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Understanding Ornamental Plant Market Shares to Rewholesaler, Retailer, and Landscaper Channels

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Market channel alternatives that include garden centers, landscapers, mass merchandisers, and rewholesalers have contributed to the growth of ornamental crops sales in the United States. The impact of growers' business characteristics on shares of sales to these channels by firm size was estimated using the two-limit Tobit model. Important explanatory variables were regions of the United States, sales of plant groups, kinds of contract sales, and channel diversity. There were important differences in behavior by grower size. Overall, the results indicate a stronger than expected role for the rewholesaler channel as a preferred channel for ornamental plant sales.

Key Words: garden centers, landscapers, market channels, mass merchandisers, ornamental plants, rewholesalers, two-limit Tobit

JEL Classifications: M31, L14

Farm-level sales of greenhouse and nursery crops in the United States increased approximately 18% between 2000 and 2006 (U.S. Department of Agriculture–Economics Research Service, 2007). One of the factors that encouraged this growth was the availability of sales opportunities within an existing set of market channels that included mass merchandiser retailers, home centers, garden centers, landscapers, and rewholesalers. The leading channels are the landscaper channel with sales of approximately 35% followed by single-location garden centers and rewholesalers with sales of approximately 21% each (Hodges, Palma, and Hall, 2010). This reflects a slight increase in share of sales to these outlets from levels reported previously from similar surveys (Brooker et al., 2005). Among different outlets, the rewholesaler channel is of interest because it appears to have increased in importance during the past three decades, suggesting a demand for value-adding activities in the industry. As an example, Florida is among the top producers of nursery products, has a large consumer base, and the share of sales to rewholesalers was 51% compared with the national average of 21% (Hodges et al., 2010).

The titles given to these channels generally are descriptive, but the rewholesaler channel may involve production, transportation, storage, and marketing functions in the journey to the consumer. For example, growers may sell some portion of their output to other growers. Those

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growers become rewholesalers when they sell to a wholesale buyer such as a garden center. This activity by the rewholesaler might reflect a business model that specifically includes purchase and resale as an ongoing activity of a production nursery or taking orders that it cannot fill from own inventory. Finally, horticultural distribution centers (HDCs) may be businesses positioned as supply chain middlemen, providing products and services including accumulation and sale of plant materials at locations convenient to the trade. The HDC might include other components such as a retail garden center.

Our objective is to explore the relationship between the shares of commercial nursery growers' production sold through the alternative channels because these are impacted by business characteristics and attitudinal variables of these business owners. Knowledge of characteristics of marketing channels is indispensable for the development of risk and sales strategies that enhance profitability, market functionality, and improve service quality and price to the consumer. Better understanding of use of these market channels should contribute to better management strategies.

Conceptual Framework

Conceptually, the channel choice reflects channel incentives, market conditions, and grower characteristics. Advantages and disadvantages of channel alternatives affect the ability of growers to achieve strategy and profit objectives. Growers are assumed to maximize profit by selling to customers who are willing to pay more for higher plant quality or other distinctive characteristics. Traditional garden centers tend to use this differentiation strategy to compete with mass merchandisers. On the other hand, the mass merchandiser strategy typically is high volume, low price. Considering these strategies, sales to garden centers are expected to be more profitable *ceteris paribus*. Growers would evaluate other channels with the same logic.

Channel choice expectations also may develop based on two widely accepted models of business behavior. First, we consider market conditions with respect to the contention that the ornamental plants industry is maturing (Hall, 2007). In a mature market, most potential buyers already are users and demand is for replacement. Hall argues that in this case maturity is indicated by slower demand growth, head-to-head competition, demanding buyers, emphasis on cost and service, and tighter margins. These bring fundamental change to competition and would be expected to affect profitability, but all channels would not be affected in the same way and magnitude.

Policies that encouraged home ownership and that spurred construction particularly in the South and the West were an important factor in growth of the ornamental plants industry. The collapse of the mortgage credit and housing markets contributed to national recession in 2008. The resulting impact on the market for plants was significant. This industry, which had been viewed as recession-resistant, suddenly faced a market with few new or repeat homebuyers and sharply reduced consumer confidence. These factors affected the attractiveness of alternative channels.

Business models have emphasized both cooperation and competition as strategies. The concept of co-opetition (Brandenberger and Nalebuff, 1997) asserts firms and supply chains may increase profitability by cooperating rather than competing. One area of application had been in supply chain management. For some supply chains, objectives for firms in the chain are to develop common goals, identify the places in the chain where activities can be performed most efficiently, coordinate on this basis along the chain, and reward firms in the chain according to risk taken and resources contributed. Production relationships between regions may illustrate this point. The transition to production in plastic containers favored the southern and the Pacific coast regions given their longer growing seasons. Improved supply chain models provided by third-party providers probably were important contributors to that evolution.

An alternative approach to the nature of competition is Porter's *Five Forces Model* (Porter, 1998). This model placed more emphasis on a competitive arm's-length relationship between firms. Porter's five forces were conditions of entry, market power of buyers/sellers, substitutes, and the nature of industry rivalry. As an example, plant materials from most sellers are reasonable substitutes. Heightened competition is a typical result. He also discussed competition and price pressure in the context of intensity of rivalry as a set of conditions that pressure margins. Better customers tended to be more similar in size to the seller and to have similar goals. He noted that (p. 17) "...some forms of competition, notably price competition, are highly unstable and quite likely to leave the entire industry worse off from the standpoint of profitability. Price cuts are quickly and easily matched... and...lower revenues for all firms unless industry price elasticity of demand is high enough. Advertising battles, on the other hand, may well expand demand or enhance the level of product differentiation ..."

Specific industry conditions often leading to rivalry are numerous or equally balanced competitors, slow industry growth, high fixed or storage costs, lack of differentiation or switching costs, and high strategic stakes for at least one of the competing firms. For example, channel choices that seem counterintuitive may reflect high fixed costs that result from a particular, inflexible asset base.

These general notions guided development of analysis. At the same time, it is recognized that growers' choice of marketing channels happens in a constrained environment. They would prefer always to sell to the channel that best fits their preferences and resources, but competition from other growers for those same markets is strong. In some cases, perhaps many, the sale may go through the opportune channel where price, terms, and conditions may be less than optimal.

