

Who joins the club?

Learning pathways for sustainable agriculture certification

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1 Introduction

Inducing firms to internalize environmental costs is a fundamental challenge for environmental governance. Voluntary environmental programs (VEPs) allow firms to signal beyond-regulation environmental behavior via third-party certification. Certification by a VEP thus constitutes an excludable “club good,” which firms may expect to be rewarded for through increased market share, brand loyalty, price premium, or regulatory relief (Prakash and Potaski, 2012).

In California, multiple VEPs are available to viticulturists including regional and statewide certifications specific to winegrape growing and general sustainable farming programs. We investigated viticulturist participation three regional programs corresponding with three regions surveyed: Napa Green Certified Land in Napa County, Lodi Rules for Sustainable Winegrowing Certification in Lodi, and Sustainability in Practice Certification in the Central Coast region. We also surveyed growers about participation in the statewide Certified California Sustainable Winegrowing program, USDA Organic certification, and Demeter Biodynamic certification. Figure 1 presents the fraction of growers participating in these programs by region. Because the club-good benefits of VEPs are reputation-dependent, the decision to join an early-stage VEP is largely anticipatory. Indeed, most of the growers we surveyed who are certified do not receive a price premium for the certification; however, the fraction who do receive a price premium for certification varies by certification and region (Figure 2).

Since most growers don’t receive a price premium for obtaining these certifications, we sought to understand what motivated growers to join VEPs. We anticipated multiple drivers operating heterogeneously over the various certifications and vineyards of different sizes, regions, and grower attributes. We expected larger vineyards to anticipate greater economic returns via economies of scale and so be more likely to join than smaller vineyards. Also anticipating economic benefits, we expected vertically integrated vineyards to be poised to more readily capture market incentives and so join with greater frequency than non-vertically integrated vineyards.

Most of these VEPs have been relatively recently developed so we expected social learning pathways to play

an important role in promoting joining. We surveyed growers about the usefulness of various information sources and grouped those sources into five learning pathways via factor analysis (Table 1). Figure 3 presents grower assessments of usefulness of these pathways by region. We hypothesized that the social pathways—public and private organizations and social learning—would be positively associated with all certifications, but especially those with an associated strong outreach effort such as the Regional certifications.

Finally, the three regions surveyed—Napa, Lodi, and the Central Coast—are different in important ways. The Central Coast is a larger area with more diffuse growers, both spatially and socially. The Central Coast Vineyard Team’s outreach efforts have been concentrated in one county (San Luis Obispo), and it does not have the history that similar organizations elsewhere do. We expected these factors to lead to lower VEP participation, especially for regional certification. In contrast, the Lodi Winegrape Commission is a strong local institution that has conducted extensive outreach around its Lodi Rules certification program. We thus expected participation to be higher for regional certification in Lodi than the other regions.

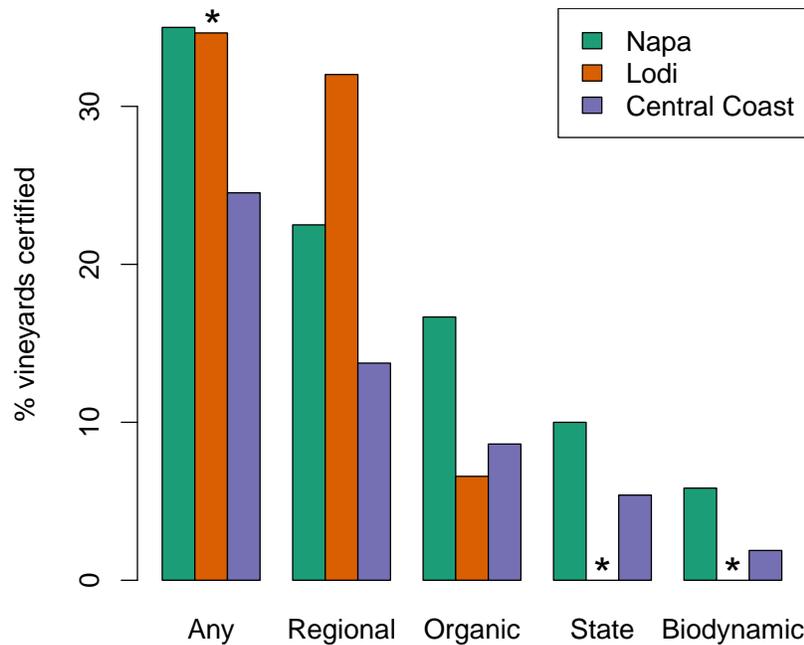


Figure 1: Percent of surveyed growers with various certifications by region. *Lodi surveys did not ask about State or Biodynamic certifications.

