



# UPDATE

## Agricultural and Resource Economics

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### The Bankruptcy of Tri Valley Growers: What Went Wrong and What Can We Learn From It?

by

*Himawan Hariyoga and Richard J. Sexton*

*Many questions have been raised regarding the causes of the demise of California's leading food-processing cooperative. A recently completed UC Davis study provides some answers.*

**T**ri Valley Growers (TVG) was a California agricultural cooperative owned by more than 500 member-growers who delivered primarily tomatoes, peaches, pears and olives to the cooperative for processing and marketing. In fiscal year 1998, TVG's sales revenue reached \$782 million, and its members' equity was \$125 million. TVG hired more than 9,500 seasonal and 1,500 annual employees. Severe financial difficulties forced TVG to file a voluntary petition for reorganization under Chapter 11 of the U.S. Bankruptcy Code, in July 2000. Its assets were sold subsequently to various buyers. TVG's bankruptcy caused ripple effects across much of the state's agricultural sector.

#### Essentials of TVG's Operations

In the mid 1990s, TVG operated ten processing plants, nine in California and a tomato-reprocessing facility in New Jersey. TVG procured raw products from growers on both a membership and a cash-contract basis and converted them into a wide variety of processed products. As time passed, the percentage of product, especially tomatoes, procured through cash contracts increased. Prior to 1983, TVG operated a single pool for products procured on a membership basis. All revenues and costs flowed into a single account, and surplus in excess of each

commodity's "established value" (EV) was returned to members in proportion to their EV. Established value, in turn, was set in accord with industry prices that were discovered through bargaining between the commodity bargaining associations for tomatoes, peaches and pears, and the major independent processors of those commodities.

In 1983, TVG established the "50/50" pooling concept, whereby commodity-specific pools were established, and 50 percent of revenues derived from each commodity flowed into its own pool, while 50 percent went to the general pool. In 1996, TVG restructured itself as a "new-generation cooperative," members' equity was converted to capital stock, and the 50/50 pooling concept was replaced by a complicated alternative that essentially represented a return to the single-pool concept.

#### TVG's Tomato Operations

Tomatoes comprised about 40 percent of TVG's revenues in the 1990s. Tomato production had relocated from coastal areas to the central valley, causing a mismatch between production and processing capacity. Also, the processing technology had come to emphasize low-cost bulk paste manufacturing undertaken in the producing areas, with remanufacturing into specific products done elsewhere.

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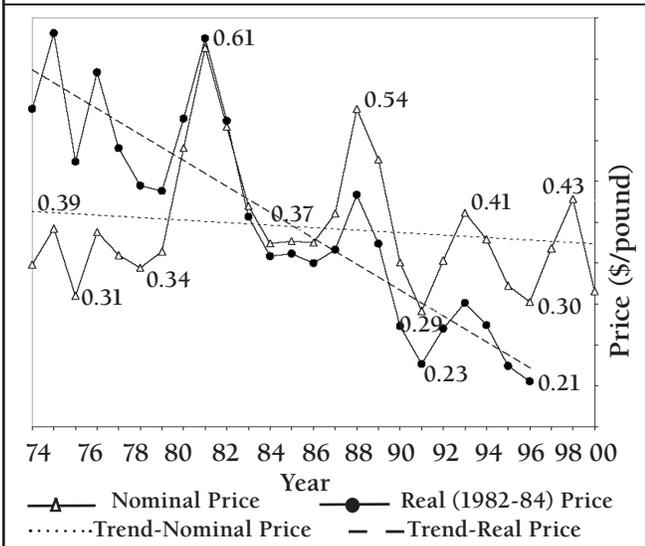
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**Figure 1. Price Trends of Industrial Tomato Paste (Fancy 31%, 55 Gallon Drum), 1974-2000**



Processed tomato products sell in a global market, and prices are subject to wide fluctuations and are strongly influenced by inventories carried forward from the prior crop year. On both a nominal and a real basis, prices declined on average during the period 1974-2000 (Figure 1).

TVG joined the paste revolution in 1974, when it built a paste-manufacturing facility near Volta and secured a favorable ten-year, cost-plus paste contract. However, TVG also adopted a nonstrategic approach to expansion in the 1980s through acquiring the membership and facilities of failed co-ops Glorietta and Cal Can. As a result, TVG's tomato facilities were not well-aligned geographically with its production, causing it to have higher shipping costs than the competition. Also, in some cases, its facilities lacked state-of-the-art technology and their production capabilities were not well-aligned with the market's needs.

Thus, circumstances suggest that TVG needed to make investments in plant modernization and relocation. However, it was constrained during the late 1980s and 1990s from doing so because it was already carrying a high debt-to-equity ratio and its members were themselves suffering from adversities in the raw-product market, making it difficult to collect more equity from them.

