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Abstract: We examine whether cooperatives are characterized by greater trust than investor-owned firms. We survey 2000 Missouri corn and soybean farmers and find that trust and farmer perceptions of honesty and competence are higher in cooperatives than in investor-owned firms and that trust is a significant factor explaining the choice of farmers to market to cooperatives rather than investor-owned firms. Interestingly, we find that trust is more significant in producers' decisions for marketing soybeans than for corn.

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Introduction

Agricultural producer-owned firms (POFs), or cooperatives, occupy a special place in the American economic landscape. Agriculture is one of few sectors of the U.S. economy in which cooperative firms directly compete on a large scale with investor-owned agribusiness firms (IOFs). The USDA (2003) reports there were 3,229 agricultural cooperatives in the United States in 2001, with membership totaling more than 3 million and producing a net income of over $1.35 billion. As of 1999, agricultural cooperatives accounted for 27 percent of total farm marketing (e.g., crops, livestock, and poultry) and 27 percent of all farm inputs (e.g., feed, seed, fertilizer, crop protectants, and petroleum) (Kraenzle, 2001).

Because they are owned by and operated for the benefit of their agricultural producer members, POFs have a distinctly different objective and focus than traditional IOFs. While POFs provide financial benefits to the producers with whom they do business, either in the form of cost-based pricing, reduced-price services, or patronage refunds, IOFs focus on financial returns to (non-producer) investors. Sykuta and Cook (2001) argue this difference in organizational objectives may create greater trust in the relation between producers and producer-owned agribusinesses than between producers and IOFs. Shapira (1999) argues that capitalist firms are "low-trust and coercive," while kibbutzim are "high-trust and democratic." In related work, Shaffer (1987) asserts that trust makes or breaks a cooperative, in part because the contract between producers and the organization is more relational in cooperatives than in investor-owned firms (IOFs) and because cooperatives are generally more reluctant than IOFs to

impose sanctions on its members. Similarly, Fulton and Giannakas (2001) show how member commitment within a cooperative – which could be a manifestation of organizational trust – is affected by cooperative characteristics and affects cooperative performance.

Despite the theoretical arguments, there has been little empirical research on the relationship between cooperative forms of organizations and trust, although what work has been done has been supportive. Balbach (1998) examines differences in contracts between U.S. sugar beet producers and producer-owned and investor-owned refining companies, arguing that the more efficient contracts with cooperatives is attributed to the higher trust producers have with the cooperative than with the IOF. Shapiro (1999) attributes the decline in cooperative effectiveness to the transition from a high-trust to low-trust culture. In these studies, trust is implied but not directly measured. A 2003 survey of 2,031 U.S. adults conducted by Opinion Research Corporation measured the relative degree of trust in cooperatives and IOFs. The survey revealed that "two-thirds of consumers believe businesses that are owned and governed by their customers and have consumers on their boards of directors are more trustworthy than those that do not" (NCBA, 2003). However, this survey examined consumer attitudes only. In related research, Chloupkova, Svendsen and Svendsen (2003) showed how the institutional environment helps create and destroy trust within cooperatives, but they did not compare how trust in cooperatives compares to IOFs. Ole Borgen (2001) showed why trust is important in cooperatives and how cooperatives can generate trust, but he did not compare trust in cooperatives with that of IOFs. And James and Sykuta (2003) found that agricultural POFs with governance structures more resembling those of IOFs exhibit lower levels of organizational trust. While such studies focus on the level of trust within organizations, they do not address the effect of trust when it comes to producers' choice of doing business with either a POF or an IOF.

The purpose of our paper is to fill the gap in the empirical literature linking trust to cooperative (producer-owned) and investor-owned organizations. We use data from a survey of 2000 Missouri corn and soybean farmers to examine the relationship between trust and the choice of agricultural organization to which farmers marketed their 2002 crop year harvest. We asked farmers whether they marketed their 2002 crops to cooperatives or investor-owned agribusinesses. We also asked about the degree to which they trusted the organizations to which they marketed their crops, the terms of the marketing agreement, and other questions about their farming practices and experiences. We find that producers have a higher trust in POFs than in IOFs when marketing their soybean crops, but not when marketing their corn harvests.

Background

Trust is an expectation that one would not be exploited by another (James, 2002a). This expectation is based in part on perceptions of the trustworthiness and competence of the entities in whom trust is placed, both of which are necessary for trust. For instance, Hardin (2004, p. 8) says that "trust depends on two quite different dimensions: the motivation of the potentially trusted person to attend to the truster's interests and his or her competence to do so." The idea is that if either perceived trustworthiness *or* competence is low, then trust might not exist. As an illustration, consider the case of public support for biotechnology. Hunt and Frewer (2001) and James (2003) state that if biotechnology institutions are perceived to have a vested interest to misrepresent the safety and efficacy of biotechnology or to have insufficient knowledge to conduct biotechnology-based research and development, then the public may not be willing to trust and hence support biotechnology institutions.

In addition to expectations of trustworthiness and honesty, James (2002b), showed that trust is also a reflection of the anticipated gains that can result from correctly trusting and the losses that can arise when trust is misplaced. Generally, the more there is to gain from correctly trusting, the greater is the likelihood of trust. However, increases in perceived vulnerability have a negative effect on trust; as the expected losses to misplaced trust increase, the lower is the likelihood of trust.

There is a growing literature on the relationship between trust and organizations. Some researchers link institutions, organizations and other formal structures to the formation and destruction of trust (e.g., Zucker, 1986; Shapiro, 1987). For example, Moorman, Deshpande, and Zaltman (1993) find that the degree of organizational bureaucratization is negatively correlated with trust in market research relationships. Kwon and Suh (2004) link trust to specific asset investments in supply chain relationships and find that specific investments by a respondent's firm lowers perceived trust, but specific investments by a partner increases trust (since such actions are an indicator of commitment). Aulakh, Kotabe, and Sahay (1996), studying cross-border marketing relationships, find that output monitoring mechanisms reduce trust while social and cultural control characteristics increase trust.

Other researchers show that trust is a factor affecting organizational form. For instance, La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1997) provide evidence that trust is positively correlated with the size of firms in an economy. Simply, trust *explains*, at least in part, the existence of large firms (see also Fukuyama, 1995).