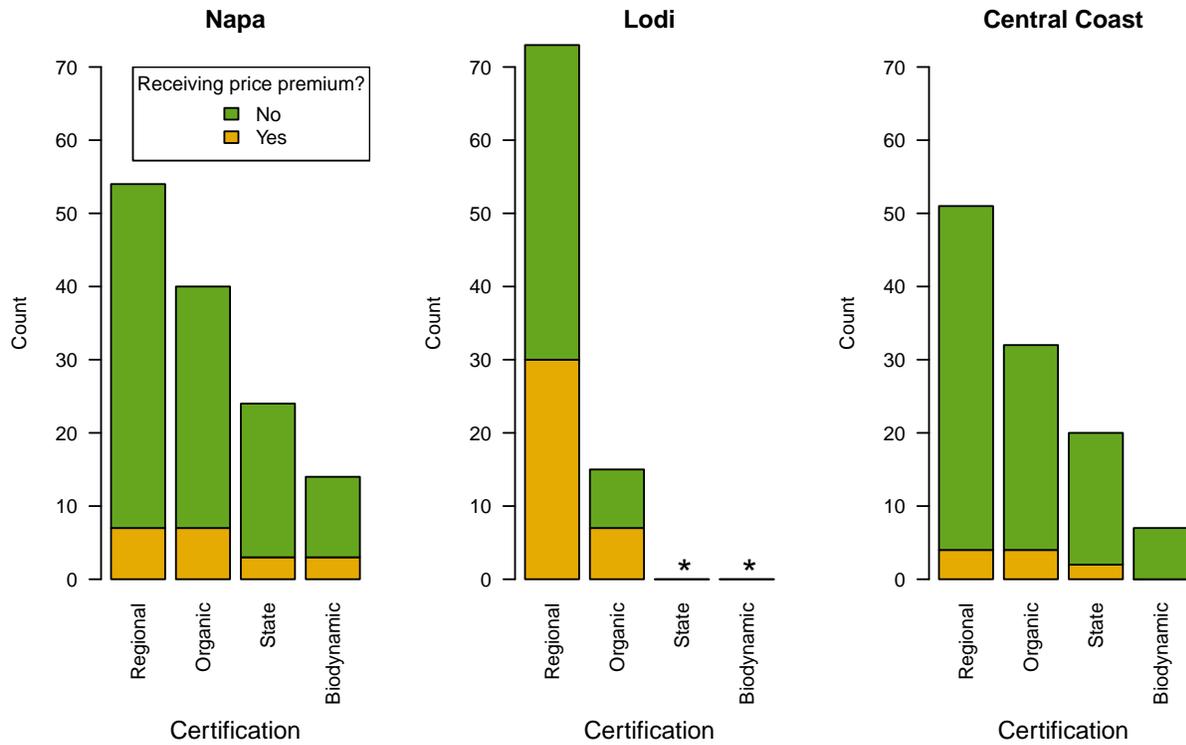


Figure 2: Vineyards receiving price premium for certification, by region and certification type. Note that some vineyards have multiple certifications but were asked about price premiums only for certification generally, so the data may slightly overestimate the number of growers receiving a premium for each certification. *Lodi surveys did not ask about State or Biodynamic certifications.

Table 1: Factor analysis grouped grower information sources into five learning pathways based on perceived usefulness.

