Chapter 5. The Evolution of Solutions to the Free Rider Problem in US Agricultural Bargaining Cooperatives

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Abstract: This paper addresses the issue of how intra-organizational incentive alignment mechanisms evolve to solve the free rider problem in collective bargaining. We focus on agricultural bargaining cooperatives (ABCs), a particular form of producer-owned firms mainly observed in the West Coast states of the US. These organizations play several crucial institutional roles that include, among others, enhancing farmers' countervailing power vis-à-vis powerful processors, deterring postcontractual opportunism, enabling price discovery, and ameliorating moral hazard and adverse selection problems. The single most important factor that constrains ABCs' ability to play such roles is the free rider problem. The latter refers to the situation where a non-member receives benefits associated with the provision of public goods by the cooperative (e.g., higher commodity prices), but avoids becoming a member—and thus eschews contributing to the costs associated with this provision, which are incurred by members alone. We review quantitative and qualitative evidence collected for more than ten years from ABCs to explore the evolution of solution instruments used to align member incentives and thus minimize the inefficiencies arising from the free rider problem. The obtained results suggest that mechanisms evolve from Market to Community to Contract to Hierarchy solutions. In organizations characterized by highly heterogeneous memberships the provision of a combination of intra-organizational incentives is the only means to addressing the free rider problem efficiently.

Introduction

Agricultural bargaining cooperatives (ABCs) are farmer-owned, -controlled, and –benefited associations that negotiate terms of trade with processors-buyers of their raw product. ABCs usually do not become involved with the handling of raw product and thus differ from marketing cooperatives [1]. They are active primarily in fruit and vegetable commodities as well as in raw milk markets, and are predominantly located in West Coast states [2]. ABCs were organized during the early decades of the 20th century but many ceased operations from the late 1930s to the mid-1950s. Agricultural bargaining became more formally established when state governments passed laws in the 1960's to sanction these collective action organizations. In addition, the Agricultural Fair Practices Act (AFPA) of 1967 provided explicit support for the formation of bargaining associations by preventing food processors from boycotting or otherwise coercing farmers for their participation in collective bargaining [3].

Twenty ABCs are currently active in the U.S. [4]. Recently bargaining has attracted again the interest of scholars and policy makers because it is viewed as a potential substitute for direct governmental intervention [e.g., 5]. Given the significant capital requirements for investment in vertically integrated marketing cooperatives, ABCs provide farmers with a low risk-capital alternative coordination and fair pricing device [6].

Since the mid-1960s a number of theories have provided alternative rationales for the formation of ABCs. Arguably, the most cited contributions view ABCs as a means to: countervail the market power of intermediaries and sustaining long-term price gains [7, 8]; deter postcontractual opportunistic behavior by producers and processors operating under forward contracts [9, 10]; enable price discovery in markets where there is uncertainty about supply and demand conditions [11]; and ameliorate moral hazard and adverse selection problems when grading is not entirely precise [12].

Irrespective of which theoretical approach is the most insightful, all view the free rider problem as the single most important condition that diminishes ABCs' opportunities for sustainable price gains [8, 1]. Temporary or permanent failures of ABCs are mainly associated with the free rider problem [e.g., 13]. The free rider problem refers to the situation where a non-member receives benefits associated with the provision of public goods by the cooperative (e.g., higher commodity prices), but avoids becoming a member—and thus eschews contributing to the costs associated with this provision, which are incurred by members alone. A similar problem occurs when a member of a bargaining association stops patronizing the association temporarily when she finds it to her best interest.

This paper addresses the free rider problem in ABCs. Particularly, it examines how intra-organizational incentive mechanisms are designed to ameliorate the free rider problem, and uses qualitative empirical material on US agricultural bargaining associations in order to explore the evolution of observed solutions. Our main goal is to understand how the interaction of various institutional, economic and cultural factors determines which particular solutions may be more successful.

We adopt the generic Lichbach [14] typology of solutions to the free rider problem and extend it by adopting an evolutionary perspective. The conceptual framework we propose is derived from an in-depth empirical analysis of ABCs in the West Coast states of the US. The questions addressed by this empirical work include: 1) which of the various solutions of the Lichbach typology have been implemented by ABCs, and 2) which solutions have been successful. It is suggested that advanced mechanisms are required in order to solve the free rider problem in complex economic environments when cooperative members have heterogeneous interests.

The ensuing section summarizes the various theoretical approaches to the free rider constraint and overviews the Lichbach typology of solutions. The subsequent section presents the sample and methodology used while section four reports the results and proposes a four-stage process to describe the evolution of solutions to the free rider problem in ABCs. The last section concludes the paper, identifies implications of the main research findings and suggests avenues for future research.

Mechanisms to Ameliorate the Free Rider Constraint

Modern theories of collective action draw from Mancur Olson's [15] seminal work, *The Logic of Collective Action.* His model addresses a group sharing a public or collective good. Olson establishes the general suboptimality of the collective action problem by comparing the Nash equilibrium and the Pareto optimality conditions. This simple and insightful formulation of the free rider problem had significant impacts on subsequent treatments of collective action.

Before Olson's 1965 book, economists routinely made the oversimplifying assumption that whenever collective action is to the benefit of a group of individuals these individuals would pursue it. Olson's work suggested that the emergence of collective action should not be taken for granted. Subsequently, the main question that the collective action research program is trying to address is the logic of collective action rather than the logic of collective inaction. This raises the following theoretical puzzle: given the free rider problem, why do rational people participate in collective action?

Given the importance of the free rider problem we seek to understand which solutions, if any, have been successfully implemented by ABCs. We start by identifying alternative solution instruments in the literature, which are then used in the empirical part of the study. The plethora of mechanisms proposed by social science scholars renders taxonomizing them very useful. Fortunately, such taxonomy exists, in which four generic solutions to the free rider problem are considered [14]: Market, Community, Contract, and Hierarchy solutions.

