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An Analysis of the 2002 Farm Bill's Value-Added Producer Grants Program

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Our objective is to identify the determinants for success among USDA's Value-Added Producer Grants (VAPG) program recipients. Business development has become an important program in departments of agricultural economics. Market share was found to be an important determinant of VAPG success. Size variables including greater sales and increased grant dollars, as well as a lower number of producers, were also determinants of business success. Departments of agricultural economics are likely best able to assist VAPG recipients by providing information on price discovery, explaining their relationship to potential plant location, and providing education on best management practices to help producers avoid costly mistakes.

Key Words: agribusiness, business development, value-added

The December 5, 2007 *Washington Post*, as part of its 2007 series on agricultural subsidy programs called "Harvesting the Cash," published the following:

> The goal [U.S. Department of Agriculture's Value-Added Producer Grants program] is to help rural businesses cover marketing and development costs to expand their markets.… [O]thers question why the USDA should help underwrite marketing expenses for large corporate groups (Gaul, 2007).

In 2001, Congress passed legislation authorizing, and later appropriating funds for the Value-Added Producer Grants (VAPG) program. The 2002 Farm Bill authorized the program for five more years with annual appropriations of $40 million. The 2008 Farm Bill provided language to continue the program. Over the 2001 to 2007 time period, $137.3 million was provided to qualified applicants of value-added agricultural products following announcements in the *Federal Register* (USDA/Rural Business-Cooperative Services, 2001, ..., 2007). The value of these grants given to value-added producers ranged from a minimum of $1,250 to a maximum of $500,000. These funds have been used to subsidize the development and marketing of value-added agricultural products, aid in the development

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of value-added businesses, and augment any other business-related expenses including working capital.

Our objective is to identify the determinants for success among USDA's VAPG recipients. Rural business development has become an important priority for Congress, especially through competitive grants. An examination of Cooperative Extension Service positions advertised by the American Agricultural Economics Association (AAEA) reveals that business development and value-added agriculture have been key features of job descriptions since 2000. But this focus is not just applicable to extension positions, as "value-added agriculture" (including "renewable fuels") has been a key job description in advertised research positions as well. Agricultural economists serve as leaders in value-added and business development research and extension efforts at universities such as Kansas State, Michigan State, Oklahoma State, and Purdue. Moreover, at least seven endowed chairs or professorships in these topics have been established over the past eight years in departments of agricultural economics at Iowa State (two endowments), Michigan State, Missouri, Oklahoma State, Purdue, and Tennessee. No other topical area has resulted in this many endowed chairs in departments of agricultural economics during this time period.

In addition, six of the ten Agriculture Innovation Centers authorized by Congress and later funded for $1 million each had links with faculty located in or led by agricultural economists at the following universities: Cornell, Kansas State, Michigan State, North Dakota State, Penn State, and Purdue. Further, departments of agricultural economics have received grant funds from the USDA, state departments of agriculture, state commodity commissions, and state producer associations to carry out business development or studies on the economics of various value-added agriculture activities. Many of these funds have generated graduate research assistantships or extension assistant positions.[1]

Clearly, business development and research on value-added agriculture has become an important function in many departments of agricultural economics. Numerous agricultural economists have worked with producers who have received VAPG funds and/or served as reviewers for USDA on the VAPG grants.

The VAPG Program

The language in the 2002 Farm Bill authorizing the VAPG program, which was later used to create the Notice of Solicitations for Applications (NOSA) after Congress appropriated funds for the program, stated that the purposes of the program were: " (A) To develop a business plan or perform a feasibility study to

[1] Other programs associated with departments of agricultural economics have received funding from programs authorized in the 2002 Farm Bill. On average, 26 Cooperative Development Centers have been authorized and funded with annual appropriations. Some of these have been based in departments of agricultural economics at various times including Iowa State, Kansas State, North Dakota State, University of California (Davis), and University of Kentucky. Of the 259 citations for the words "value-added" in AgEcon Search, 47 reflect the name of a graduate student as a co-author.

establish a viable marketing opportunity for a value-added agricultural product; or (B) To provide capital to establish alliances or business ventures that allow the producer of the value-added agricultural product to better compete in domestic or international markets."

Furthermore, the NOSA emphasized that a successful VAPG should "expand the customer base for the product or commodity, and result in a greater portion of the revenues derived from the value-added activity that is available to the producer." To do so,

> [T]he product must then meet one of the following criteria to be eligible:
>
> (a) The changing of the physical state or form of the product (e.g., processing wheat into flour, corn into ethanol, slaughtering livestock or poultry, or slicing tomatoes);
>
> (b) A product produced in a manner that enhances its value, as demonstrated through a business plan (e.g., organically produced products);
>
> (c) The physical segregation of an agricultural commodity or product in a manner that results in the enhancement of the value of that commodity or product (e.g., identity preservation system for a variety or quality of grain desired by an identified end-user or the traceability of hormone-free livestock to the retailer); or
>
> (d) [Applicability of] the term 'value-added agricultural product,' [which] includes any agricultural commodity or product that is used to produce renewable energy on a farm or ranch (e.g., collecting and converting methane from animal waste to generate energy).

