Producer Attitudes Toward Mandatory Agricultural Marketing Organizations: Evidence from the California Fresh Peach and Nectarine Industry

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May 27, 2015

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Abstract

We examine how various producer-level and farm-level factors affect producers' support for marketing orders, focusing on the California fresh peach and nectarine industries and the 2011 referendum vote in which their marketing orders were terminated. We form hypotheses regarding the effects of different factors. We then employ marketing order referendum voting data and additional data collected via a producer survey to test these hypotheses empirically. Some of our results conform to our predictions. For example, we find that producers with greater production of peaches and nectarines were less likely to vote for continuance of the marketing order. However, some results did not conform to our predictions. We found that gross income from farming and related activities to be insignificant and producers with some organic production or some direct sales are both more likely to vote for continuation. Our results suggests important dimensions of differentiation between producers for policymakers, regulators and industries to consider as they ponder the future of marketing orders.

Acknowledgements

1 Introduction

Every few years, the gargantuan omnibus piece of legislation known as the "Farm Bill" is hotly debated among legislators and academics alike. Agricultural marketing orders receive much less attention—save for a few mentions in the *New York Times* thanks to their recurring appearances in U.S. Supreme Court cases (Liptak 2015, Greenhouse2001). Nevertheless, agricultural marketing orders originated in the nation's first Farm Bill, less commonly known as the 1933 Agricultural Adjustment Act. Since then, marketing orders have been used as a policy tool for many agricultural commodities, particularly for specialty crops. Marketing orders can serve many purposes, including direct and indirect supply control, setting of quality and grading standards, market or production research, limiting of unfair trade practices and generic commodity promotion. The intended purposes differ across marketing orders and are outlined in each order's governing documents.

Much has changed since 1933. Farms have become considerably larger and more heterogeneous in size. In 1934, only 1.3% of farms were larger than 1000 acres and represented only 6.7% of harvested cropland. In contrast, in 2012, 8.2% of farms were larger than 1000 acres and represented 64.2% of harvested cropland. In 1934, 39.5% of farms were smaller than 50 acres, and represented 11.2% of harvested cropland. In 2012, 38.5% of farms were smaller than 50 acres and represented 1.40% of harvested cropland (NASS 1937, NASS 2014). In addition, the food manufacturing and retailer sectors have become considerably more consolidated, vertical coordination in agricultural and food production has increased, and information technology has altered marketing and production (Sexton 2000, Martinez 2007). Notably, the internet is an increasingly important tool in both business-to-business and business-to-consumer marketing. Taking these changes into consideration, are marketing orders that impose one-size-fits-all regulations within industries still able to serve industries in which producers are increasingly able to differentiate themselves and their products along a variety of dimensions?

We analyze producers' own assessment of the answer to this question. Specifically, we seek to what extent various producer-level and farm-level factors affect producers' support for marketing orders. We do this by employing marketing order referendum voting data. We then use additional data collected via a more recent survey to gain further understanding of those producers who were eligible to vote. Unlike many command-and-control regulations that use public hearings and

comments as their main means of gaining input on their implications and efficacy, marketing orders are based on a democratic process of member control by producers.[1] For many marketing orders, voting referenda are required at regular intervals (generally every five years). This process provides quantitative evidence of producers' support, or lack thereof, for the existence of the marketing order existence at a specific point in time. The marketing order is continued if the level of support (both in terms of the *number* of producers and the *share of output* they produce) is above a certain threshold. Once approved, the marketing order is mandatory until (or unless) it is terminated in a future referendum.

The specific context of this paper is the California (CA) peach and nectarine industry, which is concentrated in California's Central Valley. Until 2011, Federal marketing orders 916 and 917 provided for industry regulation of fruit size, grade, maturity, pack and container, as well as inspection relating to these regulations. The activities were funded by mandatory assessment on all California growers of peaches and nectarines for fresh markets. The peach order was put in place since 1939, and the nectarine order in 1958 (Federal Register 2011). The two orders, although separate, were included on the same ballot in the 2011 continuance referendum (and in earlier referenda) due to the prevalence of growers producing both crops and the marketings orders' joint administration under the CA Tree Fruit Agreement.[2] Although continuation was supported by nearly two-thirds of those producers of each fruit voting in the 2011 referendum, these growers together represented less than half the output of all growers voting in each case and consequently the threshold for share of output set for continuation was not achieved.