Public organizations	State or County Farm Bureau County Farm Advisors County Agricultural Commissioner Resource Conservation District Regional Water Resources Control Board Natural Resources Conservation Service
Private organizations	Local Grape Grower Association State Grape Grower Association Winegrape Sustainability Program* Trade association conferences/symposiums
Published materials	Trade Journal Internet resources Viticulture textbooks or other reference books University publications Newspapers
Social learning	Winery personnel Your field crew Pest Control Advisors Winegrape growers who are not your relatives Viticulture consultant Winegrape growers who are in your family Observations of other growers' vineyard conditions Field trials conducted by others
Individual experience	Trial and error with vineyard practices Observations of your own vineyard conditions Written records of vineyard inputs and performance Field trials conducted on your vineyards

**Winegrape Sustainability Program was removed from subsequent analysis for being too closely related to the dependent variables of interest.*

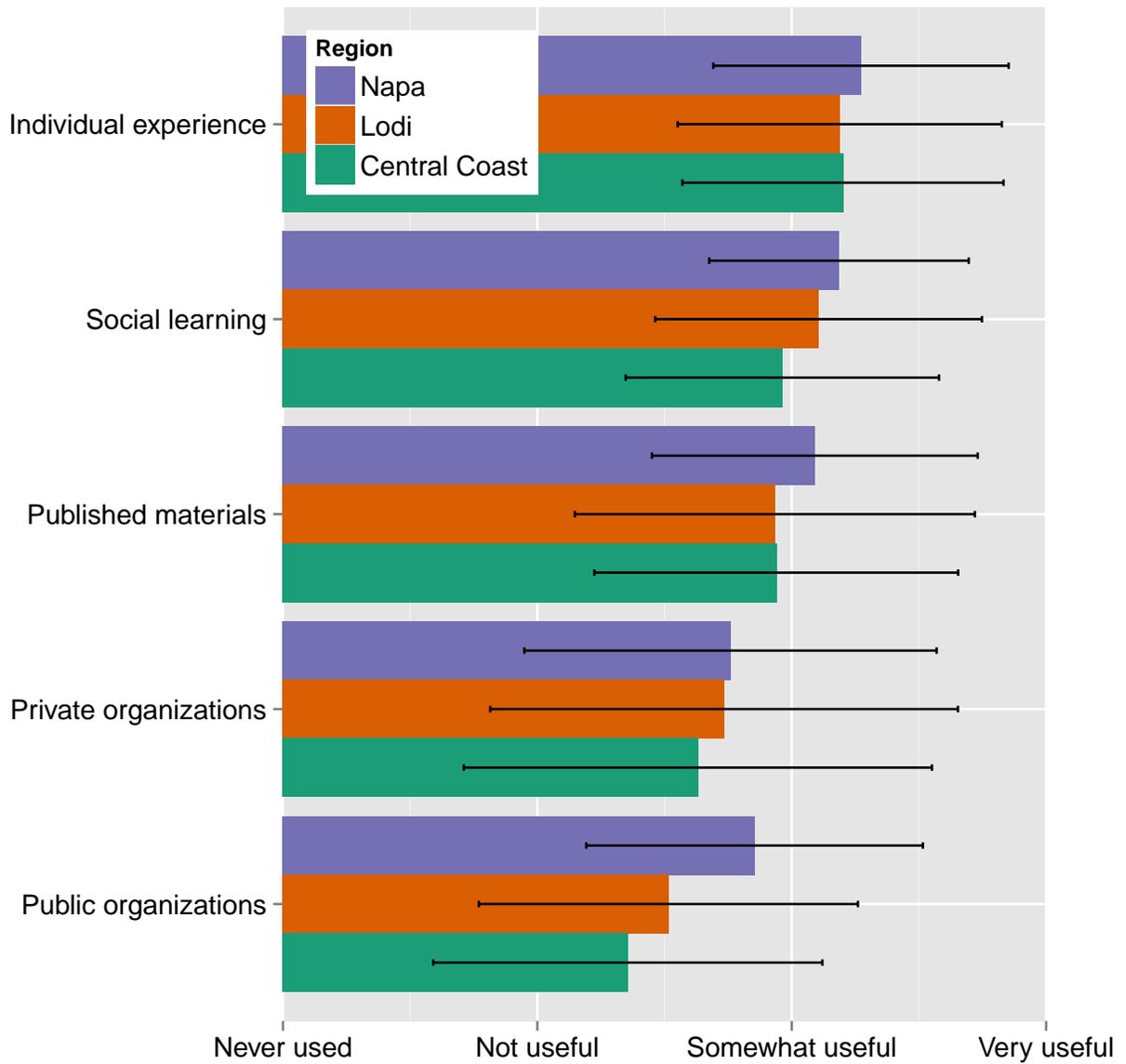


Figure 3: Average usefulness of grower learning pathways. Coding: “Never used” = 1, “Not useful” = 2, “Somewhat useful” = 3, “Very useful” = 4. Error bars represent standard deviation.

2 Methods

Winegrape growers in three wine-growing regions of California were extensively surveyed on their management practices, participation in outreach activities, learning pathways, social networks, attitudes and beliefs, economics, and demographics. Surveys were administered in 2011 for Lodi and 2012 for Napa and the Central Coast. Growers were identified from county Agriculture Commissioners' pesticide use reports, and additional eligible growers and viticulture outreach professionals were identified through snowball methods. Surveys were issued by mail and non-respondents were asked several times to respond; the final response rate was approximately 30 percent.

The survey gathered information on certification by four types of VEPs: USDA Organic ("Organic"), Demeter Biodynamic ("Biodynamic"), California Sustainable Winegrowing Alliance's Certified California Sustainable Winegrowing ("State"), and, respectively by region, Napa Green Certified Land/Fish Friendly Farming, Central Coast Vineyard Team Sustainability in Practice, and Lodi Rules Sustainable Winegrowing ("Regional"). Vineyard certifications are dummy variables coded as one for organic and biodynamic for any number of certified acres greater than zero, and for regional and state for having completed the certification process. Note that State certification was still emergent in 2011 and 2012 and participation in this program has expanded significantly in the years since.