VAPG grants are awarded annually through a competitive process. The scoring formula is contained in the annual NOSA. Applicants are required to match one dollar of their own funds for one dollar of grant funds. To our knowledge, the VAPG program is unlike any other federal program in that the applicant is given cash to pay for any number of expenses including labor (e.g., personnel, accountants, legal fees), working capital (e.g., utility bills, commodity products), marketing expenses (e.g., advertising, promotional allowances), and similar expenses. The program is also designed to encourage business investments that might otherwise have remained unfunded due to risk and uncertainty.

Bruce Gardner noted in his 2000 Presidential Address to the AAEA that lack of rural development can be attributed in part to the lower wages and amenities in rural areas. Monchuk et al. (2006) found that as rural amenities became more like urban amenities, rural economic growth rates improved. As one examines the debate during the VAPG authorization, it becomes clear that Congress was seeking a means to tackle both of these issues. Specifically, the VAPG program was designed to encourage producers to capture more of the marketing margin between farm and consumer demand through greater vertical coordination or integration into the marketing chain. However, it should be emphasized that changes in marketing margins do not imply changes in producer surplus or loss, as noted by Brester, Marsh, and Atwood (2009).

Steps in Business Development

The NOSA defines the steps in business development as: (1) creation of an idea; (2) formation of the idea into a written form through a feasibility study, business plan, or marketing plan; (3) formation of an organizational structure for the idea; (4) hiring of a manager or employee for the idea; (5) conducting an equity drive to raise capital for the idea; (6) formation of a physical structure for the idea; (7) creation of the idea into a product in the facility; (8) creation of the idea into a product for distribution and sale at retail; and (9) actual commercialization of the idea.

A list of VAPG recipients was compiled from the USDA Rural Development press releases for each year over the period 2001–2005. Each VAPG recipient was contacted to identify the stage of business development that was achieved for his or her idea (i.e., product or service). Commercialization was defined as whether the idea was being sold in March 2007. Because the grants for 2006 were awarded late in the year and recipients would not have completed their projects by March 2007, 2006 grant awards were not included. Thus, data for 2001–2005 were used in this study. Recipients were contacted by various means including personal interviews, phone calls, and written or electronic surveys. Information was obtained for 739 (98%) of the 748 recipients who received VAPG funds over the 2001–2005 study period.

Iowa had the greatest number of grant recipients, while Delaware, Nevada, New Hampshire, and West Virginia had the fewest. The average grant amount for all recipients was $153,576, and the average grant per recipient per state ranged from Kansas with $23,523 to Texas with $273,184. Grant recipients were clustered in the Midwestern and Great Plains states, which have a strong commodity-focused agriculture. Also ranked in the top 10 as grant recipients were California, Michigan, and Washington, states with a great amount of diversity and value-added agriculture.

Table 1 shows the frequency of recipients' achievement of the nine business development steps. Note that step 3 and step 9 appear most frequently. At the conclusion of step 3, the producer is faced with the question of whether to "write checks" to make the investment in the idea. Prior to step 4, the idea is being studied and no investment occurs. After step 3 (in steps 4 through 8), the idea begins the process of commercialization until final commercialization occurs in step 9. Fifty-one percent (316) of the recipients reached step 9.

Types of VAPG Recipients

Organizations that submitted grants were required to identify the grant in various categories based on language in the Farm Bill authorization. These categories included the organizational type and type of value-added activity. The four organizational types consist of an agricultural producer group (*APGROUP*), farmer and rancher cooperatives (*FARMER*), independent producers (*INDEPEND*), and majority-controlled producer entity (*MAJCON*).

Table 1. Frequency of Achievement of the Business Development Steps by Grant Recipients

Step	Description	Frequency
1	Creation of idea	3
2	Formation of idea into written form	21
3	Formation of an organizational structure for the idea	249
4	Hiring of employee(s) for the idea	5
5	Conducting equity drive to raise capital for the idea	12
6	Formation of physical structure for the idea	1
7	Creation of the idea into a product or service	3
8	Creation of the idea into a distributable product or service	11
9	Product or service is sold in March 2007	316
Total number of grant recipients		**621**

An example of an *APGROUP* is the California Olive Growers Council, a trade association that received funds to perform a market study for conducting marketing and promotional activities to increase sales of certified olive oil. *FARMER* is defined as a cooperative composed entirely of farmers or ranchers. CHS, Inc. (St. Paul, Minnesota) is an example of a cooperative that received funds to study renewable fuels production. *INDEPEND* is defined as steering committees composed of entirely independent producers. An example is Bird City Bird Seed Company (Bird City, Kansas), a cooperative that received funds to market bird seed gift items, such as instant bird feeders. Another example is Meyer Vineyards, Inc. (Superior, Nebraska), which received funds to produce and market premium wines. *MAJCON* is categorized as entities with less than 100% farmer and rancher ownership. An example of *MAJCON* is Golden Grain Energy, LLC, which used the funds to purchase grains for production of 40 million gallons of ethanol annually from 16 million bushels of corn.