Using referendum ballot data from the 2011 referendum obtained from the USDA and survey data we obtained directly from peach and nectarine producers, we examine factors influencing producers' votes. We find that producers with greater production of peaches and nectarines and those who obtained a higher percentage of their gross income from peach and/or nectarine production were less likely to vote for continuance of the marketing order. Other significant variables include organic production, direct sales, education, farming as sole occupation, yield and business type, depending on the specification. Many of these results conform to our predictions. Others—for example, that those farmers with organic production and direct sales support continuance of the

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[1] This power is not absolute, however; the supreme authority lies with the Secretary of Agriculture.
[2] The agreement was dissolved after the termination of the marketing orders.

marketing order—were unexpected. These results provide important insights about the winners and losers for this marketing order and suggest important factors to consider when evaluating marketing orders in other industries. Implicitly, these data also tell us about important factors that may have been changing in the industry over time that contributed to diminished support for the marketing order.

We contribute to the literature by considering a broader range of factors contributing to the distributional impacts of marketing orders than previous studies on marketing orders. We do this by taking a data-driven approach that utilizes both marketing order referendum ballot data and survey data. Much of the extant literature on the distributional implications of marketing order policies takes a purely theoretical approach. With a few exceptions, those that do include an empirical component look at only one dimension of producer differentiation and only one function of marketing orders. While these studies are useful in helping us to understand certain aspects of marketing order impacts, they do not provide a very complete picture of producers' attitudes toward marketing orders.

The remainder of the paper is organized as follows. In section 2, we outline our theoretical approach. In section 3, we describe the hypotheses that we will test empirically. In section 4, we describe the data. In section 5, we describe our results, and in section 6 we conclude.

2 Research Methodology

We take a very broad approach to considering the costs and benefits of marketing orders. We assume that the agricultural marketing order provides a positive benefit, B, to the industry. This benefit is the sum of benefits to the N growers comprising the industry. Grower i obtains benefit b_i. Thus, $B = \Sigma_{i=1}^{N} b_i$. Similarly, the cost to the industry, T, of administering the marketing order is allocated among the N growers constituting the industry, and grower i must pay t_i, where $T = \Sigma_{i=1}^{N} t_i$. Then, for this marketing order to exist, it is natural to assume that $B > T$. Although a natural assumption, this is actually a stronger assumption than the one needed for a marketing order to exist if we assume the requirement for existence is based on the Federal government's referendum voting rule. One could imagine a case in which $b_i > t_i$ for a sufficient number of growers with sufficient production to meet the voting requirements of the Federal government, but

the relative benefits and costs to the producers not supporting the marketing order's existence was such that $B < T$. We make no assumptions about the B-T relationship, the units of b_i and t_i for grower i, or how grower i arrives at his or her valuation of the benefits or costs of marketing order. We simply assume is that grower i will vote for continuation of the marketing order if $b_i > t_i$ and will vote for termination of the marketing order if $b_i < t_i$. Then we consider a range of factors that may affect the relative levels of t_i and b_i for grower i, and thus affect the producers' vote. For each factor, we offer some hypotheses of which producers will support continuation and which will support termination of the marketing order that are specific to our context.

