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# Quality and Self-Regulation in Agricultural Markets: What Is the Role for Producers' Organizations?

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# Quality and Self-Regulation in Agricultural Markets. What Is the Role for Producers' Organizations?

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**Abstract.** This paper focuses on self-regulation by Producer's Organizations (PO) as an alternative to market or public intervention. Using the advances of the economics of incentives, it studies the interaction of asymmetric information and the democratic process in the quality choices of a group of heterogeneous producers. With a simple model of adverse selection it presents the pricing rules and the quality provision in a group of producers facing an opportunity to gain from their collective capacity to establish a reputation for their quality products.

This paper makes the choice of the PO's pricing mechanism endogenous, extending previous analyses in which the remuneration schemes were either exogenous or not implementable because of the heterogeneity among producers. It distinguishes between a constitutional phase, in which each of the participating producers votes on the best remuneration scheme for quality, and a working phase, in which quality regulation must be enforced at the PO's level.

It compares different equilibria, according to which type of producer is in the majority and to which constitutional rule is adopted. Irrespective of the constitutional rules adopted, it finds that the quality level provided by the group is higher than the first-best with a high-quality producers' majority and lower with a low-quality producers' majority. The analysis in this paper may easily be extended to consider producers that are heterogeneous in size or efficiency, like in the tradition of the agricultural cooperatives literature.

**Keywords:** economic incentives, asymmetric information, mechanism design, pricing rules, quality regulation, self-regulation.

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## 1. Introduction.

In 1996 the European Union (EU) introduced a reform of the fruit and vegetable common European market to finance both the establishment (50% of initial expenditures) and operations (2% of annual expenditures) of Producers' Organizations (PO). According to the EU policy goals, the PO's should plan production in order to meet demand, decide and enforce quality standards, help reduce production costs and promote environment-friendly technology adoption. Advocates of the regulation claim that this approach to market organization should make producers more responsible for their actions and help the agricultural sector to bargain with an increasingly concentrated retail sector. In addition, by allowing an orderly marketing, it should help consumers too.

This type of market regulation is reminiscent of the Marketing Orders that were initiated after the 30's for different perennial crops in the U.S., especially in California.<sup>1</sup> The Marketing Orders' experience in recent years has been subject to a considerable array of criticism because of their adverse welfare effects for consumers and sometimes even for producers. Indeed, in the best case scenario, when the Marketing Orders perform properly, they give market power to the producers at the expense of consumers (USDA, 1981; Shephard, 1986; Jesse, 1987). It would seem difficult to justify this intervention in the economy if not by the usual income distribution or political-economy arguments. But a different feature of the regulation envisioned for the European market makes the comparison with U.S. experience not completely appropriate.

In Europe, PO's participation is voluntary, while in the U.S., once the Order is established, participation by producers and handlers is compulsory. This difference can have important consequences since it influences the behavior of farmers, their decision to participate, and the behavior of the organization. It is reasonable to think that the resulting market equilibrium is substantially different between the two cases, with the degree of market competition presumably higher in the European case. The analysis proposed in this paper is a starting point for an economic

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<sup>1</sup> After years of falling incomes for farmers, the U.S. Congress enacted the Agricultural Marketing Agreement Act in 1937. The Act allowed the majority of producers of certain crops to set up Marketing Orders whose rules could be extended to all producers and handlers, and whose main objectives were the orderly marketing and the quality regulation of products. The European regulation is clear about the aims of PO's, assigning them the power to regulate quality standards and production technologies that can be extended to all producers in a region when 2/3 of them agree on it, so resembling the U.S. Marketing Orders experience.

evaluation of the welfare effects of the regulation and its focus is centered mainly on quality issues. Traditionally, the main economic analysis of agricultural policies centers on quantity, price, and risk implications of different policies. A growing part of the literature now deals with quality issues. A market failure for quality provision is often the starting point for some form of public regulation, even though it is often far from clear whether public intervention can in fact contribute to its solution.

Previous analyses of the welfare effects of quality regulation enforced at the Order's level in the form of a minimum-quality standard show that it can not be welfare increasing (Bockstael, 1984; Chambers and Weiss, 1992). This paper focuses on self-regulation by PO's as an alternative to market or public intervention. It explicitly considers the democratic process through which quality levels must be chosen and enforced in the PO. It distinguishes between a constitutional phase, in which each of the participating producers votes on the best remuneration scheme for quality, and a working phase, in which quality regulation must be enforced at the PO's level. Using arguments first suggested in the constitutional economics literature (Brennan and Buchanan, 1985), the paper introduces some constitutional limits to the choices available to the PO. It then compares the equilibria attainable with an efficient pricing rule (separating mechanism) or an *equal treatment for all* producers (pooling mechanism).

