September 30, 1991; in revised form February 24, 1992.

[2]Associate Professor, Extension Agricultural Economics and Resource Development, University of Tennessee.

[3]Assistant Professor, Department of Agricultural Economics and Rural Sociology, University of Tennessee.

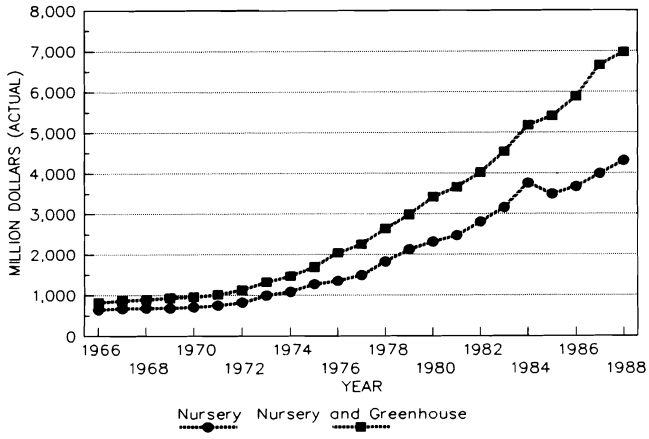

Fig. 1. U.S. cash grower receipts from the sale of nursery and greenhouse products.

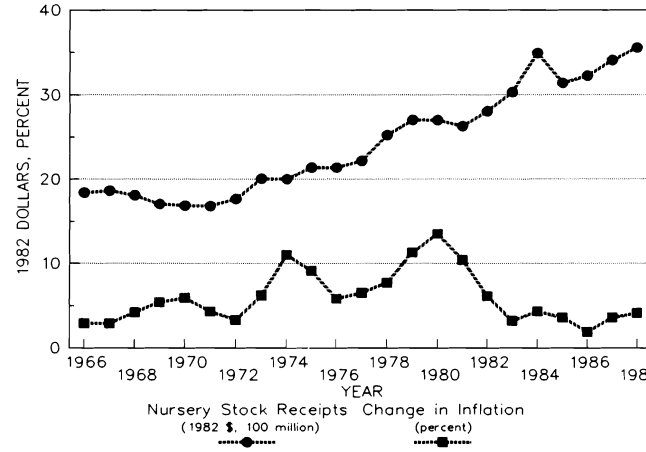

Fig. 3. Nursery stock receipts and changes in the inflation rate.

Results and Discussion

Figures 2 and 3 illustrate the relationships between nursery sales and GNP, value of construction, and changes in the rate of inflation. Real GNP tracks closely with nursery stock sales which have been adjusted for inflation, while the real value of construction only follows the general trend. As the inflation rate increases, nursery stock sales appear to decline.

The correlation coefficient, with a value of .96, also suggests that nursery stock sales are highly positively correlated with GNP. Correlation coefficients between nursery stock sales and the value of construction and changes in inflation are .52 and −.08, respectively. The correlation coefficients indicate that domestic sales of nursery stock are closely related to changes in GNP, but are not as closely correlated with total value of construction and inflation.

Although nursery stock sales were not highly correlated with an aggregate construction variable, intuitively, the sale of nursery stock would be expected to be closely related to construction, since landscapes are often developed during new construction projects or renovations. Therefore, the value of construction variable was disaggregated into the Value of Private Non-Residential (PNR), Value of Private-Residential (PR), and the Value of Home Additions and Renovations (HAR).

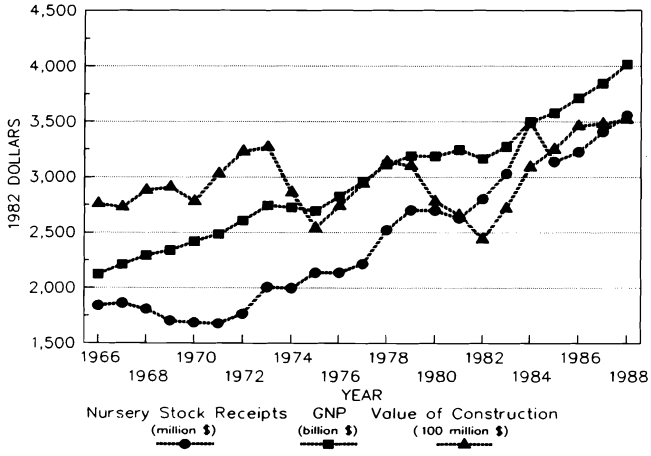

Fig. 2. Nursery stock receipts, gross national product (GNP) and the value of construction.