The evidence on the B-T relationship is mixed. Some studies appear to corroborate the idea that $B > T$ in certain specific marketing order settings (e.g. Kaiser et al. 2005, Richards et al. 1996). However, in other settings, some theoretical and empirical evidence suggests that the aggregate benefits to producers are not so clear (e.g., Saitone and Sexton 2010, Crespi and Marette 2009, and Williams et al. 2002). Regardless of whether $B > T$ or $B < T$, $b_i > t_i$ is not necessary for every producer in order for support to be sufficient for the marketing order to be approved. We expect both t_i and b_i to vary across farmers depending on their characteristics and the characteristics of their output. Over the last 15 years, there has been an increased interest in better understanding these distributional implications. Much of this work is entirely theoretical (e.g., Alston et al. 2000, Alston et al. 2003, Chung and Kaiser 2003, Crespi and Marette 2009, Zheng et al. 2010). These models are useful in illuminating distributional issues related to certain marketing order provisions. Some studies have also included an empirical case study component (e.g., Chung and Kaiser 2000, Crespi and Marette 2002, Crespi and Marette 2003), which further highlights how certain producers might be affected. What these studies lack, however, is a full accounting of the benefits and costs of marketing orders as viewed by producers. Most marketing orders have more than one activity (for example, research *and* promotion), so considering only one benefit of marketing orders does not tell us about the benefit of the marketing order as a whole. Secondly, economic studies of marketing orders invariably assume that producers maximize profits. However, anecdotal evidence from farmers suggest that some may support or oppose marketing orders for non-economic reasons regardless of whether or not they benefit personally.

We know of just two studies in addition to our own that use a very data-driven approach to the study of marketing orders. One of these studies also employs ballot data from a marketing

order referendum. Mixon et al. (1990) use marketing order referendum data for Vidalia onions to look at producer-level factors that affect marketing order support coupled with grower/packer registration forms for grower, but they do not have data from a survey to evaluate the effect of additional producer-level and farm-level variables likely to affect growers' voting decisions. Filson et al. (2001) do a cross-industry analysis to identify industry-level factors which influence the presence of a marketing order in that industry, but do not analyze producer-level and farm-level factors.

Before discussing the data, we propose a number of hypotheses regarding producers' voting decisions in the 2011 continuance referendum for the marketing orders for fresh California peaches and nectarines.

Hypothesis 1: Producers with a larger gross income from farming are less likely to vote for continuation of the marketing order. We expect producers with a larger gross income to conduct more of their own quality control in-house, likely exceeding the marketing order's grading requirements. The marketing order would thus be redundant and costly (for example, in the form of inspection transaction costs) for these producers.

Hypothesis 2: Producers with a greater volume of peach and/or nectarine production are less likely to vote for continuation of the marketing order. We expect producers with a larger volume of production to have more needs for flexibility in terms of container and pack size, as well as grade, as they meet the needs of specific retailers. The marketing order could thus be costly for these producers because it would reduce their ability to meet buyer needs.

Hypothesis 3: Producers for whom production of peaches and nectarines represents a larger share of their gross farm income are less likely to vote for continuation of the marketing order. Unequivocally, we know that producers for whom production of peaches and nectarines represents a larger share of their gross farm income also spend a larger share of their gross income on the marketing order assessment than other producers. At the same time, these producers are more specialized producers of peaches and nectarines, and this crop-specific knowledge means they have less need for the marketing order.

Hypothesis 4: Producers for whom farming is their sole occupation are less likely to vote for continuation of the marketing order. We expect producers for whom farming is their sole occupation to have greater farming skill and dedicate more time to producing and marketing their output. This farming-specific knowledge means they have less need for the marketing order.

Hypothesis 5: Producers with some organic production are less likely to vote for continuation of the marketing order. We expect that producers with organic production do not realize as many benefits from the marketing order as conventional producers because the marketing is not organic-specific—all fruit are held to the same standards but organic production is an important dimension of differentiation for these producers. Organic producers of a number of commodities have made this argument. In fact, the Organic Trade Association proposed a check-off program specifically for organic producers in early 2015 for this reason.

Hypothesis 6: Producers with some amount of direct sales are less likely to vote for continuation of the marketing order. Direct sales channels allow producers to have a direct relationship with consumers. We expect this relationship is more valuable than any standards or regulations imposed by the marketing order, so the benefits of the marketing order are limited.

Hypothesis 7: Producers who've grown peaches and nectarines for longer are less likely to vote for the marketing order. These individuals have more industry and crop-specific experience and more connections within the industry, leaving them less need for the marketing order.

Hypothesis 8: Producers with more education will be less likely to vote for the marketing order. We expect producers with more education to have greater management skill and innovation and to thus want more flexibility to manager or innovate as they see fit, as opposed to being confined in this respect by the marketing order.

