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Theories of Industrial Organisation and Competition Policy: What are the Links?

Alexis Jacquemin

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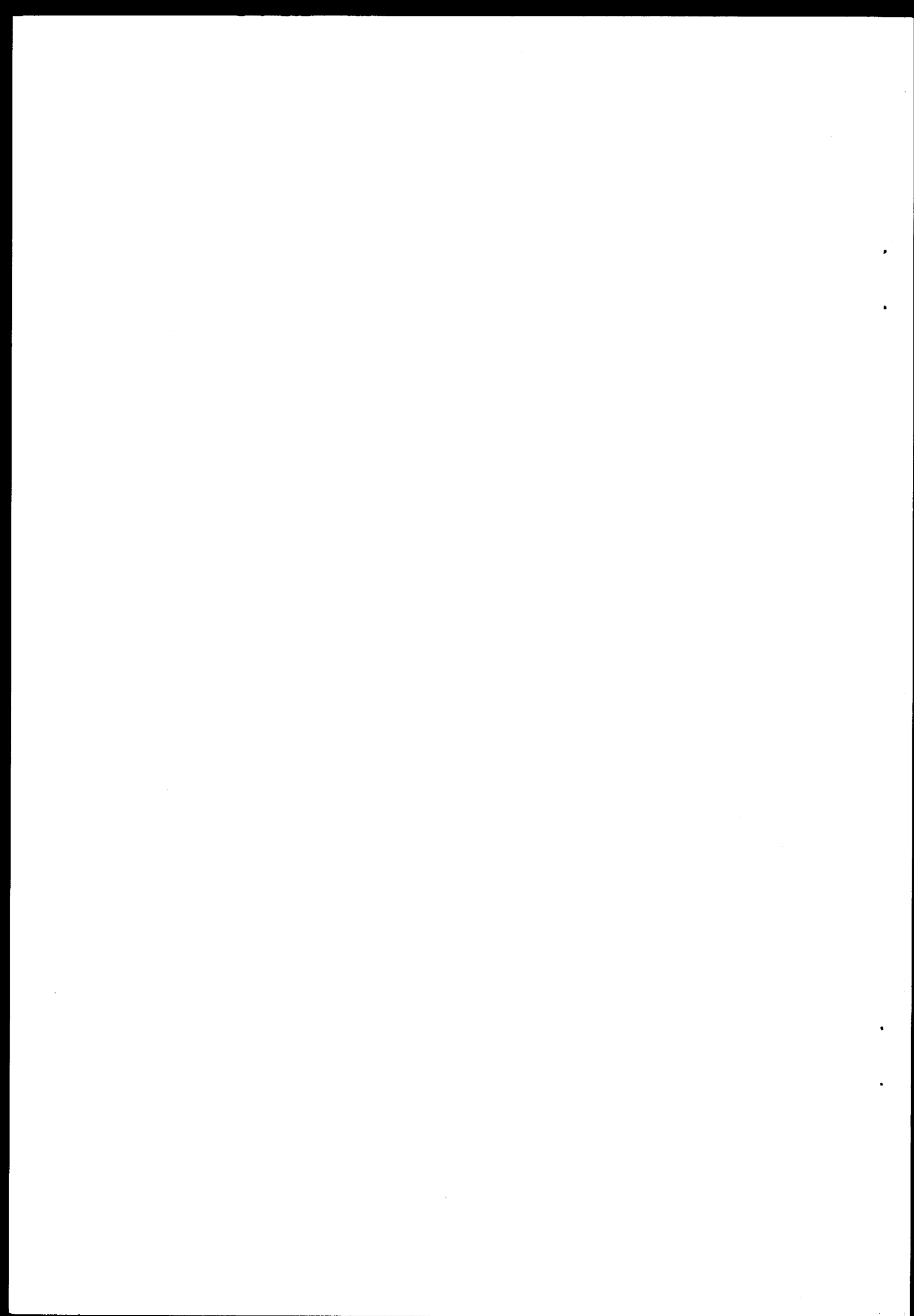
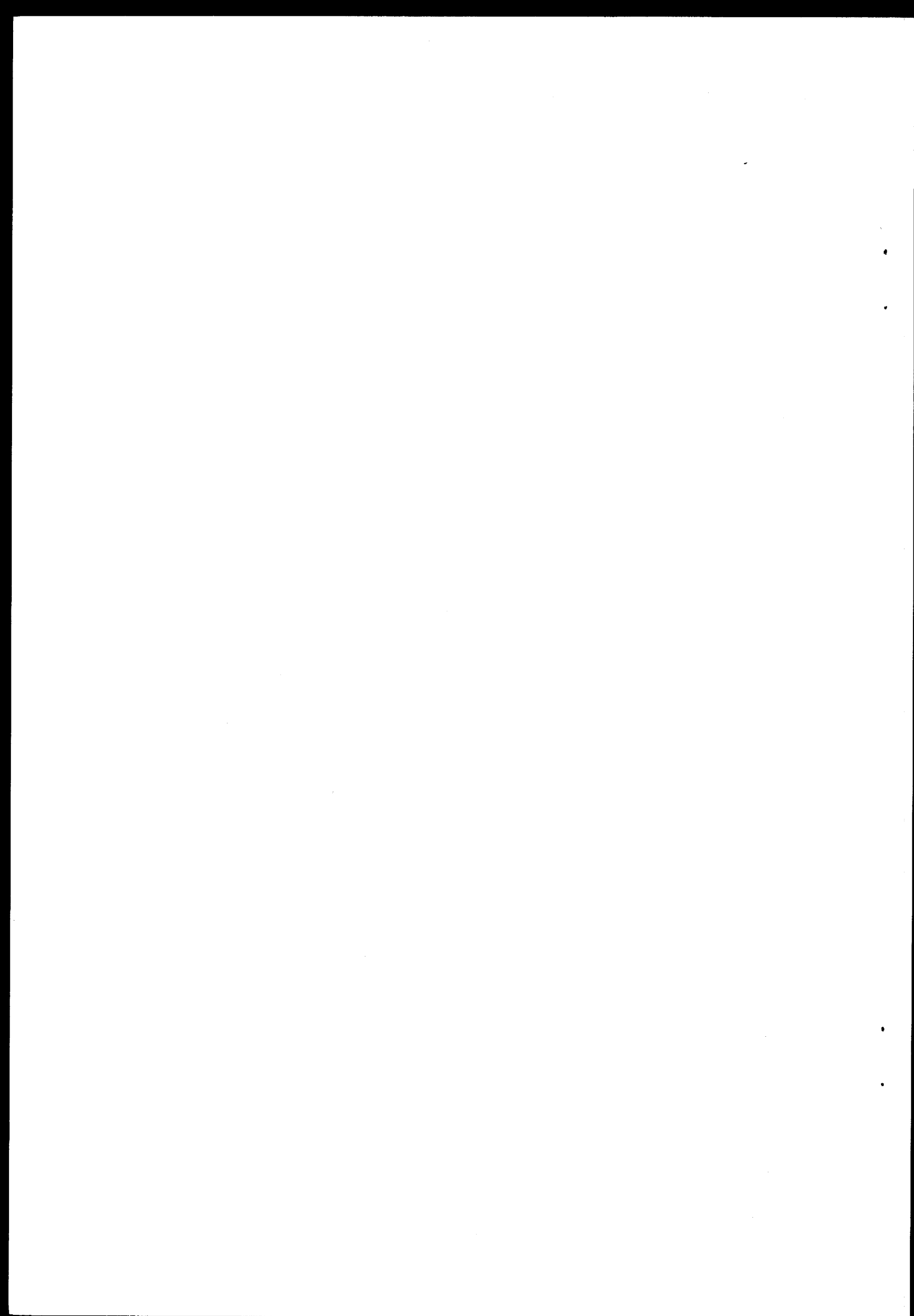