Correlation coefficients between nursery stock sales and PNR, PR and HAR are −.37, .40 and .89, respectively, indicating there is a high positive correlation between value of home additions and renovations and nursery stock sales (Fig. 4). A positive relationship exists between nursery sales and value of private residential construction and a negative relationship exists between nursery sales and private non-residential construction. The high positive correlation between nursery stock sales and the value of home additions and renovation could indicate that as residential consumers seek to improve or modify their homes, they spend both on construction and on landscaping.

A model, including the economic variables, GNP, change in inflation rate, and the value of home additions and renovation, to describe nursery stock sales was estimated using regression analysis. Collinearity problems, resulting from the high degree of correlation between GNP and the value of home additions and renovation weakened estimation of a model including all of the aforementioned economic variables. However, the share of private residential construction which is spent on home improvements and renovations (SHAR), did not suffer from this statistical problem but still provided a measure of how residential consumers spend their construction monies. Therefore, regression analysis was performed incorporating three explanatory variables; real Gross National Product (GNP), Changes in the rate of Inflation (CI), and the Share of Home Additions and Renovations (SHAR) relative to total construction. Final estimates are as follows:

$$\begin{array}{lccccc} NS = & -900.6207 & + & .9947\ GNP & - & 19.0767\ CI & + & 21.4653\ SHAR \\ & (213.680) & & (.082) & & (11.420) & & (8.000) \end{array}$$

$R^2 = .9399$, where:

NS is Nursery Stock sales (million dollars), GNP is Gross National Product (billion dollars), CI is changes in the rate of inflation (percent), SHAR is the share of private residential construction spent of home renovations and improvements (percent). The standard errors are in the parentheses below the estimated coefficients.

As indicated by the high value of the regression R^2 and the magnitudes of the regression coefficients relative to their standard errors, the model was a relatively good fit of the data. The model explained nearly 94 percent of the total variation in nursery stock sales. The impact of GNP on

nursery stock sales was positive and significant at the .001 probability level, while the impact of CI was negative and significant at the .11 level. The influence of SHAR on nursery stock sales was positive and significant at the .01 probability level.

With each one percent increase in real GNP, the real value of nursery stock increased by about 1.21 percent. The share of private residential expenditures spent on renovations and additions also had a positive impact on the sale of nursery stock. As the share increased by one percent, nursery stock sales increased by about .88 percent. Inflation had a significantly negative impact on sales. As the inflation rate increased by one percent, the sale of nursery stock decreased by $-.78$ percent.

The economic model was used to forecast annual changes in nursery stock sales for an in-sample test of the data from 1966 to 1988. Projected versus actual estimates are presented in Figure 4. Predicted values from the model track actual nursery stock sales closely over the twenty-three year period. The mean absolute percent forecast error was 5.3 percent over the test period. The model did fail to predict a downturn in the sale of nursery stock in 1970 and failed to predict a sharp upturn in sales in 1983 and 1984. The economy in 1970 was characterized by uncertain conditions centered on a credit crunch and an unusually high rate of consumer savings (4). These uncertain economic conditions and lack of available credit could have contributed to the drop in nursery sales. In 1983, an upward pressure on prices may have resulted from poor Spring growing conditions in the western U.S. and a severe freeze in the southeastern U.S. which forced consumers to replace dead or damaged plants coupled with general economic conditions favorable to demand (5).

Overall results from this study demonstrate the positive economic impact of GNP on the sale of domestically produced nursery plants. The sale of nursery stock tracks closely with changes in aggregate income and negatively with inflation, suggesting that growers can use the general economy

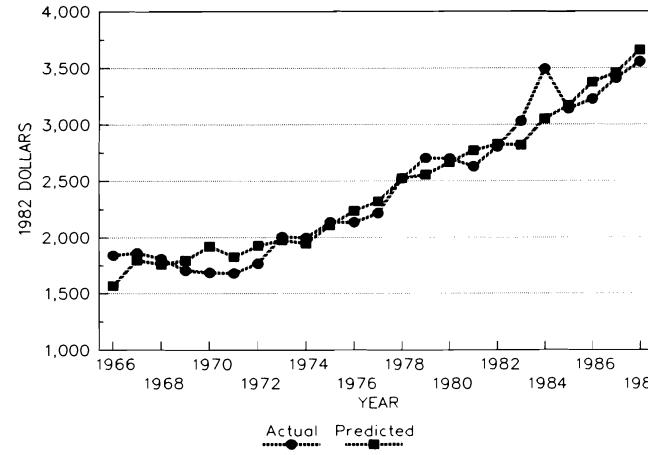

Fig. 4. Nursery stock receipts, actual and predicted.

to gauge the outlook for their industry. The results also suggest that as consumers spend a higher percentage of residential construction dollars on home renovations and additions, they also spend more on nursery stock.

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