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How Successful was the 2002 Farm Bill's Value-Added Producer Grant Program?

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The December 5, 2007, *Washington Post*, as part of its 2007 series on agricultural subsidy programs called *Harvesting the Cash*, wrote 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 . . . others question why the USDA should help underwrite marketing expenses for large corporate groups (Gaul).

In 2001, Congress passed legislation authorizing, and later appropriating, funds for the Value-Added Producer Grant (VAPG) program. The 2002 Farm Bill authorized the program for five more years with annual appropriations of \$40 million. As of December 1, 2007, House and Senate Farm Bills contain language that would continue to authorize the program subject to annual appropriations. Over the 2001 to 2007 time period, \$137.3 million were provided to qualified applicants of value-added agricultural products following announcements in the *Federal Register* (U.S. Department of Agriculture, 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 of value-added businesses and augment any other business related expenses including working capital.

Although not every congressionally authorized program is ultimately funded, the 2002 Farm Bill authorized several new programs designed to encourage rural development.¹ Of these programs, rural business development has become an important program to Congress, especially through allocations to land-grant universities. An examination of Cooperative Extension Service positions advertised by the American Agricultural Economics Association (AAEA) reveals that business development and value-added agriculture has been a key feature of job descriptions since 2000. But it is not just extension positions that use this description, as "value-added agriculture" (including "renewable fuels") has been a key job description in advertised research positions, as well. In addition, six of the ten Agriculture Innovation Centers that were authorized 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 around the country have received grant funds from USDA, state departments of agriculture, state commodity commissions or state producer associations to carry out business development or studies on the economics of various value-added-agriculture activities. Many of these funds have resulted in graduate research assistantships or extension assistants.²

Clearly, business development and research on value-added agriculture has become an important function in many departments of agricultural economics. Many agricultural economists have worked with producers who have received VAPG funds and/or served as reviewers for USDA on the VAPG grants. To date, however, no study has examined the success of these programs, though there is a great deal of interest in the outcomes (as the investigation from the *Washington Post* affirms). Our objective is to identify the determinants for success among USDA's VAPG recipients.

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 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, “the 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) The term “value-added agricultural product” 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).

An annual agricultural appropriations bill for the USDA Rural Development division contains funding for three main categories: (1) Rural Community Programs, (2) Rural Utilities Programs and (3) Rural Business and Cooperative Development Programs. The VAPG funding is contained in the Rural Business and Cooperative Development Programs. Table 1 shows the annual appropriations for this program, the VAPG program and number of VAPG recipients. Clearly, the VAPG program has been an important function of the USDA Rural Development, Rural Business and Cooperative Development Programs division.

Table 1. Congressional Appropriations for Selected USDA Rural Development Programs.

Year	Funds appropriated for		Number of VAPG Recipients
	Rural Business and Cooperative Development Programs ^a	VAPG ^a	
2001	\$58.156	\$19.9	63
2002	76.500	33.0	231
2003	76.500	28.7	186
2004	76.500	15.5	96
2005	74.182	15.5	172
2006	89.221	20.5	185
2007	89.164	19.3	162

^aNumbers are shown in millions of dollars.

Table 2 shows the number of VAPG recipients by state and the total dollars of funds. Note that Iowa had the greatest number of grant recipients with 95, while Delaware, Nevada, New Hampshire, and West Virginia had the least number of grant recipients with one each over the 2001 to 2007 time period. 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. In addition, California, Michigan and Washington, states with a great amount of diversity and value-added agriculture, were ranked in the top 10 as recipients.

Table 2. Number of VAPG Recipients and Total Dollar Amount by State, 2001 to 2007.

