Empirical analysis of the Greek milk market: Revealing a cartel? Quo vadis?

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Abstract

The illegal synergy of independent firms with similar activity aiming to create monopolistic coalitions was unusual for the Greek economic reality few years ago. Yet, the globalisation of markets and the intense competition encouraged the appointment of dominant firms that establish cooperation (cartel) to mainly achieve higher profits for their members. Despite the Greek Competition Committee's imposition of big fines to firms that are (presumably) involved in a cartel, such firms do not accept the existence of collusion; instead, they attribute the final high milk price to the high production costs and the free market. The existence of a cartel in the Greek milk market would affect the local market in both financial and social ways.

This empirical study explores the likely existence of a cartel responsible for milk prices in Greece. Different approaches are used in an attempt to find supporting evidence. First, an econometric analysis is undertaken to examine the impact of milk production costs on fluid milk prices. The resulting correlation between production price and consumer milk price is not very high and a likely collusive conduct involving consumer milk prices cannot be rejected. Second, based on the estimation of Lerner indices during the 1990-2008 period the evolution of market power in the Greek dairy products sector is analysed. The results reveal that the Greek milk market operates under oligopoly conditions, which indirectly strengthens the argument for a cartel.

Keywords: Milk, cartel, Greek market, econometric approach

JEL Classification: C19, D43, L13

1. INTRODUCTION

It is a common view that companies strive to increase their profits; to do so, they may strengthen, acquire and/or facilitate the use of monopolistic power thereby decreasing competition and thus, social prosperity. These company actions may take the following forms:

1. Fusions or Repurchases
2. Various forms of abusive exploitation of dominating position that they have in the market.
3. Agreements or harmonised practices between each other.

Cartels are considered to be specific productive structures that allow producers to exert a monopoly power in an industry. Increasing trade liberalization and increasing competition in formerly protected national markets may have given firms an additional incentive to participate in cartels. More specifically, cartels are included in the generic form of "collective agreements between business agents" under an explicit or implicit way. In the first case, cartels have an explicit agreement (but usually not written) in order to affect or cause distortion on the market. In the second, there is not an agreement but the competitors follow common rules and have a common behavior, which finally produces the same effect. Both kinds of conducts are illegal under the Greek competition law. Mehta (2005) points out that cartels often do not take the form of simple price fixing, but may for instance involve information exchange or allocation of customers, projects or geographical areas to individual firms, which might be possible to detect. There are certain industries (socio – economic enterprises) that are *de facto* exempt from antitrust laws, such that cartel behavior is prevalent and openly observable.

However, cartels in general tend to undermine international integration and decrease the benefits of liberalization particularly when citizens believe that private barriers to trade will simply replace government-created ones. In light of the above, this empirical study aims to investigate the existence of likely anticompetitive conduct among key players in the important Greek fresh milk market[1]. It does so by empirically examining the role of specific key contextual factors (i.e. market power, production, production cost) and evaluating them under the light of the methodological approaches adopted in this paper. Note that a likely cartel (and price fixing) in the former industry is difficult to be established due to its illegal nature and a lack of available data. This is unlike other key studies in the field (e.g. see Conor and Bolotova, 2006; Bolotova, 2009) where access to data was facilitated by the fact that some of the cartels scrutinized had already ceased to operate while others have been known to operate legally. Still, indices of market power such as the Lerner index used here to examine the structure of the milk market as well as the econometric analysis undertaken offer indirect support and shed more light into the issue at hand.

Bear in mind in this context that it is not the main purpose of the study to develop a comprehensive or complete econometric model given the problems faced in accessing available data; rather the purpose is to empirically examine the role of certain key factors as determinants of milk prices set. Therefore, this study constitutes a first step that could be used as a stepping-stone for further research into examining likely cartels and/or cartel behavior in particular Greek markets. The contribution is twofold. From a theoretical point of view, the study provides rare evidence relating to a much debated but little researched issue in a Greek context. More, it does so by employing an econometric approach, a method that according to Bolotova (2009) has been used little in a field where likely overcharges due to cartel existence are involved. In addition, the findings are useful from a management point of view as they suggest caution to new entrant firms aspiring to enter into the former market characterized by oligopolistic conditions.

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[1] Industries of milk-based products are excluded

The paper is organized as follows. Section 2 describes the basics of cartel characteristics and provides a literature review of international cartels. Section 3, includes a brief description and a retrospection of the facts in Greek milk market. Section 4 presents the empirical results using econometric models on the determinants of milk prices, Lerner indices and concentration. Finally, section 5 concludes with findings, study limitations and directions for further research.

