

WHEN IS IT JUSTIFIED TO REGULATE AN OLIGOPOLY? A REVIEW OF THE ECONOMIC LITERATURE

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Abstract

In this paper, a survey of the economic literature related to oligopolies and its regulation is carried out. The idea is to identify in what conditions could regulation of an oligopoly be justified and, if possible, what kind of regulation should be applied according to those conditions.

The survey is of relevance because the Body of European Regulators for Electronic Communications (BEREC) is concerned on how to regulate the new market structures appearing in European telecommunication markets. In these, a reduced number of operators have similar presence, as opposed to the historic dominance of the former legal monopolist. This makes more difficult to find Significant Market Power (SMP) operators in which to impose asymmetric obligations.

If ex-ante regulation on oligopolies is to be imposed, it should be justified on sound economic theory proving that regulation enhances social welfare. Otherwise, it should be avoided.

1. Introduction

The structure of European telecommunications markets is evolving due to significant developments, such as the trend to competition based on bundled services; mergers of fixed and mobile operators, or the deployment of NGN by alternative operators driven by its increased uptake. As a consequence, in some of the national markets, the former copper fixed line incumbent is losing market share in favour of other operators, in such a way that other two or even three operators are in similar positions.

This situation may have regulatory implications in the current European regulatory framework. As it is widely known, regulation for competition in the telecommunications market heavily relies on the concept of Significant Market Power (SMP) operator. By means of the market analysis procedure, National Regulatory Authorities (NRAs) identify SMP operators in a set of predefined relevant markets, and then impose asymmetric obligations on them. The goal of these obligations is to allow alternative operators to compete with the SMP one, by somehow compensating its power.

In the initial telecommunication market structure, in most cases originating from a legal state monopoly, it was relatively easy to identify the SMP operator: in most (if not all) cases it was the former monopolist. The situation has more or less stayed this way until recently, when the developments outlined above have started having significant effects. In these conditions, it may be difficult for NRAs to identify SMP operators in future market analysis, implying the end of asymmetric regulation.

In December 2014, BEREC launched a questionnaire regarding the issue² in which those concerns were clearly shown. Stakeholders were asked about threats coming from oligopolies, possible remedies and possible changes in the framework. BEREC seems to imply that ex-ante regulation of oligopolies is necessary and that what has to be addressed is how to do that with the current legal framework, rather than ex-post as happens in other industries³.

However, if regulation is to increase social welfare, it should be based on sound economic theory. For example, regulation of SMP operators is grounded on traditional economic theory and relies on the concept of monopoly. According to mainstream economics, a firm with market power is able to keep prices above the competitive level,

² BEREC (2014). Report on Oligopoly analysis and regulation: Questions to stakeholders. BoR (14) 172, December.

³ This statement was confirmed in the next document released by BEREC on the issue. See BEREC (2015). Report on Oligopoly analysis and regulation BoR (15)74, June.

thus attaining profitability systematically above that of the economy and creating a dead-weight loss for the welfare. As a consequence, SMP operators must be regulated to avoid this loss, because in this way social welfare increases.

No such clear explanation seems to exist for the case of oligopolistic structures. In this paper the economic literature about regulation of oligopolies will be surveyed, with the goal of providing an assessment on the state of the art, and see if such regulation may be justified and in what conditions. Surveys of economic literature are quite common, and it is a methodology generally accepted. This kind of survey is helpful to identify lines of future research and also for regulatory reference.

The rest of the paper is organized in the following way. In next section, the classic models of oligopoly are revisited, as a necessary starting point for the actual survey. Section 3 provides summaries for the most relevant papers about oligopoly regulation that have been found in the research. In section 4, the main insights extracted from the survey are exposed and critically assessed. Section 5 concludes, providing a policy recommendation about ex-ante regulation of the telecommunication market in the expected situation of oligopoly, in light of the insights obtained and the concrete features of the telecommunication market.

2. Economic theory about oligopolies

There is plenty of academic literature about the functioning of oligopolies. Good reviews of the literature can be found in Shapiro (1987), Tirole (1988), Vives (1989) or Canoy & Onderstal (2003).