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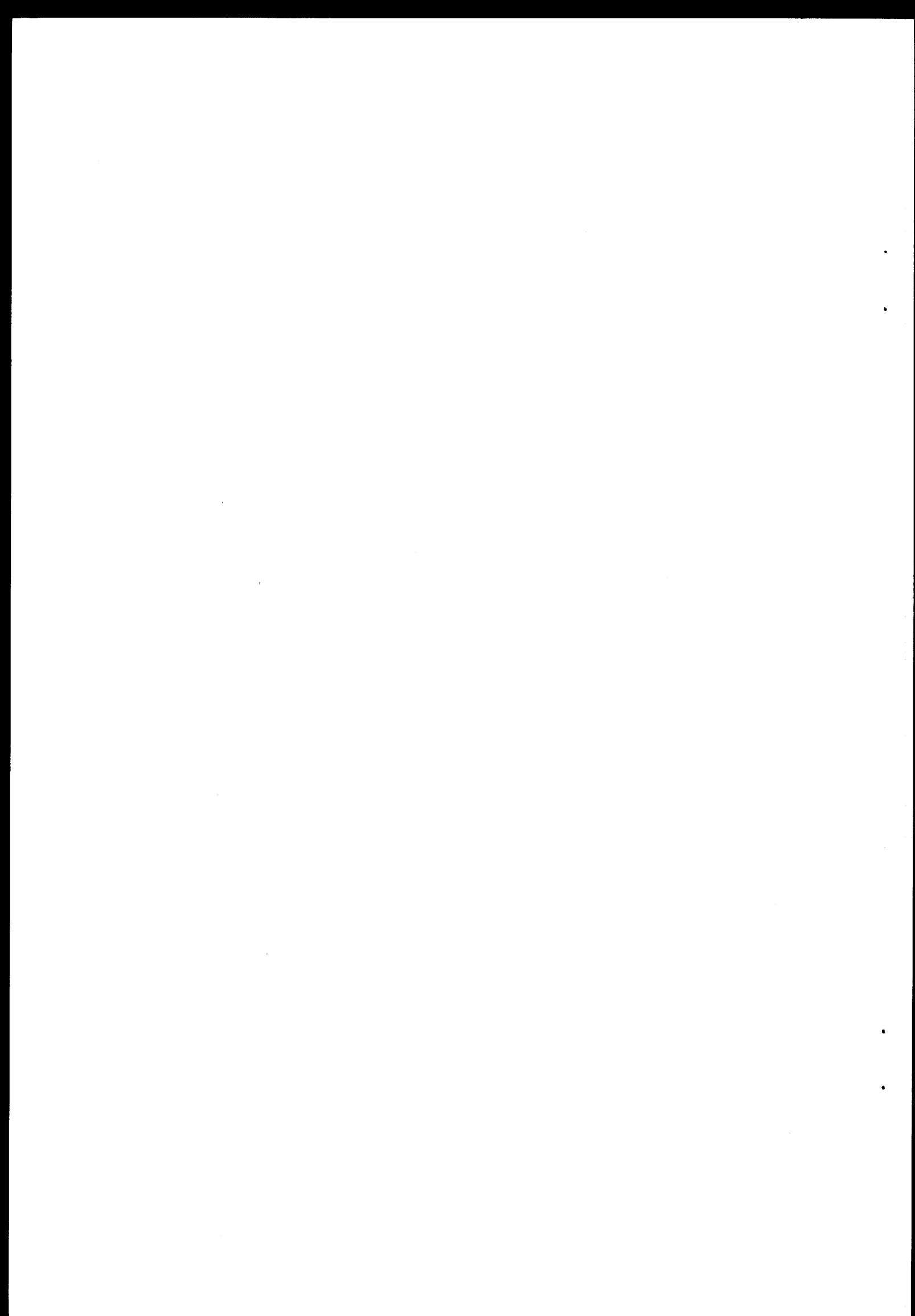
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THEORIES OF INDUSTRIAL ORGANISATION AND COMPETITION POLICY: WHAT ARE THE LINKS?