State	Number of Recipients	Total Dollars Awarded ^a	Average Dollars per Recipient
Alabama	2	102,500	51,250
Alaska	4	225,327	56,332
Arizona	6	392,750	65,458
Arkansas	5	919,900	183,980
California	49	10,408,392	212,416
Colorado	18	2,319,711	128,873
Connecticut	3	212,500	70,833
Delaware	3	575,000	191,667
Florida	11	1,263,180	114,835
Georgia	15	1,987,235	132,482
Hawaii	10	896,735	89,674
Idaho	18	3,156,402	175,356
Illinois	23	3,393,963	147,564
Indiana	12	1,192,250	99,354
Iowa	95	16,876,121	177,643
Kansas	22	517,500	23,523
Kentucky	20	2,031,927	101,596
Louisiana	4	150,632	37,658
Maine	6	580,777	96,796
Maryland	10	149,262	14,926
Massachusetts	16	3,142,453	196,403
Michigan	32	4,275,220	133,601
Minnesota	43	8,771,566	203,990
Mississippi	11	927,911	84,356
Missouri	61	9,195,520	150,746
Montana	9	1,592,557	176,951
Nebraska	62	8,717,832	140,610

Nevada	1	57,312	57,312
New Hampshire	1	40,362	40,362
New Jersey	15	780,700	52,047
New Mexico	3	136,510	45,503
New York	22	1,888,181	85,826
North Carolina	13	2,044,823	157,294

^aNumbers are shown in millions of dollars.

Continued.

Table 2. –Cont.: Number of VAPG Recipients and Total Dollar Amount by State, 2001 to 2007.

State	Number of Recipients	Total Dollars Awarded ^a	Average Dollars per Recipient
North Dakota	21	5,475,225	260,725
Ohio	12	1,534,200	127,850
Oklahoma	7	1,208,780	172,683
Oregon	35	3,014,435	86,127
Pennsylvania	13	1,914,656	147,281
Rhode Island	2	72,500	36,250
South Carolina	4	799,000	199,750
South Dakota	12	2,234,454	186,205
Tennessee	5	671,544	134,309
Texas	39	10,654,174	273,184
Utah	6	1,452,200	242,033
Vermont	11	1,105,981	100,544
Virginia	14	1,418,360	101,311
Washington	34	4,123,696	121,285
West Virginia	1	74,075	74,075
Wisconsin	42	6,551,784	155,995
Wyoming	5	523,000	104,600

^aNumbers are shown in millions of dollars.

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), 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.

Gardner (2000) noted in his Presidential address to the AAEA that lack of rural development can be attributed in part to the lower wages and amenities in rural areas. Relatedly, Monchuk et al. (2006) found that as rural amenities became more like urban amenities, rural economic growth rates improved. The twin vices of rural depopulation and economic stagnation are well known. 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. In doing so, Congress' hope was that the increase in marketing activity by producers through value-added programs would encourage the demand for skilled labor in rural areas.

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 include an agricultural producer group (APGROUP), farmer and rancher cooperatives (FARMER), independent producers (INDEPEND), and majority-controlled producer entity (MAJCON).

An example of an APROG is the California Olive Growers Council, which is a trade association composed of olive growers who received funds to do a market study to conduct marketing and promotional activities to increase sales of Council-certified olive oil. FARMER is defined as a cooperative that is 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 that are composed of entirely independent producers. Bird City Bird Seed Company (Bird City, Kansas) is an example of 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 percent farmers and rancher ownership. An example of MAJCON is Golden Grain Energy, LLC, which used the funds to purchase grains to be produced into 40,000,000 gallons of ethanol annually from 16 million bushels of corn.

Congress defined four types of value-added activity including 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 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 the energy category is Crosswind Energy LLC, which used to funds to address the feasibility of operating a wind farm in northwest Iowa. SEG is defined as product segregation and 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. VAP is defined as a change in the physical state of the product. An example of VAP is Michigan Edible Bean Cooperative, which analyzed markets for dry bean flour.

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) whether the idea actually commercialized.

A list of VAPG recipients was compiled from the USDA Rural Development press releases for each year. Each VAPG recipient was contacted to determine the stage of business development that was achieved for their idea (i.e., product or service). Commercialization was defined as whether the idea was being sold in March 2007. Grants awarded in 2006 were not used because the grants were awarded late in the year; hence recipients would not have completed their projects by March 2007. Thus, data for 2001 to 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 of the 748 recipients (98%) that received VAPG funds from 2001 to 2005.

Table 3 shows the frequency of recipients for the nine 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 3, 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 of the recipients reached step 9.

Table 3. Frequency of the Business Development Steps.