Market approaches alter the parameters of the standard model of collective action while the other three sets of solutions modify the context within which the standard model is placed. Community solutions explore the role of common idea systems in addressing the free rider issue. Contractual solutions use various forms of mutual agreements to induce collective action. Hierarchy solutions study how organizations that preexist collective action, use power to solve the free rider problem.

Market solutions adopt some or all of the standard neoclassical assumptions. For example, uncoordinated exchange relations serve as the basis for cooperation. Consequently, market solutions come in the form of an "invisible hand" that leads potential cooperators to provide voluntarily the public good they seek. The following market solutions implemented by ABCs are considered:

1. Increase benefits

Consider a person *i* who considers contributing to a public good along with *n* other individuals. If

$$b_i/n \geq c_i \tag{1}$$

where b_i and c_i stand for the benefits enjoyed and costs paid by i, respectively, then i will not free ride. This inequality can be summed across all potential cooperators. When expected gains are large, enough potential cooperators will realize that they will be better off relative to the status quo, so that collective action can proceed [16]. This solution can be implemented by increasing the relative gains from cooperation, decreasing the relative gains from greed, or decreasing the relative gains from fear.

2. Lower costs

This remedy refers to situations in which the individual costs of contributing to the collective good are lower than the expected gains. Under these circumstances, potential cooperators find riding a relatively cheap strategy. The above inequality (1) implies that if:

$$c_i \leq b_i/n \tag{2}$$

the individual *i* will not free ride. Again, if enough potential participants perceive the relative individual costs lower than the respective costs they will choose to contribute to the public good. In essence, this solution is the opposite of the increase benefits solution.

3. Reduce the supply of the public good

This solution refers to a decrease in the exogenously supplied public good which, in turn, leads to a higher demand for it. The implied substitution effect is observed in several instances. For example, in some highly regulated agricultural commodity markets farmers have little incentive to organize collective entrepreneurship schemes.

4. Restrict   exit

Potential cooperators often have the option of "exit" rather than "voice" [17]. When individuals find it less costly to obtain the same public good elsewhere they may prefer to exit and avoid contributing to the original group. Thus by "restricting exit" they are forced to cooperate.

   5.   Change the type of public good
Human beings are often more sensitive to losses than to gains [18, p. 82]. Thus by focusing on the avoidance of public "bads" instead of seeking public goods provides a better starting point for solving the free rider problem. Additional market solutions found in the literature refer to collective action movements not possessing the organizational characteristics of agricultural bargaining cooperatives (e.g., clubs) and thus are not considered in this research.

Community solutions view social relationships among potential cooperators as facilitators of collective action. They assume that communal institutions exist and that they are so effective as to render social planning unnecessary. Furthermore, they assume that the creation of a common idea system by primary groups and mechanistic patterns of solidarity are the basis for cooperation. The following community solutions implemented by agricultural bargaining cooperatives are considered:

   1.   Using common knowledge to overcome mutual ignorance
This solution is based on the assumption that individuals who expect anyone else to contribute to a public good will contribute as well [19]. The key issue is to form convergent expectations about the behavior of other potential participants and thus transform the dominant strategies of non-contribution into contingent strategies of contribution. Mutual or convergent expectations may be formed in a variety of ways. Focal points, matching behaviors, nonzero conjectural variations, and Stackelberg behavior are some of the mechanisms proposed in the literature. If mutual expectations are formed, even a public good game that is a prisoner's dilemma game may result in cooperation [20].

   2.   Using common values to overcome pecuniary self-interest
This group of solutions denounces the collective action theories' core assumption of *homo economicus*—pecuniary outcome-oriented self-interest. In North's words, "Any successful ideology must overcome the free rider problem. Its fundamental aim is to energize groups to behave contrary to a simple, hedonistic, individual calculus of costs and benefits" [21, p. 53]. By introducing a broader definition of potential participants' utility functions that incorporates both material and non-pecuniary components contributing to the public good becomes the dominant strategy in many circumstances.

Contract solutions use associational relationships among potential cooperators as the building blocks of collective action. They assume that individuals collectively plan their society and that potential cooperators engage in a face-to-face encounter during which they bargain over the type of institutions needed to solve the free rider problem. Also, contract mechanisms assume the forging of contracts/agreements between people interested in solving the free rider problem and that secondary groups and organic solidarity constitute the basis for cooperation. Contractual mechanisms ameliorate the free rider problem through participants who devise their own rules, institutions, and processes to avoid free riding, shirking, and opportunistic behavior. The implied voluntary agreements are formulated based on such principles as fairness, justice, equity, and efficiency [18]. The following contract solution implemented by agricultural bargaining cooperatives   is   considered:

1. Self-government

This solution refers to self-organized and self-regulated governance; that is, a set of institutions to govern a collective action group. It involves five types of institutions that, respectively, design, modify, adjudicate, monitor, and enforce rules. Examples include constitutions, treaties, treaties and charters that set the rules for the governance of countries, alliances, leagues, federations, corporations and councils. In the case of ABCs, by-laws play this role [14].

Finally, hierarchy solutions focus on the existence of institutions created to manage society. In these approaches a deliberate attempt to solve the free rider problem is made by some preexisting organization of potential cooperators. The following hierarchy solutions implemented by agricultural bargaining cooperatives are considered:

1. Locate agents or entrepreneurs

According to this solution, individuals solve the collective action problem by internalizing their externalities. They do this by integrating themselves into a common market, firm, or organization [14, p. 155]. Entrepreneurs who will organize one of these institutions become crucial. Thus, potential cooperators must find someone who will organize the group on their behalf [22].

The agency costs of potential cooperators limit the implementability of the Locate Agents or Entrepreneurs solution to the free rider problem. Such costs are, in effect, the transaction costs of organizing, supervising, and coordinating the principal-agent arrangement [23]. Creating different types of accountability mechanisms for different types of agency costs provides a solution to this secondary collective action problem [14, p. 165].