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3 Data

We use two data sets to examine producer attitudes toward agricultural marketing orders. The first includes production (in acres and 25-pound containers), business type, counties of production and vote choice for the 109 California producers of peaches and nectarines for fresh markets who chose to vote in the 2011 referendum that resulted in termination of the two fruits' marketing orders. This data set was obtained via a Freedom of Information Act (FOIA) request from the US Department of Agriculture's (USDA) Agricultural Marketing Service (AMS).

We obtained the second set of data via a mail survey. The mail survey was sent in January 2015 to all producers eligible to vote in the 2011 referendum. We obtained 62 responses. Along with asking questions similar to those asked in the referendum, we asked questions about operational characteristics in 2010 and 2014, producer characteristics, opinions about the marketing order, decision to vote and how to vote in the 2011 referendum, and participation in agricultural associations. The names and addresses of eligible producers were obtained from the AMS via a second FOIA request. Some addresses were redacted or out of date (as the address information was from 2010). These addresses were filled in and updated using an internet search. Out of the 437 operations (some producers appeared to have more than one operation) in the list provided by AMS, this exercise resulted in what we believed to be up-to-date address information for 380 growers. Producers were sent a pre-survey letter and were then sent the full survey twice. We received 65 responses, for a response rate of 17.1%.[3] Of the 65, three were entirely unusable due to inconsistent responses or lack of information and five simply indicated they had exited the industry since 2010 without answering any question, including those related to 2010 production, which is one of the two years our survey references. Of the remaining 57 responses, another 11 indicated they had exited the industry since 2010, but did complete the section related to 2010 production.

Table 1: Ballot and Survey Data Comparison - Continuous Variables

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[3]While we considered attempting to match the ballot and survey data by production quantity or acreage, we ultimately decided not to for two reasons. First, the numbers in the two data sets were not an exact match, so this process would have introduced error. Secondly, the ballot data has additional detail on production location that, if matched to survey data, could potentially compromise the anonymity of producers in our survey sample.

	Ballot		Survey	
	N	Mean (s.d.)	N	Mean (s.d.)
Containers (peaches)	101	121,538.7 (242885.5)	40	79,885.32 (217197.4)
Containers (nectarines)	99	108,807.5 (211920.8)	35	39,840.6 (58323.92)
Acres of peach and nectarines	107	290.2651 (586.991)	49	136.3878 (212.0225)
Yield (containers/acre)	106	651.6603 (278.8283)	44	465.9643 (307.5674)

Table 2: Ballot and Survey Data Comparison - Categorical Variables

	Ballot		Survey	
	Total N	Share	Total N	Share
Vote for peach order continuation	102	0.61	37	0.38
Vote for nectarine order continuation	99	0.63	31	0.39
Vote for peach order continuation (production)	101	0.36	31	0.35
Vote for nectarine order continuation (production)	99	0.41	27	0.21
Growing peaches and nectarines	111	0.80	48	0.65
Growing nectarines only	111	0.08	48	0.13
Growing peaches only	111	0.12	48	0.23

Tables 1 and 2 compare our two data sets. All data in these two tables correspond to the 2010 marketing year. Table 1 shows that the producers responding to our survey had less stone fruit acreage and production in 2010, as well as lower yields as compared to the complete set of those who participated in the marketing order referendum. Table 2 shows that the producers in our survey sample were much less likely to vote for continuation of the marketing order. Because the USDA decision to continue or terminate a marketing order is based on a two-part voting rule that considers both number of producers supporting continuation and their production, we calculated the share of output produced by those voting in support of continuation in each of our samples. For peaches, these two shares are similar (suggesting those voting for continuance in our survey sample produced more peaches than those voting for continuance in the referendum). The nectarine share is considerably lower in the survey sample; paired with the lower share of voters, this suggests that nectarine producers in the referendum population and survey samples were similar in volume of production.[4] Growers producing only peaches or only nectarines were overrepresented among

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[4] We obtained the ballot statistics from the raw ballot data provided by AMS. However, our computed statistic for "Vote for nectarine order continuation (production)" using the raw ballot data does not match that published by AMS in the Federal Register. We obtained 0.41, and the Federal Register entry reads 0.36. The Federal register entry for peaches is also 0.36 (as was our calculation). It seems likely that the Federal Register entry for nectarines may simply be a typo.

survey respondents.

