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Agricultural Production Restrictions and Market Power: An Antitrust Analysis

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Abstract

During the recent decade the organizations of agricultural producers in the national dairy, potato, egg and mushroom industries implemented various pre-production and production restriction practices with the primary objective of agricultural output price stabilization. The buyers of the affected agricultural commodities have challenged the legal status of production restrictions in a number of recent and current antitrust lawsuits, arguing that the Capper-Volstead Act, a limited antitrust exemption, does not protect production restrictions. Using the theory of oligopoly, this research evaluates potential market effects of agricultural production restrictions by comparing the organizations of agricultural producers with classic illegal cartels, which harmful effects antitrust law aims to prevent. The available empirical evidence on the market and price effects of agricultural output control practices is discussed in light of the theoretical analysis.

Key words: Antitrust, Capper-Volstead Act, cartels, cooperatives, output control agreements, Sherman Act.

1. Introduction

During the recent decade the organizations of agricultural producers in the national dairy, potato, egg and mushroom industries implemented some form of pre-production and production output control (production restriction practices). The primary objective of using production restrictions was to ensure a fair level of returns received by agricultural producers and to achieve agricultural output price stability. The organizations of agricultural producers acted under the Capper-Volstead Act (1922), a limited antitrust exemption from the Sherman Antitrust Act (1890).

The direct and indirect buyers of the affected agricultural commodities have challenged the legal status of agricultural production restrictions in a number of recent and on-going antitrust lawsuits, arguing that Capper-Volstead Act does not protect this particular form of joint conduct of agricultural producers acting through their organizations. This situation creates a great deal of legal uncertainty affecting production, marketing and pricing decisions of individual agricultural producers and their organizations (cooperatives, federations, associations, etc.).

The goal of this research is to evaluate the economic objectives and design of agricultural production restrictions and to analyze their market and price effects. The analysis is conducted by comparing agricultural output control implemented by the organizations of agricultural producers with similar practices implemented by classic illegal cartels, which harmful effects antitrust law aims to prevent. The nature of output control practices and empirical evidence on their market and price effects are discussed using the experience of the national dairy and potato industries.

The paper is organized as follows. Section 2 describes the economic objectives and design of production restrictions implemented by the organizations of agricultural producers (“agricultural cooperatives” to be referred further in the paper) in the national dairy and potato industries during the period of 2003-2010. Section 2 also provides a brief legal background. Section 3, using the theory of oligopoly, compares the organizational structure of agricultural cooperatives and classic cartels, the nature of market environment in which they operate as well as potential market and price effects of their output control practices (i.e. the degree of market power). Section 4 discusses the available empirical evidence on the market and price effects of output control practices implemented in the dairy and potato industries.

2. Agricultural Production Restrictions: Economic Objectives and Design

The economic forces leading to the idea of implementing some form of production restrictions in the national dairy and potato industries included the following common to both industries forces as well as their interaction. First, a consistent over-supply of agricultural output caused frequent financial situations when agricultural output prices received by producers did not cover their production costs. This imposed enormous financial stress on farm enterprises and made planning of agricultural production and marketing more challenging. Second, the level and volatility of agricultural input prices continued to increase, often at a higher rate than the level and volatility of agricultural output prices. Third, due to international trade liberalization, domestic agricultural industries became much more affected by the competition from international agricultural commodity markets and by the volatility transpiring from these markets, which often adversely affected the analyzed industries.

Fourth, the dynamics of competition process and the distribution of market power in the food supply chain changed during the recent decades. Due to the process of increasing concentration and consolidation in food processing, distribution and supermarket retailing, agricultural producers sell their agricultural output to a smaller number of buyers. The latter have a potential to exercise a buyer market power by suppressing the prices paid for agricultural commodities and purchasing a smaller quantity of agricultural commodities, as compared to a perfectly competitive market.