At a more fundamental level, trust is equated with cooperation, such as in economic models of trust (James, 2002a). For instance, La Porta et al (1997, p. 333) state that

> [e]conomists have developed two views of trust as a tendency to cooperate. One view, rooted in repeated game theory, holds that trust is a prior that an opponent is cooperative

> rather than fully rational (e.g., plays only tit-for-tat in a repeated prisoner's dilemma). … Another view, rooted in economic experiments, holds that people cooperate even in one-shot encounters, such as the dictator game or the ultimatum game …

If trust is rooted in cooperation, then we might expect that agricultural "cooperatives" – by definition – ought to be characterized by trust. However, are cooperatives or producer-owned firms (POFs) characterized by *greater* trust than investor-owned firms (IOFs)? Some researchers have suggested that POFs have higher levels of trust than IOFs (e.g., Sykuta and Cook, 2001; Shapira, 1999; Shaffer, 1987). Although cooperatives are not immune to problems that can erode public trust, the fact that cooperatives are governed by the members who patronize them might provide important advantages with respect to trust formation, at least compared to investor-owned firms. Thus, we expect that agricultural producers will have higher trust in producer-owned cooperatives than in IOFs. To examine the relationship between trust and agricultural organization, we follow La Porta et al (1997), who use trust to explain organizational characteristics. In our paper, we examine whether trust is a factor explaining the decision of producers to market their crops to POFs or IOFs, holding constant other factors expected to affect that decision, such as price received by the organization and the organization's location. We hypothesize that trust will be positively correlated with a farmer's decision to market his output to a POF rather than an IOF.

Data and Methods

We worked with the Missouri Agricultural Statistics Service (MASS) to survey a sample of 2,000 farmers from the population of Missouri (USA) corn and soybean farmers with farms in excess of 50 acres in the USDA farm census. The sample was stratified by size and by USDA reporting district in the state to ensure a statistically representative sample. We mailed surveys

in late February 2003, with a second mailing to non-respondents completed in March 2003.[1] We received 369 responses (142 from the first wave, 227 from the second), resulting in an overall response rate of 18.5 percent.[2] This response rate is not unusual for surveys mailed to farmers early in the calendar year (see Pennings, Irwin, and Good, 2002). We asked farmers how they marketed their 2002 corn and soybean harvests. We also asked farmers about the extent to which they trusted the organizations to which they marketed their harvests, how long they had dealt with the organization to which they sold their 2002 crop, whether they earned any off-farm income, and information about their personal and farming backgrounds.

The average farmer in our sample was 58 years old, farmed approximately 750 acres and had 34 years of farming experience. Seventy-six percent of respondents had a soybean harvest in 2002, 59 percent had a corn harvest, and 55 percent harvested both corn and soybeans. Sixty percent did not participate in any off-farm business activities, while 41 percent utilized only family members' labor (instead of hired labor) during harvest. Our respondent sample is 94 percent male, 87 percent married, and 97 percent Caucasian. The average yield for soybean farmers in our sample was 33 bushels per acre, while the average yield for corn producers was 104 bushels per acre. Soybean farmers in our sample received an average price of $5.38 per bushel for their 2002 crop, while corn producers received an average price of $2.35 per bushel. These yield and price averages are consistent with statewide averages for Missouri farmers reported by the Missouri Department of Agriculture and the U.S. Department of Agriculture for

[1] The surveys were mailed by MASS in University of Missouri envelops, with postage-paid return envelops addressed to MASS. MASS checked off respondents against the original mailing list and forwarded the anonymous responses to the authors.

[2] The only significant difference between first and second wave respondents was that second wave respondents were, on average, six years older than first wave respondents and had six more years of farming experience compared to first wave respondents. In all other respects, the characteristics of first and second wave respondents were statistically identical.

the 2002 crop year,[3] suggesting that our sample is a good representation of Missouri corn and soybean farmers. See Table 1 for a complete listing of variables and their definitions. Because we are interested in examining whether and how trust correlates with the decision of farmers to market their 2002 crop to POFs or IOFs, after controlling for other factors we expect to influence the marketing decision, we removed from our sample respondents who marketed their crop to both a POF and an IOF and respondents who did not market their crop to either a POF or IOF (e.g., who kept their harvest in storage at least through the end of 2002). Thus, our sample consisted of 248 soybean producers and 149 corn farmers.

We measure trust by asking farmers to indicate the degree to which they trusted that the cooperative or agribusiness to which they marketed their 2002 corn or soybean harvests "would stay within the terms of the agreement." Respondents indicated by answering definitely agree, tend to agree, tend to disagree, or definitely disagree. Additionally, we asked farmers about their perceptions of the honesty and competence of the POF or IOF to which they marketed their crops, since perceptions of honesty and competence are known to affect trust in organizations.[4] We measure perceptions of honesty by the question: "Think about the honesty and integrity of the people in the [cooperative or agribusiness] who explained the terms of the contract to you and who paid you and took delivery of your grain. Overall, how would you rate the honesty and integrity of these people?" Respondents indicated by answering very high, high, average, low or very low. Similarly, we measure perceptions of competence by the question: "Think about the competence of the people in the [cooperative or agribusiness] who explained the terms of the

[3] According to the 2003 Missouri Farm Facts, the average soybean yield in Missouri in 2002 was 34 bushels per acres, with an average price received by farmers of $5.40 per bushel. For corn producers, the average yield statewide in 2002 was 105 bushels per acre, with an average price received of $2.45 per bushel (MODA/USDA, 2003, pp.5, 64).

[4] For example, Nooteboom (2002, pp. 56, 57) says that organizational trust is reflected in part by indicators of "honesty trust" and "competence trust" in the organization.

contract to you and who paid you and took delivery of your grain – their knowledge of the industry and your business, their interpersonal skills, their ability to answer your questions, etc. Overall, how would you rate the competence of these people?" Respondents indicated by answering very high, high, average, low or very low.