Literature Review

Review of Previous Research on Market Channels for Ornamental Plants

Market channel choice for ornamental plants has received a very modest level of attention. Studies indicate that growers preferred to sell to independent garden centers, whose competitive position often was based on quality and service, so they were less price-sensitive (Hampton, 2001; Brand and Leonard, 2001). Landscapers also were expected to be less sensitive to price because plant material tends to be a smaller share of a bid than are value-adding services. Mass merchandisers offered high volume of sales, but their low price strategy and concessions, including minimum quantities and logistics services, were barriers for many sellers (Hampton, 2001; Hinson and Navajas, 2005).

Although large and small nurserymen (small was defined as sales less than $200,000) produced similar plants, the shares of output allocated to plant categories differed (Hampton, 2001). The annual bedding plant category was the largest share of sales for large growers and was the leading plant category for mass merchandisers. Because large nurseries typically supply large retailers, the channel choice appeared to be linked to grower size.

Hampton (2001) estimated impacts of factors affecting channel choice using grower characteristics including age and size of operation, share of total sales at less than standard terms, the number of channels used, use of computer technology in the business, and others. He found that larger nurseries attended more and larger trade shows, used more aggressive sales tactics, and sold larger shares of output to mass merchandisers and rewholesalers. Few other statistically significant coefficients were found. For share to rewholesalers, the number of channels used had a positive impact for small firms but a negative impact for large firms. With respect to age, older large firms had lower shares to rewholesalers.

Shares of output sold through market channels were explanatory variables in a Tobit model to understand transaction methods used by nursery growers (Hinson and Turner, 1994). Results indicated that higher shares of sales to rewholesalers were associated with higher sales through trade shows and through the mail and were associated with lower sales through in-person selling activities.

Garber and Bondari (2000) argued that although there had been little analysis of regional differences in activities of HDCs, region may provide a more complete explanation of marketing and management practices. Using standard Census Bureau definitions of Northeast, North Central, South, and West, HDCs selected suppliers based on plant quality (89%), ability to deliver on short notice (23%), and price (22%). Regional differences appeared to be a factor in some dimensions. Price had greater importance in the West and South regions than in North Central and Northeast regions, whereas product delivery on short notice was more important in the Northeast and South regions.

Two studies, one of production practices (Hodges et al., 2008) and one of marketing practices (Behe et al., 2008), evaluated regional differences in behavior of ornamental plant growers. Both studies used Duncan's multiple range test to evaluate differences among the eight USDA agricultural production regions. In the Hodges et al. study, a set of practices that included root packaging systems, change in labor use, and computer use in management functions was evaluated. Firms in the northern and interior regions more frequently used temporary labor.

Although container-based production was predominant, firms in the Southeast, South Central, and Pacific Coast regions used this system more frequently. Contracting was higher in the Pacific region. The South Central had higher levels of contracting than other regions for "other buyers" and mass merchandisers. Behe et al. (2008) searched for differences between regions with respect to marketing practices. Wholesale sales were higher in coastal regions of the United States compared with the interior. Sales to repeat customers were highest in the Southeast. The Appalachian and Southeast were highest in percent of negotiated sales. Landscaper, rewholesaler, and single-location garden centers were the sales volume leaders across regions.

The impacts of growers' business characteristics (firm age, categories of plants sold, trade show attendance, value of contracts with specific channels, and advertising expenditures) on market channel choice, by firm size, were compared using the multinomial logit model (Velástegui and Hinson, 2009). Producers with a more diversified marketing strategy sold larger shares to the mass merchandiser and garden center channels. When comparing the mass merchandiser with the rewholesaler channel, increased sales of trees/shrubs by small firms increased the odds of using the rewholesaler channel. When comparing landscaper with the rewholesaler channel, increased sales of trees/shrubs and of vines by either large or small firms increased the likelihood of choosing the landscaper, but higher sales of foliage by either firm size increased the likelihood of choosing the rewholesaler. Trade show advertising had a positive impact on choice of rewholesaler and mass merchandiser channels. Overall, sales to specific channels were affected by location, as evidenced by higher use of rewholesalers in the West compared with the South.

Review of Previous Work on Consumer Channel Preference

Consumer preferences affect selling opportunities of growers. Level and kind of expenditures at alternative floral retail outlets were evaluated as a function of attributes of outlets, intended product use, and characteristics of the purchaser (Yue and Behe, 2010). Outlets included traditional florists, box stores, general retailers, other stores, and direct sales. Results indicate that though the florist channel was losing market share, it still captured the largest share of consumer expenditures. Purchases of gifts were from florists, whereas purchases of product for own use were from box stores and general retailers. Convenience and lower prices were cited as reasons for box stores' market share growth.

Product and service preferences of consumers for landscape products were studied (Brand and Leonard, 2001). Consumers trusted information from independent garden centers more and made major purchases there. Standard products such as fertilizers were purchased at mass merchandisers.

Product and service quality dimensions of retailers were evaluated based on seven dimensions of quality (Behe and Barton, 1999). Overall, service quality gaps—the difference between expectations and perception of the actual retail experience—were higher for mass merchandisers than for traditional retail garden centers, and garden center customers perceived service in the five service quality dimensions studied to be higher than for mass merchandisers.

Although these consumer-oriented studies are not directly related to grower choice of channel, they do indicate that consumers appeared willing to pay for the higher levels of quality and service provided by traditional garden centers. The need for understanding the advantages and disadvantages of channels and preferences of producers and consumers is documented here.

It appears that channel choice is dependent on the operational context of the firm for the producer and on the perceived attributes of kinds of retailers from the consumer view. A common expectation is that growers prefer to sell to landscapers and garden center retailers to capture better margins, but they generally use a combination of channels. Knowledge about characteristics of marketing channels is indispensable for the development of risk and sales strategies that enhance profitability and market functionality and improve service quality and price to the consumer. These studies also suggest that better understanding of how market channels are used should contribute to better management strategies.

Data

Data about trade flows, marketing practices, and firm characteristics were collected for the year 2003 using a mail survey covering 44 U.S. states. Dillman's (2000) protocol was used to design and implement the survey, which was mailed to 15,588 nursery producers. A total of 2,485 respondents returned the completed survey questions resulting in a 15.9% response rate. A description of sample selection process and descriptive details is available in Brooker et al. (2005).[1]

Observations were screened and dropped from the data set if gross sales were less than $10,000 (consistent with USDA procedure for industry reporting); if sales were incompletely reported; if the percent of wholesale sales through the marketing channels did not sum to 100%; if advertising expenditure was not reported; or if 70% or more of sales was to retail customers. These reduced the usable observation number to 1,200.