2. Impose, monitor and enforce agreements

This Hierarchy solution entails three components. The entrepreneur imposes agreements on the members of the group, then monitors defections from those agreements and, finally, administers selective incentives and disincentives to reward compliance and sanction noncompliance with those agreements. All three components have been criticized on the grounds of incompleteness and/or logical inconsistency. Yet, their implementation in real-life situations suggests that individuals may accept self-constraining agreements in the short run in order to benefit in the long run [24, p. 19].

The abovementioned solutions to the free rider problem have several common features. First, either implicitly or explicitly, they recognize the importance of institutions in solving the free rider problem. The necessary conditions for starting and supporting collective action include a set of clearly defined property rights, a conducive external institutional environment in the form of relevant legislation, incorporation laws, antitrust regulations, and informal institutions—such as customs, and common cultures—that minimize transaction costs [25-28].

Second, each generic or specific solution is fundamentally incomplete, as each simply generates a second-order free rider problem [14, p. 207]. That is, the implementation of a solution is a new collective good, which requires the contribution of group members in the same fashion as the initial good.

Third, the aforementioned solutions have some fatal flaws that make them unstable and thus threaten their implementability. Market solutions, for example, by assuming that society does not exist, cannot explain how the interests, preferences, resources, and endowments that drive market models arise. Community solutions are also flawed because they assume that common values

exist but that society does not, yet the latter is clearly a precondition for the former. By implicitly assuming away heterogeneity of participants' preferences community solutions do not recognize a significant obstacle that may result in free riding behavior [29].

Contract solutions claim that individuals' preferences explain the terms of agreements signed up by people interested in solving their free rider problem. Yet, they fail to explain how preferences and intentions arise or affect free riding behaviors. Hence they cannot account for the outcome of the bargaining process among the founders of collective action groups.   Hierarchy solutions are problematic since, as mentioned earlier, hierarchy is itself a collective good and coercion is never sufficient to promote collective action.

The above discussion points out two major preconditions for solving the free rider problem: (1) create and foster formal and informal institutions that promote collective action for achieving legitimate (from the society's point of view) collective goods or avoiding collective "bads," and (2) combine more than one solutions to avoid the incompleteness of individual solutions.

Sample and Methodology

In order to create a conceptual framework that informs the evolution of free rider solutions we performed an in-depth empirical analysis of agricultural bargaining associations in the United States. Personal, face to face interviews, telephone interviews, mail surveys, clarification follow-up mail and telephone interviews were employed to gather data on ABCs' organizational characteristics and policies seeking to solve the free rider problem. The targeted sample includes the population of ABCs in California, Idaho, Nevada, Oregon, and Washington in the period 1998-2006 [30]. A questionnaire was mailed to both the CEOs and Board Chairpersons of the sample cooperatives in February 1999. Two follow-up letters were sent to those that have not replied one and two months later, respectively. Twelve out of the 14 associations included in the USDA data base [30][10] have responded (85.71% response rate) (Table **1**).

Table 1: Responding agricultural bargaining cooperatives from California, Idaho, Nevada, Oregon, and Washington.

#	Agricultural Bargaining Cooperative	Product
1	Olive Growers Council of California	Olives
2	California Pear Growers Association	Pears
3	Apricot Producers of California	Apricots
4	California Beet Growers Association	Beets
5	Washington Rhubarb Growers	Rhubarb
6	Washington-Oregon Canning Pear Association	Pears
7	California Tomato Grower Association	Tomatoes
8	Potato Grower Association of Idaho	Potatoes
9	Hazelnut Growers Bargaining Association	Hazelnuts
10	California Canning Peach Association	Peach
11	Central Washington Farm Crops Association	Various
12	Raisin Bargaining Association	Raisins

The survey instrument was informed by theoretical and empirical work from collective action, property rights, transaction costs and agency theories. It included 37 questions that were designed to obtain information in the following areas: (a) the history of the cooperative, (b)

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[10] Some of bargaining cooperatives may not be included in the USDA list because it contains only voluntarily reported activity.

evaluation of the free rider problem facing each cooperative, and (c) the implementation of particular Market, Community, Contract, and Hierarchy solutions by the responding organizations and their evolution over time.

We also interviewed the managers and board members of the responding associations during the 44th and subsequent Annual Pacific Coast Bargaining Conferences. These personal interviews gave respondents the opportunity to clarify, refine, and expand upon their survey answers while allowed for the collection of additional micro-analytic historical information. Key historical and current leaders of ABCs were repeatedly interviewed during various industry events (e.g., the 70th and 77th annual meetings of the National Council of Farmer Cooperatives held in 1999 and 2006, respectively). Additional detailed information was reviewed during the last eleven years in the form of industry magazine articles, annual income statements of ABCs, historical archives, and various USDA publications. These sources provided both qualitative information (e.g., on developments in the organization of ABCs, problems facing the associations due to the free rider problem, etc.) and quantitative data (e.g., financial and industry concentration ratios). Furthermore, over the last eleven years, through telephone interviews the mail survey respondents updated their answers to those questions that refer to policies and industry conditions[11].

Given the small sample size, the data gathered through the mail survey and personal interviews were analyzed by means of descriptive statistical techniques. Frequencies, mean values, Pearson correlations and similar statistics were calculated for the quantitative variables of interest. The results of this analysis are summarized here but a more detailed account can be found in previously presented research [31, 29]. The obtained qualitative information provided the background necessary to understand the evolution of solutions to the free rider issue. Next, based on this analysis, we describe the evolution of intra-organizational incentive mechanisms adopted by ABCs seeking to ameliorate the free rider problem.

Results

The above analysis of the organizational structures and policies of ABCs suggests that the implementation of solutions to the free rider problem has evolved along four rather distinct stages (Fig. **1**).