TVG's inability to compete in the growing but cost-driven bulk-paste segment of the market caused it to refocus on producing peeled products and branded product sales in the 1990s, but this strategy was constrained because TVG's brands were weak and the

value-added strategy brought it into direct competition with larger, financially stronger rivals. Overall, TVG produced a wide variety of low-value and/or low-margin products. During this period it manufactured 435 tomato product items or labels, including 154 peeled products, 148 remanufactured products, 61 paste items, 22 sauce products and 17 puree items. TVG mostly missed the explosion in demand in the 1990s for pasta sauces, Mexican salsas and barbecue sauces.

Very low raw-product prices in 1991-92 caused reduced grower shipments to TVG in subsequent years, leading to underutilization of plant capacity—tomatoes processed in five plants could have been consolidated into three. Poor alignment of production with processing capacity, inefficient technology and underutilization of plant capacity combined to make TVG a high-cost tomato processor relative to most competitors. Stagnant processed-product sales in the early 1990s also led to high inventory costs (Figure 2).

Tomato market adversities led to low grower returns and persistent subsidization from fruits to tomatoes under the 50/50 pooling arrangement. Most TVG growers were multi-cannery growers and lacked loyalty to TVG. TVG lacked strong membership contracts that would have required delivery and instead was forced to offer tomato growers special deals—cash contracts, accelerated payments and low rates of equity retention—to retain the patronage of tomato growers in the 1990s. Only 54 percent of tomatoes were acquired on a membership basis in 1996. Its severe problems and limitations in the tomato market caused TVG to actively contemplate a tomato exit strategy in 1994, but a new board and management team took over soon thereafter and recommitted TVG to the tomato market.

### TVG's Fruit and Olive Operations

Fruits comprised about 53 percent of TVG's revenues in the 1990s, with the lion's share representing canned peaches and fruit cocktail. Prior to its bankruptcy, TVG was the largest fruit processor in California, with about a 40 percent aggregate market share. TVG operated its own brands, such as Libby and S&W, but sold a majority of its product under private labels.

TVG was better positioned in fruits than tomatoes, and fruit products on average generated a higher margin than did tomato products. On the downside, per capita consumption of canned peaches and pears declined rather consistently from 1970 through the 1990s, as fresh-fruit alternatives became increasingly available. Despite its large share of California production, TVG

lacked large national market shares or dominant brands for any of its processed products and was essentially a price taker in these markets.

Most of TVG's fruits were procured on a membership basis and, perhaps because they had fewer selling options than the tomato growers, TVG's fruit growers were generally loyal to the co-op. However, the persistent subsidies from peaches to tomatoes through the 50/50 pooling arrangement from the mid 1980s through the mid 90s caused discontent among the peach growers.

Although olives were a high-margin item for TVG, they caused many problems. Movement as a percent of production was consistently the lowest of any TVG commodity, the percent of nonmember purchases increased rapidly to 71.5 percent in 1996, and in excess of \$10 million in costs were incurred due to environmental contamination of the olive-processing plant in Madera.

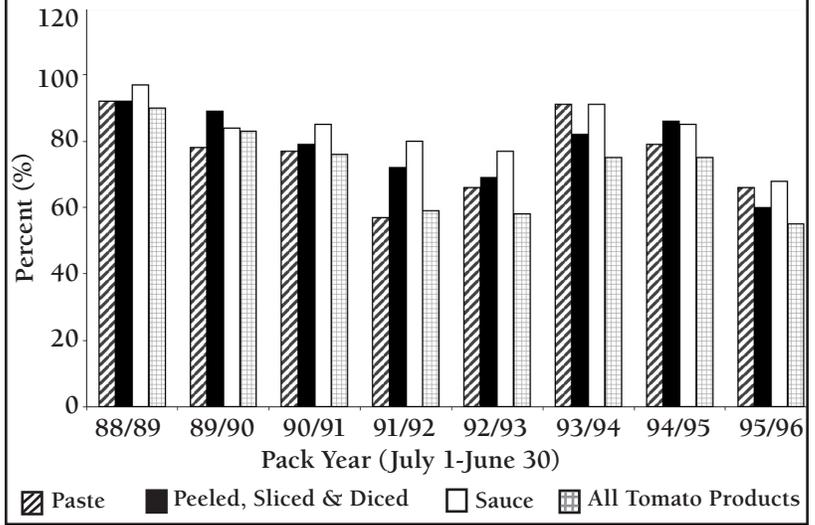
Unlike its major competitors Pacific Coast Producers, a peer co-op that focused on low-cost, private-label production, and Del Monte, which focused on value-added brands, TVG tried to perform in both market segments. However, despite many problems, TVG's fruit operations (excluding olives) were competitive to the very end.

### The "New-Generation" Restructuring

In April 1995, Joseph Famalette was hired as CEO and president of TVG. Famalette had been the architect of a restructuring plan for American Crystal Sugar, and presented a similar plan to TVG members in June 1996. TVG's equity base was hemorrhaging at this time due to loss of members and increased use of cash contracts.

