



Pooling and the yardstick effect of cooperatives



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ABSTRACT

The article addresses the competition between supplier-owned-firms (Cooperatives) and investor-owner-firms (IOFs) when procuring raw commodities of different quality from agricultural producers. The cooperative pays a (partial) pooling price to all its members and retains no surplus, whereas the IOF pays farmers prices based on their quality and maximizes its profits. When there is an IOF duopsony, farmers gain no profits. In the case of a mixed duopsony, the low-quality producer delivers to the Cooperative, while medium and high quality producers sell to the IOF. This adverse selection is due to the pooling within the Cooperative. In the case of a Coop duopsony, producers randomize their outlet decisions. The mixed duopsony is an equilibrium market structure when reservation prices of consumers are sufficiently similar. Cooperatives will challenge the monopsonistic price setting of an IOF due to the farmers being residual claimants. Both the market share of cooperatives and the extent of payment differentiation inside a cooperative have a positive effect on the prices received by farmers.

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“The consequences of the nature of the cooperative’s internal organization ... could be expected to provide new insights into the viability of cooperative enterprises and their effectiveness in influencing competition in agricultural markets.”

[Helmerger and Hoos, 1962, p 281]

1. Introduction

Competition in markets has many beneficial effects, but markets are not without problems when there are imbalances in the food chain. Examples of the problems faced by small firms are the formation of prices in markets, price instability, the procurement of high quality inputs, lack of support services, exploitative grading practices, and lack of access to markets (Dunn et al., 1979). Zusman and Rausser (1994) argue that collective action by farmers via cooperatives may solve these market failures to a certain extent. Various efficiency enhancing features of cooperatives have been identified, like eliminating the double monopoly markup, countervailing power, economies of scale, assurance of sale, coordination, information provision, providing member services, and the competitive yardstick (Hendrikse and Feng, 2013). This article focuses on the competitive yardstick of cooperatives on the procurement prices received by farmers. The competitive yardstick effect refers to the

fact that the presence of cooperatives in the market forces IOFs to offer higher procurement prices for farmers’ products.

Empirical support for the competitive yardstick is observed in the food manufacturing industry in the US (Rogers and Petraglia, 1994), the wheat market in Canada (Zhang et al., 2007), the coffee market in Chiapas, Mexico (Milford, 2012), and the European dairy industry (Hanisch et al., 2014). There are a number of other observations regarding agricultural markets. First, many agricultural markets turn out to have cooperatives as well as IOFs (Cropp and Ingalsbe, 1989; Hendrikse, 1998; Bijman et al., 2012). Second, Nilsson (1998, p43) states regarding the internal organization of cooperatives that “The principle of equal treatment within agricultural cooperatives is traditionally strong. This involves things as pricing, e.g., prices are not always differentiated based on quality and quantity, and member control, e.g., the general rule is that all members have equal voting rights”. Finally, the evidence regarding the relationship between governance structure and product quality in agricultural markets indicates that there are many cooperatives providing low quality products (Frick, 2004; Theodorakopoulou and Iliopoulos, 2012; Bijman et al., 2012; Pennerstorfer and Weiss, 2013).

This article addresses these observations by focussing on the relationship between the internal and industrial organization of enterprises, as highlighted in the opening citation by Helmerger and Hoos (1962). We follow Hansmann (1996) in characterizing the internal organization of an enterprise by its decision rights and income rights. Decision rights in the form of authority and responsibility address the question ‘Who

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has authority or control (regarding the use of assets)?', while income rights address the question 'How are benefits and costs allocated?' The main distinction between an IOF and a cooperative in terms of decision rights is that the decision rights reside formally with the investors in an IOF and with the input suppliers or buyers in an agricultural cooperative. Two important income rights of a cooperative are pooling and the zero-profit constraint. Pooling entails that the allocation of revenues as well as costs may be (partially) independent of quality and/or quantity delivered by the members.¹ The zero-profit feature captures that the revenues of the cooperative enterprise are returned to members (Helmlberger and Hoos, 1962, p 283). The distinction in terms of income rights between an IOF and a cooperative is therefore that an IOF charges farmers different procurement prices (based on their quality and/or production costs) and maximizes its profits, whereas a cooperative pays a (partial) pooling price to its members and breaks even (by distributing all surpluses to the members).

The industrial organization literature distinguishes three types of markets: homogeneous, horizontally differentiated, and vertically differentiated product markets. The competitive yardstick has been analyzed in these three markets. Various authors consider homogeneous product markets. Helmlberger and Hoos (1962) highlight the zero-profit constraint, and the follow-up by Helmlberger (1964) claims that "open membership cooperation ... tends to increase ... prices paid to producers." An analysis of a mixed market is not provided due to the complexities of oligopolistic interdependencies. The yardstick effect is driven by the zero-profit constraint in Cotterill (1987). Tennbakk (1995) addresses ownership structure choice of enterprises consisting of two equal groups of identical farmers in a Cournot duopoly. The competitive yardstick effect arises due to the elimination of double marginalization (Spengler, 1950). Farmers choose an enterprise in a Cournot duopsony in Karantininis and Zago (2001). Their simulation results indicate that profits for members are higher in the mixed duopsony than in an industry consisting of two IOFs due to members being the residual claimant of the profits of the cooperative enterprise. The cooperative attracts more of the farmers with low quality. Hendrikse (2007) presents a model with production uncertainty, and member and non-member patronage. A contracting externality in terms of a change of the probability distribution due to additional formation of cooperatives drives the competitive yardstick result.