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[11] Questions seeking to acquire knowledge related to historical events were omitted in these subsequent telephone surveys to avoid unnecessary repetition.
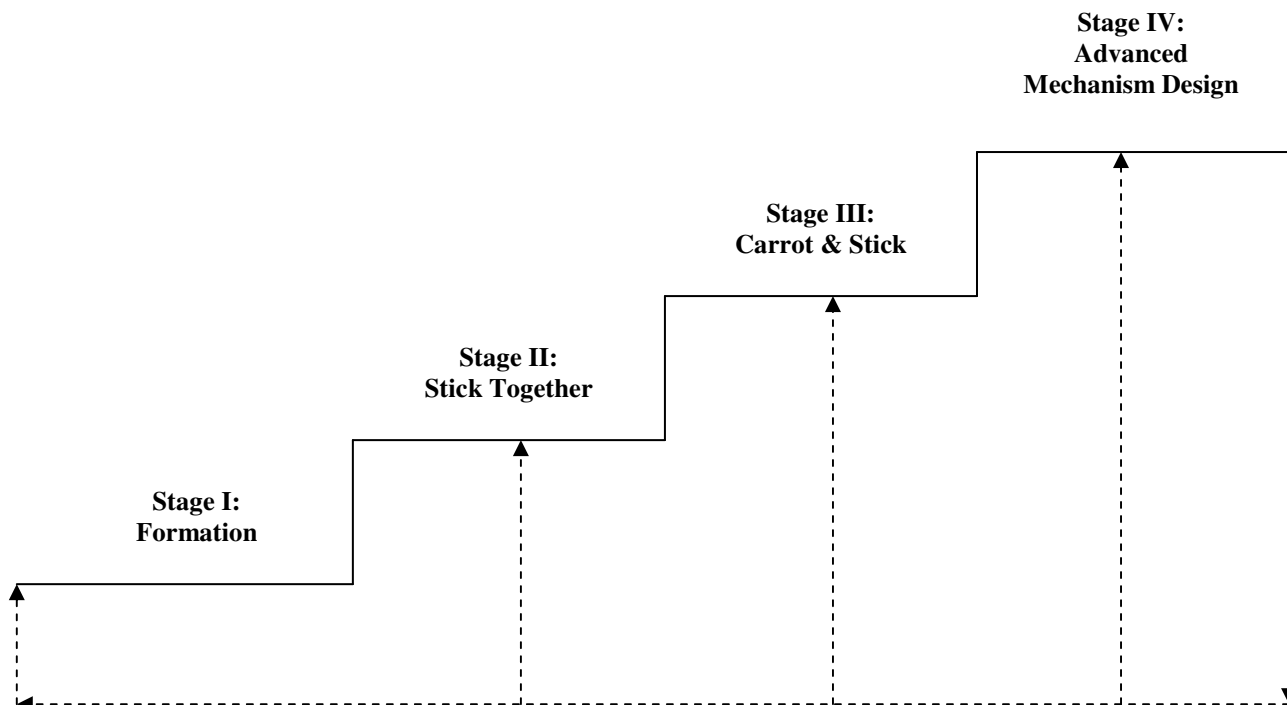
Figure 1: The evolution of solutions to the free rider problem in US's Pacific Coast agricultural bargaining cooperatives.

Stage I-Formation: The first US bargaining associations were formed in the 1920s in order to battle market failures [32, 33]. Initially a leader or a small group of producers contributed the entrepreneurial effort and capital[12]. At that time, when the prevailing market conditions of the post-World War I period were oversupply and oligopsonistic market structures, a band of producers were the major incentive providers. Producers responded to the advocated material incentives expected in the form of temporal price lifting. Given their capital constraints producers chose the organizational form of ABC.

Subsequent motivation for ABC start-up formation is consistent with our theoretical review [34, 3, personal interviews]. These included:

1. "Increase benefits/reduce costs" solution: All solutions to the free rider problem must in essence increase the benefits or lower the costs of collective action to the potential participants. Selective incentives may induce individuals to contribute to a collective good [15]. The problem with this solution though is that selective incentives are collective goods by themselves and individuals will free ride and avoid contributing to them as well [35].

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[12] See, e.g., "How California Pear-Growers Raise Returns to Growers by Cooperating," The Evening Independent, St. Petersburg, Florida, March 3, 1928, p. 24.

The "increase benefits" solution also depends on the assessment of the costs and benefits associated with the collective good by potential contributors. Heterogeneity, in terms of variation in individuals' perception of payoffs plays an important role [15]. Those who perceive the benefits they enjoy from the consumption of a collective good as higher than the costs they incur are inclined to contribute to the good. Groups including one or more such individuals are called "privileged." A privileged group is "a group such that each of its members, or at least some one of them, has an incentive to see that the collective good is provided, even if he has to bear the full burden of providing it himself" [15, p. 50]. Almost 70% of the responding managers believe that medium-volume producers are more active participants in their cooperatives. Thus we may assume that medium-volume producers constitute the "privileged" group for most of the bargaining cooperatives surveyed.

Also, bargaining cooperatives succeeded in reducing the costs incurred by their members, relative to those incurred by non-member farmers. According to the survey results, high overhead costs may explained a significant portion of farmers' refusal to join a bargaining association. The "lower the costs" solution was prominent in the attempt to retain and/or attract new members. In the previous three years to the surveys more than 80% of the responding cooperatives have attempted to lower their overhead costs in various ways [31].

2. "Reduce supply of the public good" solution: This solution refers to a substitution effect: the less of the collective good is provided externally, the more the interested individuals will provide themselves [35]. Hardin [18] discusses qualifications to this statement. For example, the technology of provision of the collective good (linear, step good provision, etc.) affects the perception of costs and benefits by potential participants decisively and thus their level of contribution. An indicator of this effect is assumed to be the tendency of farmers to join bargaining cooperatives during periods of low commodity prices. Indeed, in more than 56 % of the responding bargaining cooperatives, increased participation is observed when commodity prices are low.