In the case of the dairy industry, an additional economic force and the most significant one was a substantial decrease in the government milk price support level, which in the past provided a price floor on milk price received by dairy farmers. The Commodity Credit Corporation purchased unlimited amount of butter, cheese and dry milk from dairy processors at the announced prices, which ensured that dairy farmers would receive the milk price at least at the milk price support level. The Milk Price Support program practically became inactive at the very beginning of the 1990s, which immediately affected milk price behavior. In particular, milk price volatility began to increase.

Production restrictions in the national dairy and potato industries were elements of the supply management programs implemented by the organizations of agricultural producers in these industries. These supply management programs were private, industry-funded and administered programs. The participation of agricultural producers was on a voluntarily basis. There was no any

government involvement or assistance in the implementation of these programs. The overall economic objective of the supply management was to manage the supply of agricultural commodities to balance demand and supply in order to ensure a fair (a satisfactory) level of price received by agricultural producers and to achieve agricultural output price stability.

In the dairy industry, the National Milk Producer Federation (NMPF) and the Cooperatives Working Together (CWT) developed and implemented a herd retirement program¹. Nine rounds of this program were held during the period of 2003-2009. The purpose of this program was to remove from the production the entire milking herds of selected dairy farmers. Prior to the implementation of each round, dairy farmers who were willing to participate had to submit to CWT their bids on how much money they would accept to remove from the production (to slaughter) their entire milking herds. The CWT accepted the lowest bids. The program was funded from the assessments from the CWT members.

In the potato industry, the United Fresh Potato Growers of Idaho (UFPGI) and the United Potato Growers of America (UPGA) developed and implemented a potato acreage management program², which originally targeted fresh potato market, but later affected processing, seed and chip potato markets. The program was implemented during the period of 2005-2010. The purpose of this program was to control the number of (originally fresh) potato acres planted each year. The potato acreage reduction target during the first years of the program implementation was 15% relative to the 2004 year base. Each base acre was assessed at \$50. Potato growers (members of the cooperatives) who did not reduce their acreage by 15% were assessed a pro-rated percentage of \$50.

In light of antitrust law, the organizations of agricultural producers implementing agricultural production restrictions act as cartels. A cartel is a group of firms, otherwise competitors, who join together with the goal of controlling the output quantity and/or output price

¹ The CWT supply management program also included a dairy export assistance program and a milk production reduction incentives program. A discussion of the dairy industry supply management program and of its economic effects is presented in Brown (2009), McCay (2011) and Parkinson (2008).

² The UFPGI and UPGA supply management program also included a potato flow control program, which affected the shipments of fresh potatoes throughout the marketing year, and secondary marketing strategies, which diverted the excess of already produced potatoes from the market. A discussion of the potato industry supply management program and of its economic effects is presented in Bolotova et al (2008) and Bolotova (2009b).

in order to increase the joint profit of cartel participants³. The joint activities of competitors aiming to restrict output quantity and/or to control market price are illegal *per se* under the U.S. antitrust law. Section 1 of the Sherman Act (1890) prohibits contracts, combinations and conspiracies in restraint of trade. Price-fixing and output control agreements are treated as the most damaging practices, because their typical market effects are a decrease in output quantity, an increase in price paid by consumers and a deadweight loss. There are no any market and economic (from the societal perspective) benefits resulting from a pure output control and/or price-fixing agreement (i.e. a classic illegal cartel). This is the reason why this type of agreements are considered to be illegal *per se* rather than to be analyzed by courts using *the rule of reason*⁴.

The joint activities of agricultural producers acting through their organizations, which might affect agricultural output quantity and prices, would potentially be subject to Section 1 of the Sherman Act, because agricultural producers are competitors. The Capper-Volstead Act (1922) provides a *limited* antitrust immunity to the joint activities of agricultural producers implemented through their organizations. Section 1 defines in general terms the scope of activities protected by the Act. In particular, “*persons engaged in the production of agricultural products...may act together in associations... in collectively processing, preparing for market, handling and marketing ...such products*”.