Congress defined four types of value-added activity: differentiation (*DIFF*), farm- or ranch-based renewable energy (*ENERGY*), product segregation (*SEG*), and value-added production (*VAP*). *DIFF* is defined as differentiated production of marketing, as demonstrated in the business plan of the organization. An example of a VAPG recipient under the differentiation category is the Alabama Cattlemen's Foundation, which received funds to improve the beef cattle industry in Alabama. *ENERGY* is defined as the economic benefit realized from the production of farm- or ranch-based renewable energy. An example of a VAPG recipient under this category is Crosswind Energy, LLC, which used funds to address the feasibility of operating a wind farm in northwest Iowa. *SEG* is defined as product segregation. An example of a VAPG recipient under the segregation category is Lake Cumberland Milling (Monticello, Kentucky), which used the funds to purchase high-oil soybeans for a processing plant. Finally, *VAP* is defined as a

change in the physical state of the product. An example of a recipient under this category is the Michigan Edible Bean Cooperative, which analyzed markets for dry bean flour.

Measuring Success

Resource availability, size, labor, crop, value-added form, organizational form, and state are hypothesized to influence the level of progress in moving from one step to another in the nine steps of business development. This can be seen in the following equation, where *F* is the function operator:

(1) *Steps in Business Development* = *F*(*Resource Availability*, *Size*, *Labor*, *Crop*, *Value-Added*, *Organizational Form*, *State*).

A relationship between a variable on the right-hand side of the equation (a covariate) and the firm achieving a step in its business development is "positive" if higher steps are seen when the variable gets larger, and is "negative" if an increase in the covariate causes firms to achieve a lower step.

One measure of resource availability is the number of USDA Rural Business and Cooperatives division employees (*USDAEMP*) in a state. Another measure is whether a state had an Agriculture Innovation Center (*AIC*) whose task was to assist VAPG recipients and other similar businesses. *AIC* is a binary variable denoting states that received a competitive grant for such a center. The 10 states are Indiana, Iowa, Kansas, Minnesota, Montana, New Jersey, New York, North Dakota, Pennsylvania, and Wisconsin. In addition, some states have their own programs that are similar to the VAPG. *STATEVAPG* denotes state programs—specifically, Illinois, Maine, Massachusetts, Michigan, Missouri, Montana, Nebraska, New York, North Dakota, Oklahoma, and Wisconsin. A positive relationship is hypothesized to exist between these resource availability variables and having greater success in business development.

Measures of size include sales volume per VAPG recipient (*SALESVAPG*) and VAPG grant dollars received per VAPG recipient (*GRANVAPG*). A positive relationship is expected to exist between these variables and successful business development. As sales volume and the dollar value of a VAPG grant increase, the organization has more money to spend on marketing or labor, for example, which should lead to greater success.

Labor supply is the third variable category. *COUNTYPOP* is the number of people between the ages of 20 and 34 in each VAPG recipient county divided by the total population in each respective county (U.S. Department of Commerce, Bureau of Economic Analysis, 2004). This ratio provides a measure of the skilled labor availability in each county. A positive relationship is expected—i.e., if there is a higher pool of skilled labor, employers will hire more qualified workers which in turn should increase the success of VAPG recipients.

Table 2. Frequency of Various Crops for VAPG Recipients

Crop Variable	Frequency		Crop Variable	Frequency
AQUA	2		*POULTRY*	10
BEEF	60		*SGRAIN*	18
CORN	132		*SOYBEANS*	57
DAIRY	72		*SMEAT*	22
EBEAN	6		*SUGAR*	8
FLOWER	15		*VEGETABLES*	40
FORESTRY	21		*WHEAT*	22
FRUIT	51		*WINE*	14
NUTS	15		*WIND*	29
OTHER	9			
PORK	18		**Total**	**621**

The type of crop used as the input in creating a value-added product is the fourth variable category. These are binary variables denoting the commodity for each VAPG recipient. The crops are *AQUA* (i.e., aquaculture), *BEEF*, *CORN*, *DAIRY*, *EBEAN* (i.e., edible beans), *FLOWER*, *FORESTRY*, *FRUIT*, *NUTS*, *PORK*, *POULTRY*, *SGRAIN* (e.g., small grains such as buckwheat, oats, and rye), *SMEAT* (e.g., specialty meats such as emu, ostrich, bison, and other meats), *SOYBEANS*, *SUGAR*, *VEGETABLES*, *WHEAT*, *WIND*, *WINE*, and *OTHER* (e.g., petting farms). Table 2 shows the frequency of each type of crop.