However, most of the models seem to belong in the framework delineated by four basic models, those proposed by Cournot (1838), Bertrand (1883), Edgeworth (1925) and Chamberlin (1929). This is also true for models developed using sophisticated mathematic tools such as game theory (see Vives (1989)). In consequence, in the following lines the focus is on the four referred models.

The starting point for the economic analysis of oligopolies are the models of Cournot and Bertrand. As it is well known, both models share some assumptions: homogeneous goods, no cooperation among rivals, symmetric firms. In the Bertrand model, firms compete on prices, whereas in the Cournot model, firms compete on quantities.

Cournot (1838) assumes that firms produce homogenous goods and set their output subject profit maximization, taking their rivals' outputs as given. The market reaches stable price-quantity equilibrium, where no firm has an incentive to change the level of output at the given output of its rivals. Resulting prices are above marginal costs allowing firms to gain super-normal profits (i.e., profits above those obtained in the model of perfect competition).

Bertrand (1883) heavily criticizes Cournot model. For him, the assumption of independence of the quantities sold by each concurrent was contrary to all evidence:

“Without realizing it, he (Cournot) introduces, under the name D and D' , the quantities sold by each concurrent, and, because he deals with them as independent variables, he assumes that if one changes by the will of one of the agents, the other will be able to remain the same. The opposite is of all evidence”⁴.

He does not develop a formal model for what is now called “Bertrand oligopoly”. In fact, his contribution is limited to a paragraph criticizing Cournot oligopoly, in which however, he is able to depict the results obtained by a firms competing on prices instead of on quantities. According to him, firms would have an incentive to absorb the whole market demand by undercutting their rivals’ prices as long as their profit is not negative. This means that prices would tend to equate marginal costs (recall that both firms are assumed to produce homogeneous goods at the same constant marginal costs).

As a result, in the Bertrand model, the results are similar to those of the market of perfect competition. In the Cournot model, however, the equilibrium price is above the marginal cost, even if not so high as in the case of monopoly. The same goes for output: Output is greater with Cournot duopoly than with monopoly, but lower than in Bertrand oligopoly, which presents similar results to those of perfect competition.

For Edgeworth (1925), the oligopoly problem was essentially indeterminate, meaning that prices would never reach an equilibrium position in markets with few players, as opposed to what happens in competitive markets. According to him, the extent of indeterminateness diminishes as the goods become more differentiated, i.e., as the firms become monopolies (in different products).

Edgeworth (1925) provides the basis for the Bertrand-Edgeworth competition model, where firms compete in prices but are not required to supply all the demand at the set price, only its competitive supply at that price. In this model, the equilibrium does not consist of a price, but of a probability distribution of prices.

These theories about the working of the oligopoly have to be complemented by that exposed on Chamberlin (1929), which were in fact anticipated by Bertrand in the already referred paragraph:

⁴ “... c’est que, par une singulière inadvertence, il y introduit, sous le nom de D et D' , les quantités vendues par les deux concurrents, et que, les traitant comme des variables indépendantes, il suppose que, l’une venant à changer par la volonté de l’un des propriétaires, l’autre pourra restes constante. Le contraire est de toute évidence .” Bertrand (1883), p. 503 (own translation).

“...That is the analysis of the fight between two firms which, without being threatened by competition, produce two products of the same quality. Their interest should be partnering or at least set a common price, so getting from the buyers the higher possible revenue; but this solution is discarded”⁵.

This discard, by the way, seemed unacceptable for Bertrand. In the view of Chamberlin (1929), in the case of a small group of firms, these would realize their interdependence and would try (implicitly) to maximize joint profits taking into account the possible use of retaliation strategies to prevent defection.

Stigler (1964) accepts *“the hypothesis that oligopolists wish to collude to maximize joint profits”*, and tries to conciliate it with the fact that *“collusion is impossible for many firms, and much more effective in some circumstances than in others”*. He does it by focusing in the policy of the agreement, which for him is a problem of theory of information.