2. The Basics of Cartel Performance

Markets that are characterized by "homogeneity of products and purchasing commitments, high market concentration, small number of sellers, inelastic demand and high barriers to entry facilitate collusive conduct and potentially contribute to its success (Bolotova, 2009, p.2). Consumers generally view cartels negatively since the obvious incentive for such collusive group conduct is higher profits associated with monopolistic practices[2]. In Greece, antitrust laws make cartelization of industries illegal *per se,* such that openly observing cartel behavior is difficult. Empirical research on cartel formation is therefore limited to evidence gathered from cartels operating in a legal (or tolerant) environment or from evidence collected in anti-trust prosecutions or from unsuccessful cartels[3]. Mehta (2005) and Okada (2005) underline the importance of leniency programs in fighting collusion, and in their context, they refer to the limited resources of antitrust authorities. Thus leniency programs cannot only help in detecting conspiracies but play a significant role in gaining hard evidence after an investigation was started.

The cartel is sometimes considered as worse than a monopoly. It is often assumed that a monopoly exists for purely technical reasons, for instance because techniques are such that large economies of scale make it impossible for several firms to coexist in the most profitable way (natural monopoly). While this study's aim is not to address the general debate about competition and monopoly, in the latter case no normative judgment is issued against monopoly; it is only argued that the state has to prevent the assumed "exploitation" of consumers by regulating or nationalizing monopolies. The value judgment concerning cartels is more critical since it is assumed that there is no technical reason for any monopolist position; a cartel is created *ex nihilo* by an explicit agreement between producers in order to exploit purchasers. In fact, the longer a cartel operates the more likely it is to be successful in achieving price overcharges (Bolotova, 2009). More, the longer a cartel operates the more likely it is to establish industry practices or barriers that facilitate collusion in the future. Barriers to entry created by the cartel, either through tariffs, patent pools, or distribution agreements will not necessarily disappear with the cartel's demise and may well limit future entry and stifle innovation.

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[2]   According to few papers [Pascal Salin: "Cartels as Efficient Productive Structures", *The Review of Austrian Economics*, vol. 9, no. 2, (1996): 29-42] the cartels are not necessarily considered negatively as formal arrangements to restrict production but after having discussed this approach they explain why cartels rather play a positive role in meeting some specific demands of the market. As a consequence they modify the frontier between the firm and the market.

[3]   The actual success or failure of a cartel in any industry depends on a host of factors, such as the legal environment, economic conditions, the terms of the cartel agreement, managerial skill and industry history.

2b. INTERNATIONAL CARTEL

A variety of organizations could be plausibly described as international cartels such as the so-called "hard-core" cartels (made up of private producers from at least two countries which cooperate to control prices or allocate shares in world markets), private export cartel (where independent producers from one country take steps to fix prices but not in their domestic market) and exports cartels. Table 1 presents information regarding known cartel markets in the European Union during the 1990s[4]. The original results in the study provide information on all international cartels[5].

Table 1
Countries with firms convicted of price fixing by the European Commission during the 1990s

Austria	Carton board, citric acid, newsprint, steel heating pipes
Belgium	Ship construction, stainless steel, steel beams
Britain	*Aircraft*, steel beams
Denmark	Shipping, steel heating pipes, sugar
Finland	Carton board, newsprint, steel heating pipes
France	*Aircraft*, cable-stayed bridges, Carton board, citric acid, ferry operators, *methionine*, newsprint, *plasterboard*, steel heating pipes, seamless steel tubes, vitamins
Germany	*Aircraft*, graphite electrodes, Carton board, citric acid, aluminium phosphide, lysine, *methionine*, newsprint, pigments, *plasterboard*, steel heating pipes, steel tubes, vitamins
Greece	Ferry operators[6]
Ireland	Shipping, sugar
Italy	Carton board, Ferry operators, newsprint, stainless steel, steel heating pipes, seamless steel tubes
Luxembourg	steel beams
Netherlands	Carton board, citric acid, ferry operators, ship construction, *sodium gluconate, tampaco fibre*
Norway	Carton board, explosives, ferrosilicon
Spain	*Aircraft*, Carton board, stainless steel, steel beams
Sweden	Carton board, ferry operators, newsprint, stainless steel
Switzerland	Citric acid, laminated plastic tubes, steel heating pipes, vitamins

Source: Levenstein and Suslow (2001, Table1). Note: Products in italics are under investigation.

The typical international cartel of the 1990s included firms from two or three countries. Some cartels included firms from four or five

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[4]   As expected, given that these are Department of Justice (DOJ) and European Commission (EC) cases, most are European and US firms. It is not unusual, however, to find Japanese or South Korean participation.

[5]   These cartels have annual sales of well over $30 billion, their members included some of the largest corporations in the world and operated in a variety of industries. There are forty cartels in the original sample, with participants from over thirty countries.