The direct and indirect buyers in the recent and on-going antitrust lawsuits argue that the Capper-Volstead Act does not protect production restrictions⁵. One of the arguments is that Section 1 of this Act does not mention this particular form of collective activities. A further argument is that “collective marketing” mentioned in Section 1 does not cover agricultural production control, but immunes only “post-production” joint activities of agricultural producers⁶.

³ Cartels can be either private or public. In the latter case, a government participates in organizing and monitoring cartel activities or the government can be a part of the cartel agreement. For a comprehensive survey of cartels operating in different periods of history, the nature of their practices and the market effects of these practices see Connor (2007). An analysis of food industry cartels is presented in Bolotova et al (2007).

⁴ *The rule of reason* is used by courts to analyze cases where there are potential economic benefits resulting from the increase in market power. For example, these cases involve mergers and acquisitions that often claim cost efficiencies that can be passed on consumers in terms of lower prices.

⁵ For example, see Manning and Welle (2012).

⁶ For example, a practice of withholding already produced agricultural output from the market is likely to be protected by the Capper-Volstead Act. Also, there is a well-developed case law establishing that price-fixing by the organizations of agricultural producers is immune, as this is an element of “marketing”.

3. Market and Price Effects of Output Control: Agricultural Cooperatives and Classic Cartels

The theory of oligopoly (Stigler 1964) has traditionally been used to analyze the organizational structure of cartel agreements, the nature of market environment of their operation, the design of cartel practices (conduct) and market effects of this conduct⁷. According to this theory, factors contributing to cartel effectiveness (the main of which is the ability to impose a price increase) can be classified in two groups.

The first group includes the structural characteristics of the industry that might facilitate effective collusion: a high level of market concentration, a small number of sellers, the homogeneity of product and purchasing commitments, inelastic demand and high barriers to entry. Based on the theoretical predictions, classic cartels are typically organized in oligopolistic markets with a relatively small number of competitors. Theoretically, oligopolists joining cartel can manage to act as a single monopolist to achieve a monopolistic output price level⁸. However, a mere presence of industry structural characteristics facilitating collusive conduct is not sufficient for cartel success.

Consequently, the second group of factors contributing to cartel effectiveness includes factors relating to developing an effective cartel agreement and its enforcement mechanism (policy), including monitoring of the compliance of individual cartel members with the agreement. This represents a real challenge for cartel participants and involves substantial costs. First, an individual cartel member has incentives to deviate from the cartel agreement by maximizing his individual profit, rather than to behave in a way that maximizes the joint profit of cartel participants (it is often referred to as an opportunistic behavior or a cheating problem). Second, cartels have to deal with non-members, who create a free-riding problem and can destroy cartel efforts by pricing lower than the cartel price. Finally, given the fact that price-fixing and output allocation cartel practices are illegal, potential cartel sanctions have to be factored into the overall cartel costs.

⁷ Some of the recent discussions of this theory relevant to antitrust analysis are presented in Carlton and Perloff (2004) and Hovenkamp (1994).

⁸ In theory, the profit-maximizing quantity and price are the same for a multi-plant monopolist and for a cartel acting in the same industry (see Besanko and Braeutigam 2002). However in real world, the costs of organizing and enforcing cartel would decrease the cartel price relative to the monopoly price.

Cartel overcharge (a price increase due to collusion) is the main determinant of cartel effectiveness (success)⁹. Overcharge = $(P_{\text{cartel}} - P_{\text{benchmark}})/P_{\text{cartel}}$, where P_{cartel} is the average output price during cartel period, and $P_{\text{benchmark}}$ (or “but-for” price) is the average output price during a more competitive period (pre-cartel period, post-cartel period, a price war during cartel period, etc.). The overcharge measure is somewhat similar to the Lerner Index of market power, which reflects the firms’ (industry) ability to increase output price relative to marginal cost. Lerner Index = $(P - MC)/P$, where P is output price and MC is marginal cost. Under certain assumptions, cartel overcharge may be equal to Lerner Index¹⁰. If “a more competitive” period (a benchmark period) is perfect competition ($P=MC$) or a market environment where output price is approximately equal to marginal cost, then cartel overcharge is equal to the Lerner Index of market power.