Channel use was analyzed by firm size (large or small) as measured by sales. The sales boundary was guided by anticipated differences in management behavior between sizes and by the survey's format for reporting sales. Respondents chose from 11 predefined sales ranges or wrote in the actual sales value. The boundary chosen to delimit large/small was $500,000, resulting in 510 large and 690 small firms.

Several variables, including plant groups, negotiated sales, total contract sales, and advertising and promotional expenditures, were reported in the survey as percents of sales (Table 1). Sales value was either actual value if reported or the midpoint of the category. Dollar values for these variables were calculated as the product of total sales and percent, yielding sales-weighted variables. These were converted to a $100,000 unit basis. Dummy variables for regions were created following the general four-region definition from the U.S. Census Bureau (2011) (www.census.gov/geo/www/us_regdiv.pdf) of the Northeast, South, Midwest, and West. Plant materials originally were reported in 15 categories. A horticulturist consolidated these into four plant groups with similar characteristics, identified in Table 2, and an "other" category of materials.

Methods

We used a two-limit Tobit model developed by Rossett and Nelson (1975) because the dependent variable is a share of wholesale sales to a specific channel, which must be between 0 and 1.[2] The two-limit Tobit model can be represented as:

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[1] The *National Nursery Survey* was conducted by the S-1021 Multi-State Research Committee.

[2] We also estimated a fractional regression model as proposed by Papke and Wooldridge (1996). Because our data have a substantial number of observations in both extremes (0 and 1), a two-limit Tobit model is a better choice. Results obtained from Papke and Wooldridge's fractional regression model are available from authors upon request.

Table 1. Variable Definitions and Summary Statistics from U.S. Nursery Firms Responding to the *National Nursery Survey*

		Small Firms		Large Firms	
Variable Names	Variable Definitions	Mean	SD	Mean	SD
Regions					
DNORTHEAST	Equals 1 if Northeast, otherwise 0	0.18	0.39	0.18	0.38
DMIDWEST	Equals 1 if Midwest, otherwise 0	0.16	0.36	0.13	0.34
DWEST	Equals 1 if West, otherwise 0	0.16	0.37	0.19	0.39
DSOUTH	Equals 1 if South, otherwise 0	0.50	0.50	0.50	0.50
Plant group					
PG1	Sales of trees/shrubs ($100,000)	0.89	1.12	16.61	33.33
PG2	Sales of bedding plants ($100,000)	0.21	0.61	6.94	25.67
PG3	Sales of vines ($100,000)	0.14	0.43	5.59	20.05
PG4	Sales of foliage ($100,000)	0.09	0.46	1.51	7.10
PG5	Sales of other ($100,000)	0.39	0.80	5.62	22.65
Contracted production					
CTCTS	Total sales under contract ($100,000)	0.22	0.51	6.72	23.00
TCOP	Contract to other producers (1 if positive, otherwise 0)	0.19	0.39	0.24	0.43
TCGC	Contract to garden centers (1 if positive, otherwise 0)	0.19	0.39	0.16	0.37
TCMM	Contract to mass merchandisers (1 if positive, otherwise 0)	0.04	0.20	0.14	0.35
Kinds of promotions					
TRADE	Number of trade shows attended in 2003	0.74	1.32	3.19	3.76
PAWSS	Web site promotion expenses ($000)	0.00	0.02	0.05	0.20
PATSS	Trade show promotion expenses ($000)	0.01	0.03	0.34	1.85
Others					
AGEF	Firm age (2004 minus year established)	20.61	18.05	31.85	23.21
DCOMP	Computer management aids (1 if used greater than 3 functions from a list of 11, otherwise 0)	0.46	0.50	0.84	0.37
DCHANNEL	Channel diversity (1 if had sales in at least 3 of 4 marketing channels, otherwise 0)	0.29	0.45	0.66	0.48
DPDPU	Product uniqueness as factor in pricing (1 if rated greater than 3, otherwise 0)	0.66	0.47	0.66	0.47
PSNS	Share of negotiated sales (standard terms such as price were changed)	0.43	0.68	11.41	33.48

Note: The *National Nursery Survey* covering calendar year 2003 was conducted by the S-1021 Multi-state Research Committee in 2004. SD, standard deviation.

$$
\begin{aligned}
y_i^* &= \beta' x_i + \in_i \\
y_i &= L_i \\
&= y_i^* \quad \text{if} \quad L_i < y_i^* < U_i \\
&= U_i
\end{aligned} \tag{1}
$$

Here, y_i* is a latent variable (unobserved for values smaller than 0 [L_i] and greater than 1 [U_i]) representing the sale of product to a given outlet; x is a matrix of independent variables affecting choice of outlet; β is a vector of unknown parameters; $\in_i$ is a disturbance assumed to be independently and normally distributed with zero mean and constant variance σ^2; and $i = 1, 2, \ldots n$ (n is the number of observations). The total marginal effect can be calculated as

$$
\frac{\partial E(y/x)}{\partial x_k} = \beta_k \, . \, [\Phi(Z_U) - \Phi(Z_L). \tag{2}
$$

Here Φ (.) are cumulative distribution for the standard normal function,

Table 2. Proportions of Sales by Firm Size to Alternative Market Channels, U.S. Nursery Firms Responding to the National Nursery Survey

Sale Proportion	Garden Centers (GC)	Landscapers (LS)	Mass Merchandiser (MM)	Rewholesaler (RW)
Large firms (N = 510)				
None sold (= 0)	119	128	342	83
All sold (= 1)	6	17	7	40
Ratio none/all	19.8	7.5	48.9	2.1
Small firms (N = 690)				
None sold (= 0)	316	223	602	267
All sold (= 1)	42	89	14	89
Ratio none/all	7.5	2.5	43	3.0

$$Z_U = \frac{U - \beta x}{\sigma} \quad \text{and} \quad Z_L = \frac{L - \beta x}{\sigma}.$$

Additionally, the marginal effect depends on the number of observations being in the limiting end (observations with 0 or 1 values). If there are no observations in the limiting end, then the estimated coefficients would have the same value as ordinary least square coefficients.

The Channel Choice and Explanatory Variables

The dependent variable is share of wholesale sales to the specific channels—rewholesalers (RWs), mass merchandisers and home centers (MMs), independent garden centers (GCs), and landscapers (LSs). Explanatory variables chosen were based on the existing literature and authors' knowledge of the industry. For example, in the Pacific coast part of the West region, production volume, cost-competitiveness, a strong national sales presence, and the large and generally affluent California market have supported growers. In the Northeast, production is constrained by the difficult climate. The industry is important to state agricultural output but is a small share of national output. However, New York, Pennsylvania, and New Jersey are important exceptions (Hodges, Hall, and Palma, 2011), and there are large urban markets. The Midwest is more balanced when considering production and consumption shares. It has a history of having nationally important firms, but its growing season is somewhat shorter compared with the South and West. Nearby Midwestern population centers absorb significant volumes of output. The independent variables included in the final econometric model and descriptive statistics are described in Table 1.