ABSTRACT

The "new industrial organisation" enshrined in game theory has elaborated important concepts, models and typologies that reveal the richness of corporate conduct. To some extent, these developments have improved the quality of analyses in European antitrust policy. Three illustrations are considered in the paper: concerted practices, cooperative R&D and mergers. However, the new dimensions to be taken into account are very complex and sensitive, and the information that antitrust authorities possess is often inadequate to permit a full-blown analysis. Adopting a simpler approach, which combines "science" and pragmatism relying on presumptions and shortcuts, is inevitable.



Introduction

At its most basic level, the aim of scientific activity is the comprehension of our world. Theories should be judged by how well they enable us to organise and understand our observations. This is especially true in the domain of industrial organisation, where theory should provide a framework within which empirical research can be carried out.

The first part of this paper presents the evolution of the analyses developed in the field of "industrial organisation" which has influenced criteria used in competition policy.

As we shall see, the shift from the linear "structure-conduct-performance" paradigm, primarily empirically based, to the "new industrial organisation" enshrined in game theory, has improved the quality of analyses in antitrust, but at a price. However, a reconciliation of the two approaches is currently both possible and desirable.

The second part of the paper examines several market conducts that affect competition and for which European antitrust policy is expected to use criteria developed by old and new analyses in industrial organisation. Three illustrations will be considered: concerted practices and parallelism of actions, cooperative R&D and cartel, mergers and efficiency defense. The first of these demonstrates the emerging influence of contemporary developments in economics; the cooperative R&D illustration provides an example of lax use of the efficiency defence; conversely, the merger Regulation illustrates a strict approach, along with its dangers.

I. Industrial Organisation and the characterisation of a market.

Market analysis, either from the point of view of the firm that operates or desires to operate in it, or from the viewpoint of the public authorities, requires proper characterization.

The principal objective of industrial organisation has been precisely to provide this characterization, resorting to a scheme that relates the market structure with the behaviour of the economic agents who operate in it and with the performances that such a relation generates. Whether we refer to a manager of a firm or to a public authority responsible for antitrust policy, the fundamental problems are analogous.

At the level of market structure, industrial organisation examines the number of competitors who operate in the relevant market and the distribution of market shares, the conditions of entry and exit, product standardization and its proximity to substitutable goods, the interdependence between upstream and downstream activities, the quality of information controlled by partners and the degree of risk involved.

As far as conducts are concerned, it should determine the respective role of price and non-price strategies, the level of cooperation which has been established over time among the various agents and the use of strategies of differentiation and diversification.

Finally, through the examination of performances - which deals with the allocation of resources or with actual profitability - the results obtained are evaluated.

A study so conceived that deals with structure, conduct and performances should, then, be able to provide an answer to a fundamental question: Which type of competition exists in this market?

The sense of the question varies according to who asks it. In the view of public authorities, the intention is to determine if the spontaneous forces of competition which characterize the market in question can or cannot lead to an efficient allocation of resources and a socially acceptable distribution of income.

However, from the firm's point of view, what counts is knowing if its own actual or potential relative position benefits sufficiently from market imperfections, in order to yield substantial and sustainable profits.

The many studies of industrial organisation have applied a useful filter to this matter, permitting the identification and classification of some complex competitive phenomena of our industrial society. They have conferred substance to the famous "empty box" of traditional microeconomic analysis.

Nevertheless, until the sixties for the most part, a dangerously reductive approach was adopted. It is worthwhile underlining at least two limits of the traditional industrial organization economics, one of a theoretical nature and the other of an empirical nature. On the theoretical ground, the analysis was seldom made in the context of a precise microeconomic model and rarely has the type of oligopolistic interdependence been made explicit. On the contrary, the accent has been placed on the description of the market structure and its direct links with the performances achieved.