3. "Restrict exit" solution: This conceptual solution originates in Hirschman's work [17]. People often have the option of "exit" rather than "voice," and by restricting the first option one can coerce people to move towards the latter one.

The associations we studied implemented numerous methods to restrict members' exit. In 67.5% of the responding cooperatives members signed membership agreements that had some form of ex ante exit provisions. For example, in 72.5 % of the responding ABCs members must give advance notice of intention to stop patronizing the association. Furthermore, in 82.9 % of the responding cooperatives require member agreement that specifies a minimum time period they are obliged to patronize the cooperative.

4. Seek public "bads" solutions: many farmers joined for defensive reasons (e.g., to avoid lower prices). In the majority of the responding bargaining cooperatives, the phrase "to avoid lower prices" was and is still written explicitly in their mission statements instead of the expression "to achieve higher market prices."

Hardin [18, p. 82] argues that "psychologically, utility assessments often seem to suffer from *hysteresis*: that is, we sense that the utility gained in moving from one indifference curve to a higher one is in some sense less than the utility that is lost in subsequently retreating to a lower

curve." In other words, while the "real" gains from achieving or loosing a collective good are the same, people may perceive them differently. Loosing the collective good may be a public bad that leaves the person who experiences hysteresis at a lower utility level. In this way, people may choose to contribute and avoid a collective bad, if they perceive it as bad rather than as good.

Experiments have indeed shown that people tend to evaluate gains and losses differently. Hamburger [36] recognizes the possible difference between public bads and goods in two of his experimental games. One is a "give some" game, in which participants contribute to some public good; the other is a "take some" game in which participants refrain from contributing to a public bad. The games did elicit somewhat different responses. Subsequent experimental work confirms this phenomenon [37, 38].

Stage II- Stick Together: As initial market failures dissipate because of explicit countervailing power, a new group of incentives emerge among successful ABCs. A cooperative4 culture emerges, sculpted by association leaders. During this stage the sense of solidarity becomes evident in member behavior. A number of community solutions to the free rider problem become relevant, as observed in the survey responses:

1. "Non-zero conjectural variations" solution: People involved in a collective action situation are interdependent as firms in an oligopolistic industry and thus what each player does affects all other players and vice versa [39]. Traditional Cournot-Nash models assume a zero conjectural variation. However, under the assumption of a non-zero conjectural variation contribution to a public good is a first-best response when others contribute as well.

   Applying the Cornes and Sandler's premise to agricultural bargaining cooperatives we would expect some farmers would join the ABC because other farmers (friends, family, etc.) joined as well. According to the responses in our survey, on average, 40 % of the patrons decide to become members because their friends, family members, and neighbors joined the bargaining association.

2. "Stackelberg behavior" solution: Another "joining or me too" mechanism is proposed in the literature on the Stackelberg, leader-follower behavior of oligopolistic firms. Stackelberg models assume that players are not necessarily symmetrical and thus their behavior need not be identical. The essence of this solution hints at the Stackelberg behavior of farmers. Let us assume that two groups of farmers (Group 1 and Group 2) consider forming or joining a bargaining cooperative. In Stackelberg models, players do not make their decisions at the same time. Instead, one group might make its decision to form the association first and then another group, after observing the previous group's decision, makes its decision to join or not. In deciding to form the association, Group 1 must therefore consider how Group 2 will react. Thus Group 1 is perceived as the leader and Group 2 as the follower. Indeed, in the majority of the responding bargaining cooperatives, it was a small group of leaders who founded the association and subsequently joined other patrons or groups of farmers later.

3. "Increase social consciousness" solution: Increasing social consciousness with respect to a reference group is a way to increase other-regardingness and thus avoid the free rider problem [40]. Only when the prisoners recognize a Prisoner's Dilemma as such does collective action by prisoners become possible. Self-abnegation, empathy, and feelings of oneness and intimacy with a group lead to collective action [41, p.121]. These feelings are

4. more intense among members of groups with a common cultural and historical background, such as ethnic groups [42]. In 15% of the responding agricultural bargaining cooperatives, respondents identified a distinct ethnic group that has played an important role in founding the cooperative and motivating continuous and active participation. The dominant view held by the leaders of the responding bargaining cooperatives was that, besides the purely economic incentives, active participation from members of these ethnic groups reflects feelings of oneness and intimacy.

5. "Social incentives" solutions: Social incentives represent another solution to the free rider problem based on other-regardingness. Blalock [43] concludes that most people seek esteem, pride, respect, honor, recognition, prestige, glory, and reputation. He also concludes people might contribute to a collective good because they worry about what other people would say if they did not contribute. One hundred percent of the survey respondents agreed that trustworthiness -caring about what others might think of one's ability to be trusted- is very important in minimizing the number of free riders.

Stage III:-Carrot and Stick: As the first generation of members is succeeded by new entrants, the experience of battling the negative consequences of market failures disappears. In order to deal with an increasing number of free riders, cooperative leaders devise new solutions to the free rider problem and provide new types of incentives to contributors to the collective good.

Contract and hierarchy solutions become more dominant during this stage. These include "self-government" mechanisms (e.g., drafting by-laws) and tit-for-tat strategies.

1. "Self-government" solutions: "Self-government" mechanisms refer to the creation of a set of institutions to govern a collective action group [26]. They include constitutions, treaties, organizational charters and other similar devices. Such mechanisms are designed so that they fit the needs of the involved individuals in an incentive-compatible way. They should also include transparent rules for monitoring, enforcement, adjudication, and modification in order to increase the credibility of the collective action organization.