Results

The goodness of fit for regression models as measured by the pseudo-R^2 was in the range of 0.10–0.41. Generally, the large firms had better fit than the smaller firms for all regression models related to marketing channels. For evaluation of parameters, the 0.10 level of significance was used for inference because there are few studies in the ornamentals industry to guide expectations of direction and magnitude of influence of explanatory variables. Marginal effects of the two-limit Tobit model provide an understanding of how a unit change in the explanatory variable affects the growers' proportion of sales made through a specific marketing channel.

From the Regions variable, approximately half of respondents were from the South for both firm sizes. For large firms, shares of respondents by region in declining order were the South, West, Northeast, and Midwest, whereas for small firms, the Northeast had second highest share (Table 1). The trees/shrubs group (PG1) was largest as measured by sales with an average value of approximately $89,000 for small firms (more than double the value of the "other plants" group) and of approximately $1,661,000 for large firms (more than twice as large as the "bedding plants" group). PG1 is the basic plant material group for landscapes, and small firm sales were more concentrated in this group than were large firms. For large firms, the other three plant groups were similar in sales value, whereas the mix was more diverse for small firms. Foliage (PG4) was lowest for both sizes.

For contracts with customers across channels, values were much lower for small than for large firms ($22,000 and $672,000, respectively). Contracts with garden centers were more prevalent for small than for large firms. However, large firms had a somewhat higher incidence of contracts with other producers than did small firms and had a much higher level for the mass merchandiser channel. Large firms were approximately 11 years older (AGEF) than small firms.

The number of firms at the censored limits of 0% and 100% (we refer to this as the none/all ratio) were reported (Table 2). With respect to channel preferences, the number of firms with no sales to MM was approximately two-thirds of the total for large firms and almost 90% for small firms. The number of firms with all sales to MM was very small for both sizes. RW was highest or tied for highest in number of firms that sold 100% to the channel for both firm sizes but lowest (large firms) or second lowest (small firms) for no sales to the channel. For GC, a large number of respondents had no sales to the channel and relatively few reported all sales. We believe that these data show that GC was a relatively small share of market relative to firms that want to sell to that channel and that there was competition for those sales. The numbers for MM clearly demonstrate that the terms and conditions issue affected channel choice and that efforts by MM firms to limit number of vendors have succeeded. RW appeared to be a critical outlet for growers given that it was highest or tied for the highest in number of firms selling 100% share through the channel.

Following standard procedure, total marginal effects were estimated at the mean and are interpreted as the impact on shares to channels from a unit change in a given explanatory variable. A positive marginal effect means that a unit increase in the independent variable increased the channel share, and conversely, a negative marginal effect was a decline in channel share as a result of a unit increase in the explanatory variable. Results for each channel are presented in Tables 3 and 4.

Impacts on Use of Marketing Channels

As an example of interpretation of marginal effects, we use the bedding plants variable (PG2) for small firms in the RW column of Table 4. This was a continuous variable with a dollar value corresponding to the total sales of bedding plants (flowering annuals and vegetables, fruits, and herbs) and flowering potted plants. This marginal effect was negative and significant. For a small producer with typical business characteristics whose sales of bedding plants increased by one unit ($100,000), the proportion of wholesale sales to RW declined by a 0.07 fraction.

Channel Choice by Region

Region was a dummy variable with the South as the reference category. Our expected outcomes were based on general production and consumption opportunities within regions, as presented previously. Among these factors were length of growing season and transportation distance to major markets relative to the South.

We found that shares of sales by growers in the West region were little different from the South for the retailer channels (MM and GC), although small Western growers did have higher shares to MM (Tables 3 and 4). For large West region growers, shares to LS were lower, whereas shares to RW were higher. Distance to markets such as shipment of product combinations to specific LS jobs probably played a role in these outcomes. In addition, although the largest few California growers had extensive marketing programs, Western growers generally may have turned to RW supply chain specialists to access distant markets. We observed some differences between firm sizes, because small growers in the West had higher shares to MM, whereas large growers did not, and shares to RW were higher for large firms than for small.

Table 3. Parameter Estimates and Marginal Effects from Two-Limit Tobit Model, by Market Channel for Large Firms, from U.S. Nursery Firms Responding to the *National Nursery Survey*