Tables 3-5 and Figures 1 and 2 provide descriptive statistics of additional variables that are specific to each data set. The ballot data includes information on business type for approximately half the voters at the time of the 2011 referendum. Of these individuals, nearly 60% incorporated their operations as corporations, another 25% operated as partnerships, and the remaining individuals utilized some other organizational form. In Table 4, we see additional categorical summary statistics for the survey data. More than 20% of producers produced at least some of their output using organic production methods in 2010. In addition, 20% of producers sold some of their peach and nectarine output through direct sales, such as farmer's markets and farm stands in 2010. Finally, more then 60% of producers reported that farming was their sole occupation in 2015.[5] In Table 5, we present summary statistics for additional continuous variables from our data set. On average in 2010, our survey respondents earned more than 50% of their gross income from farming from peaches and nectarines. In addition, as of January 1, 2011, survey respondents had been been growing peaches and/or nectarines for 25 years and were 56 years old.

Table 3: Additional Summary Statistics - Ballot Data

	N	Share
Business type is corporation	51	0.59
Business type is partnership	51	0.26
Other business type	51	0.16

Table 4: Additional Summary Statistics - Survey Data (Categorical)

	N	Share
Some organic production	48	0.23
Some direct sales	48	0.21
Farming is sole occupation	57	0.65

Table 5: Additional Summary Statistics - Survey Data (Continuous)

	N	Mean	Std. Dev.	Min.	Max.
Percentage of gross income from peaches and nectarines	47	56.07	34.67	0	100
Years growing peaches and nectarines	55	25.56	13.87	1	61
Age	52	56.31	11.96	27	84

Figure 1 depicts gross income from farming and related activities in 2010. One third of survey respondents earn over a million dollars that year. These are considered large farms in

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[5]We assume this occupational status was the same in 2010 for the purpose of our regressions.

the USDA farm typology. The second most frequent category was those farms earning income of $150,000 to $349,999 annually. These farms are considered moderate-sales small farms (Hoppe and MacDonald 2013). In Figure 2, we see that more than 50% of respondents had a bachelor's degree, or graduate/professional degree in 2015.[6]

Figure 1: Gross Income from Farming Activities of Survey Respondents (2010)
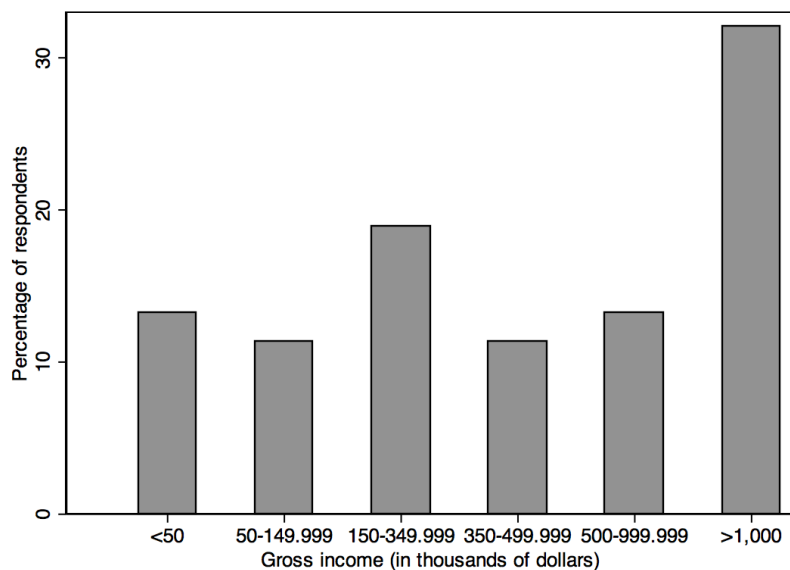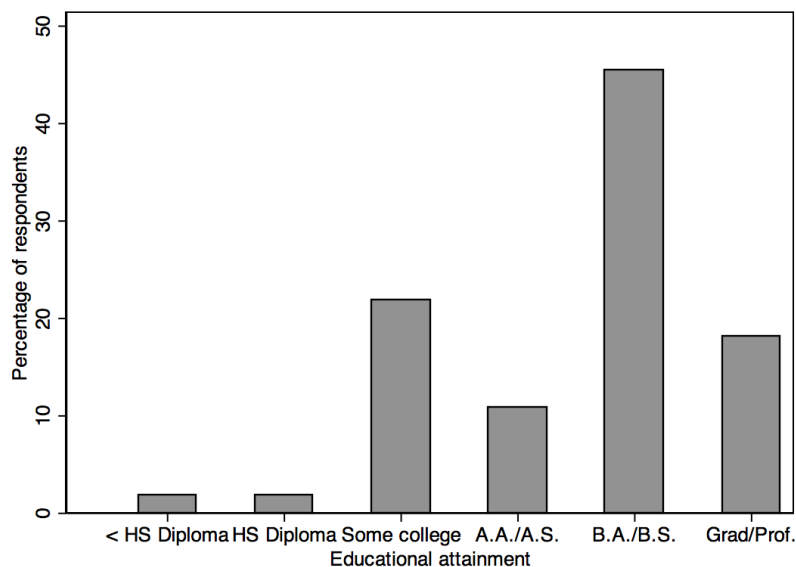