Because trust, honesty, and competence are ordinal qualitative variables rather than cardinal variables, we employ the transformation procedure outlined by Terza (1987) to replace each discrete category value (e.g., low, average, high) with a number.[5] If d_j (where $j = 1,..., J$ and J is the number of discrete categories) is the discrete category value for variable D, then d_j is replaced with $\hat{d}_j = [n_{j-1}(\delta_{j-1}) - n_j(\delta_j)]/\, p_j$, where n is the probability density function of the standard normal distribution evaluated at δ_j, p_j is the percentage of the sample observed in category j, and δ_j is calculated as follows: First, let

$$
\begin{aligned}
&N(d_1) = p_1 \\
&N(d_2) = p_1 + p_2 \\
&\cdots \\
&N(d_{j-1}) = p_1 + p_2 + ... + p_{j-1}.
\end{aligned}
$$

Then,

$$\delta_j = N^{-1}\left(\sum_{i=1}^{j} p_i\right),\ (\ j = 1,..., J-1),$$

where N^{-1} is the inverse of the standard normal cumulative distribution function, and $\delta_0 = -\infty$ and $\delta_J = +\infty$.

[5] Alternatively, we could assign numbers to these categories linearly (e.g., for TRUST we would assign Definitely Agree=4, Tend to Agree=3, Tend to Disagree=2, and Definitely Disagree=1). We reject this approach because it assigns an arbitrary mean to the variable. See Terza (1987) for a discussion.

Because we surveyed farmers after they had made their marketing decisions, trust, as we measure, it may not be exogenous. The reason is that respondents' perception of trust in the organization to which they marketed their crops would likely be affected by their actual experiences with those organizations for the crop year in question. In order to control for the expected endogeneity, we use perceptions of honesty and competence in two ways – first, as independent variables to explain producers' choice of marketing organization, and second, as instruments of trust in a two-stage specification.[6]

While trust in the organization might be important, we expect other factors to affect the decision of farmers to market to either POFs or IOFs. For example, we control for the price, in dollars per bushel, offered for the crop at the time of delivery, and the distance, in miles, to the establishment receiving delivery of the harvest. We also control for farm and farmer heterogeneity by including the following additional variables in our analysis: The total number of acres that the respondent farms; whether the farmer had above-average farming experience; whether the respondent was not involved in any off-farm business activities; whether the respondent had exclusively family members (such as spouse, children, siblings, parents, cousins, etc) help with their 2002 crop harvest, either as paid or unpaid workers; whether the respondent attended at least some college; and the marital status and age of the respondent.

Results

Tables 2 and 3 list summary statistics for our sample of Missouri farmers, separated by production of soybeans and corn. As shown in Table 2, approximately 37 percent of soybean

[6] Using instruments to correct for the endogeneity of trust follows the pattern of La Porta et al (1997) who, in addition to linking trust to organization, analyzed an instrument of trust (in their case, "hierarchical religion") as a factor affecting organization. Similarly, James (2003) used instruments of trust in a two-stage model in which trust is hypothesized to affect public support for biotechnology.

farmers marketed their 2002 soybean harvests to producer-owned firms (POFs), and 71.8 percent of soybean farmers also planted corn in 2002. In contrast, Table 3 shows that while roughly the same percentage of corn farmers (as soybean farmers) marketed cooperatives (about 38 percent), nearly all corn farmers (95.3 percent) also farmed soybeans.

With respect to the question of trust, Table 2 shows that for soybean farmers the mean of trust in producer-owned firms is significantly greater ($p=0.04$ in a difference of means test) than the mean of trust for investor-owned firms. Similarly, the mean values for honesty is greater for POFs than for IOFs ($p=0.02$); the mean values for competence is also greater for POFs than for IOFs, but only weakly so ($p=0.15$). This suggests that soybean farmers place significantly more trust in POFs than IOFs and that they perceive POFs to be characterized by greater honesty and competence than IOFs. Moreover, in comparison to farmers who marketed their soybean crops to agribusinesses, soybean farmers marketing to cooperatives received a lower price for their crop, traveled a shorter distance to deliver their harvest, had smaller farms, were more likely to participate in off-farm businesses, were less likely to rely exclusively on family members to help with harvest, and were older.[7]

Interestingly, Table 3 provides a different picture of trust in POFs and IOFs when considered from the perspective of corn growers. In particular, there is no statistically significant difference between trust in POFs and trust in IOFs. Additionally, average perceptions of honesty are slightly larger in cooperatives than in agribusinesses, but not significantly so ($p=0.26$), and corn farmers perceive cooperatives to be more competent than IOFs, but only weakly so ($p=0.14$). However, there are significant differences in the characteristics of corn farmers who market to POFs rather than IOFs – but, interestingly, these differences are reflected in fewer

[7] In a difference of means test, the differences noted here are significant at the 10 percent level or better.

characteristics for corn farmers than for soybean farmers (as described in the preceding paragraph). Specifically, farmers selling their corn to cooperatives instead of agribusinesses received a lower price for their crop, traveled a shorter distance for delivery, had smaller farms, and were older.[8]

The relationship between farmer trust and choice of marketing outlet can also be observed from an examination of the biserial correlations between measures of trust and choice of POF, as well as correlations between trust, honesty and competence variables.[9] As seen in Table 4, for soybean producers, trust and honesty are positively and significantly correlated with the variable POF (the decision of farmers to market their grain to a cooperative); competence is also positively correlated with POF, but the significance is weak. However, in the case of corn growers, only competence is (weakly) correlated with the POF variable. Importantly, honesty and competence are highly correlated with trust for both corn and soybean producers, providing *prima facie* evidence that perceptions of honesty and competence are linked to trust.

Tables 5 and 6 present results from a Probit analysis of the effects of trust and other variables on the marketing decisions of farmers. We note that, although the coefficient in a Probit model is not directly interpretable in terms of the magnitude of the effect in the probability a farmer marketing to a POF, it is possible to calculate the change in probability, given a unit change in the respective variable, by looking at the estimated coefficient times the average density function of the standard normal distribution (see Greene, 2000, ch. 19).