Step	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 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 recipients	621

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 step in the nine steps of business development. This can be seen in the following equation, where F is the function operator.

$$\text{Steps in business development} = F(\text{Resource Availability, Size, Labor, Crop, Value-Added, Organizational Form, State}).$$

A relationship between a variable on the right 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 “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. This binary variable is AIC, which denotes states that received a competitive grant for such a center. The ten 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 (SALEVAPG) and VAPG grant dollars received per VAPG recipient (GRANVAPG). A positive relationship is hypothesized to exist between these variables and successful business development. As sales volume and the dollar value of a VAPG grant increases, 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, 2007). This ratio provides a measure of the skilled labor availability in each county. A positive relationship is expected in that if there is a higher pool of skilled labor, employers will hire better workers, which should increase the success of VAPG recipients.

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 (e.g., aquaculture), BEEF, CORN, DAIRY, EBEAN (e.g., 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 4 shows the frequency of each type of crop.

Table 4. Frequency of Various Crops for VAPG Recipients.

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

MKTSHAR 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 (U.S. Department of Agriculture, National Agricultural Statistics Service, 2007a and 2007b). A positive relationship is hypothesized between this variable and successful business development. We hypothesize that, for example, 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. This variable is capturing 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 (e.g., DIFF, ENERGY, SEG, 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 frequencies of 234, 201, 128 and 58, respectively.

The final variables included in the model are dummy variables for the thirteen states representing two-thirds of the total value-added producer grants awarded. These states are Iowa (12.24 percent), 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).

Note that we were able to find complete data on 621 of the 739 respondents, with MKTSHAR being the most troublesome variable for which to find data.³ Letting Y denote a particular step of business development, the econometric model is the following:

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

Note that the betas are parameters to be estimated and epsilon is the error term.⁴ The binary variables 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).

Two econometric models are used. The first model is a binary logit model that analyzed the effects of covariates on the probability of observing a firm at step 9, the final step, and steps 1 to 8. A second model, the cumulative 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.⁵

The properties of the binary logit model are well known to economists and can be seen in any modern econometric textbook (e.g., Greene 2000, pp. 811-834). The cumulative logit is commonly used for estimating probabilities of categorical, ordered data, especially in medical research (a simple search of the medical citations database, MEDLINE, revealed over 60 papers using the technique), though less commonly used in economics (Ganguly 2006, Flamm and Chadhuri 2007). The cumulative logit was chosen over the more commonly used ordered probit, because the predictive power for the cumulative logit was superior to the ordered probit and because the comparison of the binary logit's and the cumulative logit's modeling framework, coefficient estimates and marginal effects is intuitive – making presentation concise.

Both probability models can be motivated in the same way. The firms in the study may attain any one of nine steps, with step 1 being the lowest and step 9 being the highest: $j = 1, 2, \dots, 9$. The

modeling of the probability of a recipient reaching a particular step, $\text{Prob}(Y=j)$ as allows us to measure the contributions to success at each step. In the case of the binary logit model, the VAPG recipient is either a complete success or falls short of that goal, namely, a firm reaches either $j = \text{“Step 9”}$ or falls short of Step 9. In the case of the cumulative probability model, it is necessary to ascertain the impacts of certain variables on the likelihood of a firm attaining any of the j steps 1 through 9. Further, in the case of the cumulative probability model, the order of the steps matters: step 1 is a lower step than step 2, which is lower than step 3, etc. In both cases, obviously, the rankings are likewise ordinal.

In both models, 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 v. 9.1. Note that the x_i vector of covariates differs between the two models in that the binary logit contains a single intercept while the cumulative logit model contains 8 intercepts (i.e. one less than the number of steps).

The cumulative logit model is designed to model the probability of observing a firm up to a particular step (as opposed to above a particular step). To be consistent in presenting the coefficient values for the two models, in the case of the binary logit model, the probability of observing a firm at a level less than step 9 is modeled. In other words, for the binary model, we explicitly model $\text{Prob}(Y_i < 9) = \text{Prob}(Y_i = 0)$ where $Y_i = 0$ if a firm is at steps 1 through 8 (and $1 - \text{Prob}(Y_i = 0)$, if a firm is at step 9).⁶

Thus, Y in equation 1 is defined as the step of the recipient in achieving business development with the binary logit model having a Y value with two possibilities: either reaching Step 9 or reaching any of the Steps 1 to 8; while the cumulative logit model has a Y value with nine possibilities (Step 1, Step 2, . . . , Step 9).