Predictor variables include size of vineyard, which in all cases is log-transformed to normalize its distribution and prevent undue influence of a few very large farms. In all models, region is included as a factor variable and is interacted with vineyard size. Whether a vineyard is vertically integrated with a winery and whether the owner/operator is a certified Pest Control Advisor (PCA) are included in models as dummy variables. Learning pathway usefulness scores were calculated by averaging across each individual's responses within the five categories with responses coded as "Never used" = 1, "Not useful" = 2, "Somewhat useful" = 3, "Very useful" = 4.¹ All models employed dichotomous logistic regression to test the likelihood of each certification as a function of vineyard and grower characteristics. All analyses were performed in R Statistical Computing Environment version 3.0.2 (R Core Team, 2013).

3 Results & Discussion

Larger vineyards are more likely to participate in each of the programs in each regions (Figure 4). This likely reflects economies of scale and anticipation of capturing future economic benefits. However, it may also reflect greater capacity for change with greater resources or increased awareness of programs via greater information flux. Larger vineyards played a more significant role in shaping the programs, so requirements for certification may be more suitable for larger vineyards.

The effect of vineyard size on Regional certification differs among the three regions. The effect of size is

¹We also also instantiated this variable as the fraction of responses within a category that were rated "Very useful", or the fraction "Somewhat useful" or "Very useful", or the mean response with "Never used" = "Not useful" = 1, "Somewhat useful" = 2, "Very useful" = 3". Model comparison using AICc and examination of the results indicated only minor differences based on the particular instantiation of the variable.

moderated in Lodi such that small vineyards in Lodi are more likely to have the Regional certification versus small vineyards in Napa and the Central Coast. We suspect that the long history and extensive outreach of the Lodi Winegrape Commission, which developed and promotes the Lodi Regional certification, enabled greater diffusion of the certification program to small vineyards in Lodi, while outreach in the other regions by less-well established organizations may have struggled to reach small growing operations. The attribution to outreach of the interactive effect of size and region on Regional certification is supported by the lack of such an effect for the other certifications, where outreach in support of the programs is both less intensive and less heterogeneous across regions.

Figure 5 presents coefficient estimates for multiple logistic regression for each certification (see also Table 2, which presents full model results in tabular format). Lodi vineyards are more likely to participate in the Regional certification program than vineyards in either of the other regions, but this is not the case for the other programs. Again, we attribute this to extensive program outreach efforts in Lodi.