[6]   From the beginning 2007 the Greek Committee of Competition has issued three decisions on violation of rules of competition and she imposed fines of total height 22,6 million euros while she is to judge the affair of cartels of Banks, companies of cars and companies of fuels.

countries, and in the case of shipping cartels, as many as thirty countries[7].

The time horizon involved has been linked to a cartel's success; in fact, the longer a cartel operates the more likely it is to be successful in achieving price overcharges (Bolotova, 2009). Figure 1 shows the time duration pattern for the 1990s sample of international cartels. The average duration of cartels in the 1990s sample of DOJ and EC prosecutions is six years. Average duration is generally in years, not decades; there are cartels that do survive decades, others that can't get started, and many in between.

Figure 1
International Cartel Duration in the 1990s
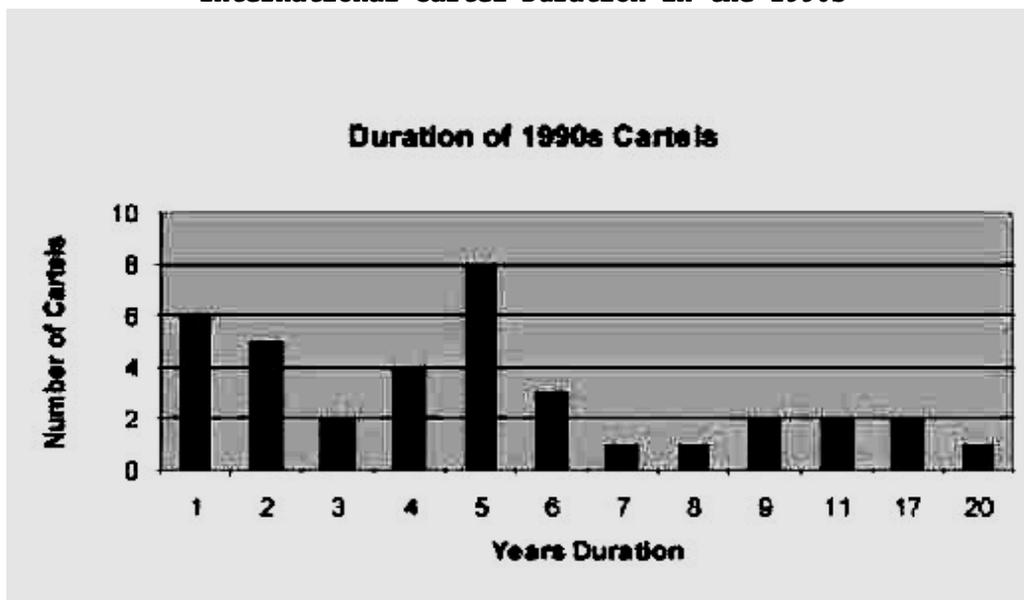
Source: Levenstein and Suslow (2001, Table1).

In its 1997 Annual Report, the World Trade Organization (WTO) highlighted the growing significance of international cartels for policymakers, noting that "there are some indications that a growing proportion of cartel agreements are international in scope"[8]. There can be little doubt that the operation of EU competition policy has been modernized, through the reforms introduced by Regulation 1/2003, to ensure both greater clarity and consistency and to provide more efficient decision-making. This revolutionary reform has been well received and accepted as an essential step to achieving the objective of undistorted competition.

Recent investigations and prosecutions of international cartels make clear two important points. First, cartels are neither relics of the past nor do they always fall quickly under the weight of their own incentive problems. Even where cheating eventually undermines collusion, consumers may have been burdened by years of increased prices, and barriers to entry may have been created by strategic cartel behavior. Second, aggressive prosecution of cartels can deter collusion, but only where sufficient international cooperation exists to gather evidence and establish jurisdiction so that cartel participants actually have something to fear.

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[7]   Between European Commission and US
[8]   World Trade Organization (1997)

3. THE BASIC CHARACTERISTICS OF GREEK MILK MARKET

The examined branch of dairy products is one of the biggest production areas in the native market. Alimentary habits of Greek consumer, classify the dairy products in the more basic types of nutrition. Important stage in the course of branch was the application of quotas system in 1984, which determines the total production of cow's milk in all countries of EU. In order to be discouraged the additional production, is applied additional contribution in deliveries that exceed quantities of report. Greece was included in this system, despite the fact that her domestic production was not sufficient for the cover of its consumption.

The domestic market in the fresh pasteurised milk is characterized by high concentration, while small number of enterprises covers the bigger part of consumption. According to estimates of market, the "Delta Industry of Milk S.A." covered share about 42% on the total consumption of fresh milk (white and chocolate milk) in 2005, and "Fage Industry of Milk S.A." extracted share of order 17%, "Mebgal S.A." occupied the 15%, while important presence had also "Agno Industry of Milk S.A.", "Dodoni S.A." "Olympos S.A." and "Neogal S.A.".