The restructuring plan included converting existing equity to a capital stock issued by commodity class. The capital stock conferred both a delivery right and obligation and could be transferred, with board approval, only to another California producer of the commodity. For example, 1.8 million shares of tomato stock were authorized, implying delivery of 1.8 million tons, but less than 800,000 were issued. The 50/50 pooling concept was replaced with a "profitability-target" concept that was closely akin to the old single-pool concept. The restructuring included a purge of many employees who were replaced with executives who had little prior experience with cooperatives or food processing. A retired TVG executive noted wryly,

**Figure 2. TVG's Percent of Tomato Pack Sold 1988/89-1995/96**



"They fired everyone who knew where the light switch was at."

### The Final Downward Spiral

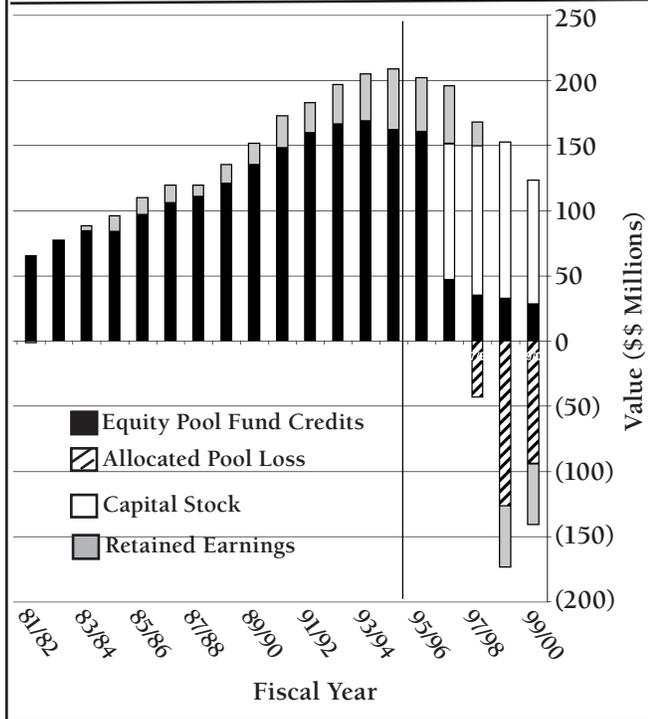
In 1996, TVG changed its definition of operating income and redefined its fiscal year. The new management also raised prices after the 1996 pack, in market conditions that were not supportive of higher prices. This move resulted in declining sales and rising inventories. Long-term debt rose from \$30.1 million in fiscal year 1995/96 to \$145.6 million in fiscal year 1996/97. In August 1997, TVG's auditor, Deloitte & Touche warned TVG of an increased risk of inaccurate financial reporting, in part because the position of chief financial officer had been eliminated in the downsizing.

In August 1998, TVG announced a net loss of \$78 million and fired CEO Famalette. About 50 percent of this loss resulted from paying growers 129 percent of the established value, versus the 90 percent that was guaranteed. Fiscal year 1998/99 closed with a loss in excess of \$120 million. These losses were carried forward on TVG's books, effectively depleting the cooperative's equity (Figure 3), and making it functionally bankrupt even before the official filing in July 2000.

### Analysis of TVG's Demise

The seeds of TVG's demise were in place prior to the 1990s in the form of high inventories, low productivity of assets, high operating and transportation costs relative to the competition, and a high debt-to-equity ratio, which inhibited needed investments in modern plant and equipment. TVG was competitive in fruit

**Figure 3. TVG Members' Equity, Fiscal Year 1981/82-1999/2000**



processing, but not in tomato processing. TVG either needed to become competitive in tomatoes by finding a market niche where it could thrive or jettison its tomato line. Using fruit revenues to subsidize tomatoes was not a viable long-term strategy. It will never be known whether TVG could have survived as a fruit processor, if it had divested its tomato lines in advance of the disastrous last years of its operation.

The new-generation restructuring was largely unsuccessful, in that it failed to stabilize either the equity base or the base of raw product, but it had little per se to do with the bankruptcy. Rather, the restructuring was a desperate response to severe problems that were already in place. The cost-reduction measures implemented at that time were counterproductive because they were too radical and ill-targeted, so as to negatively impact TVG's ability to generate revenues. The long-standing problems of poor internal controls and lack of a centralized information system were never addressed.

Some have viewed TVG's bankruptcy as a sign that co-ops are ill-suited to succeed in twenty-first century markets. One way to evaluate this concern is to ask which of TVG's problems were due to its cooperative structure, versus due to market conditions or internal problems? We view the acquisition of inefficient capital from defunct co-ops as both a co-op (due to a misplaced sense of obligation to help fellow co-ops) and

a management problem. The high debt-to-equity ratio that TVG experienced is common among cooperatives, and is due to the limited pool from which they can draw equity (namely, the members), and members' reluctance to contribute to long-lived projects, known as the "horizon problem." The unwillingness to terminate growers who were no longer viable producers for the cooperative and the dramatic grower overpayments in the final years probably also trace to the grower-ownership dimension of a cooperative.

Market problems were fundamentally twofold, but neither was insurmountable. The tomato market, though growing over time, was very volatile, and the canned fruit market was in decline.