Vertically integrated vineyards are more likely to have Organic or State certification and, to perhaps a lesser degree, the Regional certification (Figure 5). While Regional certification seems to be promoted in a bottom-up manner via grower organizations, Organic and State certifications are likely being promulgated in a top-down manner by wineries. Growers who are certified Pest Control Advisors are more likely to participate in nearly all of the certification programs, which may reflect their increased knowledge of the programs and/or increased capacity to implement program requirements.

Figure 6 presents logistic regression coefficient estimates for the effect of viticulturists' assessment of the usefulness of learning pathways on the likelihood of various certifications. Growers who find public and private organizations more useful are more likely to participate in the Regional program, but this is not the case for the other certifications. This lends further support to outreach efforts by grower organizations being responsible for uptake of Regional certification. Interestingly, Regional certification is less likely among growers who find published materials more useful. Many published materials were developed before these programs were in place, and so users of published materials may be working off of an older knowledge base that is less likely to include VEPs. Finally, farmers who find their own experiences more valuable are marginally significantly more likely to be Organic certified. Two of the "individual experience" information sources seem likely to be responsible for this effect. It may be that growers who keep written records are more amenable to the record keeping required for Organic certification, or that adopting Organic certification causes growers to keep written records that they subsequently find useful. Also, growers prone to field trials may be more likely to try Organic certification on a subset of their land, or growers may be putting a fraction of their land into Organic production, constituting a field trial that turns out to be useful, raising their assessment of the usefulness of field trials.

4 Conclusions

We surveyed California viticulturists to better understand what drives participation in agricultural VEPs. Some certifications have been fairly extensively adopted, despite price premiums for certification being rare.

Larger and vertically integrated vineyards are more likely to participate in certification programs, as are growers who are PCA certified. Growers who value information from public and private organizations are more likely to participate in regional certification programs, while growers who value published information are less. It is likely that program promotion outreach by an established regional institution can increase program participation and that this effect is pronounced among smaller growing operations. Future work will examine the diffusion of program participation through grower and consultant social networks.

5 Literature Cited

Prakash, A., and Potoski, M. (2012). Voluntary environmental programs: A comparative perspective. *Journal of Policy Analysis and Management* 31, 123–138.

R Core Team (2014). *R: A Language and Environment for Statistical Computing*.