From this viewpoint, industrial organisation is a model in which change is treated as exogenous and where behaviour and performance are structurally determined. It is also a static system (or rather a comparative static one) that does not take into account that competition is an evolving and historic process with possibilities of retroactions, going, for instance, from performance to behaviour and from behaviour to certain structures that thus become endogenous.

On the empirical level, two types of study characterize the traditional outlook: case studies and econometric studies. Case studies, which were particularly prolific in the 1960s, have provided a better understanding of some industries and of some markets.

The consideration of qualitative aspects has clarified the complexity of industrial reality, whereas quantitative measures, such as the degree of concentration or the profit rate, have provided simple summary indicators of the observed situation. These case studies, however, have not given rise to much hope that a general outline can be made and further developed.

After the 1960s econometric studies increased and set themselves the task of going beyond the limit of case studies by finding statistically significant links between some indicators of performance, such as the profit rate, and a whole set of indicators of market structure, in particular, the degree of concentration. These regressions have been based on cross sections of industries. Their objective is essentially to test simple hypotheses, possibly applicable to all markets, such as the existence of a linear relationship between the degree of concentration and the rate of profit in the industry. The theoretical arguments that are used to include or exclude a particular structural aspect from a list of explanatory variables are often ad hoc, made without clear reference to an underlying general model of which the tested equation is the reduced form. Moreover, the interpretation is a causal one - *ceteris paribus*, a high degree of concentration should result in a higher rate of profit - rather than an equilibrium relationship. The corresponding usual interpretation is the presence of market power in concentrated markets.

2. What has come to be known as the "new industrial organisation" presents innovative methodological aspects. Moreover, on the basis of a more technical analysis, it has relaunched the eternal debate between those who see in our industrial economies an efficient adaptation to external conditions and those who see a search for market power (see Jacquemin, 1987).

Compared with earlier studies, recent research is increasingly using tools of microeconomic theory, models of imperfect competition, and game theory. Going beyond the extreme cases of perfect competition and monopoly, solution concepts grow in number. Oligopolistic interdependence has been explored by cooperative games as well as by models of noncooperative behaviour. Furthermore, dynamics in industrial structure have come to replace static approaches. Schumpeter (1950) has already stressed the intertemporal framework within which the competitive process should be placed.

We must assume that economic agents are making sequential decisions and taking into account the consequences of their actions on the subsequent evolution of industrial activity. Firms do not merely react to given external conditions, but try to strategically shape their economic environment by modifying, in a credible manner, market structure and market conducts of competitors. Then, the unidirectional causality, from structure through conduct to performance, breaks. For example, we have seen that, in the "old industrial organisation", super-normal profits in an industry would be associated with collusive behaviour brought about by high concentration possibly due to exogenous barriers to entry.

In the new approach, the number of firms is determined endogenously and depends on the type of game being played by firms, defined in terms of choice variables (price, quantity and so on), timing of decision, number of replications of the game (Norman and La Manna, 1992). This approach also allows for the fact that buyers and sellers do not have a perfect knowledge of their partners or adversaries, their preferences, and their means. Situations of incomplete and asymmetric information are treated differently, and new concepts of equilibrium are again developed.

3. A result of the new approach has been a proliferation of models, according to the choice of the strategy space, the firms' beliefs, the possibility of commitments, the temporal horizon, the attitude toward risk and asymmetries arising at each stage of the decision process.

Several implications derive from these theoretical enrichments.

The first is that the corresponding behaviours derived as optimal strategies at equilibrium demand high and growing levels of rationality.

Furthermore, the number of possible equilibria for a given structure is generally large.

A third aspect is that the solutions are not robust, for they are very sensitive to slight modifications in assumed initial conditions. At the very limit, any possible outcome can be rationalized, in particular by playing with information conditions.

In such a situation, economic experts involved in antitrust actions have a wide open field to attack or justify a given practice. "Give me a result, I shall give you a theorem"!

This explains recent criticisms made against the (ab) use of game theory.

According to P. Milgrom and J. Roberts (1988, p. 450), *"in the economics of organization... the vast bulk of the research has been primarily deductive theorizing... Too often the questions that the latest paper seeks to answer arise not from consideration of puzzling aspects of observed practices... but from the desire to extend the analysis in an earlier paper that, in turn, may have been only tenuously connected to observation."*

These criticisms are important but must not imply throwing out the baby with the bath water.