Results

Recall, we are estimating the probability of observing a VAPG below step 9 in the case of the binary model and below any particular step in the cumulative logit model hence a negative sign on a parameter means the variable has a *positive* influence on a firm achieving a higher step. The first column in that table shows the variable names. Hypothesis tests are reported for the 0.05, 0.10, and 0.15 levels of significance for the parameter estimates. Discussion of the effect of an independent variable’s parameter estimate on the dependent variable is discussed with respect to their marginal probabilities.

Binary Logit Model Results

The concordant figure is 74.4 percent for the binary logit model. Bounded between zero and 100 percent, 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. In the case of a discrete choice model, a value of 74.4 is considered a very good prediction. Column two shows the parameter estimates, while column three has the standard errors in table 6. Note that the logit model has a single intercept, of which the coefficient is significant. Other variables with significant coefficients are USDAEMP, GRANVAPG, SALEVAPG, and MKTSHAR. Significant parameter estimates were observed for seven of the nineteen 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).

USDA EMP 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 negative 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 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 suggests that USDA Rural Development increased the number of Rural Business and Cooperatives division employees and refocused job responsibilities 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 that own the organization that received the VAPG grant. SALEVAPG is the sales volume for the organization that received the VAPG grant divided by the number of producers. These variables are a measure of size and their coefficients had negative 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 one to eight 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 that 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) article contained comments by a former director of the USDA Rural Business and Cooperatives program, Dr. Randy Torgerson, claiming that “. . . the larger firms could probably make better use of that (VAPG) money than some of the fledgling companies.”

MKTSHAR measured 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 negative 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 negative for these variables, suggesting that the VAPG recipients adding value to these commodities relative to OTHER (which was the dropped binary variable) had a decreased likelihood of being in steps one to eight, or rather an increased likelihood that these VAPG recipients were in step nine with

a product being marketed in March 2006. It should be noted that PORK and SGRAIN (small grains such as mustard, buckwheat and other grains) did have significant coefficients at the 0.20 level, also with a negative 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, increasing the likelihood that these organizations have greater access to market intelligence and are more likely to achieve business success.

One of the four business organizational forms (APGROUP) had a significant parameter with a positive sign, which would suggest that a successful VAPG grant written by this organization had an increased likelihood of being in the business development steps of one through eight 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 membership that is very broad and diverse. Furthermore, these variables 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 that surprising. It should be noted that the number of VAPG grants awarded to APGROUP declined in every year from 2002 (91 grants) to 36 grants in 2005, which would suggest that these entities were not as successful in receiving VAPG grants or that they did not submit as many grant proposals in later years.

Significant and negative parameter estimates were found for the binary state variables of Illinois (IL), Kansas (KS), Minnesota (MN), Missouri (MO) and Wisconsin (WI). These results suggest that VAPG recipients located in these states had a decreased likelihood of being in steps one to eight. It is hard to know what these results suggest. Missouri probably has the most sophisticated infrastructure for business development with a long-standing state program, and the only state that “strongly encourages” recipients to receive education after receiving a state VAPG grant or a USDA VAPG grant.⁷

Cumulative Logit Model Results

The concordant value is 72.2 for the cumulative logit model. Importantly for determining fit and, later, the marginal effects, the eight intercept terms have mostly significant coefficients suggesting that the cumulative logit can appropriately model these data and, hence, provides more information than the simpler binary model. Column four in Table 5 shows the parameter estimates while column five has the standard errors. The independent variables with significant coefficients in the binary logit model are likewise significant in the cumulative logit model with the same signs. Thus, an increase in these variables suggests that the likelihood of observing a VAPG recipient in one of the lower steps decreases. FLOW and SMEAT are not significant at the 0.10 level of significance but significant at 0.15.