Figure 2: Educational Attainment of Survey Respondents (2015)

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[6]Since all of the respondents in our sample were over 30 in 2015, with an average age of 60, we assume that educational attainment was the same in 2010 for the purposes of our regressions.

4 Empirical Estimation and Results

For our empirical estimation strategy we use probit estimation with robust standard errors. All specifications have as their dependent variable producer voting choice, with a value of 1 indicating that the producer voted for continuation and a value of 0 indicating that a producer voted for termination.[7] We run separate estimates for our two datasets. Table 6 contains our results using the survey data, and Tables 7-9 contain our results using the ballot data.

Our results shown in Table 6 vary by specification. In specification (1), producers with a greater percentage of their farming income coming from peaches and nectarines are less likely to support continuation of the marketing order, as expected. This result holds at the 10% significance level. However, we also see that producers with organic production are more likely to support continuation and this result is significant at the 5% level, which we did not expect. Those two effects are more significant in specification (2), when we include additional variables control for age and farming as sole occupation. In addition, in specification (2) we see that possessing a graduate degree is significant at 5% and farming as a sole occupation is significant at 10% and both have the predicted signs. However, direct sales is also significant at the 10% level and does not have the predicted sign. Finally, in specification (3), all of the significant effects found in specification (2) remain with the exception of direct sales, but their significance changes. Some organic production and farming as a sole occupation become less significant, but possessing a graduate degree becomes more significant. Also in specification (3), we find that producers producing a higher volume of stone fruit are less likely to support continuation of the marketing order, as predicted. This result holds at the 10% significance level. Finally, the Pseudo R^2 increases from specification (1) to specification (2) and specification (2) to specification (3). We highlight possible reasons for the unexpected results we found in the discussion of our hypotheses below.

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[7]Our survey data did provide us with some observations of individuals who did not vote in the marketing order referendum. Exploring the determinants of their non-participation decision remains a subject of future work.

Table 6: Marginal Effects of Survey Regression Results

	(1)	(2)	(3)
Containers peaches and nectarines	-1.39e-06	-2.10e-06	-2.53e-06*
	(1.08e-06)	(1.15e-06)	(1.03e-06)
Some organic production	.6492024**	1.234847**	.9343399*
	(.2378668)	(.394886)	(.4149627)
Yield (containers/acre)	-.0000913	.0014836	.0013466
	(.0005148)	(.0008539)	(.0011052)
Percent of gross income from peaches and nectarines	-.0150722*	-.0307209***	-.0246986***
	(.0058646)	(.0073549)	(.0060288)
Gross income > $500K	.1239967	.3586874	.2222195
	(.2942666)	(.3586847)	(.4765387)
Some direct sales	-.0334755	1.407858*	.7574335
	(.2928824)	(.645453)	(.4346944)
Growing peaches only	-.4057979	.4519862	.3510751
	(.3099002)	(.5756119)	(.6273149)
Growing nectarines only	.4948945	.0632894	.2171455
	(.3405841)	(.3325006)	(.3432426)
Less than bachelor's degree	-.426253	-.2443345	.0014354
	(.3106445)	(.3658888)	(.4142092)
Graduate or professional degree	-.498779	-.9829937*	-.9965627**
	(.3703703)	(.4384108)	(.3181304)
Farming is sole occupation		-1.819**	-1.478681*
		(.5672903)	(.6552828)
Age		.0286453	.0045049
		(.0213618)	(.0121193)
Years growing peaches and/or nectarines			.015025
			(.0105931)
N	31	30	30
Pseudo R^2	0.4973	0.5675	0.5907