While Rey (2004) focuses on collective dominance, he analyzes it as a case of oligopoly with tacit collusion, so his insight may be of relevance. In his view, the incentives for a tacit collusion to happen depend on four aspects: 1) Expected profits from undercutting rivals; 2) Losses in case of retaliation; 3) Likelihood of the undercutting leading to retaliation; 4) Discount of future profit losses relative to today's gains.

Starting from these concepts, Rey (2004) identifies possible structural factors which may make the market more prone to tacit collusion. He classifies these factors into necessary factors, important factors and other factors. He considers as necessary the following factors: entry barriers, frequency of interaction and innovation.

Canoy & Onderstal (2003) summarizes the results with respect to price level achieved by the different theories about oligopoly in the following table⁶. In it:

- P_{MC} is the marginal cost price, price equal to marginal costs
- P_C is the competitive price, the one leading to normal profits
- P_M is the monopoly price, the one at which a (hypothetical) monopolistic firm maximizes its profit

⁵ “Telle est l'étude de la lutte entre deux propriétaires qui, sans avoir à craindre aucune concurrence, exploitent deux sources de qualité identique. Leur intérêt serait de s'associer ou tout au moins de fixer le prix commun, de manière à prélever sur l'ensemble des acheteurs la plus grande recette possible ; mais cette solution est écartée . » Bertrand (1883), p. 503 (own translation).

⁶ See page 26.

Type of interaction	Outcome	Emphasizes importance of
Homogeneous Bertrand	P_{MC}	price competition
Cournot	Between P_{MC} and P_M	number of firms
Cournot with few players and high entry barriers	Between P_C and P_M	entry barriers and number of firms
Heterogeneous Bertrand	Between P_{MC} and P_M	price competition and profit opportunities
Heterogeneous Bertrand with few players and high entry barriers	Between P_C and P_M	entry barriers and number of firms
Explicit collusion	Between P_{MC} and P_M	cooperative outcomes
Tacit collusion	Between P_{MC} and P_M	cooperative outcomes

Source: Cannoy &

Onderstal (2003), p. 26.

For example, Tirole (1988) relaxes the assumption of homogeneity of goods in the Bertrand model. With this approach, the outcome is similar to the Cournot equilibrium, with a price above marginal costs and declining equilibrium price when demand becomes more elastic. Following the above table, the model of Tirole falls under the category of “Heterogeneous Bertrand”.

It is clear that there is no possibility to anticipate the concrete price to which an oligopoly will tend, as it will range from the marginal cost price (the outcome of the perfect competition model) to the monopoly price. To this, the insight provided by Edgeworth should be added, stating that prices will never reach an equilibrium position in markets with few players. So, it cannot be even assured that an equilibrium price will be reached, according to the current oligopoly economic theory.

Finally, it should be said that for Bertrand the range of prices is even wider, as he thinks that the reduction in prices in a Bertrand model would not have limit: “*whatever the price agreed, if one of the firms reduces its price, takes all the demand, doubling its revenues if the other keeps its price.*”⁷

⁷ “quel que soit en effet le prix commun adopté, si l’un des concurrents abaisse seul le sien, il attire à lui, en négligeant des exceptions sans importance, la totalité de la vente, et il doublera sa recette si son concurrent le laisse faire”, Bertrand (1883), p. 503 (own translation).

With this, the review of oligopoly theory is finished. Note that these are descriptive theories; they try to explain how oligopolies work and try to anticipate its results. In the following section, the approach changes to a normative one, as the literature on when and how an oligopoly should be regulated is surveyed.

3. Economic literature on oligopoly regulation

Our survey shows that there is much less economic research on oligopoly regulation than about oligopoly functioning. We have not been able to find a big amount of papers about oligopoly regulation as such, and in fact several of the papers located deal with the issue just tangentially. Summaries of the most relevant papers follow.

3.1 References with general reflections on oligopoly regulation

These four references provide general reflections on oligopoly regulation, the first focusing on “tight oligopolies”; the second draws its conclusions from empirical evidence, and the two last ones refers to the consequences of regulation errors.