The coefficient on the variable INDEPEND is positive and significant in the cumulative logit model (it was insignificant in the binary model). This variable denotes 100 percent producer-owned organizations that include steering committees and other similar entities. This result suggests that there was an increased likelihood of this entity being in steps one to eight rather

than being in step nine. The number of these INDEPEND entities ranged from 25 in 2002 to 45 in 2006, but there was no discernable trend.

Marginal Probabilities of the Independent Variables

A one percent change in one of the covariates affects the probability of seeing a firm at a particular step. Thus, for example in the case of the binary model, a one percent change in the ratio of grant dollar expenditures to total producers (GRANVAPG) results in a 0.0725 percent decline in the probability of seeing a firm lower than step 9 or, conversely, a 0.0725 percent increase in the probability of observing a successful firm.

In the case of the cumulative logit, the elasticity is calculated for the effect on the probability of observing a firm at a particular step.⁸ Hence, a one percent change in GRANVAPG lowers the probability of seeing the firm at step 1 by 0.12 percent, at step 2 by 0.10 percent, etc. It is interesting to note that the amount of grant dollars appears to have the biggest effects on steps 1 through 3, and then has very little effect on steps 4 to 8, but increases such that the effect on step 9 is positive. USDAEMP and SALEVAPG follow similar patterns, suggesting these variables appear to have their largest impacts on getting firms through at least steps 1-3, and then once the firms are past step 3, these variables then have the next biggest marginal impact on a firm's final success (step 9).

Recall that a VAPG recipient that completes step 3 has completed steps that do not necessarily require producer investment. Many producers make minimal or no investment prior to step four. Entry into step four requires producer investment because an entity is created in step three and capital is required to hire and pay a manager and/or employees. Each resulting increase from step three to eight requires producer investment and, correspondingly, an increase in risk. Completion of step nine suggests that 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 program designed to encourage producers to invest in ideas that would lead to value-added enterprises. Policymakers creating the 2002 Farm Bill were aware that low commodity prices existed 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 determined by several factors. Moreover, using a cumulative logit model, we were able to break the analysis down to a finer level and ask what factors helped firms reach at least to intermediary steps short of the ultimate goal of commercialization. Our study is the first of its kind to investigate the VAPG program, a program currently under much scrutiny.

Market share was an important determinant to VAPG success. It is interesting that this variable is also one that many departments of agricultural economics have long provided producers 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) and the Center for Agricultural and Rural Development at Iowa State University 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. Knowing this may have helped firms become successful but, more importantly, providing this information to potential VAPG recipients may help future businesses be successful, 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, and thus, when considering adding a new value added product to their portfolio, have greater market intelligence for 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 for VAPG recipients and helped many VAPG recipients. 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 to be able to best assist VAPG recipients by providing information on basis prices and explain their relationship to potential plant locations. For example, building an ethanol plant in a region distant from corn (e.g., eastern Montana or western North Dakota) or building a pasta plant in a region distant from the supply of durum wheat and distant from demand points for pasta (e.g., western Kansas) is something agricultural economists can explain to producers of value-added commodities.

Footnotes

¹For example, the Rural Strategies and Investment Program authorized \$280 million to invest in value-added organizations.

²Other programs associated with departments of agricultural economics have received funding from programs authorized in the 2002 Farm Bill. The Agricultural Marketing Resource Center was authorized and grants were appropriated for a national center to provide an electronic database of information available to commercial producers and service providers engaged in business development and value-added agriculture. The Iowa State University Cooperative Extension Service, Department of Economics, and Center for Agricultural and Rural Development; University of California Agricultural Issues Center; and Kansas State University Department of Agricultural Economics are partners in the center, which receives five percent of

annual VAPG appropriations to provide education and research to support the VAPG and other USDA Rural Development programs. Similarly, 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 have the name of a graduate student as a co-author.

³Despite 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) with 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 for national production data for sturgeon or caviar and 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 sturgeon products such as caviar, he did not have production data. This exhausted our efforts to include this variable in our analysis.

⁴Specifically, we parameterize the probability of observing firm $i = 1, \dots, N$ as depending on the $k \times 1$ regressor vector, x_i and a $k \times 1$ parameter vector, β such that

$$E[Y_i | x_i] = \text{Prob}(Y_i \leq j) = F(x_i' \beta).$$

⁵We point this out because typically economists are used to explicitly model 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.