The Lerner Index can be generally related to: (1) the number of market (cartel) participants (-), (2) the market share of a group of firms with market power (cartel) (+), (3) the size inequality among market (cartel) participants (-), (4) the industry demand elasticity (-), and (5) the industry competitive fringe supply elasticity (-), if the competitive fringe firms are present in the industry. The plus and minus signs in the parentheses indicate either a positive or a negative relationship of the factor to the Lerner Index magnitude¹¹.

The main differences between agricultural cooperatives implementing production control and classic cartels are the type of market structure, including the number of participants and barriers to entry, and legal status. As compared to classic cartels, which are organized in industries with oligopolistic market structures where there is a relatively small number of firms and high barriers to entry, the organizations of agricultural producers are organized in industries with perfectly competitive structures, where there are many firms (agricultural producers) and relatively low barriers to entry. The type of market structure, in particular, the number of participants, is a major determinant affecting the success of the output control strategy and the ability to increase market price. As the number of cartel participants increases, the degree of their seller market power (i.e. price increase) decreases.

⁹ Cartel duration is also considered to be a characteristic of cartel effectiveness (success).

¹⁰ Bolotova (2009a) discusses the difference between Lerner Index and cartel overcharge in greater details.

¹¹ The effect of each factor on the magnitude of the Lerner Index is identified using a number of classic profit-maximization models describing the firms’ conduct in market with the seller market power (Bolotova 2014).

The difference in the market and price effects of classic cartels implementing an output control practice and agricultural marketing cooperatives implementing production restrictions is illustrated in Figure 1. First, the figure shows the profit-maximizing price-quantity combinations corresponding to a perfectly competitive market scenario (Q_{pc} and P_{pc}) and a monopolistic market scenario (Q_m and P_m), two extremes within which the seller market power is typically analyzed. The assumptions of the economic model shown in Figure 1 are that the industry faces a linear inverse demand and a constant marginal cost. Under a perfectly competitive market scenario, the industry maximizes profit at $MR=MC$ and $MR=P$. Under a monopolistic market scenario, the industry maximizes profit at $MR=MC$, with the marginal revenue curve being twice as steep as the inverse demand curve. The industry output quantity is pre-determined, and output price is a function of output quantity.

Second, Figure 1 shows the price-quantity combinations for a classic cartel (oligopolists) aiming to implement an output cut and an agricultural cooperative aiming to implement production restrictions as well as price effects of these output reduction practices. Classic cartels are typically organized in markets with oligopolistic structures, and the oligopolists are price-makers. Q_o and P_o are the profit-maximizing quantity and price for the oligopolists aiming to restrict output according to their cartel agreement. Assuming they are effective in implementing the output reduction, the cartel price (P_{cartel}) would be approaching the monopoly price (P_m) (cartelization costs are ignored in this analysis).

Agricultural marketing cooperatives implementing production restrictions are organized in markets with perfectly competitive structures, and agricultural producers are price-takers (if they make their production decisions individually). Furthermore, an analysis of the potato and dairy industry economic environment prior to using production restrictions indicates that due to the over-supply, prices received by agricultural producers were often below production costs. So, Q_{ag} and P_{ag} are the quantity and price that reflect the agricultural over-supply market scenario. P_{ag} is below MC , and Q_{ag} is greater than Q_{pc} in this market scenario. If agricultural producers implement production restrictions effectively, the resulting price (P_{coop}) would be approaching a perfectly competitive price (P_{pc}) and theoretically may also be higher than this price.