The dairy products constitute basic foodstuff and their demand present relatively low elasticity as for the price and the available income. The turn of consumers in healthier ways of diet, the rise of level life and available income strengthened the total consumption of dairy products and more specifically of products with high added value. In the past few years, companies of dairy products provide, as a means of promotion of their products[9], discounts or credits to the supermarkets; the latter exploit the high sales achieved, press for bigger time intervals of credit and higher rates of discounts.

Figure 2
Consumer's and Producer's prices
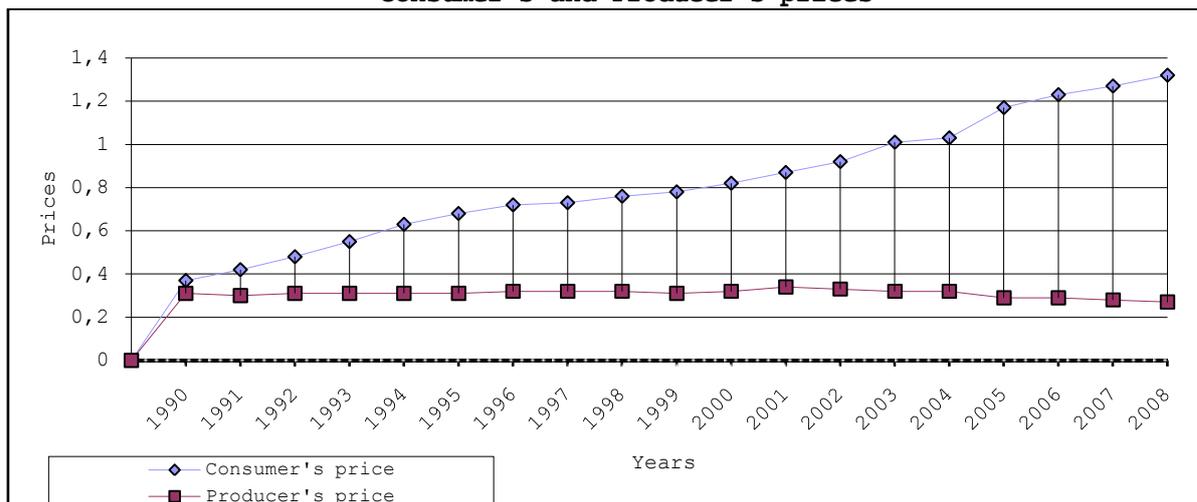
The discounts that finally provide the big enterprises of the examined branch differ depending on the way of payment and more generally the type of agreement between two parts and they fluctuate between 20%-25% on the wholesale price for the big chains of supermarkets while in the small points of sale they are shaped in lower levels. The given credits fluctuate on average mainly from the big dairy-farms, between 3-4 months. Figure 2 shows the producer's and consumer's prices shaped in the last 18 years.

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[9]   Their products are placed in better points in the shelves/refrigerators of supermarkets.

**3b. RETROSPECTION TO THE FACTS OF THE GREEK MILK MARKET**

From the late 1980s to 2006 major firms in the industry of milk started to organize specific actions to stabilize the prices of the milk at above market levels. The attempts of the industries to secure above-market-level prices met with limited success because of divisions within each cartel over strategy (the cartel in Greek market of milk has been revealed when part of the firms did not follow to a move of the competitor, so they could lose significant market share and profits), the large number of producers, external competition, the impact of restrictive trade practices and antimonopoly legislation which tried to weak further the cartels[10].

There are factors which justify a part of high price but they are not completely responsible for it, such:

1. The size of the farm and the exploitation of economies of scale (25 cows/farm in Greece).
2. Community quota (82kg/person in Greece, 348kg/person in Germany, 447 kg/person in France) which increase technically the price of milk.
3. The margin of retail profit that is debited in the consumer.
4. Producer price does not altered considerably among the countries of European Union (30.14€/100lt in Greece, 30.20€ /100lt in France, 31.82€ /100lt in Germany)
5. The morphology of ground and the climatic conditions intensify the lack of sufficient connection between the farms and the pasture lands. The possibility of free pasturage and diet of animals is limited and depends from the buy-transported precise forages.
7. The cost of collection depends from the number of units and the geographic dissemination (Greece 6.73 €/100kg, Europe 2 €/100kg)
6. Cost of transport in combination the road network (Greece 2.59 €/100kg, Europe 1.2 €/100kg)