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

In reviewing the results of our regressions using ballot data in Tables 7-9, we find that volume is significant in the predicted direction in all specifications; producers with greater volume are less likely to vote for marketing order continuation. In addition, in specifications (6) and (7) in Table 7, specification (11) in Table 8 and specifications (14) and (15) in Table 9, we find that one or more of the business-type variables is significant, which was unexpected. The omitted business type is a corporation. The significance levels invariably increase with the addition of county controls. We did not ask about business type in our survey. However, it's possible that business type is correlated with other variables we did include in our survey that were significant in one or more of

the specifications reported in Table 6—for example, if survey respondents with graduate degrees are more likely to have operations structured as corporations. In addition, yield is significant in our nectarine regression with or without the inclusion of county-level controls (specifications (14) and (15) in Table 9). In this case, yield could be driven by other variables not available in the ballot data but available in our survey data, such as education or gross income from farming and related activities. In each of Tables 7 through 9, Pseudo R^2 increases from left to right.

Table 7: Marginal Effects of Ballot Regression Results - Peach and Nect. Producers

	(4)	(5)	(6)	(7)
Containers	-5.12e-07**	-6.01e-07**	-1.68e-06**	-1.85e-06***
	(1.74e-07)	(2.03e-07)	(5.58e-07)	(4.26e-07)
Yield (containers/acre)	.0002279	.0001885	.0002269	.0001374
	(.0001829)	(.0001934)	(.0002797)	(.0002844)
Growing peaches only	-.016815	-.0293294	-.3004691	-.255143
	(.1570695)	(.1597909)	(.2584829)	(.2565889)
Growing nectarines only	.0935743	.1093377	omitted	omitted
	(.2058389)	(.2198409)		
Business type is partnership			.2991456	.3562783
			(.2143547)	(.2346816)
Other business type			.8269843**	.6939039***
			(.2892619)	(.1854969)
County controls		X		X
N	106	102	45	42
Pseudo R^2	0.0784	0.1027	0.3198	0.3610

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Table 8: Marginal Effects of Ballot Regression Results - Peach Producers

	(8)	(9)	(10)	(11)
Containers	-9.29e-07**	-1.28e-06**	-1.56e-06**	-2.59e-06***
	(3.59e-07)	(4.73e-07)	(5.94e-07)	(7.39e-07)
Yield (containers/acre)	.0002413	.0002228	.0002095	-.0001564
	(.0001474)	(.0001713)	(.000206)	(.0002467)
Growing peaches only	.0107349	-.0570332	-.189877	-.1649381
	(.1567794)	(.1660326)	(.2518339)	(.2480336)
Business type is partnership			.3003513	.4613976
			(.2019936)	(.2604283)
Other business type			.3411585	.691356**
			(.2542967)	(.2594943)
County controls		X		X
N	101	90	46	41
Pseudo R^2	0.0799	0.1316	0.2205	0.3527

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

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Table 9: Marginal Effects of Ballot Regression Results - Nectarine Producers

	(12)	(13)	(14)	(15)
Containers	-8.42e-07*	-1.01e-06*	-4.68e-06**	-7.02e-06***
	(3.33e-07)	(4.07e-07)	(1.64e-06)	(1.72e-06)
Yield (containers/acre)	.0003336	.0003128	.0010926*	.001149*
	(.0001837)	(.0002087)	(.0004502)	(.0005662)
Growing nectarines only	.2163008	.1675818	omitted	omitted
	(.2164952)	(.2387899)		
Business type is partnership			.4347451	.5826572*
			(.2420434)	(.2853258)
Other business type			.47999*	1.084708***
			(.2303505)	(.23183)
County controls		X		X
N	99	90	42	37
Pseudo R^2	.0775	.0948	.3776	.4914

* $p < 0.1$ ** $p < 0.05$ *** $p < 0.01$

Returning to our hypotheses, we consider some alternative explanations for the results that did not conform to our predictions.