Canoy & Onderstal (2003) consider that firms in a “tight oligopoly”⁸ may sustain high prices both by coordinated and unilateral effects, thus reducing welfare. Implicit in this reasoning is the hypothesis that prices above the marginal cost price are detrimental for social welfare. Due to the uncertainty of the resulting price explained in the previous section, they stress “*that the existence of tight oligopolies in itself does not imply welfare reductions. Yet, economic theory provides many possibilities for firms in tight oligopoly to reduce welfare. Hence, if there are plausible alternatives, tight oligopolies are better avoided.*” (p. 42).

According to them, governments concerned about “tight oligopolies” may follow three types of strategy (pp.68-69): prevention (blocking mergers), treatment of symptoms (ex post antitrust law) and cure (issuing new licenses or ex ante intervention to decrease entry barriers).

The concrete strategy to be chosen would depend on factors such as “(1) whether the market being a tight oligopoly has serious consequences for welfare, (2) the existence of countervailing power, (3) signs that the problem is temporary, (4) the costs associated with the policy instruments, and (5) the likeliness of government failure.”

⁸ For the authors, a tight oligopoly is an oligopoly of which the market characteristics facilitate the realisation of supranormal profits for a substantial period of time. (see p.12)

Coccoresse (2010) studied the car insurance market in Italy from 1994 to 2000, after the liberalization of the clauses included in contracts with consumers. Results show that the information interchanges among insurance firms during those years have caused the firms to act as a collusive oligopoly.

The author empirically proves that the oligopoly is only social harming if there is collusion and price increase. In other case, the cooperation among firms in the oligopoly may increase the efficiency of the market, thus leading to welfare increase. According to the author, it is not sound to regulate oligopolies ex-ante, because the most evident proof that collusion has occurred is the increase in prices, something that can only be observed ex-post.

Schinkel & Tuinstra (2006) focuses on competition policy, but the results may also be of interest from an ex-ante perspective. They analyze the consequences of imperfect competition law enforcement and its impact on the strategy of firms. According to their model, the incidence of anti-competitive behavior increases both in Type II errors (i.e, fines too low, because they logically incentivize anticompetitive behavior) and Type I errors (i.e, false allegations, because the firms anticipate they will be sanctioned even if they comply with antitrust laws).

According to the authors, in some conditions, it is better to cope with some type of collusion instead of fighting them, thus avoiding regulatory errors and welfare loss. For example, if research costs are high and there are constant technological advances, making it easier for regulatory authorities to incur in mistakes due to misunderstanding of the productive structure, it is likely better for social welfare to allow some degree of collusion in the market.

Alvisi, Carbonara & Parisi (2011) analyze the consequences of antitrust policy in oligopolistic complementary markets with vertical differentiation, for different types of quality leadership. They propose operative systems and microprocessors as example of complementary goods markets in these conditions.

They found that, if there is a quality leader, increasing competition by forcing divestitures or prohibiting mergers, enhances consumer surplus. However, when quality leadership is shared, the same policy may lead to higher prices and low consumer surplus. In consequence, they propose to avoid antitrust regulation in oligopolies where some members are quality leaders.

3.2 References on use of SMP remedies for oligopolies regulation

Two references on this topic have been found. The first one deals with access regulation, while the other is concerned with quality standards.

Brito & Pereira (2010) takes as starting point the traditional access regulation theory. According to it, a vertically integrated monopolist with exclusive access to a productive factor has incentives and capability to restrict access to this factor to downstream firms, and so hinder competition. The model proposed by Brito & Pereira shows that in the case of an oligopoly, the better strategy is, however, to allow access to new entrants. This is because, even if one of the oligopolists restrict the access, it is very likely that the entrant may obtain the factor from another of the oligopolists. As the losses derived from the entry will be shared by all incumbents, it is better to be the access provider and thus get wholesale access revenues not accrued otherwise. In fact, this gives rise to an instance of the Prisoner's Dilemma.

The proposed model shows that entry of new firms (through access to the exclusive productive factor) may cause a decrease in prices, but it may also lead to an increase. The reasons are the following: if the oligopolist raises the price, the revenues of the new entrant increase (it gets more costumers) and so do the wholesale revenues of the access provider. Besides, as marginal cost for the new entrant is likely to be higher, its prices will also tend to be higher.