Figure 3
Sales of dairy products-2005

The Greek Competition Committee accused nine industries in 2006, for forming a cartel and more specific, for "horizontal collusion, so as to impose prices to the producers and share the market of fresh milk" as for the "vertical collusion with super markets for the determination of single retail price in pasteurized milk".
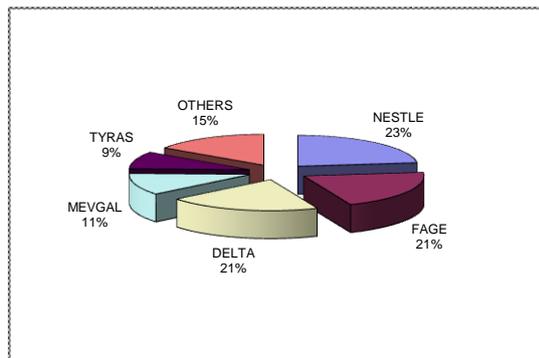
Fluid milk market orders are routinely criticized because they force consumers to pay higher fluid milk prices. Delta - Vivartia, Mevgal, Olympos, Fage, Nestlé of Greece were also attacked as a cartel that if eliminated would result in lower prices to consumers. The above figure (Figure 3) shows clearly the share market of the biggest industries in Greek milk market for the year 2005. As it is shown, the three biggest industries (NESTLE, FAGE, DELTA) share a little over 60% of the native milk market.

The competition in the sector of dairy products strengthened further by the activation of enterprises of providence which are differentiated

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[10]   According to decision of the Greek Justice

strategically appearing a profile of traditional operation and exploitation, the biological products and products P.O.P., P.G.E. and E.P.P.E. Worth in quality and superiority in only Greek products succeeded to give a few associations in dairy products market. So, many Associations[11] undertake, on the basis of coordinated enterprising plan, with proper organization, healthy function and creation of continuously new investments, the disposal of milk of Greek producers strengthening in this way their income. Statisticals reveal that the smaller enterprises are developed more rapidly as the total income increase at 8.8% for 2006 opposite 4.7% in the big enterprises. It is worth here to be mentioned that milk in Greek market is not important private label food category contrary to other markets in European Commission and US[12]. On 2006, PLs had share of fresh milk market in Attica only 6.2%, Macedonia-Thraki 3.8%, the central Greece 3.5%, Peloponisos 3.6% and Crete 5.8%.
Finally, on December 2007 the Committee of Competition decided rigorous punishment and fines, which exceed 48 million Euros (the biggest since her foundation) against seven big industries of dairy products[13]. What is pending henceforth is the publication of decision on the vertical cooperation in the market of milk and yogurt.

4. ECONOMETRIC MODEL AND DATA

In the first part, regression techniques are utilised to examine whether the market price of milk is affected from producer costs. Unfortunately, limitations in the availability of data prevented the development of a more detailed econometric model (see more in section 4). Yet, Producer costs are the primary source cost milk industries have to face. The data came from the Ministry of Growth and Commerce, the Ministry of Agriculture Growth, ICAP and from own elaboration; they refer to the years 1990-2008. OLS regression techniques are employed. The dependent variable is the annual consumer price of milk as provided by all the above.

The dependent variable in the model is the annual consumer price of milk (paper packing of kg). We assume that supermarkets appear to have in wide latitude the same pricing milk and when we refer to "milk" we mean the fresh milk, pasteurized milk and UHT (ultra high temperature) milk.
The independent variables are: the total production of milk (in thousands of tones), the producer price of milk (in Euros), and a yearly dummy taking the value of "1" for the years 2000-2008 and "0" otherwise. The reason for the introduction of the year dummy is, as shown in Figure 4, the fact that approximately at the beginning of the decade the evidence indicates the probable formation of a cartel among milk industries. Also, regarding the annual time series of the consumer milk price (see Figure 4), there seems to be a stable upward trend of the milk price from year 2000 onwards.

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[11]   Agrarian Associations (EAS) of this kind are of Kalavrita, Agrinio, Iraklio, Evol, Dodoni.
[12]   In fact, about one of every five items sold in US supermarkets, drug chains, and mass merchandisers are private labels (PL), reaching approximately $52 billion in sales, accounting for 16,3% of sales including food products (PLMA, 2003). This percentage is, however, much longer in some European countries such as France (21,7% of sales), Germany (25,7%) and Great Britain (37,4%). A few articles investigated the impacts of PLs on fluid milk prices and price differentials using thousands observations from many countries. Non-parametric results reveal that although PLs milk prices decrease as PL milk shares expand, eventually the effect is to increase the prices of manufacturers' brands. Econometric results further reveal that supermarkets exert some degree of price discrimination through controlling the brands of milk sold.
[13]   Discharged the firms of Sergal and Rodopi.