Internal problems related to management and the board of directors were several, in our view. Nonstrategic acquisitions of failed competitors has already been noted, failure to adopt an integrated management information system was a critical error, so, too, was the Famalette-era purge of employees who were knowledgeable about the food-processing business. Other internal problems attributable to the co-op's leadership include failure to come to grips with the grower end of the tomato business, including over-reliance on cash contracts. Finally, TVG had a persistent lack of focus on the selling side—for example, whether to emphasize brand or private-label sales and whether to emphasize paste or value-added products in tomatoes.

Ultimately, we do not think that TVG's cooperative structure was the major factor in its bankruptcy. The fact that peer cooperative Pacific Coast Producers continues to experience success supports this view. We do think the TVG experience offers lessons for cooperatives. A multiproduct marketing co-op is desirable in the sense that modern markets prefer "full-line" suppliers, but marketing multiple products has the potential to create significant internal problems in terms of pooling and director loyalty and responsibility. TVG's experience with its tomato growers emphasizes the importance of long-term grower contracts to encourage member loyalty. However, loyalty to other cooperatives should not replace sound business judgments. Finally, TVG was probably slower in responding to changing market forces than its competitors, perhaps due to a cumbersome cooperative decision-making process.

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## Cultivar Diversity as a Risk Management Strategy for Tree Crop Growers

by

**Steven C. Blank**

*Risk reduction through diversification across cultivars is evaluated. A case study of peach growers in California shows that cultivar diversity reduces both yield and revenue variability. As a result, the probability of falling below minimum-income requirements set using a safety-first model is reduced using this strategy.*

Cultivar diversification is a traditional production risk minimization strategy still practiced around the world; however in modern agriculture its use differs across commodities. Producers of high-value annual crops, such as vegetables, commonly use diversification across crops, locations and cultivars. For perennial crop producers, diversification across crops is common, while specialization in cultivars is often promoted for both production and marketing reasons. In general, farmers who are reluctant to use cultivar diversification usually practice specialized production as a means of achieving economies of scale in one particular enterprise, or cultivar specialization in response to markets' desires for product standardization. In industries producing tree crops, risk reduction through diversification across cultivars is seldom practiced as more farmers pursue specialization. One notable exception is the peach industry; cultivar diversity is practiced, but peach growers vary widely in the degree to which they use the strategy. This makes the peach industry a good case study for evaluating the benefits of cultivar diversity as a risk management tool.

Farmers use three types of production diversification. The most common type is diversification across products. This strategy can be utilized by any farmer with knowledge of how to grow more than one commodity, including growers with small and/or contiguous parcels of land. The goal of this type of diversification is to reduce variance in sales revenues by participating in more than one product market. For this strategy to be successful, the product markets must have low or negative levels of correlation in their prices and/or yields. The second type of diversification, across locations, has been practiced less often because it requires operating two or more

parcels that are geographically separated, which could be infeasible for some growers. Many peach growers use this risk management strategy. Spatial diversification requires that a grower scatter his/her production across locations far enough apart to have low levels of correlation in their weather extremes. Thus, the focus is on reducing yield variance, so this strategy can be applied by growers specializing in one commodity. Finally, cultivar diversity is a form of temporal diversification, but it incorporates aspects of both of the other two strategies. The usual goal of cultivar diversity is to have portions of total acreage (either contiguous or

scattered) reach the harvest stage at different times of the year. By selecting cultivars of a single commodity that are not highly correlated in their growth schedules, farmers can both (1) reduce average yield variability by reducing weather- risk exposure (similar to geographical diversification), and (2) raise average price received and/or lower

price variance by being able to sell output in more than one market season (similar to product diversification). Practicing cultivar diversity complicates both production and marketing, but can increase profits.

For peach growers, diversification is one of the few risk management strategies available or acceptable to a majority of producers. In California, only 4.2 percent of peach growers have crop insurance and there is no price risk-management tool available for peaches. As a result, peach growers all use some type of diversification.

The objective of this study is to analyze cultivar diversity as a risk management strategy for fresh-market peach growers in California. This industry provides a rare case study allowing comparisons between tree-crop operations that are fairly specialized versus others that are diversified in their cultivars for a single commodity.

*“For peach growers, diversification is one of the few risk management strategies available or acceptable to a majority of producers.”*

**Table 1. Peach Yield Mean, Standard Deviation and Coefficient of Variation for Each Season (Boxes per Acre)**

	Mean	Standard Deviation	CV (%)
Early-season	592	280	47
Mid-season	929	402	43
Late-season	998	389	39

*Note: the early-season is defined to include all peach sales before July 1, the mid-season includes all of July, and the late-season includes everything after July.*

## Measuring Risk Management Performance

In this analysis, the effects of using cultivar diversification to manage risks are measured using a safety-first criterion. Safety-first models create a rank ordering of decision alternatives by placing constraints upon the probability of failing to achieve certain goals of the firm. This study assumes a farmer's goal is to generate enough sales revenue to produce at least some designated minimum level of profit. The designated safety threshold is a personal preference based on financial obligations, lifestyle goals and opportunity costs—thus, it will vary across individuals.