In Table 5, we present results of our analysis of soybean farmers. We find that trust, as well as honesty and competence, are highly correlated with POFs, even after controlling for other

[8] In a difference of means test, the differences noted here are significant at the 10 percent level or better.
[9] A biserial correlation measures the correlation between a dichotomous variable (e.g., POF) and a continuous variable (e.g., trust).

factors expected to affect the marketing decision of soybean producers. Specifically, a one standard deviation increase in perceived trust increases the probability that a soybean farmer will market his crop to a POF by nearly nine percent.[10] Controlling for the expected endogeneity of trust by examining perceptions of honesty and competence as independent variables, we find that increases in these variables also improve the likelihood of a farmer marketing to a POF. Finally, we use honesty and competence, as well as the number of years the respondent marketed his crop to the establishment, as instruments in a two-stage model in which predicted values of trust (labeled "trust_hat") from the first-stage regression are used in a second-stage Probit model. We find that the impact of trust not only remains significant but also increase in importance, in that a one standard deviation in trust increases the likelihood that farmers market their soybeans to POFs by 25 percent.

Although trust in the organization to which a farmer markets his crop is an important factor in marketing decisions, other factors are also important, according to our analysis. For example, each $0.10 increase in soybean price decreases the probability that a farmer will market his soybeans to a POF by approximately three percent. Since IOFs offered, on average, a 27 cents per bushel premium for soybeans (see Table 2), the probability that producers marketed their crop to a POF decreased by approximately nine percent. This might explain why the majority of soybean farmers in our sample marketed their 2002 harvest to IOFs.[11] We also find

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[10] As shown in Table 3, one standard deviation of the trust variable is 0.813. Thus, 0.813 x 10.5% (=8.5%) gives the percentage change in the probability of a farmer marketing his soybeans to a POF resulting from a one standard deviation increase in trust.

[11] We note that one reason the price variable is negative and significant is that producer-owned firms often return revenue to producers in the form of a patronage refund. Therefore, some farmers might be willing to accept a lower price for their crop from a POF in anticipation of receiving a patronage refund from the POF. However, the fact that the price and distance variables are significant might indicate that the expected patronage refund is not sufficient to induce some farmers to market to a POF in and of itself. If the expected patronage refund were sufficient to make up the difference between the POF and IOF price, then price would not be expected to be significant. That is, at the margin, farmers would be indifferent between marketing to a POF and IOF, if the patronage refund paid by the POF

distance is a significant factor affecting the marketing decision of soybean farmers. The greater the distance to the organization, the less likely the farmer will market to a POF, other things being equal. In other words, soybean farmers appear to be willing to travel a greater distance to an IOF than to a POF, most likely to take advantage of the higher price offered by the IOF, in spite of the fact that soybean producers seem to place greater trust in POFs than in IOFs. Moreover, we find that soybean farmers with above-average farming experience were between 15 and 22 percent more likely to market their soybeans to POFs than to IOFs. Farmers who had only a farming business (i.e., did not participate in off-farm businesses) were between 15 and 18 percent less likely to market to cooperatives. Soybean farmers who utilized only family help for their harvest were between 12 and 21 percent less likely to market to POFs. Finally, married farmers are less likely to market to POFs than to IOFs, other things being equal.

Table 6 presents a different picture of the effect of trust on the decision of corn producers to market their crop to POFs. We find that trust is not significantly correlated with the POF or IOF decision of corn farmers, even when controlling for expected endogeneity by using perceptions of honesty and competence as instruments of trust. Rather, as in the case of soybean farmers, price, distance, and other factors are important. For example, we find that the 14 cents per bushel premium offered by IOFs for corn over the average price offered by POFs (see Table 3) resulted in an approximately eight percent reduction in the probability that corn farmers will market to a POF, other things being equal. Distance is also negatively correlated with the decision to market to a cooperative.

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was expected to "make up the difference" between the IOF and POF prices. We believe the relationship among patronage refund, price paid and other factors on the marketing decision of farmers is an important problem that deserves further research.

Discussion

We find that farmers marketing soybeans place higher trust in POFs than IOFs and that trust is correlated with the decision to market soybeans to a POF, other things being equal. However, while trust matters for soybean marketing decisions, the relationship between trust and agricultural organization does not appear to be the same for corn marketing decisions. We find no significant difference in the trust corn farmers place in POFs and IOFs. Why might trust be important for marketing soybeans but not corn, especially if most soybean producers also grow corn, and vice versa? We offer three possible explanations for this finding.

First, the soybean marketing decision might drive the corn marketing decision for farmers producing both crops, thus masking any effects trust might have on the corn marketing decision. The reason is that, while corn and soybeans may be substitutes in production (farmers will typically rotate between growing one or the other) and may be marketed through the same distribution channels, the economics (or returns to production) of the two crops are different. According to USDA reports, between 1997 and 2002 total net returns per acre of production averaged –$31.34 for soybeans and –$71.80 for corn in the production region that includes most of Missouri (see Table 7). Operating returns per acre for the same period and region averaged $146.40 for soybeans and $133.37 for corn. These figures suggest that farmers might perceive soybeans to be more important than corn in terms of overall returns to production. Simply, some farmers might expect that they have more to gain (or less to loose) by producing soybeans rather than corn – which could explain why more farmers in our sample had a soybean harvest than a corn harvest.[12] Additionally, we note that for farmers marketing both soybeans and corn, there is a high correlation between the choice of marketing outlet for each crop (see Tables 2 and 3).

[12] Recall from Tables 2 and 3 that 248 farmers had a soybean harvest while 149 harvested corn. Moreover, 71.8 percent of soybean farmers also grew corn, but 95.3 percent of corn farmers planted soybeans.

Farmers marketing one crop to a cooperative are also likely to market the other crop to a cooperative, while farmers marketing one crop to an IOF are very unlikely to market their other crop to a cooperative. These facts suggest that for many farmers in our sample, the marketing choice for soybeans might be driving the corn marketing decision.

We explore the interdependence of the soybean and corn marketing decisions by including a variable in the Probit analysis of the first crop indicating whether the farmer marketed the second crop to a POF (e.g., consider soybean producers who also grew corn – if they marketed their corn to a POF, what effect would that have on their soybean marketing decision?). The results (in Table 8) show that this variable (labeled "farmer marketed other crop to POF") is large and significant for both the soybeans and corn models. In the case of soybeans, including this variable does not significantly alter the remaining coefficient estimates, but it does improve the over-all fit of the model. The analysis shows that soybean farmers who marketed a corn crop to a POF are between 22 and 30 percent more likely than other farmers to market their soybeans to a POF, other things being equal. However, the other factors affecting the marketing decision of soybean – trust, price of soybeans, distance to establishment, farming experience, off-farm business participation, exclusive reliance on family members, and marital status – also remain important.