The second phase, the working of the group of producers, is analyzed taking into consideration the incentives of heterogeneous producers, i.e., the constraints represented by the voluntary participation and the asymmetric information about individual producers, in the spirit of the mechanism-design literature. The results can then be compared with those resulting from the first-best. The outcome of the group's democratic process is expressed in terms of payment schemes and quality provision for different producers.

The analysis of this paper may easily be extended to consider producers that are heterogeneous in size or efficiency, like in the tradition of the agricultural cooperatives literature. In this literature, the efficiency and fairness of different pricing mechanisms are the subject of a lively debate. One of the main contributions (Sexton, 1986) shows why it may be inefficient to have a marginal pricing rule and that it may be preferred to have also some additional lump-sum fees or rebates, even though these latter might not be feasible because of heterogeneous membership. Vercammen *et al.* (1996) show the different pricing mechanisms with heterogeneous producers and asymmetric information. In their

work, the choice of the different mechanism is exogenous, and no consideration is given to the democratic process with which the group decides upon the rules.

The next section introduces a simplified model that tries to capture the main features of the situation at hand. It is a model of hidden information, with two types of producers - high and low-quality - with a relatively simple production technology. Section three gives some preliminary results for the case in which the PO can freely implement an efficient pricing mechanism. In the fourth section the results when the PO may implement only an *equal treatment for all* pricing rule for all producers are derived. The last section sketches possible extensions of the model and closes with some conclusions.

## 2. The model.

Consider an agricultural commodity, i.e., an orange, an apple, etc., that can be thought of as an **experience good**. Its quality can vary and it is not known by consumers before consumption. The problem of asymmetric information could be alleviated by a brand or a label which would help to establish reputation for higher quality and facilitate confidence in the market. Agricultural firms are usually small, and since marketing investments exhibit important economies of scale, it is assumed that a single producer can not profitably set up an individual brand.<sup>2</sup>

The problem is for a group of farmers to decide whether or not to form a Producers Organization (PO) with common rules about production and trade of products. If a PO is formed, a management committee will be formed to execute the agreement. The PO needs to maintain the reputation for the brand and the group so it requires costly effort - i.e., quality provision - from the producers-stakeholders. Every producer is expected to supply the good at some specified quality level and the management is in charge of the monitoring and the enforcement of the rules. It is assumed that management has no divergent interests with the firm, i.e., there are no Agency problems with management.

The group is made of  $n$  heterogeneous producers. Some have better outside opportunities and

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<sup>2</sup> This depiction of the game resembles the working of a marketing cooperative. A group of producers can seize an opportunity only through collective action: either some large investments with increasing returns, or an increase in bargaining power, or the establishment of a brand with some collective reputation or other marketing programs.

some have better skills, i.e., lower costs of producing high-quality products. Assume for simplicity that producers can be of 2 types:  $\theta^H$  denotes the high-quality type and  $\theta^L$  the low-quality. High-quality means that the producer has lower cost of production for quality.<sup>3</sup> For convenience, assume  $n$  is an odd number and  $n_L + n_H = n$ .

The production technology for different producers can be represented using a technology set in the following way:

$$T_{\theta^i} = \{(x, q) : x \text{ can produce } q \mid \theta^i\},$$

where  $x \in \mathfrak{R}_+$  is a vector of inputs that producers choose,  $q \in \mathfrak{R}_+$  is the quality level, and  $i=L,H$ . Let us normalize production level to unity, so we can work only with quality levels. Producers' choices can be indirectly represented with their cost function:

$$c(q, \theta^i) = \min_x \{wx : (x, q) \in T_{\theta^i}\},$$

where  $w$  is the vector of input prices. To allow for heterogeneity among producers, assume type  $\theta^i$  member's cost of production,  $c(q(\theta^i), \theta^i)$ , to be twice differentiable, strictly increasing, strictly convex in  $q$  and without fixed costs. In addition, express the better skills of producers of type H as:  $c_q(q, \theta^H) < c_q(q, \theta^L)$  for all  $q$ , that is the marginal cost of quality is everywhere higher for type  $\theta^L$ .

We consider risk-neutral producers whose preferences are separable in income and effort and whose profits for the production of a unit of good of quality  $q$  are:  $\pi(\theta^i) = y(q(\theta^i)) - wx$ , where  $y(q(\theta^i))$  is the price each producer receives from the PO for a unit of product of quality  $q(\theta^i)$ .