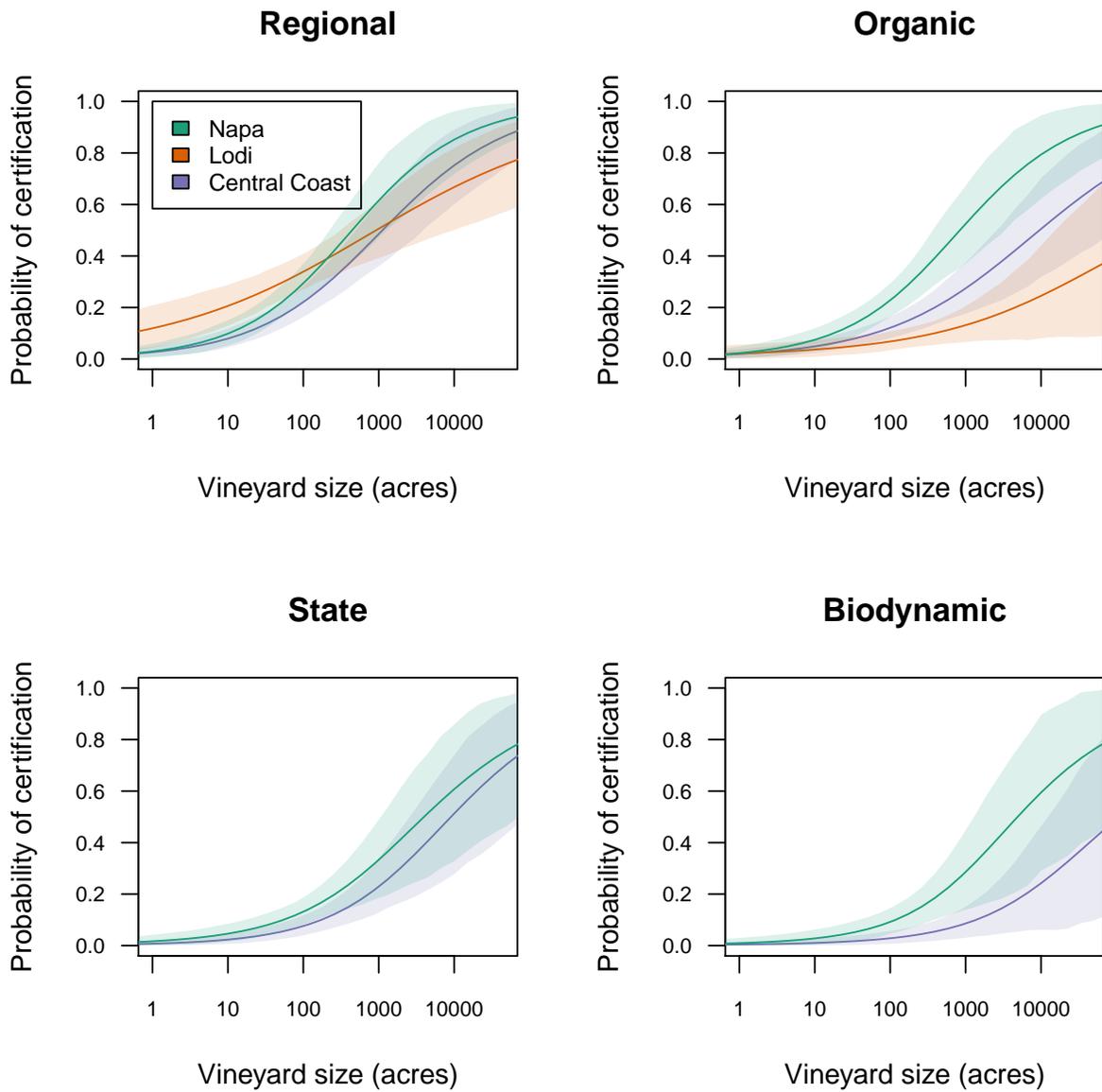


Figure 4: Logistic regressions of probability of various certifications versus vineyard size and region (interacted). Shaded regions reflect 95% confidence intervals of the estimates.

