

Economics and Marketing

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Do Demand Elasticities and Supply Flexibilities Apply to Environmental Horticulture?

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Key Words: price elasticity; supply flexibility; horticulture; production; marketing

Significance to Industry: The specialty crop and environmental horticulture market is being bolstered by positive media press, from the “buy local” movement. Annual and perennial plants retailers see a win-win for their green goods departments from participating in the buy local phenomenon – increased revenues and profits from loyal customers seeking and buying plants from markets that support the local growers, and lower costs of sourcing the produce due to reduced transportation and inventory storage costs as well as lower prices paid (price rations the increased local supply of plants) to growers, as experienced and observed in demand or price elasticities and supply or price flexibilities, respectively. Are these marketing tools and measurements quantifiable at the local level and what are the implications of the calculations for growers, marketers and consumers? Price and quantity data at the retail and grower levels were collected for the 2010 and 2011 marketing seasons for seven annual or perennial specialty crops produced and marketed in Georgia. Demand elasticities at retail-level and supply flexibilities at farm-level were calculated for each of the crops, with the results evaluated as to pricing implications for grower, marketer, and consumer.

Nature of Work: Demand or price elasticity is a measurement of the consumers’ purchase behavior (quantity purchased) when a perceived price change occurs. For a normal good and a rational consumer, when a price increase is observed, the purchase is of a lesser quantity, and vice-versa. Depending on the magnitude of the price change, the purchase quantity will also vary; however, each plant price change elicits a quantifiable change in quantity purchased. In formula, demand elasticity is calculated as the percentage change in quantity purchased or demanded divided by the percentage change in price, $\Sigma_D = \% \Delta Q \div \% \Delta P$. Demand elasticity is measured at the retail level.

Supply or price flexibility is a measurement of the price change observed at the grower level when supply or production quantities change. Price rations supply with price decreasing when an abundant supply exists; after all, if you don’t sell it, you smell it or it goes on the mulch pile, so price must clear the inventory. With a supply shortage, price is raised to ration the limited supply. The formula for supply elasticity is the percentage change in price divided by the percentage change in supply, $\Sigma_S = \% \Delta P \div \% \Delta S$. Supply elasticity is measured at the grower level. In theory, the price elasticities and the price

flexibilities should be approximate reciprocals of each other, and both carry negative signs reflecting the inverse relationship between price and quantity.

The marketer is the intermediary between the grower and the consumer. Consequently, as growers are enticed into producing more and more specialty plants or crops, supply increases; as supply increases, prices paid by the marketer to the grower decline in order to clear the harvested and marketable supply. At the other end of the marketing channel, the marketer monitors consumers' reactions to price changes via the quantities the consumers purchase. At retail, the goal of price changes is to increase the green goods department's revenues (price multiplied by quantity), so knowing the typical purchase response to an observed price change gives guidance to the retailer as to the magnitude of a price change to implement and the expected sales response in sales dollars (revenue). Hence, the double-edged sword of buying local is observed – the demand elasticity at retail and the supply flexibility at the nursery or greenhouse.

The interaction of the supply and demand response to price changes can be validated with the “cobweb theory” for the expansion and contraction of the production of environmental horticulture. In response to an increase in demand for local plants (the buy local concept), the supply at the nursery gate increases, and the price paid by the buyer falls at the production site. Growers react to the falling prices and limit future production (decreasing the farm level supply at harvest) with no apparent change in demand at retail. With the decrease in supply at the farm level, the prices at both the farm gate and the retail outlet increase; with the increase in price, the incentive to increase production (and hence supply) occurs. Over time, the cobweb is woven. Among marketers, this is often called the “price trap,” because of the movement toward a stable, unchanging price. If a shock occurs, such as a hurricane or hail storm or immigration legislation or diseased plant recall, either of the demand curves or the supply curve may alter slope or elasticity resulting in a “new” cobweb to be developed – perhaps expanding rather than contracting.

Price and quantity activity was tracked within the Georgia marketing season at both the container nursery and greenhouse level (prices paid for specified quantities, paying particular attention to sequential changes in supply and the resulting prices paid) and the retail level (quantities purchased by consumers resulting from observed or perceived price changes) for locally available specialty crops. The retail venues monitored for calculating demand elasticities included two state-sponsored farmers' markets and three community- or county-sponsored farmers' markets, and four family-owned garden centers, whereby price and per customer purchase data were acquired. Growing operations that each produced the environmental horticulture crops cooperated in providing production (supply) data and prices received data for supply flexibility computations. The primary data was supplemented with secondary data provided by the individual retailer vendors and buyers.