Chioveanu (2012) analysed the markets for food and professional services, in which increases in quality are not realized by rivals until there is no price competition. This is modelled by an oligopoly model with simultaneous price and quality choice, with homogeneous sellers competing by offering products at one of two quality levels. She found that in the symmetric equilibrium firms use mixed strategies that randomize both price and quality, obtaining positive profits.

She uses this model to study the effects of a regulatory intervention on quality standards. She observes that this regulation initially intensifies price competition. However, as the cost of increasing quality is a variable cost, sellers will tend to increase prices, thus compensating for the competitive effect. The imposition of quality standards forces consumers wishing for low quality at low prices, to inefficiently buy high quality products at a higher price. In conclusion, quality standards regulation harms both consumer and social welfare.

3.3 References about price regulation on oligopolies

The following two references refer to how to apply price regulation to oligopolistic firms competing both in “captive” and in competitive markets.

Bouckaert, Degryse & Dijk (2013) focus on remedies, concretely on the banning of price discrimination for the SMP firm in an oligopolistic market. If this happens in a regulated context, the affected firm is normally the former legal monopolist. In a liberalized market, this firm may be a dominant firm which tries to exploit its position by price discrimination.

They consider that this imposition can only be justified in the following cases:

- To prevent dominant firms from carrying out exclusionary strategies.
- To protect specific consumer groups that risk excessive prices due to the lack of alternative providers.
- To incentivize the entry of new firms by limiting the competitive reaction in prices by the dominant firm.

They conclude that, if the monopolized market segment is not too big in comparison with the competitive one, the banning of price discrimination increases social welfare, but do not incentivize new entries. Conversely, if the monopolized market segment is large enough, the regulation does not increase social welfare but incentivizes the entry of new firms due to the expectative of high profits.

Iozzi, Sestini & Valentini (2002) develop a model to study the effects of two alternative regulatory regimes of price regulation. Results are obtained for a same firm acting in a competitive market and in an oligopolistic (captive) market.

The so called *Absolute* regime places a fixed upper limit to the prices charged in captive markets, while the *Relative* regime constrains the captive prices relatively to the competitive ones. The results show that, under the *Relative* regime, captive prices are only weakly lower and competitive prices are always higher than under the *Absolute* regime. However, the number of competitors and/or their output may be higher under the *Relative* regime.

Regarding social welfare, the authors conclude that *Relative* regime is more likely to increase consumers’ surplus and social welfare the more efficient are the competitors. However, they admit several important caveats for this result,

due to its high sensibility to the concrete social measures in place, to the actual degree of competition and to other parameters of the model.

In other words, they conclude that in the case of firms operating both in competitive and oligopolistic markets, social welfare increases if price regulation is established in the competitive market instead of in the oligopolistic one.

3.4 References about incentives-based regulation

Schaffer (1989), Kim & Chang (1993), Schwermer (1994), López-Cuñat (1995) and Lee (1997) propose different types of optimal regulatory schemes for oligopoly by generalizing schemes originally proposed for the case of monopoly. The goal of these papers is to propose devices by means of which a Cournot oligopoly is forced to behave competitively. Their implicit assumption is that the result of a Cournot oligopoly can be improved in terms of social welfare, by approaching its output to the results of perfect competition model.

For example, Schwermer (1994) proposes a regulatory mechanism consisting of a subsidy depending on the firm's contribution to an equilibrium price reduction, and a tax equal to the profit of the previous year. According to the author, this scheme provides "*appropriate incentives to enforce competitive behavior in a Cournot oligopoly. The scheme is welfare improving even if firms collude*".

These are the papers dealing with oligopoly regulation that we have been able to find. Even if this is a reduced collection, the survey seems quite complete. Both the BEREK and OPTA, the Dutch NRA, recently published reports⁹ in which they try to argue the case for ex-ante regulation of oligopolies. The fact is that in neither of the reports appear so many references as has been put forward in this survey. Because of this, we are confident on the completeness of the survey. In the following section, an analysis of the survey is provided.