	Rewholesaler (RW)		Mass Merchandiser (MM)		Garden Center (GC)		Landscaper (LS)	
Variables	Coefficient	Marginal	Coefficient	Marginal	Coefficient	Marginal	Coefficient	Marginal
Regions								
DNORTHEAST	–0.03 (0.52)	–0.02 (0.51)	–0.11 (0.10)	–0.03 (0.07)	0.14 (0.00)	0.11 (0.00)	–0.07 (0.20)	–0.05 (0.18)
DMIDWEST	–0.10 (0.07)	–0.07 (0.06)	–0.25 (0.01)	–0.05 (0.00)	–0.07 (0.07)	–0.05 (0.06)	0.22 (0.00)	0.17 (0.00)
DWEST	0.08 (0.07)	0.07 (0.07)	0.07 (0.26)	0.02 (0.29)	0.05 (0.17)	0.04 (0.18)	–0.21 (0.00)	–0.14 (0.00)
Plant groups								
PG1	–0.00 (0.02)	–0.00 (0.02)	–0.00 (0.44)	–0.00 (0.44)	0.00 (0.62)	0.00 (0.62)	0.00 (0.06)	0.00 (0.06)
PG2	–0.00 (0.01)	–0.00 (0.01)	0.00 (0.03)	0.00 (0.03)	0.00 (0.63)	0.00 (0.63)	0.00 (0.65)	0.00 (0.65)
PG3	–0.00 (0.04)	–0.00 (0.04)	0.00 (0.17)	0.00 (0.17)	0.002 (0.00)	0.00 (0.00)	–0.00 (0.47)	–0.00 (0.47)
PG4	0.00 (0.09)	0.00 (0.09)	0.01 (0.01)	0.00 (0.01)	–0.001 (0.39)	–0.001 (0.39)	–0.02 (0.00)	–0.02 (0.00)
PG5	0.00 (0.25)	0.00 (0.25)	–0.00 (0.32)	–0.00 (0.32)	–0.001 (0.12)	–0.00 (0.12)	0.00 (0.19)	0.00 (0.19)
Contracted production								
CTCTS	0.00 (0.06)	0.00 (0.06)	0.00 (0.34)	0.00 (0.34)	0.00 (0.01)	0.00 (0.01)	–0.00 (0.20)	–0.00 (0.20)
TCOP	0.29 (0.00)	0.23 (0.00)	–0.07 (0.22)	–0.02 (0.20)	–0.08 (0.02)	–0.06 (0.01)	–0.19 (0.00)	–0.13 (0.00)
TCGC	–0.18 (0.00)	–0.13 (0.00)	–0.04 (0.52)	–0.01 (0.50)	0.31 (0.00)	0.25 (0.00)	–0.08 (0.18)	–0.05 (0.17)
TCMM	–0.09 (0.11)	–0.07 (0.09)	0.64 (0.00)	0.32 (0.00)	–0.17 (0.00)	–0.11 (0.00)	–0.26 (0.00)	–0.17 (0.00)
Kind of promotion								
TRADE	0.01 (0.14)	0.01 (0.14)	0.00 (0.95)	0.00 (0.95)	0.00 (0.73)	0.00 (0.73)	0.00 (0.85)	0.00 (0.85)
PAWSS	–0.11 (0.24)	–0.08 (0.24)	–0.05 (0.64)	–0.01 (0.64)	0.07 (0.29)	0.05 (0.29)	0.08 (0.40)	0.06 (0.40)
PATSS	0.01 (0.18)	0.01 (0.18)	–0.01 (0.36)	–0.00 (0.36)	0.00 (0.78)	0.00 (0.78)	0.00 (0.91)	0.00 (0.91)
Other variables								
AGEF	0.00 (0.07)	0.00 (0.07)	–0.00 (0.86)	–0.00 (0.86)	0.00 (0.31)	0.00 (0.31)	0.00 (0.04)	0.00 (0.04)
DCOMP	–0.02 (0.61)	–0.02 (0.62)	0.09 (0.22)	0.02 (0.17)	–0.04 (0.34)	–0.03 (0.35)	0.03 (0.53)	0.02 (0.53)
DCHANNEL	–0.08 (0.03)	–0.06 (0.03)	0.34 (0.00)	0.09 (0.00)	0.25 (0.00)	0.17 (0.00)	0.03 (0.46)	0.02 (0.46)
DPDPU	–0.05 (0.14)	–0.04 (0.14)	–0.03 (0.59)	–0.01 (0.60)	0.02 (0.41)	0.02 (0.40)	0.03 (0.42)	0.02 (0.41)
PSNS	–0.00 (0.62)	–0.00 (0.62)	0.00 (0.02)	0.00 (0.02)	0.00 (0.50)	0.00 (0.50)	0.00 (0.14)	0.00 (0.14)
Sigma	0.36		0.39		0.27		0.39	
Pseudo R^2	0.16		0.39		0.42		0.19	

Note: *P* values are shown inside parentheses. Coefficients and marginals are rounded to two decimal numbers.

Table 4. Parameter Estimates and Marginal Effects from Two-Limit Tobit Model, by Market Channel for Small Firms, from U.S. Nursery Firms Responding to the *National Nursery Survey*

	Rewholesaler (RW)		Mass Merchandiser (MM)		Garden Center (GC)		Landscaper (LS)	
Variables	Coefficient	Marginal	Coefficient	Marginal	Coefficient	Marginal	Coefficient	Marginal
Regions								
DNORTHEAST	–0.21 (0.01)	–0.10 (0.00)	–0.02 (0.89)	–0.00 (0.89)	0.12 (0.05)	0.06 (0.06)	0.02 (0.82)	0.01 (0.82)
DMIDWEST	–0.22 (0.00)	–0.11 (0.00)	0.14 (0.48)	0.01 (0.52)	0.05 (0.43)	0.03 (0.44)	0.10 (0.16)	0.06 (0.17)
DWEST	0.10 (0.14)	0.06 (0.15)	0.64 (0.00)	0.07 (0.00)	–0.06 (0.39)	–0.03 (0.38)	–0.26 (0.00)	–0.14 (0.00)
Plant groups								
PG1	–0.02 (0.48)	–0.01 (0.48)	–0.40 (0.00)	–0.03 (0.00)	–0.03 (0.25)	–0.01 (0.25)	0.11 (0.00)	0.07 (0.00)
PG2	–0.12 (0.02)	–0.07 (0.02)	0.17 (0.08)	0.01 (0.08)	0.14 (0.00)	0.07 (0.00)	–0.11 (0.02)	–0.07 (0.02)
PG3	–0.22 (0.00)	–0.12 (0.00)	0.13 (0.24)	0.01 (0.24)	0.08 (0.14)	0.04 (0.14)	0.08 (0.11)	0.05 (0.11)
PG4	0.09 (0.10)	0.05 (0.10)	0.01 (0.94)	0.00 (0.94)	–0.01 (0.88)	–0.00 (0.88)	–0.11 (0.05)	–0.06 (0.04)
PG5	0.09 (0.01)	0.05 (0.01)	–0.02 (0.79)	–0.00 (0.79)	–0.09 (0.01)	–0.04 (0.01)	0.01 (0.83)	0.00 (0.83)
Contracted production								
CTCTS	0.12 (0.04)	0.06 (0.04)	–0.38 (0.02)	–0.03 (0.02)	–0.07 (0.19)	–0.04 (0.19)	0.02 (0.73)	0.01 (0.73)
TCOP	0.57 (0.00)	0.33 (0.00)	0.02 (0.91)	0.00 (0.92)	–0.32 (0.00)	–0.14 (0.00)	–0.27 (0.00)	–0.15 (0.00)
TCGC	–0.38 (0.00)	–0.18 (0.00)	0.06 (0.66)	0.00 (0.67)	0.48 (0.00)	0.27 (0.00)	–0.14 (0.03)	–0.08 (0.02)
TCMM	–0.12 (0.37)	–0.06 (0.34)	1.16 (0.00)	0.22 (0.00)	–0.31 (0.01)	–0.12 (0.00)	–0.34 (0.01)	–0.18 (0.00)
Kind of promotion								
TRADE	0.03 (0.10)	0.02 (0.10)	0.04 (0.41)	0.00 (0.41)	–0.00 (0.83)	–0.00 (0.83)	–0.02 (0.24)	–0.01 (0.24)
PAWSS	–0.72 (0.50)	–0.39 (0.50)	1.67 (0.41)	0.11 (0.41)	0.78 (0.41)	0.39 (0.41)	0.01 (0.99)	0.01 (0.99)
PATSS	–0.01 (0.99)	–0.01 (0.99)	4.41 (0.02)	0.30 (0.02)	0.23 (0.79)	0.11 (0.79)	–1.16 (0.19)	–0.68 (0.19)
Other variables								
AGEF	0.00 (0.54)	0.00 (0.54)	–0.00 (0.53)	–0.00 (0.53)	0.00 (0.83)	0.00 (0.83)	–0.00 (0.88)	–0.00 (0.88)
DCOMP	0.01 (0.92)	0.00 (0.92)	–0.10 (0.41)	–0.01 (0.40)	–0.03 (0.47)	–0.02 (0.46)	0.04 (0.45)	0.02 (0.45)
DCHANNEL	0.10 (0.07)	0.06 (0.07)	0.52 (0.00)	0.05 (0.00)	0.32 (0.00)	0.17 (0.00)	0.03 (0.51)	0.02 (0.51)
DPDPU	0.13 (0.02)	0.07 (0.01)	–0.11 (0.36)	–0.01 (0.37)	–0.04 (0.42)	–0.02 (0.42)	–0.09 (0.06)	–0.05 (0.06)
PSNS	0.04 (0.29)	0.02 (0.29)	0.01 (0.95)	0.00 (0.95)	–0.07 (0.06)	–0.04 (0.06)	–0.01 (0.88)	–0.00 (0.88)
Sigma	0.59		0.83		0.52		0.56	
Pseudo R^2	0.14		0.25		0.17		0.10	