    An example of a "self-government" solution in agricultural bargaining cooperatives is by-laws. Drafting cooperative by-laws provides cooperative members with an opportunity to design incentive alignment mechanisms that ameliorate or mitigate some of the negative consequences of the free rider constraint. Over 40% of the surveyed associations have included in their by-laws penalties for free riders. Consistent with the conceptual literature bargaining cooperatives have over the years modified their by-laws. However, only a small group of respondents have implemented processes of adjudication, monitoring, and enforcement.

2. "Tit-for-tat strategies" solutions: Tit-for-tat strategies solve the free rider problem by targeting the need of producers to be famous for being trustworthy. In Tit-For-Tat games players may be prevented from taking noncooperative actions for short-run benefits if they believe that there are greater long-term gains from cooperation. Again, institutional arrangements may be very useful in providing aligned incentives. Thus, rationality involves time preferences in addition to expectations of what others will do, that is, consideration of

3. the short and long term. The key to successful resolution of the free rider issue in repeated games lies in the relative value decision-makers attach to the present and future [44]. As long as players do not discount the future too heavily, Tit-For-Tat strategies can secure the cooperative outcome. Also, informal institutions (e.g., culture, trust, etc.) can be useful in minimizing potential participants' discount rate [45]. In the second stage of bargaining associations' evolution it was reported that such informal institutions (e.g., trustworthiness) has contributed significantly in the amelioration of the free rider problem.

The dominant hierarchy solution implemented by agricultural bargaining cooperatives is the "impose, monitor, and enforce agreement" mechanism. This type of solution assumes the existence of a central agent or entrepreneur who is interested in promoting (for her own purposes) collective action. Then the solution proceeds in three stages: first, the entrepreneur imposes agreements on the members of the group benefited from the results of collective action. Second, the entrepreneur monitors defections from those agreements by group members, and third, she is able to administer selective incentives and disincentives to reward compliance and sanction noncompliance with the agreements [15].

The idea behind this solution is that the entrepreneur is able by his actions to provoke the commitment of group members. This is done by altering the payoff matrix of the game [46]. Before imposing the agreements, players face two choices: they either cooperate or free ride. After the agreements are imposed, group members have an additional choice, that of signing the agreements, which ties them to the collective goals of the group. Monitoring group members' actions is required in order to be able to enforce the imposed agreements [47].

Finally, enforcement of the agreements requires that the entrepreneur is able to administer selective incentives and disincentives, to reward cooperators and punish free riders [15]. Selective incentives are created in a number of ways. For example, individuals may be excluded from the collective good so that the collective good is Pareto-optimally supplied by some private process that is competitive and efficient [48]. Other methods involve the introduction of individual property rights [25] or the supply of extra benefits exclusively to contributors [15].

The free rider problem can be overcome under three conditions: (a) some benefits or costs are available as private goods; (b) people are affected differently depending on whether or not they choose to participate in collective action; (c) the specific rule by which private goods are distributed is that a special reward or punishment is contingent upon actual participation [19].

The history of agricultural bargaining cooperatives reveals that most were formed by a local leader or a small group of leaders. Acting in order to protect their own vital interests these leaders were able to provoke the participation and commitment of other farmers through a series of actions. The bylaws of these associations represent an agreement to cooperate. Member commitment is monitored by the cooperative and individual non-free-riding members.

The third component of this solution is the implementation of selective incentives and disincentives. According to the aforementioned arguments one should expect to find out that agricultural bargaining cooperatives use a series of selective incentives and disincentives to encourage participation to the cooperative and deter free riding behavior. It seems, however, that the responding cooperatives use selective incentives and disincentives to an extent that would discourage free riders only marginally. "Lack of industry information" is a disadvantage for free

riders in only 53 % of the responding cooperatives, while "lack of legislative representation" in 41 % of them. Furthermore, "lack of technical support" and "non-eligibility for participation in commodity programs" are not perceived by managers as important disincentives for deterring free riding behavior. On the other hand, free riders receive the same price increases as members in 92 %, and the same non-price terms of trade in 47 % of the responding agricultural bargaining cooperatives.

Difficulties in sustaining farmer loyalty and thus controlling non-member production, constraints the ability of a bargaining cooperative to negotiate significant price increases with processors and handlers of farm output. On average, 53% of the potential farmer-members free ride on members' collective efforts to achieve better terms of trade in their transactions with oligopolistic processing industries [29]. This finding may provide an explanation to the long-term inability of bargaining cooperatives to raise commodity prices alternative to the information sharing and quality assurance arguments [e.g., 11, 12].

Stage IV: Advanced Mechanism Design: During this phase in the evolution of solutions to the free rider problem, cooperative leaders utilize their past experience. They realize that individual solutions are necessarily incomplete and that each member is motivated to participate in bargaining cooperatives by a different solution to the free rider problem [49]. Subsequently they implement combinations of complex mechanisms that result in the provision of combinations of incentives. For any given situation more than one type of incentives provides the major explanation of successful collective action during Stage IV [50, p. 49].

As manifested in their by-laws, operational strategies, and revealed through personal interviews with managers and board members, the majority of bargaining cooperatives currently adopt solutions that belong to at least three different solution types. Furthermore, the leaders of these associations are constantly seeking new, innovative methods for ameliorating the free rider problem. Our survey results showed high positive correlation (0.94) between the percentage of producers that join the association and the number of adopted solutions [29].

Conclusions and Future Research

This research focuses on the free rider problem facing agricultural bargaining cooperatives in the West Coast states of the US. Historically, the free rider problem has been the single most important factor inhibiting bargaining associations' success potential [51]. Since their formation, bargaining cooperatives have implemented various incentive mechanisms in their attempt to ameliorate the free rider constraint. These solutions have evolved from simple to advanced intra-organizational incentive mechanisms. According to a series of primary and secondary qualitative and quantitative data sources the adoption of the various mechanisms follows an evolutionary process that has expanded over four stages. We argue that the four types of generic solutions proposed by Lichbach have indeed been implemented by ABCs. Thus, the adoption of solution instruments follows a time line from Market to Community to Contract and Hierarchy solutions. This paper suggests that the next stage in this evolutionary process finds bargaining associations implementing advanced combinations of complex incentive alignment mechanisms (Table **2**).