In the case of corn producers, including the "other crop" variable significantly alters the empirical results. The price of corn and distance to the establishment not only are reduced in importance but also are no longer statistically significant. In fact, no other variables are statistically significant, except the variable indicating whether the corn farmer also sold a soybean harvest to a cooperative. In this case, corn farmers who market soybeans to a POF are between 47 and 50 percent more likely than other corn farmers to market their corn to a POF.

This evidence suggests that the decision farmers are making with respect to the marketing of soybeans is a driver for the corn marketing decision and that the marketing decision of corn farmers may not be independent enough from the soybean decision for us to adequately capture the effect of trust on choice of marketing organizations from a corn farmer perspective. Stated differently, trust in organizations might be important for both crops, but it is manifested primarily through the soybean marketing decision.

Second, in addition to having different mean returns, the two crops have differing production and market value uncertainties that may affect farmers' perceptions of vulnerability and hence the role of trust. As shown in Table 7, the financial returns to planting corn are relatively more volatile than the financial returns to producing soybeans, as measured by the standard deviation of total net returns and operating returns. Combined with the higher average returns to soybeans noted above, this suggests a higher mean-adjusted uncertainty for returns to corn. The higher uncertainty in corn returns is a generalized uncertainty resulting from production factors and market prices of inputs and corn and is not closely related to the marketing agent to which the farmer sells the crop, whether a POF or an IOF. Most corn in Missouri is marketed for animal feed, the value of which is likely not subject to large differences among buyers of corn. The greater financial uncertainties associated with planting corn may create a greater sense of vulnerability for farmers when compared to soybean production, thus impacting the willingness of corn farmers to trust their marketing partners independent of who their marketing partners are. This perception of greater vulnerability with corn is also consistent with the observation that almost all farmers that produced corn also produced soybeans, perhaps as a diversification strategy. Moreover, since the uncertainty in corn value is independent of the identity of the buyer, one would expect less of a role for trust in the marketing decision.

Soybeans, on the other hand, may be subject to lower overall financial uncertainty, but soybeans in Missouri are purchased for a much wider variety of uses with differing values. Because there are more marketing opportunities and potential uses for soybeans than for corn, there is potentially more information asymmetry in the value of the soybeans. This asymmetry could be viewed as a source of vulnerability for farmers marketing soybeans; however, in this case the source of the vulnerability is the buyer of the crop, who likely has better information about the ultimate consumer of the soybeans and the value of the beans to that particular user. As discussed earlier, Sykuta and Cook (2001) argue it is exactly this type of situation – higher information asymmetry about the value of production – in which producers may place greater trust in a POF, since the POF's objective function is to provide value its producer-owners. Thus, one would expect a greater role for trust in the marketing decision for soybeans.

Third, Nooteboom (2002) makes clear that while organizations can be the object of trust, it is the perception of the interests and competence of organizational members that defines that trust. Simply, trust in an organization is based on trust in the people in it. If a farmer deals with one person from an organization, that one person will likely affect the farmer's perception of the competence and honesty, or trust, of the organization. Thus, the fact that soybean producers place greater trust in POFs than IOFs, but corn farmers do not, might in fact be an accurate description of the nature of perceived trust in POFs and IOFs, if soybean farmers deal with different people than corn farmers do.

Conclusion

We examine the decision of Missouri farmers to market their crops to either an agricultural cooperative or an investor-owned agribusiness and find that trust is an important

factor affecting that decision. However, our results present an interesting puzzle concerning the nature of producers' relationships with the organizations to which they market their crops. The literatures on collective organizations and trust both suggest that agricultural producers might have higher trust in producer-owned marketing organizations than in investor-owned firms. Our results suggest that while such a trust relationship appears to exist in soybean marketing relationships, there is little evidence it exists in corn marketing relationships.

The puzzle is why such a difference would exist between the two products. As noted above, one possibility is that the soybean decision drives the marketing decision for farmers planting both soybeans and corn, thus making it difficult for us to observe an effect of trust in the context of corn marketing decisions. Another possible explanation is that uncertainty in the value of the two products likely created different perceptions of vulnerability; corn farmers perceive greater vulnerability due to the nature of the crop itself, whereas soybean farmers perceive greater vulnerability to asymmetric information in the value of the crop. A higher sense of general vulnerability for corn producers may decrease trust across the board, while the buyer-specific vulnerability for soybean producers and the nature of the relationship between producers and POFs gives rise to greater trust in POF trading partners. Finally, farmer perceptions of trust are affected by farmer interactions with different people within the organizations to which they marketed their crops, and these experiences might differentially affect the trust they place in the organizations.

While these are important issues in their own right, they highlight the fact that our understanding of the relationship between trust and organizations is quite limited. Our study paints a broad picture of trust as a factor affecting participation in organizations, in that we distinguish between producer-owned firms and investor-owned firms. However, there are wide

variations of organizational structures within these broad categories, which we expect to affect perceptions of trust, honesty and competence. For example, James and Sykuta (2003) show that different organizational characteristics of producer-owned firms affect trust differentially and that trust in New Generation Cooperatives is lower than trust in traditional cooperatives. This suggests that more work is needed examining the effects on trust of specific organizational characteristics rather than broad categories of firm structure.

Another issue involves the question of whether the value of trust in organizations can be estimated. If farmers do in fact place greater trust in producer cooperatives than in investor-owned firms, but receive lower prices for their crops from cooperative as we find in our study, then is this evidence of the economic value of trust, once patronage refunds and other economic considerations are accounted for? We encourage continued research on these and other questions involving the relationship between cooperative and other organizational structures and trust and their impacts on producer marketing decisions.

Table 1. Variable names and definitions.