This simple graphical analysis indicates the following. First, the economic objective and market benefits of output control implemented by classic cartels and agricultural cooperatives are different. In the case of a classic cartel, the adverse market effects are a lower output quantity,

which further increases a dead-weight loss due to the seller market power, and additional price increase imposed on consumers. In contrast, agricultural output control allows agricultural producers to eliminate unnecessary commodity losses due to agricultural over-supply and also to decrease (and ideally eliminate) the costs of producing the volume that cannot be absorbed by the market at the acceptable price level. Consequently, this helps agricultural producers attain a fair level of price, which is the level of price that covers their production costs. The overall societal benefit is maintaining a viable agricultural production.

Second, the magnitude of output price increase due to the output reduction is different for classic cartels and agricultural cooperatives. The price increase in \$ per unit and as a % of market price is higher for classic cartels than for agricultural cooperatives due to the magnitude of demand elasticity. The price increase of the classic cartel is typically in the range of the demand curve characterized by a lower magnitude of demand elasticity (inelastic demand). The price increase of the agricultural cooperative is in the range of the demand curve characterized by a higher magnitude of the demand elasticity (elastic demand). This result implies that theoretically it is easier for a classic cartel to achieve and maintain a profitable price increase due to an output reduction than for an agricultural cooperative.

While the nature of market environment is one of the requirements for a successful implementation of output control, the cartel organization and enforcement costs are major considerations that cartel participants have to face. A large membership of agricultural cooperatives makes it more difficult to develop and especially to effectively enforce the output control strategy. Another enforcement problem is a presence of non-members representing a free-rider problem. Some of them may choose to comply with the programs of the cooperative without acquiring a formal membership. However, some of them have incentives to undermine the efforts of the cooperative by either producing more or selling at a lower price. In summary, a large membership of the organizations of agricultural producers and a presence of non-members have a potentially negative effect on the originally planned output reduction and expected price increase.

Finally, the nature and feasibility of output control implemented by agricultural cooperatives is quite different from the one of classic cartels due to the complex nature of agricultural production. In particular, uncertainty associated with agricultural production process and constantly increasing yields (due to the improvements in animal and plant genetics and

technologies) are likely to mitigate the effective impact of agricultural output control on market price.

4. Empirical Evidence on the Market and Price Effects of Agricultural Production Restrictions

Dairy Industry

A number of studies analyzing the price effects of the dairy industry herd retirement program (Brown 2009, McCay 2011 and Parkinson 2008) report milk price increases hypothetically caused by the implementation of this program. The estimated milk price increases vary depending on the assumption on milk demand elasticity. For example, Brown (2009) reports the milk price increase range of \$0.22/cwt to \$1.54/cwt, with the average of \$0.67/cwt. McCay (2011) reports milk price increases in the range of \$0.03/cwt to \$0.62/cwt. Parkinson (2008) reports the average nation-wide milk price increase of \$0.36/cwt. Overall, as a percentage of market price, the estimated milk price increases are rather small in magnitude. For example, Parkinson (2008) reports the range of 2.03% to 3.71%, with the average of 2.63%. The latter study uses \$13.67/cwt as a reference price to compute the percentage price increases.

It is rather challenging to evaluate the economic magnitude of these price increases. First, milk prices at the farm level are set within the system of Federal and State Milk Marketing Orders. These prices are formula-based and are announced on a monthly basis. Second, milk price volatility has been very high during recent decades. For example, during the period of 1995-2010, the all milk price was in the range of \$12.11/cwt (2002) to \$19.13/cwt (2007) (McCay 2011: Table 2). During the period of the implementation of the herd retirement program (2003-2009), the total milk production costs ranged from \$18.46/cwt in 2005 to \$24.04/cwt in 2008 (USDA ERS Milk Cost-of-Production Estimates: 2000-2013). Despite the reported milk price increases, milk prices received by dairy farmers were practically below the total milk production costs. The reviewed studies emphasize that the observed positive price effects of the herd retirement program tend to be short-term rather than long-term.

Potato Industry

According to the available empirical results reported in the literature, there is evidence suggesting that the potato supply management program was effective during the first few years of its implementation. Bolotova (2009b) reports an increase in the Lerner Index of market power of the Idaho potato industry from 0.4% in 2004 to 11.3% in 2005 (the first year of the program

implementation). This analysis is based on potato price and quantity data for the overall potato industry, including fresh, processing and seed potato markets.