Figure 4
Consumer's Price
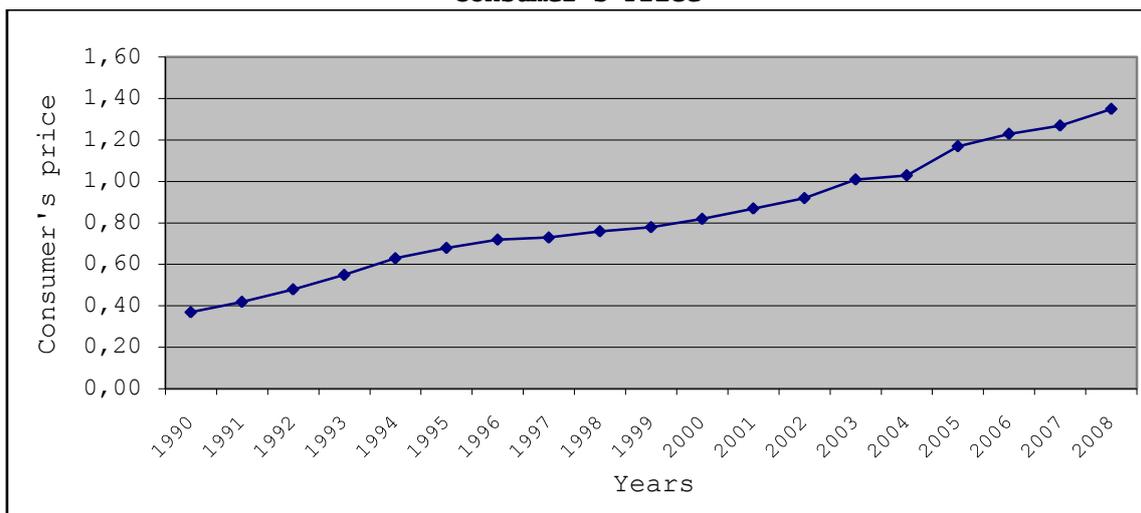
Table 2 provides the regression results and the tests statistics of the regression regarding the determinants of consumer milk price in Greece. Note that evidence of heteroskedasticity was found and the standard errors of the regression are corrected for heteroskedasticity with White standard errors. Although the regression model presents some satisfactory test statistics, it inadequately relates consumer milk prices to two of the key determinant factors that should affect milk price, namely the production and the producer cost. As the R2 statistic indicates, it is only 85% of the variance in consumer milk prices that is explained by the model. Therefore, one may conclude that other factors that are not controlled for in the regression also affect strongly the configuration of consumer milk prices (see section 4 too).

TABLE 2

Independent variables	*Regression on the determinants of milk consumer price, 1990-2008 Coefficient*
Production	0.00001 (0.03)
Producer price	-1.74 (-0.97)
Year dummy (2000+)	0.19 (2.65)
Constant	-2.87 (-2.71)
R^2	0.85
F-statistic	30.64 (0.00)
Observations	17

* In the parenthesis the *t*-statistics are provided. Errors are corrected for heteroskedasticity.

In addition to the above, an analysis of the market power is undertaken. The appropriate way to examine the market power in a specific sector would be to calculate indices of market power, such as the Lerner index that is the focus point of the following analysis.

4b. EMPIRICAL APPROXIMATION TO THE LERNER INDEX

The Lerner index is one of the most popular measures used in cases of cartel price overcharges (e.g. see Bolotova, 2009) as well as to capture the degree of the market power. The Lerner index is calculated as follows:

$$L = \frac{P - MC}{P}$$

where P: is the product price and MC: the marginal cost of the enterprise. The index allows for examining the extent to which the monopolists can exert market power as to fix a price above margin cost. Therefore, in the case of a market operating under perfect competition the Lerner index should be zero. This is because profit maximization requires that price should be equal to marginal cost. On the contrary, when the market is monopolistic the index should be 1. When the Lerner index has values close to 1, it is suggested the existence of an oligopolistic or collusive market.