Note: P values are shown inside parentheses. Parameter estimates and marginal effects are rounded to two decimal numbers.

For the Midwest region, there appeared to be more consistent differences from the South for the large farms. Given the strong production and consumption (residential and commercial) bases in the Midwest, differences were expected. Our results showed significantly lower use of RW compared with South region growers. Proximity to markets may help to explain this outcome, but home building patterns that encouraged creation of rewholesaler firms may have been a factor that raised the South's RW share. For both MM and GC, large firms in the Midwest reported lower shares. However, the LS channel had higher shares, suggesting regionally higher interest in creation and maintenance of lawns and gardens. We observed differences in channel choice by size. Large and small growers were different from the South for most of the channels.

The Northeast region was expected to be different from the South, as discussed previously. We observed higher shares to GC in the Northeast, consistent with a strong independent retail sector in this area with a high urban proportion of population. At the same time, some large urban areas have been less welcoming to MMs and lower shares from large growers to MM were observed in the region. For differences in channel choice between sizes, both the retailer channels were different for large growers with higher shares to the GC channel and lower shares to MM. The share to RW was lower compared with the South for small firms but not for large ones.

Impact of Product Mix on Channel Choice[3]

The impact of changing sales levels of trees/shrubs (PG1) was most apparent in the channel shares for RW, MM, and LS (for both firm sizes). For RW for large firms, the PG1 share was negatively related to increased sales but was positive for LS. For small firms, this group's share decreased for the MM channel but increased for LS. As noted earlier, PG1 contains basic products used in landscaping, so the latter relationship was expected.

An increase in sales of bedding plants (PG2), used for color accent applications, led to lower shares to RW and higher shares to MM for both firm sizes. PG2 is a significant product set in the MM business model of low price (often a price leader) and high volume. Increasing shares to MM is a result that reflects marketplace reality. Additionally, for small firms, sales of PG2 led to lower shares to LS and higher shares to GC. Overall, additional PG2 sales had significant impact on shares to small channels with the two retail channels gaining shares at the expense of the other two.

For the vines group (PG3), we found less impact on shares as sales changed. Additional sales led to lower shares through RW and higher shares through GC for large firms. For small firms, the RW share was negatively affected.

For the foliage group (PG4), sales were inversely related with shares to LS and were directly related with shares to RW for both firm sizes. In the context of the LS channel's needs, foliage is less important than are other plant materials. RW received higher shares from both firm sizes as PG4 increased. This plant group appeared to have little influence on most of the retail channel shares, although it was positive for the MM channel for large firms.

We found no significant results from the "other plants" group (PG5) for large firms. This is a diverse group in which channel choices of one of the group's component may be offset by others.

Impacts from changes in sales by plant groups appeared more often in the RW channel with negative impacts on channel choice for PG1, PG2, and PG3 but positive for PG4 for large firms. There were negative impacts on PG2 and PG3 for small firms but positive impacts for PG4 and PG5.

There also were positive impacts on LS, a leading outlet for tree and shrub materials (PG1). Sales of bedding plants (PG2) appeared to influence the channel choice more compared with the other groups. The GC channel responded to changes in sales across the plant groups only for PG3 for large firms and for PG2 and PG5 for small firms, perhaps an indicator of the stability of the garden center business model in which differentiation is emphasized and a diversified product line is an asset. Generally, the MM and the LS channels seemed less affected than RW. Results also suggest that the GC and MM channels respond minimally to plant sales group compared with the other outlets.

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[3] Because these coefficients are rounded to two decimals, smaller values appear as zeros for large firms for different plant groups (PG) in Table 3.

Impact of Contracted Production on Channel Choice

These contracted production variables suggest how channel shares changed as contracted sales levels changed. When total sales under contract (CTCTS) level increased, we found a positive relationship with shares to RW for both firm sizes, suggesting this may be a critical link. With respect to impacts on retail channels, share to GC for large firms increased and share to MM for small firms declined.

For the other contract variables, we observe the contrast between firms with no contract sales and firms that had some positive share of sales. Because the shares for an individual observation summed to 100%, if share to the channel in question increased, then share to at least one other channel decreased. These estimates, then, show the adjustment process in response to channel sales.

Contracts with other producers (TCOP) appeared to be contracts with rewholesalers. When growers had a positive level of TCOP, the share to RW was higher by approximately 23% for large firms and approximately 33% for small firms compared with firms that reported no TCOP. These shares were not unexpected. Some producers have integrated the rewholesale function into a diversified business plan. As growers increased their RW share, we observed the tradeoff driven by the TCOP activity in the form of lower shares to the GC and LS channels for both sizes.

Similarly, for growers who reported positive sales through contracts with garden centers (TCGC), the share to GC is significantly higher with values of approximately 25% for large firms and approximately 27% for small firms. The adjustment process is reflected in RW, in which the adjustment is a reduction in share to RW by approximately 13% and approximately 18% for the respective firm sizes.