As mentioned earlier, originally the potato acreage management program targeted fresh potato market. It is the least profitable industry segment, which is also characterized by the highest level of the potato price volatility. Bolotova et al (2008) analyze the fresh potato price behavior during the first years of the program implementation (i.e. the coop period: 2005-2008), as compared to a few previous years (i.e. the pre-coop period). The study reports an increase in the fresh potato price (aggregated over all potato varieties) received by growers in Idaho from \$3.89/cwt in the pre-coop period to \$6.63/cwt in the coop period (a 70% increase).

The pre-coop price of \$3.89 was below the minimum level of potato production costs reported for the same period, \$4.63/cwt. The coop price of \$6.63/cwt was above the maximum level of potato production costs during the same period, \$5.96/cwt. These results may be interpreted using the Lerner Index of market power for the Idaho fresh potato market. During the pre-coop period the Lerner Index was -27%, and during the coop period the Lerner Index increased to 16%¹². This result may suggest that the effective implementation of the potato supply management program (including potato acreage management program) was likely to be the key factor explaining the observed outcome. Although the evidence is that the market power of the Idaho potato industry increased, this increase supports the hypothesized economic benefits of agricultural production restrictions discussed in the previous section. The Idaho fresh potato growers were able to effectively deal with the fresh potato over-supply problem during the first few years of the program implementation.

Guenthner (2012) presents an analysis of the price effects of the potato supply management program by focusing on the overall period of program implementation (2004-2010). The study reports that fresh potato growers received higher prices during the first years of the program implementation. In particular, in 2008 when the planting was reduced by 13%, Idaho fresh potato prices increased to \$19.00/cwt for varieties harvested early in the season. However, later in the same marketing season prices dropped to \$6.00/cwt, while the potato production and storage costs averaged \$7.61/cwt. The situation continued to change in 2009, when Idaho growers increased

¹² To calculate Lerner Index, the midpoint of the potato production cost reported in Bolotova et al (2008) was used as a proxy for marginal cost. The pre-coop period potato production costs ranged from \$4.63/cwt to \$5.23/cwt. The coop period potato production costs ranged from \$5.17/cwt to \$5.96/cwt.

potato planting area by 5%. At the same time, potato yield also increased by 13%. As a result, fresh potato price received by growers decreased from \$8.00/cwt early in the marketing season to \$4.90 during the main harvesting season of 2009 and to \$2.90 in March 2010.

5. Conclusion

The empirical evidence on the market and price effects of agricultural production restrictions in the national dairy and potato industries tends to be consistent with the theoretical predictions discussed earlier in the paper. The economic objective of agricultural production restrictions is different from the objective of output control agreements of classic cartels, which simply decrease output quantity, increase price and increase already existing dead-weight loss. The goal of using agricultural production restrictions is to balance supply and demand to achieve a fair level of price received by agricultural producers. An adverse price effect of a typical over-supply market scenario is the output price below the level of production cost. Agricultural production restrictions theoretically can correct this adverse market situation, thus eliminating unnecessary production costs and the amount of output that the market cannot absorb.

The reviewed empirical evidence on the market and price effects of agricultural production restrictions used in the national dairy and potato industries during the recent decade may suggest that the efforts of the organizations of agricultural producers in these industries were somewhat effective in correcting the over-supply market situation and achieving a fair price level. However, the positive price effects of agricultural production restrictions tend to be short-term rather than long-term. The uncertainty and complex nature of agricultural production, constantly increasing yield over time and a large membership of agricultural cooperatives are the main factors that diminish the feasibility of the effective agricultural output reduction (control). This consequently makes it challenging, if not impossible, to achieve sustainable (in terms of magnitude and duration) price increases. In summary, the market and price effects of agricultural production restrictions are much weaker than the market and price effects of output control practices of classic cartels, which harmful effects antitrust law aims to prevent.