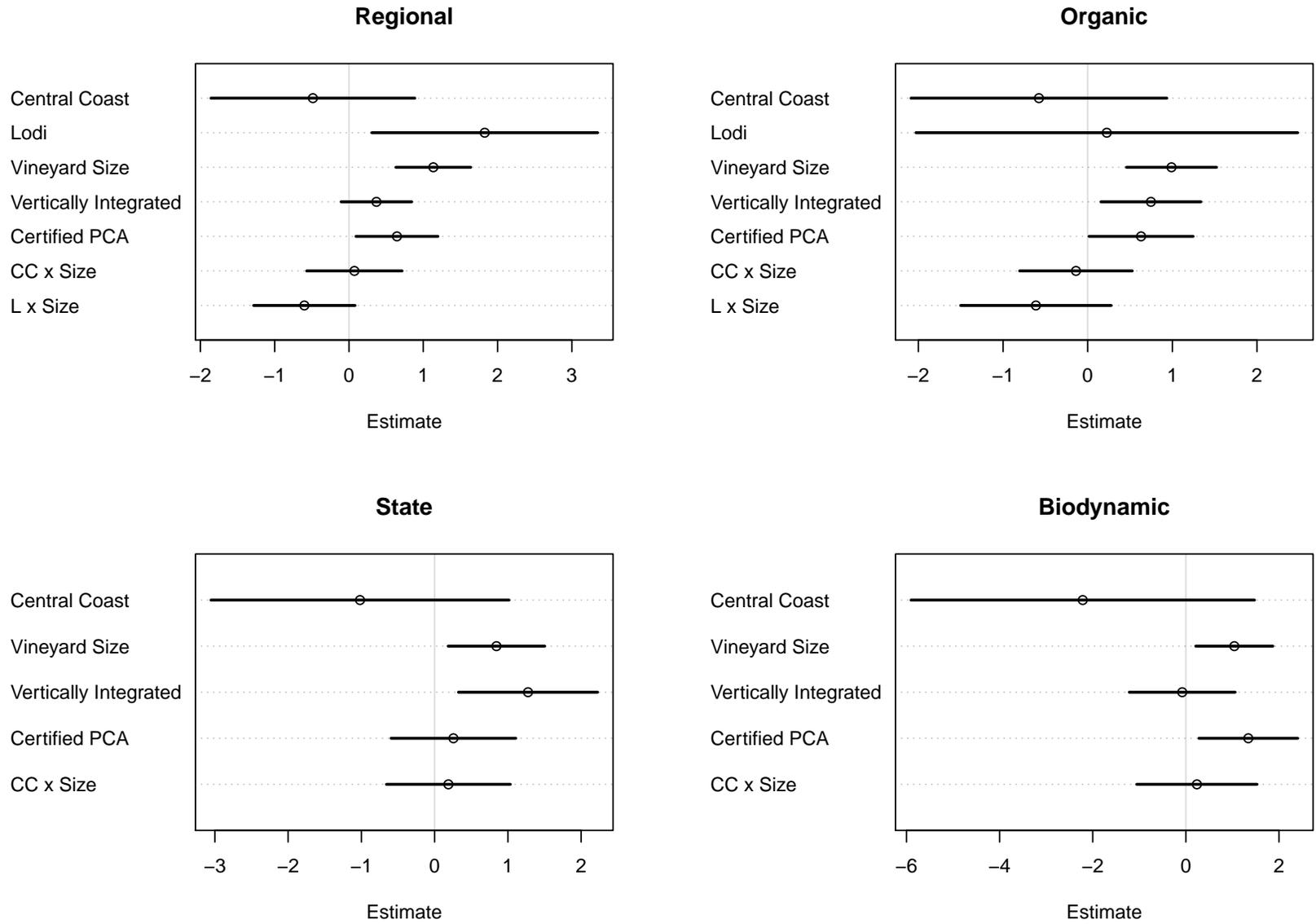


Figure 5: Logistic regression coefficients for probability of various certifications. Bars represent 95% confidence intervals. For regions, Napa is base category.