STAGE	TYPES OF SOLUTIONS	SUCCESSFUL SOLUTIONS ADOPTED BY WEST COAST BARGAINING COOPERATIVES
I: Formation	Market	*Market* • Reduce costs incurred by members • Reduce supply of public good—join when prices are low • Seek public "bads"—avoid even lower prices
II: Stick Together	Community	*Community* • Non-zero conjectural variations—join if others do • Stackelberg behavior—join if a leader does • Increase social consciousness—ethnic groups • Social incentives—avoid peer disapproval
III: Carrot and Stick	• Contract • Hierarchy	*Contract* • By-laws • Tit-for-tat strategies—become famous and trustworthy *Hierarchy* • Impose, monitor and enforce agreements • Administer selective incentives/disincentives
IV: Advanced Mechanism Design	Combinations of solutions	Combinations of successful solutions <u>Examples:</u> ➢ By-laws and reduce costs incurred by members ➢ Impose, monitor and enforce agreements, and provide social incentives

Table 2: The Evolution of Solutions to the Free Rider Problem in US's West Coast Agricultural Bargaining Cooperatives (1920-2006).

The proposed framework is based on the premise that different types of solutions to the free rider problem are effective in the various social, market and institutional environments. It is the interaction of market conditions and formal and informal institutions that determine which types of solutions have a higher success potential. The typical ABC started in the 1920s by providing simple incentives to its members and slowly moved to more complex types of incentives. Groups thus might start out by offering material incentives, turn to group consciousness, and then emphasize the probability of winning. Finally, combinations of incentives may be required to ameliorate the free rider problem in complex social, market and institutional environments where cooperatives are characterized by an increasingly heterogeneous membership. The need for complex solutions emanates from the convolution of incentive alignment in such cases.

An implication of this framework is that cooperative leaders should design incentive mechanisms that take into consideration not only the need for combination of incentives, but also other crucial parameters. Those include the type of collective action, the technology of provision of the public good (e.g., higher product prices), and the characteristics of their industry. Incorporation of the

lessons provided by the Theory of Mechanism Design should improve ABCs' ability to address the free rider issue [e.g., 52, 53].

The institutional and cultural context is also very important. While Contract   and   Hierarchy solutions seem to present an advance over Market and Community solutions, the latter two could become more essential in an institutional environment different from the one examined in this research.

As this discussion demonstrates, the free rider problem is a complex puzzle facing US, West-Coast agricultural bargaining cooperatives. Consequently, its amelioration requires the adoption of multi-faced sets of complementary solutions. Market, Community, Contract, and Hierarchy solutions all are incomplete when individually implemented. It is the combination of complementary solutions and the adoption of carefully designed formal and informal institutions that would create the synergies necessary to solve the free rider problem. By providing integrated sets of incentives both to members and would-be members, these combinations of solutions constitute a reaction to an increasingly complex economic, social, and institutional environment facing agricultural bargaining cooperatives. Both cooperative leaders and policy-makers should have this in mind when designing their future strategies.

Despite this paper's contribution, several issues remain unaddressed. For example, future inquiries should provide answers to the following questions:
- Do ABCs formed in recent years follow the same evolutionary path with respect to the adoption of solution instruments?
- Which combinations of solutions have a higher success potential in various economic, institutional and cultural environments? What are the key determinants of this potential?
- How did the dominant market conditions affect the choice of incentive alignment mechanism during each of the four evolutionary stages suggested by this research?
- How does member interest heterogeneity impact on the choice of solution mechanism?
- Is there possibly any cycle logic behind the evolution of solutions to the free rider problem?

As these potentially additive research questions suggest agricultural economists with an interest in complex organizational issues can pursue one of several options. One of this paper's objectives is to foster further discussion of the free rider problem in agricultural bargaining.

References
[1] Hansmann H. The ownership of enterprise. Harvard (MA): The Belknap Press of Harvard University Press; 1996.
[2] United States Department of Agriculture (USDA). Directory of farmer cooperatives. Washington, DC: Service Report 22, Rural Business-Cooperative Service, USDA; 2001.
[3] Banje RB. Cooperative farm bargaining and price negotiations. Washington, DC: USDA; 1980.
[4] United States Department of Agriculture (USDA). Directory of farmer cooperatives. Washington, DC: Service Report 22 (updated), Rural Business-Cooperative Service, USDA; 2009.
[5] Hueth B, Marcoul P. An essay on cooperative bargaining in U.S. agricultural markets. Journal of Agricultural & Food Industrial Organization (serial online) 2003 [cited 2009 Jan 2]; 1(1): Article 10. Available from: http://www.bepress.com/jafio/vol1/iss1.

[6] Iskow J, Sexton R. Bargaining associations in grower-processor markets for fruits and vegetables, Washington, DC: USDA; 1992.

[7] Ladd G. Agricultural bargaining power, Ames (IA): Iowa State University Press; 1964.

Lang MG. Collective bargaining in agricultural product markets: findings of a survey. Agricultural Experimentation Station Bulletin 1979; 241. Purdue (IN): Purdue University.

[8] Helmberger PG, Hoos S. Cooperative bargaining in agriculture: grower-processor market for fruits and vegetables. Davis (CA): University of California, Division of Agricultural Sciences; 1965.

[9] Knoeber CR. An alternative mechanism to assure contractual reliability. Journal of Legal Studies 1983; XII: 333-43.

[10] Knoeber CR, Baumer DL. Guaranteeing a market and the contracts of bargaining cooperatives. Journal of Agricultural Cooperation 1986; 1: 1-10.