Figure 5
Lerner Index, 1990-2008
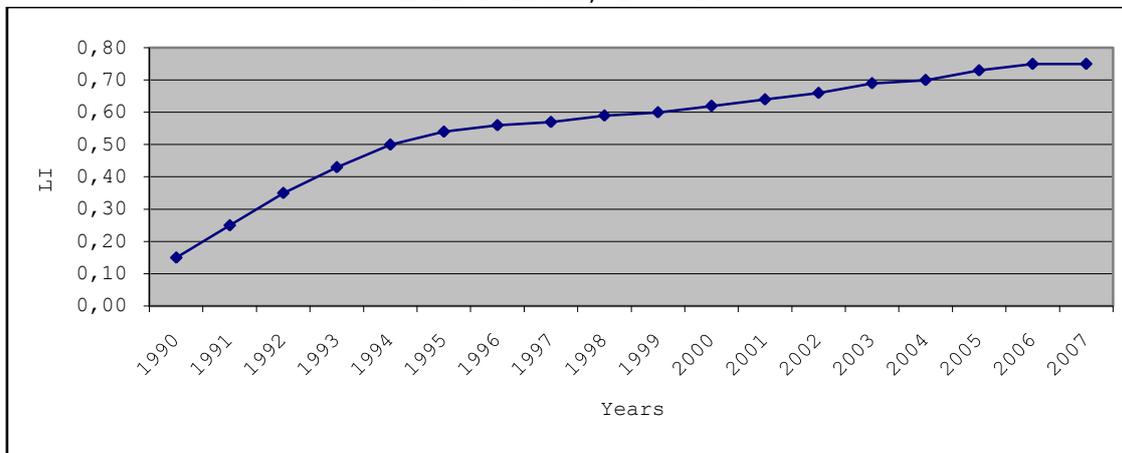
This is clearly evident in Figure 5 presenting the time series data for the Lerner index for the period between 1990-2008. It shows that the Lerner index gets closer to 1 each successive year.

To be more specific Table 3 includes the annual computations of the Lerner index in the Greek milk market. It is shown that the index exhibits a gradual upward tend during the time period examined. In fact, the index increases from 0.15 in 1990 to almost 0.80 in 2008. In other words, the degree of market power increases gradually especially in the decade of 2000. By implication, the values of the Lerner index especially in the '00s suggest that the market is characterized by oligopolistic or collusive conditions. This empirical result actually provides some indirect support for arguments favoring the existence of a cartel in the native milk market. The analysis conducted below points to the same direction thereby strengthening the former argument.

TABLE 3

Years	Lerner index

1990	0.15
1991	0.25
1992	0.35
1993	0.43
1994	0.50
1995	0.54
1996	0.56
1997	0.57
1998	0.59
1999	0.60
2000	0.62
2001	0.64
2002	0.66
2003	0.69
2004	0.70
2005	0.73
2006	0.75
2007	0.75
2008	0.76

Specifically, a more thorough examination of the market power of the Greek milk market was undertaken in addition to that discussed above. In fact, Concentration indices are constructed regarding the market share that the three larger milk companies enjoy during the time period studied.

FIGURE 6
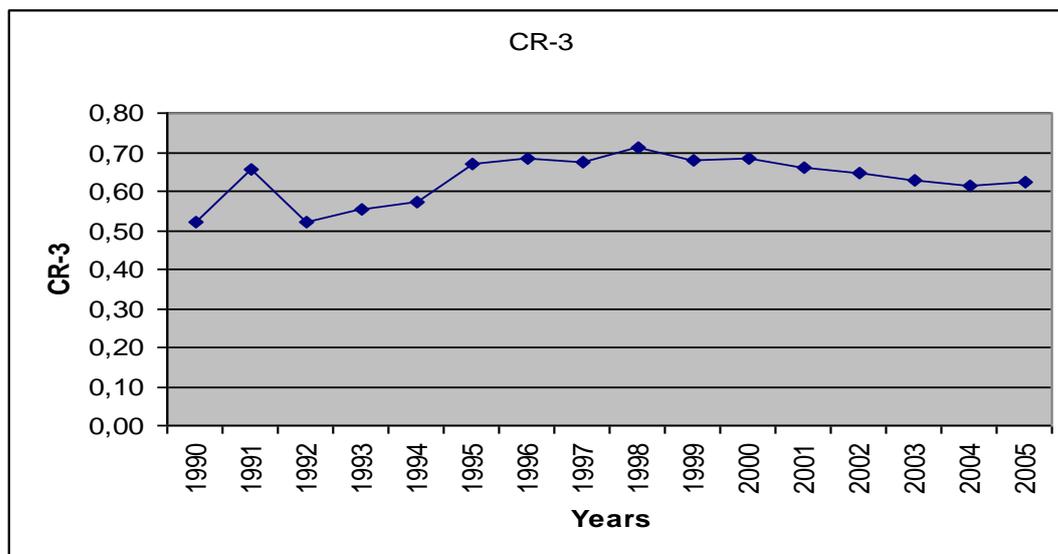
In Figure 6, the time series for the Concentration Ratio of the three companies holding the largest share of the market (based on total profits) are examined during the years 1990-2006. Even since 1992 there is an upward trend in market shares, a trend that was reversed from 1998-2003 and then market shares start to grow again. Unfortunately,

limitations in the available data compromised the study's initial intention to also include and assess the market shares of more recent years, which are not presented in Figure 6.