⁹ BEREK (2015). Report on Oligopoly analysis and regulation BoR (15)74, June.
OPTA (2006). Are Two Enough? Economic Policy Note n° 6, September.

4. Analysis of the survey results

The first question we tried to answer with this survey referred to the conditions in which regulation of oligopolies is justified. The survey also provides insight about what kind of remedies may be imposed on an oligopoly to increase social welfare.

4.1 Justification for oligopoly regulation

Although most of the literature does not refer to the reasons for oligopoly regulation, the concerns seem quite clear. Canoy & Onderstal (2003) justify possible regulation of an oligopoly in the difference between the marginal cost price and the expected price resulting from the oligopoly, which in many of the studied models is above that price. This is in line with the implicit assumption of Schwermer (1994) and similar papers.

Coccoresse (2010) concludes that an oligopoly is social harming (and in consequence should be regulated) when there is collusion and the price increases (collusion per se does not justify regulating the oligopoly). From this, Coccoresse concludes that oligopolies should not be regulated ex-ante, because it would not be possible to observe the second of the conditions for an oligopoly to be social harming (i.e., an increase in price). Alvisi, Carbonara & Parisi (2011) go even farther than Coccoresse, identifying oligopolies whose features make even antitrust regulation undesirable.

According to the table shown at the end of section 2, in order to anticipate the resulting price from an oligopoly, it is necessary to establish the type of oligopoly as a first step. This is not an easy matter; even if there is some insight about how to do it. For example, Vives (1989) considers that the slope of marginal costs is a crucial determinant to see if a Cournot or a Bertrand model is a more appropriate description of the competitive process in a market:

“Steep (flat) marginal costs, linked to inflexible (flexible) technologies, are conducive to Cournot (Bertrand) type behavior. Other factors come also into play, supply functions tend to be flatter for less differentiated products, for example” (Vives, 1989, p. 508)

The same author also considers that *“basic technological or institutional conditions, relating in particular to the relative flexibility of prices and quantities, dictate which is the relevant model.”* (p. 511).

European Commission (EC) in its guidelines for SMP¹⁰ has provided criteria that may cause an oligopolistic market to collude tacitly or explicitly. Both Canoy & Onderstal (2003) and the already quoted documents from BEREC and OPTA

¹⁰ European Commission (2002). Commission guidelines on market analysis and the assessment of significant market power under the Community regulatory framework for electronic communications networks and services, OJ 165/6 of 11 July.

echo this set of criteria. They were defined in a well-known sentence by the European Court of First Instance (ECFI)¹¹. According to it, coordination (i.e, tacitly colluding oligopoly) is more likely if:

- (i) there is a possibility of reaching terms of coordination,
- (ii) it is possible to monitor deviations,
- (iii) there is an effective deterrent mechanism in place
- (iv) there are insufficient reactions of outsiders.

This set of criteria is of course very relevant from a legal point of view, but it has no relevance from an economic theory perspective. We are not aware of any empirical evidence proving the economic statement made by the ECFI. Nor are we aware of the existence of theoretical models with a minimum of acceptance showing that it could be the case.

In fact, the most relevant economic literature we have been able to find is the already referred works of Stigler (1964) and Rey (2004) (which basically coincides with Cannooy & Onderstal (2003)).

Even if these criteria were accepted to identify a tacitly colluding oligopoly, recall that the expected price from this situation range from the marginal cost price (or even below it, see the last quote to Bertrand above) to the monopoly price. So, in line with Coccoresse (2010), it would still be necessary to assess the actual price in order to justify a regulatory intervention.

In fact, the same could be said of any of the model of oligopolies identified. Only in the cases of a Cournot or a heterogeneous Bertrand oligopoly with few players and high entry barriers, the price would for sure be above the level of the marginal cost price. In the remaining cases, even on the cases of colluding oligopolies, unless prices are observed to be above marginal costs, no regulatory intervention is warranted. This means that no ex-ante intervention is justified, because prices have to be observed in order to assess if the oligopoly harms social welfare.