[11] Hueth B, Marcoul P. Information sharing and oligopoly in agricultural markets: the role of the cooperative bargaining association. American Journal of Agricultural Economics 2006; 88(4): 866-81.

[12] Bogetoft P, Olesen HB Incentives, information systems, and competition. American Journal of Agricultural Economics 2003; 85: 234-247.

[13] Reynolds BJ. Grower dichotomy and the 2003 collapse of California pear bargaining (unpublished paper). Washington, DC: CP/RD/USDA; 2008.

[14] Lichbach ML. The cooperator's dilemma. Ann Arbor (MI): The University of Michigan Press; 1996.

[15] Olson M. The logic of collective action: public goods and the theory of groups. Cambridge (MA): Harvard University Press; 1965.

[16] Libecap GD. The conditions for successful collective action. Journal of Theoretical Politics 1994; 6(4): 563-92.

[17] Hirschman AO. Exit, voice, and loyalty: further reflections and a survey of recent contributions. Social Science Information 1974 February; 13: 7-26.

[18] Hardin R. Collective action. Baltimore (MD): John Hopkins University Press; 1982.

[19] Schelling TC. Micromotives and macrobehavior. New York: W.W. Norton; 1978.

[20] Fundenberg D, Maskin E. The folk theorem in repeated games with discounting or with incomplete information. Econometrica 1986 May; 54: 533-554.

[21] North DC. Structure and change in economic history. New York: W.W. Norton; 1981.

[22] Alchian AA, Demsetz H. Production, information costs, and economic organization. American Economic Review, 1972; 62: 777-795.

[23] Miller GJ. Managerial dilemmas: the political economy of hierarchy. Cambridge (UK): Cambridge University Press; 1992.

[24] Elster J. Nuts and bolts for the social sciences. Cambridge: Cambridge University Press; 1989.

[25] Coase RH. The problem of social cost. Journal of Law and Economics 1960; 3: 1-44.

[26] North DC. Institutions, institutional change and economic performance, Cambridge: Cambridge University Press; 1990.

[27] Barzel Y. Economic analysis of property rights. 2nd ed. Cambridge: Cambridge University Press; 1997.

[28] Williamson OE. The mechanisms of governance, New York: Oxford University Press; 1996.

[29] Iliopoulos C, Cook ML. Solutions to the external free rider problem in US agricultural bargaining cooperatives: an update. , Working Paper Series, AEWP-2008-01 (serial online) 2008

[cited 2009 Apr 4]; Athens (Greece): Agricultural Economics & Policy Research Institute. Available from: www.igeke.gr.

[30] United States Department of Agriculture (USDA). Directory of bargaining associations, Washington, DC: Rural Business-Cooperative Service, USDA; 1998.

[31] Iliopoulos C, Cook ML. Solutions to the external free rider problem in US agricultural bargaining cooperatives. Paper presented at the organized symposium: Managing Membership Issues in Cooperatives, American Agricultural Economics Association Annual Meeting, July 28-August 2, 2000. Tampa, Florida, USA.

[32] Nourse EG. The economic philosophy of cooperation. American Economic Review 1922 Dec; 12: 497-557.

[33] Torgerson RE. Producer Power at the Bargaining Table, Columbia (MO): University of Missouri Press; 1970.

[34] Marcus GD, Frederick DA. Farm bargaining cooperatives: group action, greater gain, Washington DC: ACS Research Report 130, USDA; 1994.

[35] Sandler T. Collective action: theory and applications. Ann Arbor (MI): The University of Michigan Press; 1992.

[36] Hamburger H. N-person prisoner's dilemma. Journal of Mathematical Sociology 1973; 3(1): 27-48.

[37] Kahneman D, Tversky A. Prospect theory: an analysis of decision under risk. Econometrica 1979 Mar; 47: 263-91.

[38] Fleishman JA. The effects of decision framing and others' behavior on cooperation in a social dilemma. Journal of Conflict Resolution 1988 March; 32: 162-180.

[39] Cornes R, Sandler T. Are public goods myths? Journal of Theoretical Politics 1994; 6(3): 369-385.

[40] Kahn S. Organizing: a guide for grassroots leaders. New York: McGraw-Hill; 1982.

[41] Keohane RO. After hegemony: cooperation and discord in the world political economy. Princeton (NJ): Princeton University Press; 1984.

[42] Hofstede G. Culture's consequences: Comparing values, behaviors, institutions and organizations across nations. 2nd ed. Thousand Oaks (CA): Sage; 2001.

[43] Blalock HM Jr. Power and conflict: toward a general theory. Beverly Hills (CA): Sage; 1989.

[44] Axelrod R. The evolution of cooperation. New York: Basic Books; 1984.

[45] Fukuyama F. Trust: the social virtues and the creation of prosperity. New York: Free Press; 1995.

[46] Myerson, RB. (1986) An introduction to game theory. In: Reiter S, editor. Studies in mathematical economics, Washington, DC: Mathematical Association of America; 1986. pp. 1-61.

[47] Kollock P. An eye for an eye leaves everyone blind': cooperation and accounting Systems. American Sociological Review 1993 Dec; 58: 768-86.

[48] Demsetz H. The private production of public goods. Journal of Law and Economics 1970; 13: 293-306.

[49] Ostrom E. Governing the commons: the evolution of institutions for collective action. Cambridge (MA): Cambridge University Press; 1990.

[50] Elster J. The cement of society: a study of social order. Cambridge: Cambridge University Press; 1989.

[51] Sexton R, Iskow J. Factors critical to the success of emerging agricultural cooperatives. Davis (CA): Giannini Foundation Information Series No. 88-3, University of California-Davis; 1988.

[52] Myerson RB. Mechanism design by an informed principal. Econometrica 1983; 52: 461-87.

[53] Maskin E, Tirole J. Unforeseen contingencies and incomplete contracts. Review of Economic Studies 1999; 66: 84-114.