Variable	Definition
POF	Dummy variable equal to one if respondent marketed his 2002 crops to a producer-owned firm (cooperative); equal to zero if 2002 crops marketed to an agribusiness.
Trust	Qualitative response variable based on respondent's agreement with the statement that the cooperative or agribusiness would stay within the terms of the agreement, where response options are Definitely Agree, Tend to Agree, Tend to Disagree, or Definitely Disagree.
Honesty	Qualitative response variable based on respondent's assessment of the honesty and integrity of the people within the cooperative or agribusiness who explained contract terms, took delivery of the crop, and paid the farmer, where response options are Very High, High, Average, Low, and Very Low.
Competence	Qualitative response variable based on respondent's assessment of the competence (such as knowledge of industry and interpersonal skills) of the people within the cooperative or agribusiness who explained contract terms, took delivery of the crop, and paid the farmer, where response options are Very High, High, Average, Low, and Very Low.
Price of crop	Price received by respondent for 2002 crop at time of delivery.
Distance to establishment	Distance, in miles, from respondent's farm to cooperative or agribusiness establishment where delivery of the 2002 crop occurred.
Size of farm	Number of acres farmed by respondent.
Had above-average farming experience	Dummy variable equal to one if the respondent had above-average number of years farming experience.
Did not participate in off-farm business	Dummy variable equal to one of respondent was not involved in any off-farm business ventures or occupations in 2002.
Utilized only family help at harvest	Dummy variable equal to one if family members only (rather than or in addition to hired employees) helped the respondent with the 2002 crop harvest.
Attended at least some college	Dummy variable equal to one if respondent attended at least some college.
Was married	Dummy variable equal to one if the respondent was married.
Age	Respondent's age.
Soybean farmers planted corn	Dummy variable equal to one if soybean producers also planted corn in 2002.
Corn farmer planted soybeans	Dummy variable equal to one if corn farmers also planted soybeans in 2002.

Table 2. Summary statistics for **soybean** producers.

	All Soybean Growers				Soybean Growers Marketing to POFs				Soybean Growers Marketing to IOFs			
Variable	**Mean**	**S.D.**	**Min**	**Max**	**Mean**	**S.D.**	**Min**	**Max**	**Mean**	**S.D.**	**Min**	**Max**
POF	**0.371**	0.484	0	1	**1**				**0**			
Trust	**0.000**	0.813	-2.874	0.651	**0.173**	0.725	-0.909	0.651	**-0.096**	0.846	-2.874	0.651
Honesty	**0.000**	0.908	-2.874	1.004	**0.216**	0.827	-1.305	1.004	**-0.135**	0.934	-2.874	1.004
Competence	**0.000**	0.918	-2.586	1.157	**0.135**	0.863	-1.184	1.157	**-0.077**	0.943	-2.586	1.157
Price of crop	**5.38**	0.44	2.50	6.18	**5.20**	0.53	2.50	6.18	**5.47**	0.35	4.50	6.12
Distance to establishment	**23.1**	27.3	1	212	**10.6**	10.6	1	60	**30.3**	31.1	1	212
Size of farm	**859.5**	935.8	50	5800	**642.5**	740.1	50	5500	**987.5**	1014.6	50	5800
Had above-average farming experience	**0.524**	0.500	0	1	**0.587**	0.495	0	1	**0.487**	0.501	0	1
Did not participate in off-farm business	**0.650**	0.478	0	1	**0.571**	0.498	0	1	**0.697**	0.461	0	1
Utilized only family help at harvest	**0.440**	0.497	0	1	**0.359**	0.482	0	1	**0.487**	0.501	0	1
Attended at least some college	**0.492**	0.501	0	1	**0.489**	0.503	0	1	**0.494**	0.502	0	1
Was married	**0.870**	0.340	0	1	**0.837**	0.371	0	1	**0.885**	0.321	0	1
Age	**58.2**	12.9	26	86	**60.5**	13.2	31	86	**56.9**	12.6	26	86
Soybean farmer planted corn	**0.718**	0.451	0	1	**0.717**	0.453	0	1	**0.718**	0.451	0	1
Soybean farmer planted corn and delivered corn to POF	**0.238**	0.427	0	1	**0.522**	0.502	0	1	**0.071**	0.257	0	1
N	**248**				**92**				**156**			

Table 3. Summary statistics for **corn** producers.

	All Corn Growers				Corn Growers Marketing to POFs				Corn Growers Marketing to IOFs			
Variable	**Mean**	**S.D.**	**Min**	**Max**	**Mean**	**S.D.**	**Min**	**Max**	**Mean**	**S.D.**	**Min**	**Max**
POF	**0.383**	0.488	0	1	**1**				**0**			
Trust	**0.000**	0.797	-2.461	0.546	**-0.030**	0.887	-2.461	0.546	**0.018**	0.744	-1.015	0.546
Honesty	**0.000**	0.915	-2.731	1.078	**0.115**	0.931	-2.243	1.078	**-0.078**	0.902	-2.731	1.078
Competence	**0.000**	0.920	-2.699	1.159	**0.157**	0.917	-1.066	1.159	**-0.102**	0.913	-2.699	1.159
Price of crop	**2.35**	0.25	1.45	2.90	**2.26**	0.24	1.60	2.70	**2.40**	0.24	1.45	2.90
Distance to establishment	**20.4**	21.8	1	108	**9.8**	8.4	2	60	**27.0**	24.7	1	108
Size of farm	**949.8**	1042.6	48	5800	**665.9**	863.4	50	5500	**1125.7**	1107.9	50	5800
Had above-average farming experience	**0.477**	0.501	0	1	**0.544**	0.503	0	1	**0.435**	0.498	0	1
Did not participate in off-farm business	**0.651**	0.478	0	1	**0.571**	0.499	0	1	**0.700**	0.461	0	1
Utilized only family help at harvest	**0.436**	0.498	0	1	**0.439**	0.501	0	1	**0.435**	0.498	0	1
Attended at least some college	**0.503**	0.502	0	1	**0.561**	0.501	0	1	**0.467**	0.502	0	1
Was married	**0.899**	0.302	0	1	**0.860**	0.350	0	1	**0.924**	0.267	0	1
Age	**58.1**	13.2	26	86	**60.6**	14.1	32	86	**56.5**	12.4	26	86
Corn farmer planted soybeans	**0.953**	0.212	0	1	**0.947**	0.225	0	1	**0.957**	0.205	0	1
Corn farmer planted soybeans and delivered soybeans to POF	**0.329**	0.474	0	1	**0.807**	0.398	0	1	**0.033**	0.179	0	1
N	**149**				**57**				**92**			

Table 4. Correlation coefficients between measures of trust and farmer's decision to market crops to a producer-owned firm (POF) rather than to an investor-owned firm (IOF).