Observe that in both cases, (i) ex ante regulation for Cournot/heterogeneous Bertrand oligopoly with few players and high entry barriers, and (ii) ex post regulation in the rest of model, the yardstick to measure if they are or not socially harming, is the comparison with the marginal cost price.

¹¹ Case T-342/99, on the merger Airtours /First Choice.000000

This price is considered optimal for the social welfare because it is the resulting price from the perfect competition model¹². Neoclassical economics has considered this model as the optimum for social welfare since Arrow (1951) showed that it was Pareto optimal. In other words, the outcome of the discussed oligopoly structures is not optimal, *only if compared with the outcome of the model of perfect competition.*

However, there are increasing doubts about the optimality of the model of perfect competition for social welfare¹³. Without entering into too much detail, it should be recalled that the assumptions of that model are, among others:

- Homogeneity of goods
- Lack of economies of scale
- Perfect information
- Absence of entry barriers

When the perfect competition model is taken as reference for optimal social welfare, what is done in fact is to assume that a market in which there is only one good is better for society than one in which there is variety of goods. According to this logic, for example, is better to have just one type of car, than the current variety of models, colors, consumes, features... It is obvious that this is just not true. The same kind of reasoning could be applied to the other features of the model of perfect competition.

The findings on justification for oligopoly regulation can be summarized as follows:

- 1) Regulation is justified on the basis of the resulting price of the oligopoly. If the price is above the marginal cost price, then regulation may be justified. However, this assumes the perfect competition model as optimal for social welfare, something which is currently under question.
- 2) Theoretical models are not able to predict if the resulting price will or will not be above the marginal cost price, with the exception of a Cournot or a heterogeneous Bertrand oligopoly with high entry barriers and few players.
- 3) There is no consensus on the criteria to classify a concrete market into one of the theoretical oligopoly models. A same market may be classified in different categories by different analysts.

¹² See for example BEREK (2015). Op.cit. (p.11):

“According to economic theory, perfect competition with a large number of suppliers and consumers results in prices that are equal to marginal cost and in the efficient use of resources in terms of both productive and allocative efficiency. In a static setting, this would maximize total welfare for society.”

¹³ For a summary of the criticism see Herrera-González, F. (2011). See also references quoted in this article.

- 4) Assuming the perfect competition model as optimal for social welfare, ex ante regulation could be justified in a Cournot or heterogeneous Bertrand oligopoly with high entry barriers and few players. In the rest of models, only ex post regulation is warranted, because the prices need to be observed.

In the next subsection, we deal with the issue of remedies.

4.2 Regulatory remedies for oligopolies

The surveyed literature is very cautious about remedies proposed to regulate oligopolies, in coherence with the difficulties shown above to justify such regulation.

Canoy & Onderstal (2003) are explicit when they state: “*A government that decides to intervene in this type of market should be aware of the potential consequences of intervention, in particular the consequences of making mistakes.*” (p. 56). They also refer to the higher probability of mistakes in a dynamic environment, in line with Schinkel & Tuinstra (2006).

Canoy & Onderstal (2003) propose “*cure*” remedies (ex-ante obligations) together with “*prevention*” and “*treatment*” strategies, and then only for what they call “tight oligopolies”. This means that if an oligopoly is found in the economy, the solution may not be to regulate it, but to inquiry in why this oligopoly was born in the first place, and act consequently, for example, eliminating legal entry barriers.

Brito & Pereira (2010) and Chioveanu (2010) agree in that regulation that may work under a monopoly is not effective for the case of an oligopoly. The first author concludes this with respect to access regulation, while the other discards the imposition of quality standards on oligopolies.

Regarding price regulation, there seems not to be consensus. Bouckaert, Degryse & Dijk (2013) state that the banning on price discrimination may enhance social welfare if the monopolized market is not too big in comparison with the competitive one. However, for Iozzi, Sestini & Valentini (2002), social welfare may increase if price regulation is established on the competitive market instead of on the oligopolistic one.