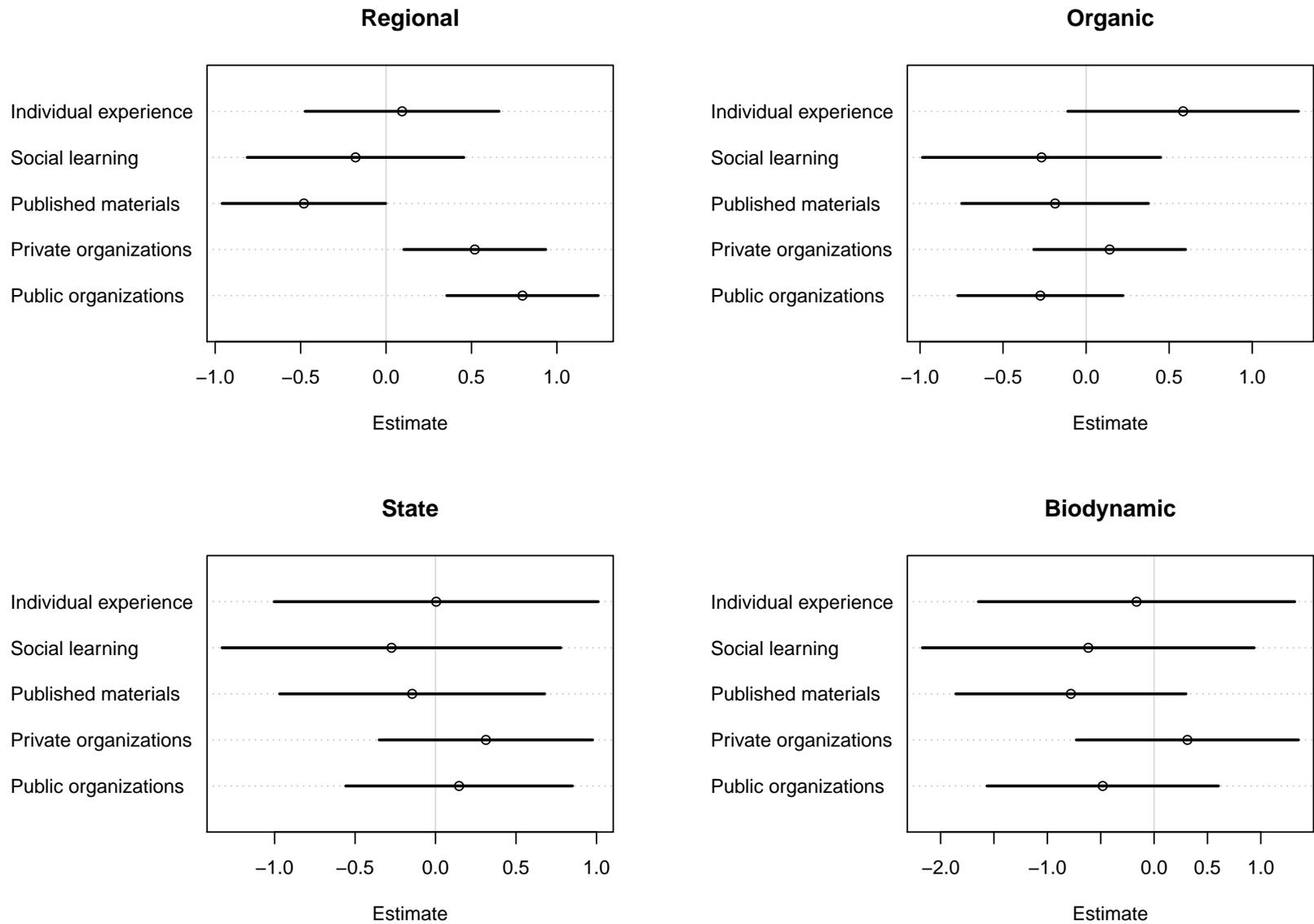


Figure 6: Logistic regression coefficients for probability of various certifications versus growers' assessment of learning pathways' usefulness. Models also include other predictors; the full model results are presented in Table 2. Bars represent 95% confidence intervals. For regions, Napa is base category.

Table 2: Logistic regression of four certifications on vineyard variables and farmer learning pathway preferences.

	Regional	Organic	State	Biodynamic
Central Coast	-0.080 (0.748)	-0.742 (0.785)	-0.785 (1.093)	-2.471 (1.824)
Lodi	2.562*** (0.835)	0.222 (1.167)		
Vineyard Size	1.071*** (0.271)	1.010*** (0.279)	0.881** (0.355)	1.150** (0.454)
Vertically Integrated	0.330 (0.255)	0.703** (0.309)	1.440*** (0.524)	0.328 (0.639)
PCA Degree	0.608** (0.296)	0.574* (0.324)	0.218 (0.456)	1.816*** (0.599)
CC x Size	-0.031 (0.346)	-0.141 (0.343)	0.093 (0.450)	0.206 (0.647)
L x Size	-0.824** (0.368)	-0.665 (0.460)		
Public orgs	0.798*** (0.226)	-0.275 (0.254)	0.146 (0.359)	-0.481 (0.553)
Private orgs	0.519** (0.212)	0.142 (0.233)	0.313 (0.338)	0.312 (0.531)
Published materials	-0.481** (0.244)	-0.187 (0.287)	-0.145 (0.420)	-0.780 (0.550)
Social learning	-0.179 (0.323)	-0.268 (0.366)	-0.274 (0.537)	-0.616 (0.793)
Individual experience	0.094 (0.289)	0.584* (0.354)	0.004 (0.514)	-0.164 (0.756)
Intercept	-5.529*** (1.091)	-3.925*** (1.208)	-4.763*** (1.729)	-0.164 (1.900)
Observations	535	571	407	349

Note:

*p<0.1; **p<0.05; ***p<0.01