	Correlation Coefficient (Probability)			
Variable	**POF**	**TRUST**	**HONESTY**	**COMPETENCE**
		Soybean Growers		
POF	1.000	0.159 [b] (0.036)	0.188 [b] (0.016)	0.111 (0.153)
Trust		1.000	0.539 [a] (0.000)	0.451 [a] (0.000)
Honesty			1.000	0.790 [a] (0.000)
Competence				1.000
		Corn Growers		
POF	1.000	-0.029 (0.758)	0.104 (0.259)	0.138 (0.138)
Trust		1.000	0.624 [a] (0.000)	0.519 [a] (0.000)
Honesty			1.000	0.824 [a] (0.000)
Competence				1.000

[a] significant at 1%, [b] significant at 5%

Table 5. Probit analysis of farmer decision to market 2002 **soybean** harvest to producer-owned firms (POFs) rather than investor-owned firms (IOFs), where the dependent variable is POF=1.

Variables **Model:**	**TRUST**	**HONESTY**	**COMPETENCE**	**TRUST_HAT**
Trust	0.425 [a]			1.460 [a]
	(0.173)			(0.458)
	[0.105]			[0.310]
Honesty		0.364 [b]		
		(0.161)		
		[0.090]		
Competence			0.335 [b]	
			(0.161)	
			[0.081]	
Price of crop	-1.286 [a]	-1.302 [a]	-1.267 [a]	-1.548 [a]
	(0.395)	(0.376)	(0.377)	(0.448)
	[-0.318]	[-0.323]	[-0.308]	[-0.328]
ln(Distance to establishment)	-0.515 [a]	-0.467 [a]	-0.521 [a]	-0.629 [a]
	(0.143)	(0.148)	(0.145)	(0.198)
	[-0.127]	[-0.116]	[-0.127]	[-0.133]
ln(Size of farm)	0.060	-0.066	-0.037	-0.077
	(0.141)	(0.149)	(0.146)	(0.016)
	[0.015]	[-0.016]	[-0.009]	[-0.018]
Had above-average farming experience	0.598 [c]	0.871 [a]	0.780 [b]	1.060 [a]
	(0.325)	(0.351)	(0.344)	(0.413)
	[0.148]	[0.216]	[0.190]	[0.225]
Did not participate in off-farm business	-0.742 [a]	-0.599 [b]	-0.664 [b]	-0.498
	(0.289)	(0.307)	(0.298)	(0.355)
	[-0.183]	[-0.149]	[-0.161]	[-0.106]
Utilized only family help at harvest	-0.493 [c]	-0.842 [a]	-0.877 [a]	-1.138 [a]
	(0.274)	(0.300)	(0.299)	(0.364)
	[-0.122]	[-0.209]	[-0.213]	[-0.241]
Attended at least some college	0.144	0.137	0.039	0.180
	(0.279)	(0.286)	(0.287)	(0.348)
	[0.036]	[0.034]	[0.009]	[0.038]
Was married	-0.477	-0.655 [c]	-0.673 [c]	-1.183 [b]
	(0.353)	(0.380)	(0.389)	(0.489)
	[-0.118]	[-0.162]	[-0.164]	[-0.251]
ln(Age)	-0.431	-1.351	-1.288	-1.966 [c]
	(0.796)	(0.855)	(0.841)	(1.041)
	[-0.106]	[-0.335]	[-0.313]	[-0.417]
Soybean farmer planted corn	0.180	-0.107	0.037	-0.101
	(0.293)	(0.306)	(0.309)	(0.358)
	[0.044]	[0.027]	[0.009]	[0.021]
Constant	9.682 [a]	14.451 [a]	13.991 [a]	18.998 [a]
	(3.982)	(4.519)	(4.415)	(5.674)
	[2.391]	[3.584]	[3.400]	[4.028]
Pseudo R-square	.470	.471	.481	.573
% Correctly Predicted	86.6	85.3	86.7	89.1
Likelihood Ratio (DF=11)	60.935 [a]	57.772 [a]	60.480 [a]	63.251 [a]
Ave Density	0.247	0.248	0.243	0.212

[a] significant at 1%, [b] significant at 5%, [c] significant at 10%
Standard errors in parentheses. Estimated slope in brackets, calculated by multiplying coefficient with average density.

Table 6. Probit analysis of farmer decision to market 2002 **corn** harvest to producer-owned firms (POFs) rather than investor-owned firms (IOFs), where dependent variable is POF=1.