The models proposed by other authors involve the use of taxes (Shaffer (1989)), a combination of subsidies and taxes to the oligopolists (Schwermer (1994), Lee (1997), Kim & Chang (1993)) or are based on contracts with the government (López-Cuñat (1995)).

In summary, the surveyed literature is far from being conclusive on what ex-ante remedies could be imposed on a welfare harming oligopoly. The only useful conclusion that may be extracted is that the usual remedies for monopoly (or SMP) do not seem to work for an oligopoly. More research is definitely needed in this area before any specific regulatory measures are proposed for oligopolies.

5. Conclusions

In this paper, a survey of the economic literature related to oligopolies and its regulation has been carried out. This survey tries to inform the concerns of the BERECA, which has been showing an increasing interest in oligopoly regulation during the last couple of years.

This interest likely derives from the evolution of the telecommunication markets across Europe, in which is going to be difficult to find SMP operators on which to impose asymmetric regulations. In the current market structures, a reduced number of operators have similar presence, and the historic dominance of the former legal monopolist has been diluted.

However, if regulation on oligopolies is to be imposed, it should be proved that it increases the social welfare and thus, be based on sound economic theory. Recall that current ex ante regulation is supposedly based on the (arguably) reduction of welfare that the presence of an operator with market power imposes to the society. The same should be proved to happen in the case of an oligopoly, if it is to be regulated.

In fact, the only way to objectivize the debate of oligopoly regulation is through the use of economic theory. Otherwise, there are only positions of the interested parties together with their argumentations. These argumentations may be persuasive or not, but they are not usually scientific, because what they defend is a certain position from which the party think it can profit.

But this is not the way regulatory decisions should be taken. The main goal to be achieved by NRAs with their decisions is (or should be) the increase of the social welfare. This is the way in which the recent Nobel laureate Jean

Tirole approaches regulatory issues, prize granted to him due precisely to his research on “*market power and regulation*”.

Our survey shows that there is a vast amount of literature on how oligopolies work, but a dismal record on how they should be regulated, likely due to the results reached by the former one.

Economic literature proves that it is almost impossible to anticipate which will be the resulting price of an oligopoly, with independence of the type of oligopoly. Prices may range in each model, even in the case of collusive oligopolies, from the marginal cost price (in which social welfare is maximized and thus no regulation is required) to monopoly price. Besides, it even may be the case that there is no stable outcome for the oligopoly, as shown by Edgeworth (1925) and implicit in game theory models. This reason *per se* seems enough to abandon any purported ex-ante regulation on oligopolies.

Even in the cases of a Cournot oligopoly or a heterogeneous Bertrand with high entry barriers and few players, which unambiguously result in a price above the marginal cost price and thus regulation could be justified, there is no consensus either on how to identify ex-ante a Cournot oligopoly or an heterogeneous Bertrand oligopoly from other types of oligopolies. Some criteria have been provided (Vives (1989)), but considerably more research is required in order to achieve a certain consensus.

It would also be necessary to define objectively when entry barriers can be considered high and also what is the maximum number for “few” players. With respect to this last point, there is also some research (for example, Selten (1973) or Huck, Normann & Oechssler (2004)), but once again we are far from any possible consensus.

The sparse literature about remedies undoubtedly derives from the state of the art just depicted. As there is no clear case for ex-ante regulation, what is the point in researching about possible ex-ante remedies for these market structures?

There is one useful insight obtained from the survey: the extrapolation of current SMP regulation to oligopolies does not seem advisable; at least, it does not seem to work in the case of access regulation or quality standards.

In light of the analysis carried out, our policy recommendation would be in line with that suggested by Coccoresse (2010) and also partially by Canoy & Onderstal (2003):

- 1) Avoid ex-ante regulation for oligopolies
- 2) If a collusive oligopoly is able to keep increasing prices during a long period of time, explore the possible causes:
 - a. If it is due to legal entry barriers, issue more licenses or preferably remove those legal barriers.
 - b. Otherwise, use competition law.

However, this recommendation is based on the admittedly limited existing economic literature on oligopoly regulation. More research is required on this field, as it is about criteria to categorize actual markets into one or other oligopoly model.

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