The following table summarizes the observations taken from primary data and combined with any appropriate secondary data to arrive at the price or demand elasticity at the retail level and the price or supply flexibility at the producer level, if

determinable. To gather appropriately accurate information, aggregation of data had to occur. Interpreting the third entry in the table for hanging baskets, if the price of locally grown hanging baskets were to decrease 10-percent (from \$10.00/lb to \$9.00/basket, as an example), the quantity purchased would likely increase a mere 3.2-percent. Evaluating the companion entry, if the supply of locally grown hanging baskets were to increase 10-percent, the price paid would generally decrease 31.0-percent [price and quantity are in opposite directions, hence the minus signs].

| Item | Measurement | Demand Elasticity | Supply Flexibility |
|--------------------------|-----------------|-------------------|--------------------|
| Cut flowers | stems purchased | - 1.12 | - 0.90 |
| Annuals (bedding plants) | flats purchased | - 0.95 | 1.05 |
| Hanging baskets | production | - 0.32 | - 3.10 |

Results and Discussion: Application of the quantified measurements of price flexibility can be used to a marketer's advantage if a desired contribution margin is to be maintained. Contribution is selling price minus variable costs, with contribution divided by selling price to arrive at the contribution margin percentage. In essence, the selling price per unit is equated to 100-percent and the desired contribution margin might be 30-percent, leaving the variable costs to be 70-percent of the selling price. Knowing what the purchase price of a particular produce is to be (this becomes the variable cost in the contribution margin format) and the desired margin to be maintained, a new selling price can be determined. For instance, if a produce buyer for a retail market buys cut flower stems for 35¢ each and sells them for 50¢ each, the contribution of 15¢ is a contribution margin of 30-percent. If, due to a reduction in farm level supply, the price to be paid by the marketer rises to 40-cents each (the new variable cost from the price flexibility computation) and the marketer desires to maintain the 30-percent contribution margin, the new selling price should become 57¢ each. Demand elasticity and supply flexibility combined with the cost-volume-profit or contribution margin analysis tool provide mechanisms for answering a lot of "what-if...?" questions by the retail marketer.

Considering the table of values (above), marketers understand that if the demand elasticity is elastic (elasticity > - 1.0), to increase revenue the marketer must lower price. If the plants marketer has been selling cut flowers at \$0.65/stem and decides to lower the price 10% to increase revenues, with a cut flower price elasticity of -1.12, lowering the price from \$0.65 to \$0.585 (a 10% decrease) will generate 11.2% more stems sold. If the marketer has been buying cut flowers from a local grower for \$0.30/stem and selling them for \$0.65, this results in \$0.35 contribution (a 54% contribution margin). Concerned that the marketer will have enough cut flowers to meet the increased demand resulting from lowering the retail price, the marketer encourages local cut flower growers to raise the total production by 20%. The supply elasticity of - 0.90 suggests that an increase in cut flower output by 20% will result in plants buyers paying 18% less in price to meet the expected rise in demand. Instead of the earlier \$0.30/stem price the marketer was paying the grower, a lower price to be paid of \$0.25 is anticipated (price rations supply). With the new retail price of \$0.585/stem and the new price paid to the grower of \$0.25/stem, the marketer realizes a new contribution of \$0.335, which is a 57% contribution margin. The marketer has been able to lower the

retail price to the consumer while paying less for the cut flowers from the grower and still increase the marketing margins and the revenues. The arithmetic of pricing favors the intermediary (the marketer).

For the grower, realizing that unless his/her products are highly differentiable from other growers raising the same specialty crop, as the aggregate supply increases due to the demand encouragement of the buy local movement, the price received from the plant buyer (the retail marketer) will decline by the calculated supply flexibility. What appeared to be a “good thing” initially for the grower in terms of sales revenues from producing, harvesting and marketing a specialty crop may be dampened by the reduced price received from the environmental horticulture buyer if the total or aggregate production supply increases.

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Is There a Role for Environmental Horticulture and the Nursery Industry in the 2012 Farm Bill?

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Key Words: farm bill, specialty crops, environmental horticulture, ag policy, farm safety net

Significance to Industry: Farm safety net programs started in the throes of the Great Depression, when farmers were facing historically low commodity prices, lost crops due to the ravages of the Dust Bowl, and rural household incomes were one-third of the national average. The Agricultural Adjustment Act of 1933 was enacted with the main goal of reducing agricultural output by paying farmers to withhold some of their land from cultivation, in order to raise crop prices. Today's safety net agricultural policy is a far cry from the purpose of this first farm bill, with price and income support programs, agricultural disaster programs, decoupled income support, farm loan and related credit programs, biofuels policy, conservation and environmental programs, and specialty crop programs. With federal attention directed toward a balanced budget and cutting the federal deficit, the timing possibly couldn't be worse for the development of a 2012 farm bill, except that within the farm bill are the mandatory programs of domestic food assistance and nutrition. Will environmental horticulture and specialty crops be the last programs to get into the farm bill, and consequently be the first ones removed?

Nature of Work: Each farm bill usually has a focus – conservation, community development, commodity programs – with is borne out in the title of the enacted legislation. A watershed moment occurred with the 1996 farm bill, known as the Federal Agriculture Improvement and Reform (FAIR) Act, which eliminated set-aside requirements for program eligibility, ended the deficiency payment/target price system, established fixed, decoupled payments linked to past production, and retained a marketing assistance loan program should commodity prices fall. Within a few years after passage of the FAIR Act, Congress resumed its old habits of piling on top of the existing policy framework. The Asian financial crisis in the late 1990s led to a decline in demand for US ag exports, and a drop in commodity prices and farm income. Congress responded by providing “market loss assistance payments,” which were replaced in the 2002 farm bill by price-based countercyclical payments which were supplemented by a revenue-based “average crop revenue election” option. So what does this have to do with specialty crops and environmental horticulture? And why is there concern about the 2012 farm bill?