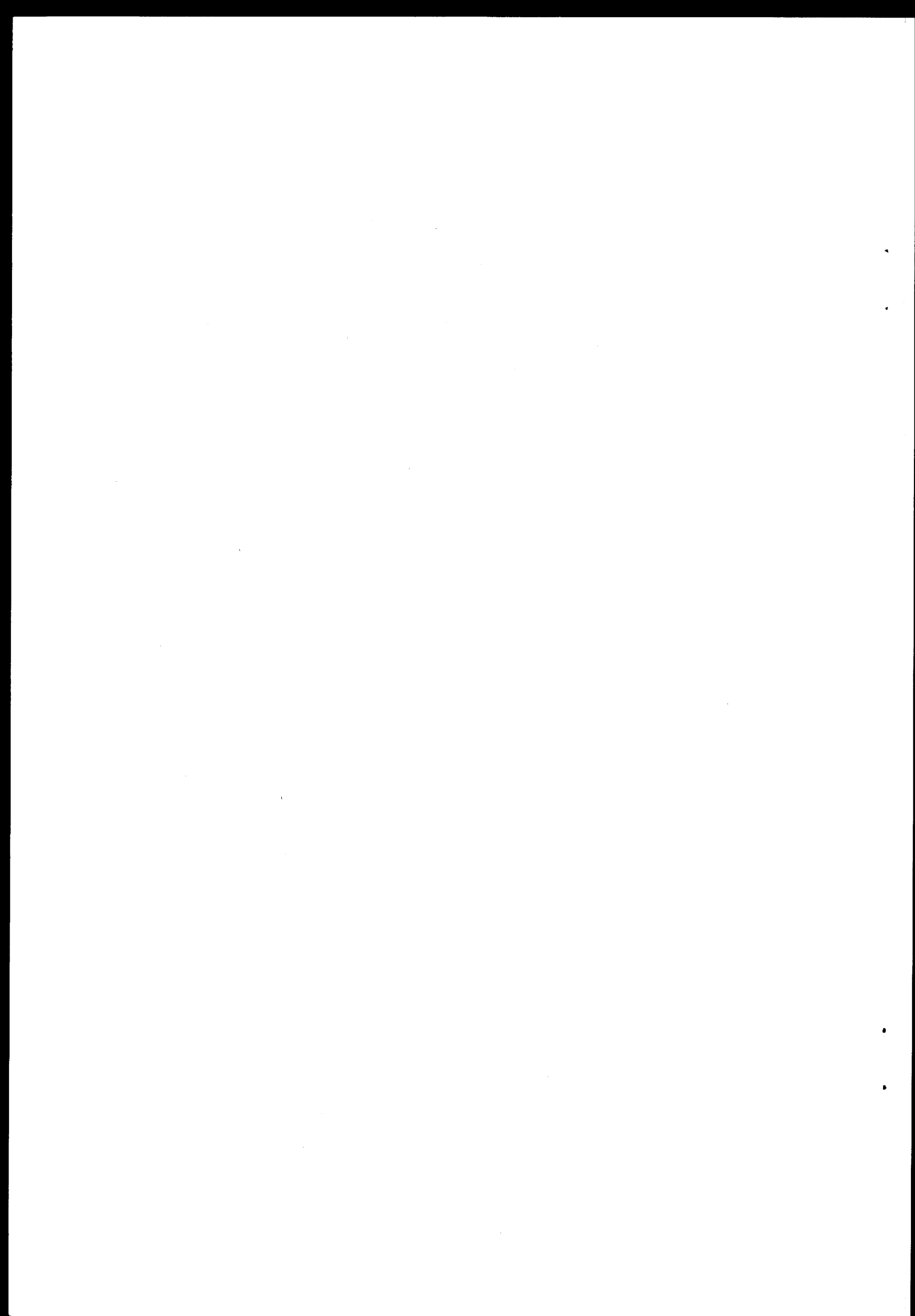
What the rich panoply of possible models requires is a new combination of theoretical and empirical analyses. Rather than looking for *the* model which permits simple generalizations that can be applied to most industries, as previous authors would have liked, we must develop a menu of theoretical models from which the best adapted model to the market under study can be selected. On this basis, different views have been expressed. According to F. Fisher (1989, p. 119), "*the role of a generalizing theory is to tell us... how conduct and performance depend upon structure... It may very well be the case that one cannot understand the history of the American rubber tire industry without knowing that Harvey Firestone was an aggressive guy who believed in cutting prices... The job of theory is to discover what characteristics of the rubber tire industry made such aggressive behaviour a likely successful strategy.*" But he adds: "*That question would be answered if we had a generalizing theory of oligopoly*". The following comment of S. Martin (1993, p. 564) is pertinent: "*A theoretical model tailored to the specific characteristics of the American rubber tire industry would answer the same question. Quite likely, it would supply the answer with greater clarity*". Contrary to monism, eclecticism is paradoxically close to the concern of losing, as a result of modeling, the qualitative richness of the information supplied by specific case studies of industry and markets.

Monism and eclecticism may in fact be complementary, in the sense that the model can be adapted to the major observed features of the industry. Beyond this, a richer typology of behaviour can be made to correspond to appropriate models. Indeed an important function of game theory is the classification of the multiple interactive decision situations. Just making the classification is already a form of science. "*The right classification is often the key to a successful theory. Modern biology was made possible by Linnaeus's classification of all living things into species and genera.*" (R. Aumann, 1985, p. 39).¹

By the same token, econometric studies based on inter-industry cross sections which is plagued by many problems of interpretation have been complemented by time series analyses of industry on the one hand and by intra-industrial comparisons on the other. Heterogeneity of economic agents, of their performance, and their strategies within the same industry can then be tested. More generally, game theory must be completed by description of decision behaviour and empirical support. According to M. Shubik (1985), "*Game - theoretic solution - concepts should be judged and understood in terms of the quality and quantity of their applications;*" Neither theory nor empirics can stand alone, at least as regards the analysis of real-world industries.