Empirical applications of safety-first models often use a measure called the “Probability of Disaster,” or “risk of ruin.” This measure indicates the chance (in percentage terms) that a producer will generate a return below some critical level. A risk management strategy that reduces the probability of disaster, compared to the current situation, is a useful tool.

### Empirical Methods

The main variables considered in this study are yield per acre of freestone peach cultivars and revenue in dollars per acre. Yield is reported as the number of 25-pound boxes per acre. Growers' gross revenue per acre is computed as yield times the average price for each season for each cultivar.

The data were collected from a sample of 50 peach growers in Fresno County. Those growers were interviewed in 1999 about their production of peach cultivars over the previous five years, from 1994 through 1998. The 50 farms represent 73 percent of the 15,885 total acres of peaches in Fresno County reported in the 1997 Census of Agriculture.

In this study, two forms of peach cultivar diversification benefits are defined. The first form is the resulting absolute reduction in variance compared to

the level observed for a single cultivar. The second form is measured by how much diversity lowers the probability of revenue falling below the farm's disaster level. This is indicated through the difference in probabilities for each farm's diversified versus single-crop operation. The disaster level for each grower was set at the point identifying the lowest ten percent of the (revenue or yield) distribution for the industry in any given year. This level was identified during the interviews by asking each grower to specify a minimum revenue or yield threshold necessary to meet his or her financial obligations.

Three standard statistical measures are used in this analysis: the mean, standard deviation and coefficient of variation. The “mean” is the average value of some group of numbers. It indicates the numerical level of the data in absolute terms. The “standard deviation” refers to the dispersion of the data values. It also is an absolute value. The standard deviation indicates the range of values in the group of numbers because nearly all data values will be within three standard deviations of the mean, and about 68 percent of the data points will be within one standard deviation of the mean. The coefficient of variation (CV) is calculated as the standard deviation divided by the mean. The CV is a relative value, usually expressed as a percentage, that can be used to compare the relative variabilities of two or more groups of numbers. The higher the CV, the more variable is the group of numbers. Thus, it is often used to indicate relative degrees of risk across data series: the series with the highest CV is the “most risky.”

### Results

Most peach operations are relatively small because no peach grower produces only peaches. The acreages evaluated here are those with peaches only and growers' other crop acreages are not included.

### Variability

The mean, standard deviation and coefficient of variation of peach yield for the 50 farms are 707 25-pound boxes, 73 25-pound boxes and ten percent, respectively. The mean yield for all cultivars on a farm ranged from 262 to 1,264 over the data period. The coefficient of variation ranged from two percent to 67 percent for individual farms.

The data (Table 1) indicate that cultivars maturing in the early-season (marketed before July 1) provide lower yield and show relatively higher variation than

mid-season (July 1-31) and late-season cultivars (August 1 or later). This implies that planting combinations of early-, mid- and late-season cultivars may be less risky than relying on cultivars maturing during a single season.

Fresh-market peach prices during the five-year period are summarized in Table 2. For this study,

prices of all ten sizes and grades of freestone peaches for each harvest season (early, mid and late) were averaged and used as the mean price growers received in each season. The average coefficient of variation of prices was 37 percent, 22 percent and 18 percent for the early-, mid- and late-seasons, respectively. The high-price variability of early-season cultivars occurs because peach prices are highest in the “early periods” of the early-season when supply is short, but they decline quickly as supplies increase. In mid- and late-seasons, however, price gradually stabilizes with peach supplies.

Peaches are perennial crops, so year-to-year variation in bearing acreage is low. Therefore, the major changes in production come primarily from yield variation. Cultivars that have high price and yield variability may generate relatively stable gross revenue because of negatively correlated prices and yields. For the 50 farmers surveyed, revenue per acre had a mean of \$6,512, a standard deviation of \$1,803 and a coefficient of variation of 28 percent. The range of those values, respectively, was \$2,741 to \$9,558, \$274 to \$1,927, and seven percent to 46 percent.

### The Disaster Level

The minimum threshold for yield and revenue was determined by using the average responses of farmers to interview questions asking them to specify a level below which they could not meet their financial obligations. For each factor, the cut-off value identified was approximately ten percent on the normal distribution.

For yield, that translated into 412 boxes per acre. Thus, any cultivar yielding 412 boxes or fewer per acre is considered to have a disastrous result for growers.

**Table 2. Annual Peach Prices in Fresno, California (\$ per Box)**

Year	Early-Season			Mid-Season			Late-Season			All Seasons	
	Mean	SD	CV%	Mean	SD	CV%	Mean	SD	CV%	Mean	CV %
1994	7.30	3.6	49	6.37	2.1	32	6.70	1.6	24	35	
1995	10.49	2.7	19	7.59	1.5	19	8.90	1.2	13	17	
1996	11.08	2.6	24	11.21	1.3	12	9.57	1.6	16	17	
1997	9.24	3.8	42	5.79	1.5	25	5.87	0.7	11	26	
1998	14.26	7.4	52	7.18	1.7	24	6.75	1.7	26	34	
Overall	10.47	4.0	37	7.63	1.6	22	7.56	1.4	18	26	

*Note: The early-season is defined to include all peach sales before July 1, the mid-season includes all of July, and the late-season includes everything after July. Prices are reported by the USDA's Market News Service.*

The cut-off level for revenue disaster was calculated to be \$4,204 per acre. If a grower obtained less than \$4,204 per acre from all of his cultivars he would suffer what is called here a “100 percent disaster.” He can also experience an intermediate level of disaster by getting less than \$4,204 per acre from some of his cultivars.