The share of sales to MM by growers who reported positive levels of contracts with mass merchandisers (TCMM) was 32% for large growers and 22% for small growers and illustrates the power and influence of the MM channel. Shares to GC and LS channels for both firm sizes were driven down by double digit values, and a decline of approximately 7% for large growers to RW was observed. Given that coefficient values were somewhat smaller for RW, it might be inferred that TCMM had more important impacts on GC and LS. This evidence of the MM impact on other channels may suggest that strategies to mitigate the risk of dealing with MM channel should be important to nurserymen.

In considering these results, some similarities appeared to exist between changes to the LS and the RW shares across the contract space. The MM channel shares were not affected by contracts with firms in other channels.

We found evidence that *channel diversity* (DCHANNEL) affected channel choice. This variable reflected whether the firm sold some share of product through more than three of the five channels (data for MMs and home centers were collected separately to document differences but were combined for model estimation). A more diversified market strategy resulted in higher shares to MM and GC for both large and small firms. For GC, spreading sales across market channels (three or more channels) led to higher shares of sales to GC by approximately 17% for either size when compared with firms with less diverse channel use. However, the share to RW was lower by approximately 6% for large firms. RW also appeared to be part of the strategy for large firms when fewer channels were used because its share declined when more channels were used, suggesting that the channel was in the channel mix with lower diversification. In addition, small growers who agreed more strongly that uniqueness was a factor (DPDPU) had lower shares to LS and higher shares to RW. These results from the diversification variable and the "uniqueness as a pricing factor" may provide less support for our hypothesis that the GC channel is preferred, and stronger support that RW provides important advantages as a channel.

For the *promotions* variables for small firms, higher shares to RW occurred when trade show attendance (TRADE) increased, and shares to MM increased as dollars spent at trade shows (PATSS) increased. *Firm Age* (AGEF) affected shares to channels used by large firms, because a 1-year increase in age led to a lower share of sales to LS but to a higher RW share.

Uniqueness as a factor in pricing (DPDPU) was collected as a 5-point Likert scale from "strongly disagree" with the statement to "strongly agree" and was one of several questions intended to reveal growers' attitudes. It was reconstructed into a dummy variable. We expected small growers to agree, and that GC channel share might be enhanced. However, there was no impact on either retail channel, but small growers who chose the higher levels had lower shares to LS and higher shares to RW.

Prediction of Sale Proportions to Rewholesaler Channel by Regions

The rewholesaler channel appeared to be increasingly important as an outlet for nursery crop sales. To understand the differences among different regions on shares going to RW by sales level, we predicted the proportion of sales to different outlets, keeping all other variables to their mean level except the regional dummies and income. Results are presented in Figure 1A–B. Sales values were categorized into distinct categories using a statistical method and visual observation of sales values because most respondents simply checked a category, whereas a few reported exact sales value. Thus, the graphic results are shown in five sales values categories for large firms and three sales values categories for small firms. In Figure 1A–B, the value for each observation is plotted with the predicted proportion going to the RW channel on the Y-axis and total sales values on the X-axis.

Generally, for both firm sizes (large or small), growers located in the West had higher shares of sales to the rewholesaler channel than those firms located in the South. The difference in predicted proportions of sales going to the rewholesaler channel for large firms was higher than for small firms. For large firms, except for the very high sales values category of above $4.5 million, the share of sales going to the rewholesaler channel was highest in the West followed by the South, Northeast, and Midwest regions. For small firms (sales less than $500,000), Northeast firms consistently sent the lowest proportion of sales to rewholesale channel regardless of sales value categories. Both of these graphs confirmed our findings and *a priori* belief.

Discussion and Conclusions

Most of the results for small and large firms as measured by marginal effects were anticipated. We found generally that three groups of variables—region, the plant groups, and the contract production group—played an important role in channel choice. In addition, the channel diversity variable was associated with higher shares for both retail channels as RW declined.

Vigorous economic activity based on housing policies and the increasing market value of homes from 2002–2007 may have obscured change in and market maturation of the industry. Since 2007, overall economic activity levels and the decline in demand for the industry's products support the conclusion that the market may be mature. We discuss evidence of this in the subsequent sections.

The entry of MMs and associated buyer power was a major force in changing competition. The MM share of grower sales, although not largest, is higher than reported here because some share of grower sales to RW is resold to MM. Thus, for the product groups in which MM competes, traditional garden center retailers face stiff price and promotion competition. Hall (2007) also commented on the role of advertising and promotion as indicators of maturity. Although not documented in these model results, there is an increasing emphasis on plant brands in the industry. These brands and products are developed at several levels—by the large growers (*Distinctively Better*® and *Monrovia*® by Monrovia Nursery, Monrovia, CA), by regional groups of growers (*Plants that Work*® by Novalis®, Granby, CT) and by marketing companies that develop and promote unique plants (*Proven Winners*® by a group of leading U.S.

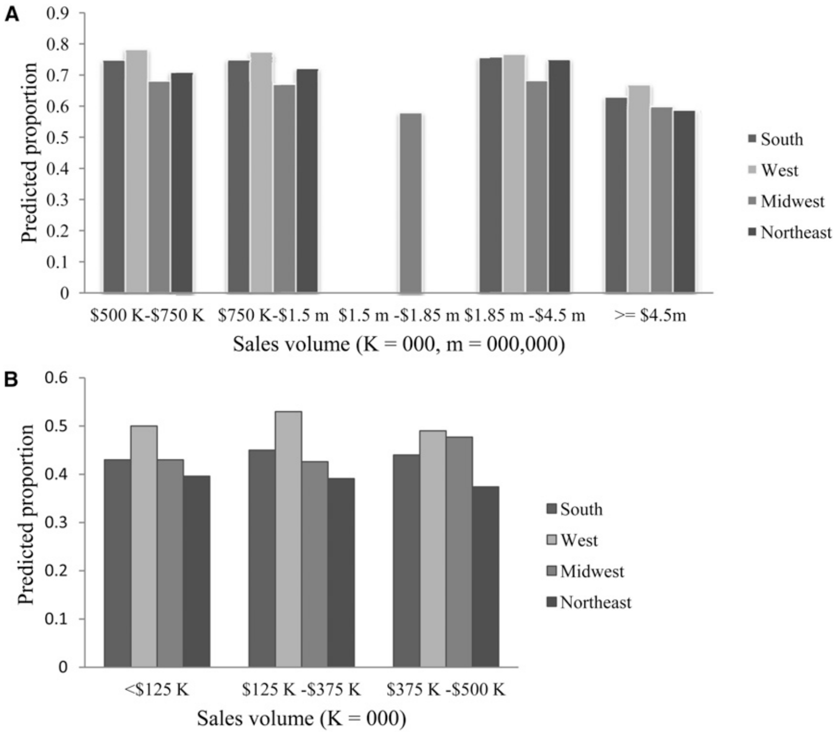

Figure 1. (A–B) Predicted Proportion of Sales to the Rewholesaler Channel by Firm Size (A = large firm, B = small firm), by Sales Volume within Size, and for Four Regions

plant propagators). This is a redefinition of competition.