Table 4 includes the regression results on the effect of Concentration Ratios upon the Lerner Index. The time period studied is 1990-2006 and the standard errors account for heteroskedasticity, as in previous regressions. As expected the higher the market share enjoyed by the largest three companies the higher their market power is. This is consistent with views suggesting that collusive conduct (cartel) seems to be facilitated by the existence of a small number of powerful sellers, homogeneity of products and quite inelastic demand (Bolotova, 2009) as the Greek milk market is.

TABLE 4

Independent variables	Regression on the effect of Concentration Ratio (CR-3) on Market Power (Lerner Index) β Coefficient
CR-3	1.27 (2.80)
Year dummy (2000+)	0.19 (4.16)
Constant	-0.34 (-1.14)
R^2	0.65
F-statistic	11.75 (0.00)
Observations	16

- In the parenthesis the *t*-statistics are provided. Errors are corrected for heteroskedasticity.

The above finding is also in line with several previous studies (in other industries/market sectors) supporting a positive relationship between high concentration and limited market power. Therefore, it is safe to conclude that a high concentration seems to be one of the major determinants of low market power in the Greek milk market. A more thorough investigation of the remaining determinants of market power is not possible, due to limitations in the availability of relevant data.

4. CONCLUSION, CONTRIBUTION, LIMITATIONS AND FURTHER RESEARCH DIRECTIONS.

Cartels exist when "various companies producing similar products or services work together to control markets for the types of goods and services they produce. The cartel association may use formal agreements to set prices, establish levels of production and sales for the participating companies, allocate market territories and even redistribute profits" (Cateora and Graham, 1999, p. 578). The detection of a cartel in a specific market is not an easy undertaking due to the illegal nature of the venture and the actions of the participants to hide it. Having said that, note that this study shares the view that adequate evidence pointing to a cartel should be provided prior to sanctioning any likely collusive conduct among firms. While the research questions addressed here were hampered by the limited data availability, the study is able to provide evidence for the existence of an oligopolistic milk market in Greece. The fact that the analysis indicates oligopolistic

conditions in the Greek milk market (indirectly) increases the likelihood for cartel formation and seems supportive of the argument for cartel existence in the above market. Also, the fact that the key milk production price variable explains only part of the consumer milk price variance, suggests that a likely collusive conduct could not be rejected. In addition, the data analysis points out that market power is positively and strongly affected by the observed concentration characterizing the Greek milk market. This is consistent with the theory of oligopoly arguing that the power of a cartel to influence and manipulate market prices is affected by the degree of market concentration, the number of firms and firm size differences (Bolotova, 2009).

This empirical study is limited in terms of the milk price predictors used. In this respect, remember that it was not the main purpose of the study to develop a comprehensive or complete econometric model given the problems faced in accessing available data; rather the purpose was to empirically examine the role of certain key factors as determinants of milk prices set. Further research should focus on developing a more comprehensive econometric model to predict consumer price and/or price overcharges by furnishing data for such variables as cartel market share, buyer concentration, number of cartel members and leading firm market share (Connor and Bolotova, 2006). To adequately address the title question (quo vadis), it would also be important to employ a good model of price wars so as to better study the moves and the countermoves in the milk price war; a better understanding of the inner workings of cartels and price fixing agreements as well as consideration of the independency between the various players seem to be a promising area for further research, too.

Having acknowledged the above, this study's contribution is two-fold. From a theoretical point of view, the study provides rare evidence relating to a much debated but little researched topic in a Greek context. More, it does so by employing an econometric approach, a method that according to Bolotova (2009) has not been used extensively in the field where cartelisation and price overcharges may exist. In light of the above, this paper constitutes a first step that can be used as a stepping-stone for further research into likely cartels and/or cartel behavior established in the Greek context.

From a managerial point of view, this study is useful in terms of suggesting *caution* to new entrants aspiring to enter into the former market characterized by oligopolistic conditions. According to the findings it seems reasonable to assume the existence of a native milk market cartel. While this might not have been a concern if anti-trust laws provided a sufficient deterrent, the longer a cartel operates, the more likely it is to have established industry practices or barriers to facilitate future collusion and/or limit entry either through tariffs, patents, or distribution agreements. There can be cartel enforcement costs for monitoring performance and preventing members' opportunistic behavior and also costs associated with modifying collusive agreements in light of economic and legal changes (Bolotova, 2009).

The analysis of collusion among oligopolistic firms remains an interesting research topic of industrial economics provided that data is available. Further research should also focus on questions this study has not addressed such as those involving interaction between competition policy and cartel behaviour (e.g. leniency programs), too.

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