Based on these calculations, 38 percent of the growers had some level of yield disaster and eight percent showed a 100 percent disaster level. On the other hand, 44 percent of growers had some revenue disaster because revenue from at least one cultivar was less than the minimum threshold. However, only two percent experienced a 100 percent revenue disaster. The percentage of growers with 100 percent disasters was lower for revenue than yield, indicating that revenue variance may be reduced by offsetting price and yield variation.

### Correlation Among Cultivar Revenues

To reduce risk through diversification, farmers should choose cultivars with negative or low correlation between their revenues, because a potentially disastrous result from one cultivar can be offset by an adequate result from another. In this study, the average revenue correlation between all cultivars on individual farms ranged from -0.85 to 0.99, indicating good potential for risk reduction for some farms.

The offsetting effect of high price on low yield can be seen by comparing Tables 1 and 2. The average price of early cultivars was consistently higher than the prices of mid- and late-season cultivars, whereas average yield was lower for early cultivars than for mid- and late-season cultivars. Revenue per acre over

the 1994-98 period averaged \$6,200 for the early-season, \$7,090 for the mid-season and \$7,480 for the late-season. The difference in revenue between early- and late-season cultivars is 20 percent, whereas the difference in yield between early- and late-season cultivars is 69 percent.

### Variance Reduction Through Diversity

The 50 farms surveyed varied in diversity, ranging from two cultivars to 15 with an average of five. The within-farm variability of revenue observed with multiple cultivars was compared to the variability observed from a single cultivar for each farm. For 86 percent of the growers, revenue variability decreased as a result of cultivar diversity. Revenue variability was reduced by 21 percent on average.

Finally, the second form of benefits also shows positive results in that diversity reduces the probability of revenue falling below the disaster level. Eighty-eight percent of growers had revenues above the disaster level of \$4,204 per acre. Also, the group of most diversified farms had a lower probability of disaster compared to the group of least diversified farms.

### Concluding Comments

Growers face trade-offs when considering cultivar diversification versus specialization as a production strategy. Specialization may lead to economies of scale that lower per unit production costs, increasing the profitability of operations. However, diversification of all types has been found to reduce variance in returns. Therefore, the trade-off involves risk and returns. Interviews with peach farmers revealed that they are concerned about revenue variability and the probability of avoiding a financial disaster.

Like most farmers, peach growers are a heterogeneous group. The 50 growers interviewed ranged widely in size and they varied in their approaches to risk management. One common component of the risk management strategies being used by these farmers was diversification of at least two types. All of the growers were practicing cultivar diversification and crop diversification. It is possible that some growers' crop-diversification activities influenced their cultivar-diversification decisions. For example, a grower using a crop diversification strategy may be less concerned about variation in peach returns because he/she is diversified across other enterprises.



*The results imply that planting combinations of early-, mid- and late-season cultivars may be less risky than relying on cultivars maturing during a single season.*

*Photo by Julie McNamara*

The results of this study provide strong support for cultivar diversification as a risk management strategy. Compared to the results that surveyed farms would have generated as single-cultivar operations, cultivar diversity reduced yield variation in all cases, and 86 percent of farms had lower revenue variation with diverse cultivars. Most importantly, the results show that diversification significantly lowered the probability of disaster. This can be critical to the survival of farms in an industry like peaches where the probability of disaster increases rapidly with relatively small increases in cost per acre. Therefore, when a grower is unwilling to consider production systems that may have a financial result with some "risk of ruin," cultivar diversification is an alternative that provides a safer balance between risk and returns.

**For Additional Information  
the Author Suggests the Following Reading:**

Tadesse, D. and S. Blank, "Cultivar Diversity: A Neglected Risk Management Strategy," *Journal of Agricultural and Resource Economics* 28, 2 (2003): 217-232.

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## Conditional Cash Transfer Programs: Are They Really Magic Bullets?

by

*Alain de Janvry and Elisabeth Sadoulet*

*Conditional cash transfer programs pay recipients in exchange for an action that brings private behavior closer to the social optimum. We analyze one such program in Mexico, Progresa, that pays four million poor mothers to send their children to school and health visits. We show that these programs are effective, but that they can be made more efficient by following simple rules in selecting beneficiaries and calibrating transfers for maximum response per unit of transfer.*

In recent years, conditional cash transfer (CCT) programs have been introduced for a variety of different purposes. Applied to education and child health in developing countries, for instance, they consist of giving cash to poor parents with the condition that they send their children to school and health visits. These programs have been hailed as being among the most significant innovations in promoting social development in recent years. Nancy Birdsall, president of the Center for Global Development, was thus quoted in the *New York Times* of January 3, 2004, as saying, “I think these programs are as close as you can come to a magic bullet in development.