Hypothesis 1: Producers with a larger gross income from farming are less likely to vote for continuation of the marketing order. This hypothesis was not supported by our results. We did not find any significant effect–positive or negative–of this variable. This result is important because farm size is an often-studied dimension of differentiation among producers. However, our results suggest that overall farm size is not a significant factor in determining producers' support for marketing order continuation.

Hypothesis 2: Producers with a greater volume of peach and/or nectarine production are less likely to vote for continuation of the marketing order.
The results from specification (3) using the survey data and all specifications using the ballot data (4 through 15) support this hypothesis. Volume is always at least weakly statistically significant ($p < 0.01$) and is significant at the 5% level in all but two of the specifications using the ballot data.

Hypothesis 3: Producers for whom production of peaches and nectarines represents a larger share of their gross farm income are less likely to vote for continuation of the

marketing order. The results from specifications (1), (2) and (3) using the survey data support this hypothesis.

Hypothesis 4: Producers for whom farming is their sole occupation are less likely to vote for continuation of the marketing order.
The results from specifications (2) and (3) using the survey support this hypothesis.

Hypothesis 5: Producers with some organic production are less likely to vote for continuation of the marketing order. The results from specifications (1), (2) and (3) using the survey data contradicted this hypothesis. In fact, producers with some organic production were significantly more likely than other producers to support continuation of the marketing order. This result could be driven by the research services of the CTFA, because organic producers must identify pest and disease management techniques that are permissible under organic certification while conventional producers often have a broader set of options. Many producers commented in their survey responses that CTFA research was very useful to them and they would have liked this aspect of the marketing order to remain in place.

Hypothesis 6: Producers with some amount of direct sales are less likely to vote for continuation of the marketing order. Results regarding this hypothesis are mixed. The results from specifications (2) using the survey data contradicted this hypothesis. In this specification, we found that producers with some direct sales were significantly more likely than other producers to support continuation of the marketing order. However this result disappears in specification (3) when a variable for years growing peaches and nectarines is added.

Hypothesis 7: Producers who've grown peaches and nectarines for longer are less likely to vote for the marketing order. This hypothesis was not supported by our results. The variable never had a statistically significant effect.

Hypothesis 8: Producers with more education will be less likely to vote for the marketing order. The results from specifications (2) and (3) using the survey support this hypothesis.

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5 Conclusion

In this paper, we identify some of the important factors affecting producers' support or lack thereof for the Federal marketing orders for fresh California peaches and nectarines that were terminated in 2011. Some of the results match our predictions. We find support for our hypotheses that producers with a large volume of stone fruit production, those with a larger percentage of their gross income from farming coming from stone fruit, and producers for whom farming is their sole occupation were less likely to vote for continuation of the marketing order, as were producers with more education (and we would expect, managerial skill).

However, not all results matched our prediction. We learned some surprising things about producers who had some organic production or market some of their output through direct sales—these growers were more likely to vote for continuation of the marketing order. This result is counter to anecdotal evidence that growers of organic and local foods are not benefited by marketing orders. In our survey responses, we received several comments that organic growers did not benefit from the marketing order. In addition, the Organic Trade Association is petitioning USDA for their own organic check-off, an action with suggests existing marketing orders and check-offs are not fully meeting the needs of organic producers. Finally, we found that farm income—which we expected to be a significant driver—was not important given our specifications. Neither was years of experience growing peaches and/or nectarines.

These results suggest that the reasons producers support or oppose marketing orders may go beyond the most obvious dimensions of producer heterogeneity, such as farm size (as measured by gross income from farming in our data). Our study is the first that we are aware of to use survey data from growers with ballot data from marketing order referenda, which gives us more information about producers in the industry and how they viewed the marketing orders at the time of the continuation referendum and suggests other significant factors of differentiation that may be of interest to policymakers and regulators as they consider the future of particular marketing orders.

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