From that point of view, the field of competition policy is a particularly important laboratory. It shows that competition policy must rely on sounder theoretical characterization than in the past but, simultaneously, that the diversity of models and results requires a case-by-case approach where insights into the ways firms acquire and maintain positions of market power become essential.

¹ Aumann also writes that "it is somewhat surprising that our disciplines have any relation at all to real behaviour"!

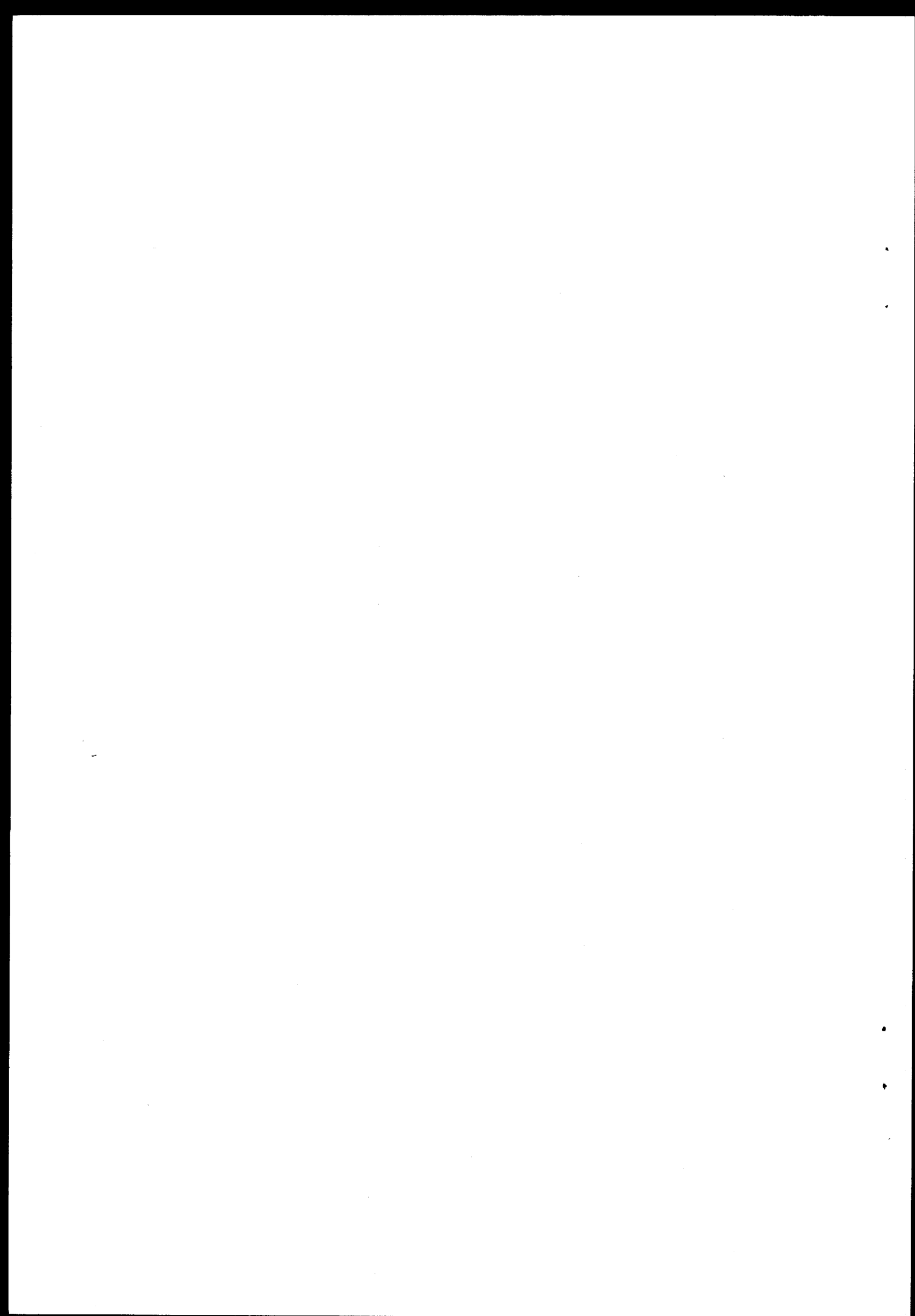


II. The use of industrial organisation in European competition policy: some illustrations.

Differences in attitude and legislation about cartels and monopolies are evident from country to country. Several factors play a role. For example, contrary to large economies, small developed open economies having weak effects on the prices of traded goods maximize their real income level by a policy of free trade; and in this situation antitrust policy is not usually important given that international trade provides an effective source of discipline on market performance. In developing countries, on the other hand, the infant industry argument is often used for justifying protection against imports as well as the adoption of various forms of regulation restricting competition at home.