They are creating an incentive for families to invest in their own children’s futures. Every decade or so, we see something that can really make a difference, and this is one of those things.” In all cases, the objective of the CCT program is to correct for market failures, where a specific socially desirable action is under-rewarded by the market, a situation that economists describe as positive externalities. The transfers act like a price effect on the action: they are expected to induce individuals to increase their supply of the action by raising its price via a conditional cash transfer. Examples of the application of this principle include the following two:

*Learning externalities.* Despite the high private benefits derived from education, there is under-investment in education by individual households because the positive benefits that it generates on others are not rewarded by market forces. It has thus been observed that the educated create employment for others, that

wages are higher for high school graduates in cities where the supply of college graduates is higher, and that the educated have higher civic participation and make better decisions over policy choices that affect the economy. Education creates inter-generational benefits as educated mothers have on average healthier babies. As the educated tend to take greater risks in experimenting with new technological innovations, it allows others to learn from them. For all these reasons, local and state governments subsidize primary and secondary education. Higher education in public universities such as Land Grant Colleges is also highly subsidized.

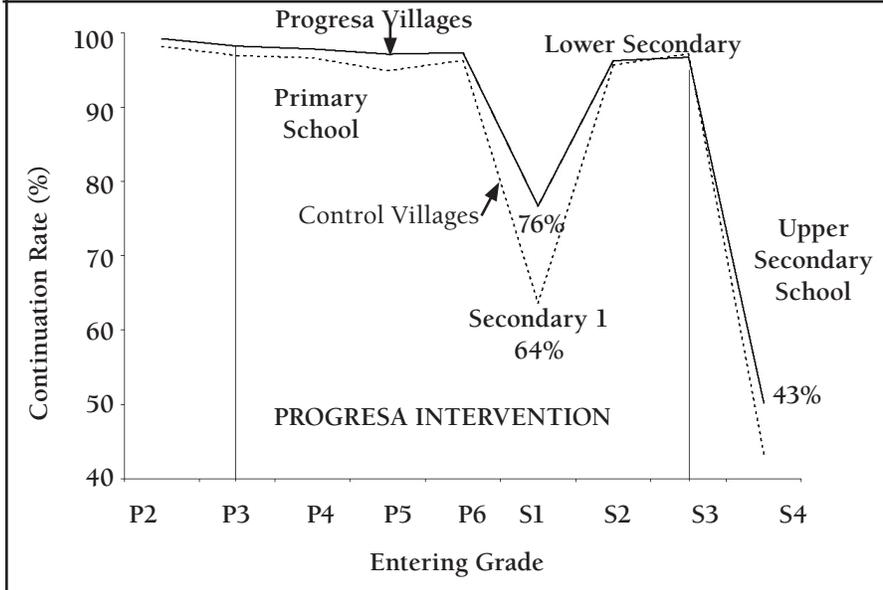
*“It is better to deal with the few children who are not attending school through specialized interventions than through an offer of a general cash transfer to poor parents.”*

*Environmental externalities.* There is private underinvestment in forest conservation due to positive benefits associated with carbon capture, conservation of biodiversity, watershed management, landscape quality, and the preservation of open spaces that forest owners generate for others with no direct rewards to themselves through the market. This has led many countries to introduce public

programs of payments for environmental services to encourage forest conservation. Notable among those are the Conservation Reserve Program in the United States and the payment to forest owners in Costa Rica. These programs are of the CCT type, as payments made are subsidies to specific actions in forest conservation.

This CCT principle has been applied massively to educational and child health programs in many developing countries to induce poor parents to increase the supply of child time to education (instead of work) and the supply of their own time to caring for the

**Figure 1. School Continuation Rates of Poor Children in Sample Villages**



health of their children. These programs are popular with politicians and international development agencies because they are efficiency-oriented, and also serve to transfer resources to the poor. Some of these programs have become extraordinarily large and costly. This raises the pressing issue of using these funds as efficiently as possible for their stated purposes. In this paper, we first review the example of Progresa, an extensively lauded program of CCT for education, health and nutrition that is the flagship of Mexico's social protection system. We then analyze the efficiency of this program. This is used to make recommendations that can help achieve higher efficiency levels in CCT programs.

### Analysis of a CCT: Progresa

Progresa was introduced in Mexico in 1997 to offer cash transfers to poor mothers in marginal rural communities, conditional on their children using health facilities on a regular basis and attending school between third grade of primary and third grade of secondary. Children cannot miss more than three days of school per month without losing the transfer, and will not receive the transfer if they have not visited a health center. The program was recently renamed Oportunidades, and expanded to sixth grade of secondary education and to peri-urban areas. In 2003, it serviced four million families at an annual cost of US\$2.2 billion. Extensive data were collected on the program to allow impact analysis, with randomized

selection of 320 treatment and 186 control villages between 1997 and 2000. The payment schedule is tailored to grade and gender, with primary schoolers receiving from \$70 per year in 3rd grade to \$135 in 6th grade, and secondary schoolers receiving from \$200 per year for boys in first grade (\$210 for girls) to \$220 for boys in third grade (\$255 for girls).