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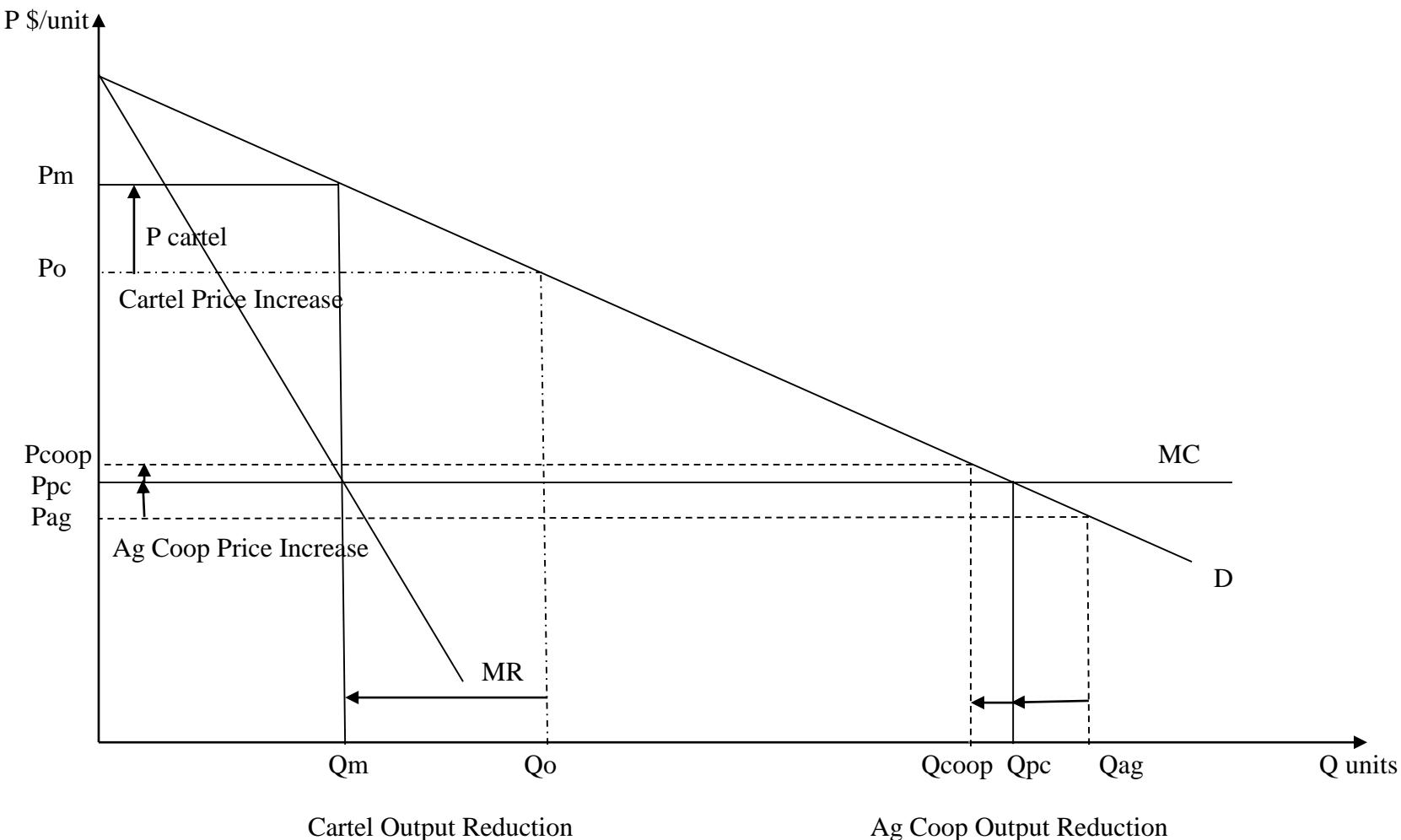


Figure 1. The Price Effects of Output Reduction: Classic Cartels and Agricultural Cooperatives.