More profoundly, there are differences in attitudes toward economic power (private or public), freedom of contract and trade, efficiency and equity, that are grounded in dissimilarities in political, cultural and moral history, what C. Edwards (1967) calls the "cultural inheritance". For a long time in Europe, though competition has been considered desirable, it has not been accepted as an automatic selective device by which the fittest survive. Instead emphasis was put on the moral obligation in economic affairs: competition has to be fair. The predominant American view on the contrary has relied upon the interplay of selfish motives in competitive markets that Adam Smith's invisible hand is able to convert into public virtues. It is therefore not surprising that competition policy varies from country to country and over time. It is also expected that competition policy will be the result of forces different from the simple objective of promoting efficiency. In this field, political economy explanations could be as important for understanding public policy debates as economic arguments.

It is in that relativistic context that I shall present some illustrations of the European policy towards cartels and mergers. Through them, we shall see to what extent old and new economic criteria derived from Industrial Organisation are utilized. Before that, a brief presentation of various objectives of competition policy will highlight the fact that the search of allocative efficiency is not the only criterion.



II.1. Goals of competition policy

Three main goals can be distinguished. The first one is the diffusion of private economic power, the protection of individual freedom and individual rights. Monopolies and cartels can then be seen as a radical departure from such individualism. It is in the light of these "non-economic values" that E. Mestmacker (1980) has characterized the attitude adopted by the German authorities with respect to cartels before World War II. "The Nazis", he wrote, "had shown how to transform a highly concentrated and cartelized economy into a central planning system... Boycotts and collective discrimination were applied against outsiders in order to discipline them in the public interest. If the more traditional measures of economic coercion proved insufficient for the purpose, even the formal transformation of private cartels into compulsory cartels was provided for after 1933" (p. 388). Mestmacker adds that acceptance of cartels was not limited to conservatives who cherished them as safeguards against the anarchy of free competition. Marxists also looked upon cartels and concentration as forerunners of rational socialist planning. He quotes Hilferding, who interpreted this development as tending towards "a universal cartel, that is a rationally regulated society"!

Conversely, the criterion of a diffusion of private economic power was originally basic to antitrust legislation and still occupies an important place, although perhaps more at the level of public opinion than at policy level.

A second goal of competition policy distinct from a search of efficiency may be to protect the economic freedom of market competitors. Here the protection of competitors takes precedence over the defence of the competitive process as such. Attention is directed towards abusive practices such as coercion, discrimination, refusal to sell, boycotts, and cartels through which powerful firms might endanger the existence of weaker competitors. This type of approach is particularly in evidence in the national laws regarding "unfair competition". According to the Paris Convention of 1883, unfair competition is "any act of competition contrary to honest practices in industrial or commercial matters". The corresponding laws are intended to ensure that the competitors compete in a fair way, and carry out their social functions according to an ethical code of conduct. The standard of business ethics plays an important role in developing such a code of honest trade practices, but it is ultimately determined by the common sense of the courts.

The third type of competition policy goal is dear to the hearts of economists. Competition policy is one of the main instruments to ensure consumer welfare through both allocative and productive efficiency. One of the neatest affirmations of a purely efficiency-directed competition policy has been made by R. Bork (1967). According to his view, antitrust law must challenge inefficient conduct. A necessary (but not sufficient) attribute of inefficiency is a restriction of output beyond levels which would prevail under competitive conditions. Conduct not so identified must be presumed to enhance efficiency, and should not be the subject of legal sanction.

However, new research in industrial organization has shown that simple formulas for efficiency defined as net aggregate economic welfare (consumer surplus + producer surplus), appear to be deceptive and misleading. According to J. Tirole (1989), the theoretical foundations provided by game theory "led many economists to reject the simplistic *Chicago view* of the world (based on perfect information) that price cuts are always natural responses to cost and demand shocks or to increased competitive pressure" (p. 380). More generally, with the various types of non-price competition, consumer welfare becomes more multi-dimensional and includes aspects such as the quality of the product, the speed and security of the supply and so on. Most of these aspects are not measurable and value judgments are necessary. An example is whether allocating a greater amount of resources to activities which result in technological change or product variation than would be allocated under a more "classical" form of competition contributes enough to consumer welfare to outweigh the possible losses resulting from static inefficiencies. On the whole, a precise definition of the "efficiency" criterion is more apparent than real and most of the time requires a delicate appreciation of complex trade-offs.

Three principles seem to have inspired the European authorities in this matter.

Although EC competition law encompasses many policy objectives and values, including distributive concerns, European authorities seem to have adopted the view that the rules of competition were not formulated to give protection to individual competitors but to uphold the competitive process. In its First Report on *Competition Policy* (1972), the Commission wrote :

Competition is the best stimulant of economic activity since it guarantees the widest possible freedom of action to all. An active competition policy makes it easier for the supply and demand structures continually to adjust to technological development. Through the interplay of decentralized decision-making machinery, competition enables enterprises continuously to improve their efficiency which is the *sine qua non* for a steady improvement in living standards. Such a policy encourages the best possible use of productive resources for the greatest possible benefit of the economy as a whole and for the benefit, in particular, of the consumer.

Secondly, the idea is not to strive for the realisation of perfect competition but to promote a "workable competition", that is a process of rivalry under conditions of uncertainty that achieves a more efficient allocation of resources. This would ensure mobility of resources, the provision of alternative choices for producers and consumers and the use of the best economic practices in production and distribution.

"Workable competition" does not have the same solid theoretical foundations as perfect-competition theory and implies a value judgement from the political authorities; it simply describes market structures in which new technologies, organisational forms, preferences or products can arise and be developed without public or private restrictions.