In the 2008 (current) farm bill, groups representing specialty crop producers formed an effective political coalition for the first time, demanding their “piece of the action.” The coalition declined to seek direct subsidies or similar forms of support (such as row crop producers – cotton, corn, soybeans, etc.) receive. Instead, these groups sought funds to help increase demand for products or reduce production costs. The “title” or chapter of the farm bill devoted to specialty crops maintained strong opposition to allowing specialty crops to be planted on base acres from row crop programs; recognition of being agricultural enterprises was more important than taking land from food and row crop production. The specialty crop title was funded at about \$1 billion for the 2008 – 2017 period, plus additional programs in other titles were directed toward specialty crops – agricultural disaster assistance and crop insurance, conservation and environmental programs, working lands programs, commodity programs (food and nutrition), and biofuels. Funding for USDA/NASS surveys for floriculture and nursery crops would continue, so that public information on the industry would be available for all stakeholders.

Specialty crop block grants were provided to state governments based on the respective share of overall specialty crop production in that state; the grants can be used to “improve the competitiveness of US specialty crops.” Pest and disease management research programs were also funded for early pest detection and surveillance, provision of “clean” propagative material to growers, and specialty crop research. The organic programs are also nestled in the specialty crop title, with organic conversion cost sharing provisions, data collection and reporting, and organic research and extension. Lastly, technical assistance for specialty crops grant were funded to help resolve trade sanitary and phytosanitary issues.

Results and discussion: Late fall 2011 witnessed a scurry of activity by a super-committee of 12 individuals representing both House of Representatives and Senate as well as Republicans and Democrats with the responsibility of trimming \$1.5 trillion or more off the federal budget within a ten year timeframe, all the while juggling revenues with expenditures. Thanksgiving 2011 brought news of the inevitable – the super-committee couldn’t accomplish the task, ending in a super failure. With the stalemate, full sequestration appears in order where automatic cuts to the budget deficit will occur beginning in 2013, with no sacred cows. Included in the current plan are cuts to the agriculture baseline over the next ten years primarily from elimination of direct payments (of concern to row crop farmers), reduced subsidies for crop insurance (companies and producers), and adjustments to target conservation programs – the latter two have effects on specialty crops.

Mandatory programs are established on a long-term basis by committees of jurisdiction, and payments are generally made to anyone who qualifies, without annual overall limitations. The largest programs in this category make up the US social safety net: social security, Medicare, Medicaid, and domestic nutrition assistance programs (food stamps and school lunch and child nutrition). The category also includes agriculture programs such as farm support and crop insurance programs, and these programs are often referred to as ‘entitlement’ programs.

The farm program and food stamp spending combined account for just over 2% of the federal budget in 2010. Both policy topics are in the Farm Bill discussions, with food stamp spending being a full 2% itself of the federal budget. If the mandatory sequestration is imposed, 54% of current agriculture-related spending must be protected. Exempted programs would include the Supplemental Nutrition Assistance Program (SNAP; the food stamp and nutrition assistance program), child nutrition, including school meals, and the conservation reserve program (CRP) under the Agriculture Committee jurisdiction. Estimates of agriculture commodity program cuts with sequestration are approximately \$14-\$15 billion over ten years, \$6.5 billion from conservation programs, and \$4-\$5 billion from nutrition programs. In fall 2011, announcements were made about curtailing many of the production and marketing data surveys for several crops, including nursery and floriculture crops, due to budgetary constraints.

What turf is involved in the battle for the Farm Bill? The farm safety net programs provided through the Farm Service Agency (FSA) and the federal crop insurance program run by USDA's Risk Management Agency (RMA), the Natural Resources Conservation Service programs, the Environmental Protection Agency's pesticide licensing and geographic programs, agricultural productivity research including invasive species, trade promotion programs all include provisions for specialty crops. The domestic nutrition programs of the Supplemental Nutrition Assistance Program, child nutrition programs (school breakfasts, lunches, after-school snacks and suppers), Women, Infants, and Children (WIC), and other programs and administration - all effect production and revenues from specialty crops – are facing limited cuts. Related federal agencies include the Food and Drug Administration's Center for Food Safety and Applied Nutrition, the National Institute for Health, the Center for Disease Control, and the US Department of Agriculture's Agriculture Research Service, National Agricultural Statistics Service, Economic Research Service, and Agricultural Marketing Service.

So what will be bottom line on the 2012 Farm Bill and the role of specialty crops and environmental horticulture? Are they on the 'chopping block?' Food horticulture as a specialty crop will be involved, but it is questionable about the environmental counterpart. As Mark Twain is reported to have said, "Those who like policy and sausage should watch neither being made." As of early December 2011, a 2012 Farm Bill with titles, details, and implementation guidelines may be a long time in coming.

Selected References: Available upon request.