⁶ Because some of the steps had only a few observations, we also estimated a cumulative 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 in this paper and were left out for brevity, though are, of course, available from the authors.

⁷There is no statutory language that requires 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.

⁸With a cumulative 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. We have chosen the latter here for consistency with the binary model.

References

Dhuyvetter, K.D. "Crop Basis Maps." Department of Agricultural Economics, Kansas State University, Available Online December 2, 2007 at www.AgManager.info

Center for Agricultural and Rural Development, Iowa State University. "Daily Crop Basis Maps." Available Online December 2, 2007 at www.card.iastate.edu

Flamm, K., and A. Chaudhuri. "An Analysis of Determinants of Broadband Access." *Telecommunications Policy* 31, 6-7(2007):312-326

Ganguly, S.S. "Cumulative Logit Models for Matched Pairs Case-Control Design: Studies with Covariates." *Journal of Applied Statistics* 33,5(2006):513-22.

Gardner, B.L. "Economic Growth and Low Incomes in Agriculture." *American Journal of Agricultural Economics* 82,5(November 2000):1059-74.

Greene, W.H. "Econometric Analysis." Fourth Edition. Prentice Hall Inc., Upper Saddle River, New Jersey, 2000.

Monchuk, D.C. "An Analysis of Regional Economic Growth in the U.S. Midwest." *Review of Agricultural Economics* 29,1(2006):17-39

U.S Department of Agriculture, National Agriculture Statistics Association. "The 2002 Census of Agriculture." Available Online June 24, 2007a at <http://www.agcensus.usda.gov/Publications/2002/index.asp>

U.S Department of Agriculture, National Agriculture Statistics Association. "Agriculture Statistics Database." Available Online July 5th, 2007b at <http://www.nass.usda.gov/>

U.S. Department of Agriculture, Rural Development. "Value-Added Grant Recipients." Available Online (years 2001 to 2007) December 2, 2007 at www.rurdev.usda.gov

U.S. Department of Agriculture, Rural Business-Cooperative Services. "Notice of Funds Availability Inviting Applications for the Value-Added Agricultural Product Market Development Grant Program." *Fed. Reg.* 66, 44: 13490-13495

U.S. Department of Agriculture, Rural Business-Cooperative Services. "Notice of Funds Availability Inviting Applications for the Value-Added Agricultural Product Market Development Grant Program." *Fed. Reg.* 66,126(2001):34610-34611.

U.S. Department of Agriculture, Rural Business-Cooperative Services. “Notice of Funds Availability Inviting Applications for the Value-Added Agricultural Product Market Development Grant Program.” *Fed. Reg.* 67, 121 (2002):42531-42538.

U.S. Department of Agriculture, Rural Business-Cooperative Services. “Notice of Funds Availability Inviting Applications for the Value-Added Agricultural Product Market Development Grant Program.” *Fed. Reg.* 68, 171(2003):52565-52572

U.S. Department of Agriculture, Rural Business-Cooperative Services. “Notice of Funds Availability Inviting Applications for the Value-Added Agricultural Product Market Development Grant Program.” *Fed. Reg.* 69, 114(2004):33348-33360.

U.S. Department of Agriculture, Rural Business-Cooperative Services. “Notice of Funds Availability Inviting Applications for the Value-Added Agricultural Product Market Development Grant Program.” *Fed. Reg.* 70, 43(2005):10938-10938.

U.S. Department of Agriculture, Rural Business-Cooperative Services. “Notice of Funds Availability Inviting Applications for the Value-Added Agricultural Product Market Development Grant Program.” *Fed. Reg.* 70, 44(2006):75780-75790.

U.S. Department of Agriculture, Rural Business-Cooperative Services. “Announcement of Value-Added Producer Grant Application Deadlines.” *Fed. Reg.* 72, 72(2007):18949-18959.

U.S. Department of Commerce, Bureau of Economic Analysis. “Regional Economic Information System.” Database Available Online June 20, 2007 at <http://www.bea.gov/regional/docs/reis2004dvd.cfm>