MKTSHR is the proportion of a crop's market share in the VAPG recipient county to its overall production in the United States. This variable is defined as the quantity of the crop as measured in bushels, pounds, or other units in the recipient county divided by the total U.S. quantity of that crop for the year prior to the grant being awarded (USDA/National Agricultural Statistics Service, 2002, 2007). A positive relationship is expected between this variable and successful business development. For example, we hypothesize that someone creating a value-added corn product will find input prices and transportation costs lower if the VAPG is located in a county with an abundance of corn. The *MKTSHR* variable captures the ability of the VAPG recipient to turn this crop into a more profitable product.

A binary variable for the type of value-added organization is also included and represents the four different types of value-added classifications (*DIFF*, *ENERGY*, *SEG*, and *VAP*) for the VAPG recipients as defined by Congress. The frequency of each was 349, 112, 90, and 72, respectively. Organizational form is the sixth variable category, and we included dummy variables for these as well: *APGROUP*, *FARMER*, *INDEPEND*, and *MAJCON*, with respective frequencies of 234, 201, 128, and 58.

The final variables included in the model are dummy variables for the 13 states representing two-thirds of the total value-added producer grants awarded. These

states are Iowa (12.24%), California (7.41%), Missouri (7.25%), Nebraska (6.92%), Minnesota (4.83%), Michigan (4.03%), Washington (4.03%), Wisconsin (3.86%), Texas (3.54%), North Dakota (3.38%), New York (3.22%), Illinois (2.90%), and Kansas (2.90%).

Table 3 presents a summary of the statistics for the variables that were included in the model. Note that we were able to find complete data on 621 of the 739 respondents, with *MKTSHR* being the most troublesome variable for which to obtain data.[2]

Letting Y denote a particular step of business development, the econometric model is written as follows:

$$
\begin{aligned}
(2)\quad Y = {} & \beta_1 USDAEMP + \beta_2 AIC + \beta_3 STATEVAPG + \beta_4 SALESVAPG \\
& + \beta_5 GRANVAPG + \beta_6 COUNTYPOP + \beta_7 AQUA + \beta_8 BEEF \\
& + \beta_9 CORN + \beta_{10} DAIRY + \beta_{11} EBEAN + \beta_{12} FLOWER + \beta_{13} FRUIT \\
& + \beta_{14} NUTS + \beta_{15} PORK + \beta_{16} POULTRY + \beta_{17} SGRAIN \\
& + \beta_{18} SOYBEANS + \beta_{19} SMEAT + \beta_{20} SUGAR + \beta_{21} VEGETABLES \\
& + \beta_{22} WHEAT + \beta_{23} WIND + \beta_{24} WINE + \beta_{25} MKTSHR \\
& + \beta_{26} APGROUP + \beta_{27} FARMER + \beta_{28} INDEPEND + \beta_{29} DIFF \\
& + \beta_{30} ENERGY + \beta_{31} SEG + \beta_{32} IA + \beta_{33} CA + \beta_{34} MO + \beta_{35} NE \\
& + \beta_{36} MN + \beta_{37} MI + \beta_{38} WA + \beta_{39} WI + \beta_{40} TX + \beta_{41} ND + \beta_{42} NY \\
& + \beta_{43} IL + \beta_{44} KS + e.
\end{aligned}
$$

The β's are parameters to be estimated and e is the error term.[3] The binary variables *FORESTRY*, *OTHER*, *MAJCON*, and *VAP* are dropped for estimation purposes.

Methodology

The dependent variable, the success of the VAPG recipient, is a naturally ordered progression of business steps, and the producers are not able to skip business steps in the decisions. An example of the natural order is that firms are not able to sell their product (step 9) before obtaining equity to finance their operation (step 5).

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[2] Despite vigilant efforts, we were unable to obtain complete information on every VAPG recipient. For example, Tsar Nicoulai Caviar, LLC, an urban San Francisco value-added aquaculture processor comprised of California producers, received a VAPG grant in 2003 ($115,403) for the purpose of launching a new sturgeon product (smoked sturgeon) into domestic markets. In 2004, it received a second VAPG grant for $217,721 to market branded caviar produced from farm-raised sturgeon. We contacted USDA to obtain national production data for sturgeon or caviar, but were unsuccessful. We then contacted the director of the University of California Agricultural Issues Center for state data. While the director was quite familiar with value-added fish products such as caviar, he did not have production data. This exhausted our efforts to include this variable in our analysis.

[3] Specifically, we parameterize the probability of observing firm $i = 1, \ldots, N$ as depending on the $k \times 1$ regressor vector ($\mathbf{x}_i$) and a $k \times 1$ parameter vector ($\boldsymbol{\beta}$) such that $E[Y_i \mid \mathbf{x}_i] = \text{Prob}(Y_i \le j) = F(\mathbf{x}_i'\boldsymbol{\beta})$.