Figure 1 gives a good understanding of the problem to be solved. Attendance to primary school reaches 97 percent without transfers. Hence, there is very little a transfer can do in improving school enrollment, and most of the payments are leakages from an efficiency standpoint. Only one

percentage point in enrollment is gained through the transfers, and the cost of sending an additional child to school is as a consequence no less than \$9,600 per year. As the figure shows, the big drop in enrollment is at entry into secondary school, when 36 percent of the children that completed primary school fail to continue. Progresa transfers raise participation from 64 percent to 76 percent, a 12 percentage point gain that erases, in particular, the educational gap between poor and non-poor in these marginal communities, a remarkable achievement. Still, in terms of program efficiency, two facts are notable: one is that 64 percent of the recipients of transfers would have gone to school without a transfer, implying a leakage of resources in terms of efficiency gains; the other is that 24 percent of the children that qualify for the program and received an offer of a CCT failed to participate, implying a potential efficiency loss if differently calibrated transfers could have induced them to go to school.

Hence, there is an important problem to be discussed: could CCT programs better target and calibrate transfers in order to increase uptake and decrease leakages? This is what we address in the following section.

### Determinants of Efficiency

Like other CCT programs for education, Progresa transfers are confined to the poor. The objective of a CCT program can be conceptualized as one of

selecting categories of children among the poor and calibrating the level of transfer offered to each particular category of children in order to maximize the increase in the probability of school attendance, subject to a budget constraint and to verification that the condition on behavior has been satisfied. Solving this problem shows that eligible children should be selected among those with a low probability of going to school without a transfer, and with a high probability of going to school if a transfer is offered to them. The transfer is calibrated to maximize this response. This requires knowing (1) what is the risk that a child of a particular type would not be going to school without a transfer, and (2) how parents of different types respond to conditional cash offers of different magnitudes in deciding to send their children to school or not.

Running through this exercise shows how much efficiency can be gained with the same overall budget. To start with, it is clear that from this perspective, offering cash transfers to primary schoolers is not efficient, as most of the transfers end up in leakages (i.e., go to kids who are paid to do what they already do). It is better to deal with the few children who are not attending school through specialized interventions than through an offer of a general cash transfer to poor parents.

Analyzing entry into secondary school shows that efficiency gains could also be achieved at that level. By calibrating transfers to the level needed to induce response and by targeting children according to the risk that they may not be going to school but will go with a transfer, enrollment rates would increase from 64 percent to 78 percent, a 14 percentage points gain compared to the previous 12 points. In this case, what we find is that larger transfers should be offered to the eldest child in the family (younger siblings are more likely to go to school), to children with an indigenous father, and to children who live in villages where there is no secondary school, particularly girls. The tighter the program budget constraint, the more leeway program administrators have in selecting from among the poor for low leakages and high responses. Hence, program efficiency gains increase as budget constraints are more binding. If, for example, the budget were half the current level, the efficiency gain from targeting and calibrating for efficiency would be 30 percent over simply offering transfers to the poorest half of the poor population in the selected villages.

## Conclusions

We derive four conclusions from this analysis. The first is that CCTs that aim at inducing socially beneficial behavior should be regarded as contracts with recipients for the delivery of a service, not as handout programs. In this case, the fundamental objective of the conditional payment is to increase efficiency by internalizing an externality to avoid a discrepancy between private and social supply of child time to school.

Second, CCTs should be seen as creating price effects, not income effects through the transfers. If under-investment is due to market failure, an income effect will buy almost nothing in increased schooling and health. In all cases, aligning private and social behavior will be cheaper through price effects (conditional transfers) than through income effects (unconditional cash transfers).

Third, efficiency gains from CCTs can be enhanced by calibrating transfers for increased participation, and by reducing leakages by focusing on cases where the conditionality will be most effective in altering behavior. The tighter the program's budget constraint is in selecting among qualifying beneficiaries, the larger the potential efficiency gains from applying simple optimality rules in selecting beneficiaries and calibrating transfers.

Finally, the rule of targeting on likelihood that a condition will be met in response to a transfer (when it would not be without) and of calibrating transfers to increase uptake is a general principle for CCT programs. In payments for environmental services, this implies focusing on categories of resources (e.g., trees) at risk of being degraded and with high likelihood of not being degraded in response to a transfer. This expected gain in survival of the resource is then weighted by the environmental benefit from preserving this category of resource in order to maximize environmental returns per unit of subsidy paid.

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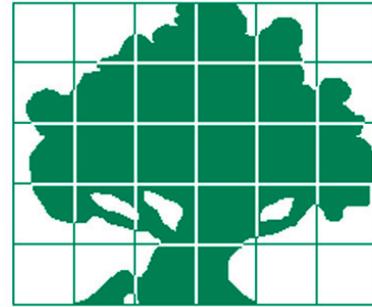
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