Variables **Model:**	**TRUST**	**HONESTY**	**COMPETENCE**	**TRUST_HAT**
Trust	-0.008			0.240
	(0.197)			(0.340)
	[-0.002]			[0.072]
Honesty		0.158		
		(0.182)		
		[0.046]		
Competence			0.213	
			(0.186)	
			[0.061]	
Price of crop	-1.945 [a]	-1.368 [b]	-1.371 [b]	-1.133 [c]
	(0.770)	(0.658)	(0.652)	(0.664)
	[-0.545]	[-0.398]	[-0.393]	[-0.341]
ln(Distance to establishment)	-0.464 [a]	-0.386 [b]	-0.357 [b]	-0.331 [c]
	(0.171)	(0.168)	(0.171)	(0.174)
	[-0.130]	[-0.112]	[-0.102]	[-0.100]
ln(Size of farm)	-0.034	-0.116	-0.144	-0.192
	(0.155)	(0.156)	(0.155)	(0.161)
	[-0.010]	[-0.034]	[-0.041]	[-0.058]
Had above-average farming experience	0.587	0.622	0.725 [c]	0.638
	(0.423)	(0.410)	(0.417)	(0.414)
	[0.164]	[0.181]	[0.208]	[0.192]
Did not participate in off-farm business	-0.460	-0.645 [c]	-0.642 [c]	-0.679 [b]
	(0.362)	(0.343)	(0.340)	(0.342)
	[-0.129]	[-0.188]	[-0.184]	[-0.204]
Utilized only family help at harvest	-0.085	-0.134	-0.244	-0.293
	(0.311)	(0.313)	(0.322)	(0.325)
	[-0.024]	[-0.039]	[-0.070]	[-0.088]
Attended at least some college	0.101	0.149	0.128	0.150
	(0.319)	(0.310)	(0.313)	(0.317)
	[0.028]	[0.043]	[0.037]	[0.045]
Was married	-0.492	-0.258	-0.240	-0.213
	(0.488)	(0.472)	(0.483)	(0.476)
	[-0.138]	[-0.075]	[-0.069]	[-0.064]
ln(Age)	-0.031	0.036	-0.298	-0.325
	(0.858)	(0.854)	(0.871)	(0.868)
	[-0.009]	[0.010]	[-0.086]	[-0.098]
Constant	5.869	4.771	6.185	6.081
	(4.081)	(4.012)	(4.112)	(4.098)
	[1.643]	[1.388]	[1.775]	[1.830]
Pseudo R-square	.374	.359	.365	.330
% Correctly Predicted	81.3	80.4	81.2	79.5
Likelihood Ratio (DF=10)	32.215 [a]	32.051 [a]	31.937 [a]	26.581 [a]
Ave Density	0.280	0.291	0.287	0.301

[a] significant at 1%, [b] significant at 5%, [c] significant at 10%
Standard errors in parentheses. Estimated slope in brackets, calculated by multiplying coefficient with average density.

Table 7. Estimated Net and Operating Returns per Acre for Soybean and Corn Production in USDA Heartland Region between 1997 and 2002, as reported in USDA's Agricultural Resource Management Survey. The Heartland region includes most of the crop production land in Missouri as well as other major producing States in the north-central region.

Year	Total Net Returns: Soybean	Total Net Returns: Corn	Difference in Net Returns	Operating Returns: Soybeans	Operating Returns: Corn	Difference in Operating Returns
1997	41.53	-23.66	65.19	214.38	183.26	31.12
1998	-15.28	-89.58	74.3	160.06	121.54	38.52
1999	-66.21	-130.42	64.21	111.84	83.02	28.82
2000	-58.67	-121.5	62.83	125.26	98.29	26.97
2001	-77.1	-66.94	-10.16	111.51	121.17	-9.66
2002	-12.33	1.28	-13.61	155.33	192.96	-37.63
Mean	-31.34	-71.80	40.46	146.40	133.37	13.02
Std Dev	44.69	52.73	-8.04	39.36	44.93	-5.57

Source: USDA Economic Research Service website, Commodity Costs and Returns page, http://www.ers.usda.gov/data/CostsandReturns/testpick.htm, accessed November 1, 2004.

Table 8. Probit analysis of farmer decisions to market 2002 both **soybeans** and **corn** to producer-owned firms rather than investor-owned firms, with inclusion of a variable indicating whether farmer marketed other crop to POF (e.g., for soybean producers, if they marketed their corn harvest to a POF, the effect on the soybean marketing decision).

	Soybean Producers		**Corn Producers**	
Variables	**TRUST**	**TRUST_HAT**	**TRUST**	**TRUST_HAT**
Trust	0.528 [a] (0.203) [0.102]		-0.462 (0.298) [-0.060]	
Trust_hat		1.462 [a] (0.503) [0.272]		-0.493 (0.455) [-0.076]
Price of crop	-1.383 [a] (0.463) [-0.267]	-1.570 [a] (0.489) [-0.292]	-1.505 (1.116) [-0.196]	-0.767 (0.841) [-0.119]
ln(Distance to establishment)	-0.519 [a] (0.161) [-0.100]	-0.620 [a] (0.204) [-0.115]	-0.392 (0.248) [-0.051]	-0.255 (0.231) [-0.040]
ln(Size of farm)	0.098 (0.159) [0.019]	-0.057 (0.167) [-0.011]	-0.219 (0.223) [-0.028]	-0.240 (0.209) [-0.037]
Had above-average farming experience	0.530 (0.360) [0.102]	1.041 [b] (0.437) [0.194]	0.281 (0.574) [0.037]	0.555 (0.524) [0.086]
Did not participate in off-farm business	-0.771 [b] (0.320) [-0.149]	-0.505 (0.378) [-0.094]	0.255 (0.530) [0.033]	0.050 (0.501) [0.008]
Utilized only family help at harvest	-0.383 (0.306) [-0.074]	-0.927 [b] (0.375) [-0.172]	0.779 (0.486) [0.101]	0.737 (0.497) [0.114]
Attended at least some college	0.605 (0.318) [0.117]	0.213 (0.375) [0.040]	0.398 (0.458) [0.052]	0.495 (0.452) [0.077]
Was married	-0.544 (0.406) [-0.105]	-1.253 [b] (0.540) [-0.233]	-0.876 (0.743) [-0.114]	-0.592 (0.716) [-0.092]
ln(Age)	0.138 (0.899) [0.027]	-1.399 (1.119) [-0.260]	-0.261 (1.106) [-0.034]	-0.447 (1.048) [-0.069]
Farmer marketed other crop to POF	1.569 [a] (0.343) [0.303]	1.195 [a] (0.385) [0.222]	3.586 [a] (0.741) [0.466]	3.274 [a] (0.681) [0.508]
Constant	7.493 [c] (4.391) [1.446]	16.250 [a] (5.930) [3.023]	5.506 (5.345) [0.716]	4.164 (4.937) [0.645]
Pseudo R-square	.609	.643	.775	.730
% Correctly Predicted	90.7	91.8	94.8	93.5
Likelihood Ratio (DF)	85.194 (11) [a]	73.991 (11) [a]	84.508 (11) [a]	73.831 (11) [a]
Ave Density	0.193	0.186	0.130	0.155

[a] significant at 1%, [b] significant at 5%, [c] significant at 10%

Standard errors in parentheses. Estimated slope in brackets, calculated by multiplying coefficient with average density.

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