Table 3. Means, Standard Deviations, and Hypothesized Signs for Variables Included in the Model

Variable	Mean	Standard Deviation	Hypothesized Sign
USDAEMP	6.7118	3.4950	+
AIC	0.3688	0.4829	+
STATEVAPG	0.3800	0.4858	+
GRANVAPG	0.0141	0.0280	+
COUNTYPOP	0.1963	0.2195	+
AQUA	0.3688	0.0567	+
BEEF	0.0966	0.2957	+
CORN	0.2126	0.4094	+
DAIRY	0.1159	0.3204	+
EBEAN	0.0097	0.0979	+
FLOWER	0.0242	0.1537	+
FRUIT	0.0821	0.2748	+
NUTS	0.0242	0.1370	+
PORK	0.0290	0.1679	+
POULTRY	0.0161	0.1260	+
SGRAIN	0.0292	0.1679	+
SOYBEANS	0.0918	0.1260	+
SMEAT	0.0354	0.1850	+
SUGAR	0.0225	0.1129	+
VEGETABLES	0.0644	0.2457	+
WHEAT	0.0354	0.1850	+
WIND	0.0225	0.1486	+
WINE	0.0467	0.2112	+
OTHER	0.0145	0.1679	+
MKTSHR	0.0288	0.1183	+
APGROUP	0.3768	0.4850	+
FARMER	0.3237	0.4683	+
INDEPEND	0.2061	0.4048	+
MAJCON	0.0934	0.2912	+
DIFF	0.5620	0.4965	+
ENERGY	0.1804	0.3165	+
SEG	0.1449	0.3523	+
VAP	0.1127	0.3165	+

An ordered logit model takes into account the order of the dependent variable, so that effects of the covariates on step 1 through step 9 can be shown. The cumulative model controls for the steps that are ordered.[4] The ordered logit was chosen over the more commonly used ordered probit, because the predictive power for the ordered logit was superior to the ordered probit and because the comparison of the ordered logit's modeling framework, coefficient estimates, and marginal effects is intuitive—making presentation concise.

The firms in the study may attain any one of nine steps, with step 1 being the lowest and step 9 being the highest ($j = 1, 2, \ldots, 9$). The modeling of the probability of a recipient reaching a particular step, Prob($Y_i = j$), allows us to measure the contributions to success at each step. In the case of the ordered logit model, it is necessary to ascertain the impacts of certain variables on the likelihood of a firm attaining any of the j steps 1–9. Further, in the case of the ordered logit model, the order of the steps matters: step 1 is a lower step than step 2, which is lower than step 3, etc.

The logistic cumulative distribution function (CDF) is used, and parameter estimates are found through maximum likelihood via the Newton-Raphson technique in the logistic procedure in SAS version 9.1. Note that the $\mathbf{x}_i$ vector of covariates in the ordered logit model contains eight intercepts (i.e., one less than the number of steps). Thus, Y in equation (2) is defined as the step of the recipient in achieving business development, as the ordered logit model has a Y_i value with nine possibilities (step 1, step 2, ..., step 9).[5]

Results

The parameter estimates, standard errors, and other statistics for the ordered logit models are reported in table 4. A positive sign on a parameter means the variable has a positive influence on a firm achieving a higher step. The first column in table 4 gives the variable names. Hypothesis tests are reported for the 5%, 10%, and 15% levels of significance for the parameter estimates. The effect of an independent variable's parameter estimate on the dependent variable is discussed with respect to its marginal probability.

The concordant value is 72.2 for the ordered logit model. Importantly, for determining fit, and later the marginal effects, the eight intercept terms are significant at least at a 10% level, suggesting the eight steps are at least statistically distinct (i.e., there is little reason to combine particular steps). Bounded between zero and 100%, the concordant value is akin to an R^2 value in a linear model and provides a measure of how well the model correctly predicted the particular steps.

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[4] We point this out because typically economists are accustomed to explicitly modeling the probability of observing a "1". Technically, there is no difference, as it merely changes the signs but not the magnitudes of the coefficient estimates.

[5] Because some of the steps had only a few observations, we also estimated an ordered logit model examining steps 1–3, steps 4–8, and step 9 as three distinct stages of development. Results are qualitatively similar to what is presented here, and were left out for the sake of brevity. Of course, full results are available from the authors upon request.