It appears that GC's role continues to change. The expectation of channel preference was that growers preferred to sell to GC and to LS. However, the RW share declined with diversity suggesting it was one of the first channels to be used. Another point was that the industry is increasingly complex, and middlemen have identified needed services in the market. In many cases, middlemen would be closer to markets physically and in terms of gathering demand information to serve markets better. This appears to be supported in the increasing channel share of RW as sales increased 1) for the four plant groups; 2) when the channel's role increased as total contract sales increased; and 3) when growers reported contracts with other producers.

These factors suggest but do not prove that the industry has matured. Evidence of a strong role for the rewholesaler in the industry appears through the impacts on RW shares in the regions, the plant groups, and in the "contracts" group of variables. The RW share was moved by changes in these variables. Also, the relative numbers of firms that used RW for no or all sales differed from the pattern of the GC and the LS channels.

As noted, Porter's Five Forces model helps to understand channel choice as part of competitive strategy. Here, the crucial structural features of substitutes, rivalry, and market power of buyers are addressed.

In the sense that market channels are alternative ways for production to reach the customer, they are *substitutes*. These channel advantages and disadvantages are discussed in some detail in the conceptual and literature review sections and include customer needs, grower preference, and asset base of seller and buyer. Both sides of a transaction search for alternatives that can perform the function at the best tradeoff between price and performance.

Regarding channels as substitutes, we believed small firms selling to the GC and LS channels would rate uniqueness as a pricing factor as an important variable. However, small growers who agreed more strongly had lower shares to LS and higher shares to RW. The numbers of growers in this survey who chose not to use the MM channel (the none/all ratio) suggests the channel is less desirable. It should be recalled that MM firms actively manage vendor numbers. On the other hand, the RW channel had the lowest none/all ratio with values below three for both firm sizes, and growers used the channel relatively frequently. GC and LS ratios were in the midrange of this measure. Given these considerations, RW may be at least a good substitute and perhaps a preferred channel.

Next we turn to *market power of buyers*. Traditionally, growers developed relationships and sales with customers at industry trade shows. Here, there was little evidence that attendance at trade shows or resources expended on promotion affected shares to channels. The MM channel appeared to exert most power, as reflected in the none/all ratio from Table 2 and the contract variable results. From Porter's list of reasons that a buyer may be powerful, the more relevant include: that MM purchases large volumes relative to almost all growers, and many buyers from all channels are significantly larger than sellers; that grower contracts with MM affected all other channels significantly; that although products purchased by firms in any channel tend to be undifferentiated, brands have been developed; that buyers face low switching costs; and that the absence of promotion variable impacts may suggest buyer power.

Buyer power is mitigated to an extent because product supplied by growers is important to the quality of the retail product for all channels.

As noted, MM buyers can have extensive influence and previous research documented costly terms and conditions imposed on all firms. Monrovia (one of the nation's largest growers) restricts its namesake branded product to non-MM channels. In summary, the MM channel specifically appeared to have sufficient power to affect growers' prices and profitability.

The third of Porter's forces discussed here is the intensity of *interfirm rivalry*. As the industry matures, rivalry may appear between grower firms for channels and markets. Rivalry can increase competition for sales, encourage price cuts to secure the sale, and reduce profitable sales opportunities. As MM has gained share, more rivalry for the "better" channels would be expected. Again using the none/all ratio, the existence and behavior of MM appears to increase rivalry between growers for the alternative channels. This argument suggests additional pressure on profitability across channels as MM has grown. As evidence, in competition for sales to the channels, promotion did not matter. It was expected that shares to channels would be different, but there was relatively little difference between the MM and GC channels. That similarity may help explain the observed impacts with respect to differentiation efforts through branding. New products and branding have become important competitive tools for growers and for retailer firms.

With respect to plant groups variables, an important theme was the positive relationship between growth in sales of PG4 and PG5 shares to RW share. It appears that industry maturity and the emergence of RW mid-market specialists have occurred at least coincidentally. RW clearly was a critical outlet for a significant share of growers, providing a service that funnels product to markets with highest value and helps with differentiation. In considering contracted production, RW was the primary beneficiary when total contracts increased. It also appears that TCOP comprised an important segment of contracting given similar results for CTCTS and TCOP.

We expected that the profit potential and the reality of the competitive situation in which growers compete for sales in preferred channels would be reflected in the channel choice. This choice would reflect the tradeoff among high margin, differentiated customers who can pay more, and price-sensitive customers who offer sales volume that can decrease average fixed costs. Changes resulting from industry maturity were thought to influence channel shares and the concept appeared to contribute to understanding the model results.

Results from the two-limit Tobit model may support the argument that nursery growers prefer to sell to traditional GC and/or LS customers. In addition, a picture emerges of a competitive RW channel. We assume this is the result of the range of activities and business models. RW may be dissimilar to MM with respect to imposition of costly terms and conditions. Evidence includes higher channel share in the West compared with the South, gains in share as sales of all plant groups increased, higher shares as total contracts grew, and higher shares when there were contracts with other producers. The channel diversity variable implied that RW was in the channel mix when channel use was less diverse. These results seem to position RW positively with regard to grower perceptions. This may be the case because it is more familiar with markets and may have a broader network of industry contacts. In addition, some growers may prefer to outsource the marketing function and focus their energies on quantity, quality, and efficiency of production as a risk management strategy and foil for the power of large buyers.

Overall, this study was intended to assist growers' understanding of opportunities, including identification of business characteristics associated with increased or reduced shares of wholesale sales made through four different market channels. Results from our study suggest progress in understanding the relationships between channels, but additional studies are needed to confirm these findings. A caution is that data for this analysis represent only growers' opinions and perceptions. Studies of other links in the supply chain, including rewholesalers, retailers, and service providers such as landscapers, could provide other perspectives.

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