In this paper we consider only hidden information: each producer has private information about his own type. To simplify things, assume that the PO can perfectly observe and verify the quality level provided by each producer. Given this assumption, the PO can ensure that the payment to the producers should be a function of the quality provided,  $y(q)$ . The PO sells the commodity on the market and the price it receives is related to the quality that the consumers expect. We indeed assume that the consumers' willingness to pay is a function of the average quality of the good marketed by the PO.<sup>4</sup>

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<sup>3</sup> Lewis *et al.* (1989) suggest that producers may have both different costs and different outside opportunities.

<sup>4</sup> Even though this assumption is quite standard in the literature, for example on quality and international trade (Chang and Masson, 1988), it is not devoid of criticism. Indeed, as Tirole puts it, it leads to bootstrap equilibria in which reputation matters because consumers believe it matters (Tirole, 1988:123).

If  $q(\theta^i)$  represents the quality of the good produced by the producer of type  $\theta^i$ , the average quality from the  $n$  producers participating in the PO may be seen as  $Q = \frac{1}{n} \sum_{i=L}^H n_i q(\theta^i)$ , with  $i=L,H$ , and the consumers' willingness to pay equal to  $p(Q)$ . It has a general form - with  $p'(Q) > 0$  and  $p''(Q) < 0$  - to accommodate for different market structures.<sup>5</sup>

One feature of the group is that it is a *polity*: any PO that is formed must be governed through a democratic process or some collective choice mechanism to decide upon the rules that govern the group. To keep things simple the paper considers the case in which the decisions are made according to majority rule. Here we are interested in the rules that affect the economic behavior of the producers: in particular the payments for the quality level provided by different producers, which must be decided and known in advance by all producers.

The potential  $n$  members meet together to decide whether to form the PO and how to run it. If the PO is formed, the producers pool their production together under the collective brand and receive a market price according to the level of quality they provide. From the PO each producer receives according to what quality of commodity he has provided. Each individual behaves in his own interest and would like to see the PO adopting the policies that better suit his own needs. So he votes for those proposed rules that best suit his own interests.

Producers are heterogeneous and have different preferences. Each producer can expect that what he can get from the PO is "bounded" from above and from below. Indeed, he cannot receive less than what he would get from his outside opportunities, because otherwise he would be better off not participating; and he cannot receive more than what is allowed by the fact that the PO must break-even. Even though this paper does not consider explicitly the voting process, for the purpose of illustration it is reasonable to think that among the implementable mechanisms each producer independently votes for the one that is the best for himself. Given the assumption about types, it is sensible to think that two contracts emerge, one that is optimal for low-type and one for high-type producers. The pricing mechanism that is then decided at the PO's level is the one that is voted by the majority of the producers.

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<sup>5</sup> It is important to consider different market structures since it has been recognized that the higher the level of coordination or collusion in an industry is, the higher the tendency to set the minimum quality standard too high for the social welfare optimum is (Leland, 1979; Shaked and Sutton, 1981; Bockstael, 1987).

The idealized situation can be translated into a game which can be represented in the following way (figure 1). Nature at the beginning of the game decides the distribution of the  $n$  producers between the two types:  $n_L$  producers of type  $\theta^L$  and  $n_H$  producers of type  $\theta^H$ . Farmers have private information about their own type, but the distribution of types (Nature's choice) is not known. If  $n_L > n_H$ , there is a low-quality majority, while if  $n_H > n_L$  the majority is of high-quality producers. At this stage no one knows which type is the majority.

**Figure 1. The timing of the game.**

<i>Phases:</i>	<i>Constitutional</i>	<i>Working</i>
<b>0</b>	<b>1</b>	<b>2</b>
Nature draws $n_L$ and $n_H$	Producers consider feasible contracts and vote for the welfare maximizing one	Producers execute their contracts. Outcomes and payoffs are realized.

The next phase is the **constitutional** choice, and it is represented by the period 1. The producers vote and agree on a set of initial rules - the constitution - which specifies the democratic rules of the producers' organization, the fees to be paid, the rights and obligations of each agent. Assume that producers vote for what is best for their own interest and the set of rules and regulations that gets the majority of the votes wins. The next is the **working** phase, or period 2 in figure 1. Producers can either reject or accept the contract. If they reject the contract they remain at their reservation utility.<sup>6</sup> If they accept the contract, they start to work with the PO and must comply with its rules.<sup>7</sup>

This one-shot game can be solved by backward induction. The optimal contract in the first

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<sup>6</sup> Here we assume that producers prefer to stay in the PO when offered a contract that drives them to their reservation utility. One could argue that the PO could offer  $\varepsilon$  (small enough) above the reservation utility to induce the producer to participate. Note that we rule out the possibility of collusion among any subset of producers.

<sup>7</sup> At this stage, we consider the case in which all  $n$  producers must be given enough incentives to participate. This may not always be the case, since  $n$  can be endogenous. Future research will address this issue.