Table 4. Ordered Logit Parameter Estimates, Standard Errors, and Results of Hypothesis Tests

Variable	Parameter Estimate	Standard Error	Variable	Parameter Estimate	Standard Error
Intercept 1	3.9937***	1.0482	*SOYBEANS*	0.6526	0.7568
Intercept 2	1.8434***	0.8980	*SMEAT*	1.1764*	0.8271
Intercept 3	−1.5062**	0.8910	*SUGAR*	0.0048	1.0047
Intercept 4	−1.5464**	0.8911	*VEGETABLES*	0.5756	0.7675
Intercept 5	−1.6437**	0.8914	*WHEAT*	1.2433*	0.8691
Intercept 6	−1.6519**	0.8914	*WIND*	0.3962	0.9559
Intercept 7	−1.6762**	0.8914	*WINE*	2.1463***	0.8273
Intercept 8	−1.7644***	0.8917	*APGROUP*	−0.9480***	0.3592
USDAEMP	0.1221***	0.0536	*FARMER*	−0.1979	0.3474
SALESVAPG	7.46E-07***	2.63E-07	*INDEPEND*	−0.7474**	0.4152
GRANVAPG	8.43E-06***	3.68E-06	*DIFF*	−0.2593	0.3428
COUNTYPOP	0.9972	1.1269	*ENERGY*	−0.3154	0.4486
MKTSHR	2.2406**	1.2636	*SEG*	−0.2250	0.4310
AIC	−0.0713	0.3678	*IA*	−0.1343	0.5992
AQUA	−1.3407	1.5399	*CA*	−0.1197	0.4500
BEEF	0.7759	0.7480	*MO*	0.6023**	0.3586
CORN	0.5543	0.7616	*NE*	0.0911	0.4310
DAIRY	1.3934**	0.7490	*MN*	1.2371***	0.5142
EBEAN	0.2272	1.1163	*MI*	0.1456	0.6479
FLOWER	1.2561*	0.8880	*WA*	0.3505	0.4499
FORESTRY	1.0101	0.8444	*WI*	2.0215***	0.5767
FRUIT	1.8505***	0.7830	*TX*	0.6471	0.4880
NUTS	2.1406***	0.9823	*ND*	0.1128	0.5639
PORK	1.1245	0.8787	*NY*	0.5001	0.5895
POULTRY	1.3315	1.0674	*IL*	1.3981***	0.5596
SGRAIN	1.0093	0.8685	*KS*	1.8446***	0.6406

Log Likelihood = −595.972
Fit (% concordant) = 72.2%

Notes: Single, double, and triple asterisks (*,**,***) denote statistical significance at the 15%, 10%, and 5% levels, respectively, based on the Wald χ^2 statistic. Models are estimated using 621 observations. The dependent variable is the probability of seeing a firm at least at steps j = 1–9 in the case of the ordered logit. A positive coefficient is correlated with an *increased* likelihood of seeing a firm at a higher step.

Column two of table 4 shows the parameter estimates and column three presents the standard errors. Thus, an increase in variables corresponding with the negative coefficients suggests that the likelihood of observing a VAPG recipient in one of the lower steps decreases, while an increase in variables corresponding with positive coefficients suggests an increase in the likelihood of observing a VAPG recipient in a higher step.

Other variables with significant coefficients are *USDAEMP*, *GRANVAPG*, *SALESVAPG*, and *MKTSHR*. Significant parameter estimates were observed for seven of the 19 crop variables (*DAIRY*, *FLOWER*, *FRUIT*, *NUTS*, *SMEAT*, *WHEAT*, and *WINE*) and one of the four business organizational forms (*APGROUP*). Finally, significant parameter estimates were found for the binary state variables of Illinois (*IL*), Kansas (*KS*), Minnesota (*MN*), Missouri (*MO*), and Wisconsin (*WI*).

USDAEMP denotes the number of USDA Rural Business and Cooperatives division employees in the state where the VAPG recipient resides and is a measure of resources available to assist the VAPG recipients. The positive sign suggests that as the number of employees increases, the likelihood of observing a VAPG recipient in the first eight steps decreases. Correspondingly, the likelihood increases for observing a VAPG recipient in the last step of business development with a successful product being marketed in March of 2007. It is not possible to obtain precise information on the number of employees in each state over time and their individual job responsibilities. However, anecdotal information indicates that USDA Rural Development increased the number of Rural Business and Cooperatives division employees and refocused job responsibilities in order to help manage and work with the VAPG program after its authorization in the Farm Bill.

GRANVAPG denotes the VAPG grant amount measured in dollars divided by the number of producers who own the organization that received the VAPG grant. *SALESVAPG* is the sales volume for the VAPG recipient organization divided by the number of producers. These variables are a measure of size and their coefficients had positive signs. An increase in the value of grant dollars received or sales volume for the VAPG recipient in the numerator (or a decrease in the number of producers in the organization in the denominator) suggests that the likelihood of observing a VAPG recipient in steps 1–8 decreased. Alternatively, the likelihood increases for observing the VAPG recipient in the last step of business development.

It is difficult to make any broad generalizations regarding these variables. However, larger VAPG grants tended to go to organizations that had a successful business operation with existing sales volume and were seeking to expand into a value-added product, suggesting such firms had good intelligence regarding the market for such a product. Very few large grants went to businesses that were starting a value-added product from "scratch." Gaul's 2007 *Washington Post* article contained comments by a former director of the USDA Rural Business and Cooperatives program, Dr. Randy Torgerson, who claimed "… the larger firms could probably make better use of that [VAPG] money than some of the fledgling companies."