Sexton (1990) and Tribl (2012) establish a competitive yardstick effect in spatial models with homogeneous farmers. Sexton (1990) shows that the magnitude of the effect depends on the intensity of the competitive process, the open versus closed membership policy, and the cooperative pricing policy being either Net Marginal Revenue Product or Net Average Revenue Product, while Tribl (2012) shows that there is also a Stackleberg leadership effect in the competitive process.

Three models addressing cooperatives in vertically differentiated product markets have been developed in the literature. Zago (1999) and Deng and Hendrikse (2013) highlight contracting issues regarding product quality in models with a monopolist cooperative. The competitive yardstick effect cannot arise in these models. Saitone and Sexton (2009) analyzes optimal cooperative pooling in a quality-differentiated market with the cooperative facing a competitive fringe. The competitive fringe acts as a constraint on the pricing policy of the cooperative in order to prevent exit by farmers in their model.

We develop a simple duopsony model with vertically differentiated products to address various aspects of the competitive yardstick. The number of enterprises and their governance structures are determined endogenously. This allows us to address the following research questions: Which procurement prices are paid in different market structures? Is there a competitive yardstick effect? Is the competitive yardstick affected by the extent of pooling? When is the mixed duopsony an equilibrium market structure? The results show that the two income

rights of a cooperative act as constraints on the procurement prices paid by the IOF in order to prevent farmers to join the cooperative. They are responsible for the competitive yardstick effect. Not only farmers delivering to the cooperative receive a higher surplus, but also the other farmers receive more than in a market with only IOFs.

This article is organized as follows. Section 2 specifies the game between farmers and enterprises. Section 3 determines the equilibrium. We extend the model to partial pooling within cooperatives in section 4. Section 5 concludes and formulates some possibilities for future research.

2. Model

This section develops a non-cooperative game highlighting the pricing policies of the enterprises, and the farmers' choices of product outlet. The five elements of the game are specified, i.e. players, choices, payoffs, information structure, and the sequence of decisions.

2.1. Players

Assume that there are three farmers, two enterprises, and three consumers. Farmer 1 (2, 3) produces a low (median, high) quality product. The quality produced by farmers is given exogenously. One reason for this assumption is that there are many sources of heterogeneity between farmers (Iliopoulos and Cook, 1999), and some of them are hard to change. The two enterprises act as marketing organizations that purchase products from farmers and sell to consumers.

2.2. Choices

An enterprise e ($= 1, 2$) takes two decisions. First, it has to take an entry decision. If an enterprise chooses to enter the market, then a fixed sunk cost F is incurred. Examples of fixed sunk costs are the costs of registering the enterprise at the chamber of commerce and the costs of listing the name of the enterprise (Sutton, 1991; Bresnahan and Reiss, 1994). There are no costs when there is no entry. Second, each enterprise chooses its governance structure, either an open-membership cooperative or an IOF. An open-membership cooperative chooses a zero-profit pooling price policy and farmers can join in the cooperative without limitation or any cost. An IOF chooses a profit maximizing, differentiated price policy and can reject farmers to deliver to it.

Each farmer chooses where to deliver and how much to produce. Let q_j^{eg} be the delivery and output choice of farmer j ($= 1, 2, 3$) to enterprise e ($= 1, 2$) with governance structure g ($= I, C$), where I (C) is an IOF (a cooperative). Assume that each farmer produces either nothing or one unit of the product, i.e. the quantity produced is normalized to 1. We have therefore that $q_j^{eg} = 1(0)$ when farmer j delivers (does not deliver) a unit of the product to enterprise e with governance structure g .

Consumer 1 (2, 3) buys either nothing or one unit of the product. It is assumed that there are only 3 types of consumers in the retail market, and that they are perfectly separated into three segments.

2.3. Payoffs

IOFs and cooperatives are characterized by different payment schemes. An IOF prices products on the basis of quality when purchasing inputs from farmers. It earns the difference between the input price and the sales price. A cooperative pools inputs of differentiated qualities and pays farmers a pooling price. It distributes all revenues to members. Both an IOF and a cooperative price their products discriminatorily when selling products in the final product market, depending on the quality of products.

Define R_j as the reservation price of a consumer for the product of farmer j . Consumers attach value to quality, i.e. $R_1 < R_2 < R_3$. The production costs of producing one unit of product j by farmer j are c_j

¹ Menard (2004) identifies pooling as a characterizing attribute of cooperatives.

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