MKTSHR measures the proportion of the commodity produced in the county where the VAPG recipient was located divided by the total U.S. production of that commodity. This variable is a measure of the underlying commodity being utilized and its coefficient had a positive sign. As the market share increased

(either through an increase in the numerator which would suggest greater production in that local market, or a decrease in the denominator which would suggest a smaller national market), the likelihood that the VAPG recipient was in one of the first eight steps decreased.

Crop binary variables with significant coefficients included *DAIRY*, *FLOWER*, *FRUIT*, *NUTS*, *SMEAT* (specialty meats), *WHEAT*, and *WINE*. The parameter estimates were positive for these variables, indicating that those VAPG recipients adding value to these commodities relative to *OTHER* (which was the dropped binary variable) had a decreased likelihood of being in steps 1–8. Rather, there was an increased likelihood that these VAPG recipients were in step 9 with a product being marketed in March 2007. It should be noted that *PORK* and *SGRAIN* (small grains such as mustard, buckwheat, and other grains) did have significant coefficients at the 20% level, also with a positive sign.

Crops such as nuts, fruits, and flowers are grown in a much smaller geographic region relative to other crops. Thus, market share is likely to be higher in these regions. Furthermore, many of the producers in these industries are vertically integrated through cooperatives or warehouses and have significant market share at retail, thereby increasing the likelihood that these organizations have greater access to market intelligence and are more likely to achieve business success.

The coefficient on the variable *INDEPEND* is negative and significant in the ordered logit model. This variable denotes 100% producer-owned organizations that include steering committees and other similar entities. Our finding suggests there was an increased likelihood of this entity being in steps 1–8 rather than in step 9. The number of these *INDEPEND* entities ranged from 25 in 2002 to 45 in 2006, but there was no discernable trend.

One of the four business organizational forms (*APGROUP*) had a significant parameter with a negative sign, revealing that a successful VAPG grant written by this organization had an increased likelihood of being in business development steps 1–8 relative to *MAJCON* (which was the dropped binary variable). Remember that APGROUPs are trade associations composed of producers or cooperatives. These organizations tend to have a very broad and diverse membership. Furthermore, these organizations do not undertake business development, but rather make the results of their VAPG grant available to all their members to consider developing a business for the opportunity identified by the study. Many of these activities are market studies. Thus, this result may not be so surprising. It should be noted that the number of VAPG grants awarded to APGROUPs declined in every year from 2002 (91 grants) to 2005 (36 grants), which would suggest these entities were not as successful in receiving VAPG grants or possibly they did not submit as many grant proposals in later years.

Significant and positive parameter estimates were found for the binary state variables of Illinois (*IL*), Kansas (*KS*), Minnesota (*MN*), Missouri (*MO*), and Wisconsin (*WI*). Based on our results, VAPG recipients located in these states had a decreased likelihood of being in steps 1–8. It is difficult to interpret these results. Missouri probably has the most sophisticated infrastructure for business

Table 5. Elasticities for Selected Variables

Covariate Elasticity Effect on the Probability of:	*USDAEMP* [a]	*SALESVAPG* [b]	*GRANVAPG* [c]	*COUNTYPOP* [d]	*MKTSHR* [e]
Step 1	−0.8162	−0.4199	−0.1181	−0.1949	−0.0644
Step 2	−0.6948	−0.3693	−0.1015	−0.1653	−0.0556
Step 3	−0.4236	−0.3750	−0.0707	−0.1018	−0.0458
Step 4	−0.0052	−0.0139	−0.0013	−0.0015	−0.0012
Step 5	−0.0111	−0.0327	−0.0028	−0.0032	−0.0028
Step 6	−0.0009	−0.0028	−0.0002	−0.0003	−0.0002
Step 7	−0.0026	−0.0084	−0.0007	−0.0008	−0.0007
Step 8	−0.0081	−0.0294	−0.0022	−0.0025	−0.0023
Step 9	+0.1716	+0.0200	+0.0232	+0.0384	+0.0098

Note: Elasticities measure a 1% change in the covariate on the probability of observing a firm at a particular step. Elasticities were calculated at every observation and then averaged.

[a] *USDAEMP* = USDA Rural Business and Cooperatives division employees.

[b] *SALESVAPG* = Sales volume per VAPG recipient.

[c] *GRANVAPG* = VAPG grant dollars received per VAPG recipient.

[d] *COUNTYPOP* = Number of people between ages of 20 and 34 in each VAPG recipient county divided by the total population in each respective county.

[e] *MKTSHR* = Proportion of the commodity produced in the county where the VAPG recipient was located divided by the total U.S. production of that commodity.

development with a long-standing state program and it is the only state that "strongly encourages" recipients to receive education after being awarded a state VAPG grant or a USDA VAPG grant.[6]

Marginal Probabilities of the Independent Variables

Table 5 provides the elasticities for selected continuous variables in the model. Specifically, the table shows how a 1% change in one of the covariates affects the probability of observing a firm at a particular step in the nine-step process. In the case of the ordered logit, the elasticity is calculated for the effect on the probability of observing a firm at a particular step.[7] Hence, a 1% change in the amount of grant dollars (*GRANVAPG*) lowers the probability of seeing the firm at step 1 by 0.12%, at step 2 by 0.10%, etc. It is interesting to note that the amount of grant dollars appears to have the strongest effects on steps 1–3, and then has very little

[6] There is no statutory language requiring the VAPG recipient to do anything except complete the forms for the grants. Many USDA programs require the recipient to receive some form of education or mandate some form of reporting. Congress has passed no such requirements for the VAPG recipients. Missouri is the only state that we are aware of where recipients receive some form of "mandatory education." This is done because many recipients also receive state VAPG grants where such a requirement is in place.

[7] With an ordered logit, one may either model the marginal impact on the probability of observing a firm at any step below a particular step or, through simple algebra, at a particular step.

effect on steps 4–8, but increases whereby the effect on step 9 is positive. *USDAEMP* and *SALESVAPG* follow similar patterns, suggesting these variables appear to have their largest impacts on advancing firms through at least steps 1–3, and once the firms are past step 3, these variables then have the next biggest marginal impact upon a firm's final success (step 9).

Recall that a VAPG recipient who completes step 3 has completed steps that do not necessarily require producer investment. Many producers make minimal or no investment prior to step 4. Entry into step 4 requires producer investment because an entity is created in step 3, and capital is required to hire and pay a manager and/or employees. Each resulting increase from step 3 to step 8 requires producer investment and, correspondingly, an increase in risk. With the completion of step 9, the result of successful business development in adding value to an agricultural commodity (and decreasing the marketing margin) is known.

Implications

The VAPG program is a unique USDA program designed to encourage producers to invest in ideas that would lead to value-added enterprises. Policy makers creating the 2002 Farm Bill were aware of the existence of low commodity prices at the time, and such investment could result in more of the marketing margin accruing to producers. A VAPG program can be considered a success if it actually allowed a product or service to be commercialized. Analyzing data from 621 out of 739 VAPG recipients, we have determined that the success of a VAPG recipient was motivated by several factors. Moreover, using an ordered logit model, we were able to further refine the analysis and identify what factors helped firms reach at least the intermediary steps short of the ultimate goal of commercialization. We believe this study is the first of its kind to investigate the VAPG program.

Market share (*MKTSHR*) was an important determinant of VAPG success. Interestingly, many departments of agricultural economics have long provided producers with market share information through extension and research programs. The positive relation between this variable and a successful VAPG may be related to this dissemination of information. After all, knowledge of the basis for different crops is important information for determining where to consider opportunities for adding value to a commodity. Thus, inexpensive corn in Iowa and southern Minnesota is likely to lead to greater opportunities to add value to corn through corn sweetener plants or ethanol plants. Kansas State University (Dhuyvetter, 2007) and the Center for Agricultural and Rural Development at Iowa State University (2007) report basis map information for major commodities for selected Midwestern states. This information is provided daily and weekly and has been very useful to groups considering adding value to crops in their geographic region. Access to this information may have helped firms achieve success but, more importantly, providing this information to potential VAPG recipients may help future businesses in their efforts as well.

Size variables including greater sales and increased grant dollars, as well as a lower number of producers, were also determinants of business success. Congress has capped the amount of grant dollars to be awarded. Larger VAPG recipients as measured by sales volume are likely to have been in business for a longer period of time. When considering adding a new value-added product to their portfolio, these entities consequently have greater market intelligence associated with the potential demand for that product. Some states (such as Iowa) have made business development part of the job description for selected county extension agents. Some of these agents have entered into subcontracts with VAPG recipients and have provided valuable guidance and assistance. Group action is easier when there are smaller numbers of producers, and a county agent or other service provider is likely to have greater impact with a smaller number of producers.

Every state has at least one USDA Rural Business and Cooperatives employee. Because these employees are points of contact for producers interested in value-added activities and because they are information providers for the VAPG program, networking with these individuals is important for departments of agricultural economics. There may be opportunities to undertake research on behalf of these VAPG recipients.

Departments of agricultural economics are likely best able to assist VAPG recipients by providing information on basis prices, explaining their relationship to potential plant location, or providing education on best management practices for business development and work to help producers avoid costly mistakes. For example, agricultural economists can explain to producers of value-added commodities the impracticality of building an ethanol plant in a region distant from corn (e.g., eastern Montana or western North Dakota) or constructing a pasta plant in a region distant from the supply of durum wheat and distant from demand points for pasta (e.g., western Kansas).

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