A third principle is that competition is not the exclusive means of achieving the Community's goals. Other instruments may have to be used in situations "when competition in itself is not enough to obtain the required results without too much delay and intolerable social tension" (First Report on Competition Policy, 1972, p. 17). The choice between the alternative policies available, including industrial policy, must be based on their relative efficiency.

Finally, competition policy is viewed as the key instrument to achieve a genuine European market without internal frontiers.

II.2. Concerted practices and parallelism of actions

Article 85 of the Treaty of Rome states that "*agreements between undertakings, decisions by associations of undertakings and concerted practices which may affect trade between Member States and which have as their object the prevention, restriction or distortion of competition within the Common Market shall be prohibited as incompatible with the Common Market*". Hence article 85 covers much more than formal cartel arrangements. It also embraces concerted practices, "open-price" or information agreements. Such types of collusion without formal agreement may be expected to increase when cartel agreements are forbidden. The concept of concerted practices emerges most clearly in the celebrated Dyestuffs case where manufacturers were accused of price collusion in the years 1964-7.

In 1964, some ten producers sent telexes to their subsidiaries at almost exactly the same time, telling them to raise the prices of particular dyestuffs by a uniform rate of 14 per cent in Italy and in Benelux. In January 1965, the increase was applied to West Germany.

In August 1967, a meeting of dyestuffs' manufacturers was held in Basel, Switzerland. One of them announced his intention of raising prices by 8 per cent in October. The other firms reacted by stating that the proposal would be considered. At the end of August, Geigy informed its agents and customers in several countries that prices would be raised. Other companies followed in September.

The accused companies defended themselves by stating that the *parallel action* was not concerted, but was based on the compelling force of the prevailing oligopolistic situation. In other words, the argument was that the companies could not have behaved otherwise because of the structure of the market. The defence also claimed that a firm which abstained from raising its prices could not have improved its market position because its competitors would have withdrawn their announced increases, and the profitability of all would have been impaired.

However, both the Commission and the Court pointed out that concertation of action had been in evidence: in 1964, telex messages in similar terms had stipulated equal price increases at exactly the same time. In 1965, and again in 1967, the facts belied the manufacturers' contention, and indicated gradual progressive co-operation between the firms concerned. With regard to the contention that an oligopolistic market structure compels firms to behave similarly, the response was that in the dynamic and uncertain conditions of real markets, this is not at all obviously true. In the Dyestuffs case there were several factors promoting intermittently competitive behavior, such as the interchangeability of the standard colours, the different cost structure of manufacturers and the growing over-all demand for dyestuffs.

Since that first case, there has been a proliferation of similar situations where the Commission and the Court have had to distinguish between conscious parallelism of actions and concerted practices.

Simultaneously, game-theoretic contributions have made clear that collusive equilibria can be obtained without cooperation and direct communication: firms may only intelligently react to the actions of their competitors.

The central concept is the "Nash equilibrium" from which nobody has an interest to deviate because all players have adopted their best replies.

In the context of non-cooperative repeated games, where firms never meet to communicate their strategies or to correlate their moves, it appears that a "pacifist" attitude could lead everybody to more profitable equilibria than a aggressive one.

This was already the intuition of E. Chamberlin (1933) when he wrote: "*since the result of a cut by any one is inevitably to decrease his own profits, no one will cut and, although the sellers are entirely independent, the equilibrium result is the same as though there were a monopolistic agreement between them*".

In recent years, the literature on the subject has been immense.² It has improved the identification of the structural factors that could hinder a collusive outcome that does not result from anticompetitive behaviour, such as a lack of market transparency, assymetrics among firms, dispersion of demand.

² For surveys, see C. Shapiro, 1989, A. Jacquemin and Slade, 1989 and, more recently, J. Baker, 1993

Simultaneously, many economists have attempted to measure equilibrium outcomes in markets that might be susceptible to tacit collusion. In these econometric studies, firm and industry conduct are viewed as unknown parameters to be estimated. For example, M. Slade (1987) has used daily time-series data on retail gasoline prices, sales, and unit costs, in a context of a price war. Demand, reaction function, and cost functions have been estimated. She was then able to test for tacit collusion and found support for profits higher than those implied by Nash behaviour in the one-shot game. More generally, the recent econometric studies of market power in single markets suggest that there is a great deal of market power in the sense of price-cost margins in concentrated industries (see Bresnahan, 1989).

As mentioned in the first part of this paper, game literature on the theory of collusion has an embarrassment of richness, given the large range of possible collusive outcomes.³ Consequently, it is difficult to select from such a vast multiplicity of equilibria. Furthermore, the results are sensitive to the conditions of information. For example, the distinction between collusion in homogeneous goods market and heterogeneous goods markets is not confirmed by the theory: even large diversity between firms in some dimension may not be an impediment to achieving collusion. Heterogeneity among firms may, however, become an impediment to collusion when there is asymmetric information among firms about this heterogeneity.⁴ For example, firms may have private information about their own costs, which is unobservable for competitors. In this case, it becomes a problem for firms to efficiently design cartel quotas.

At the empirical level, similar questions emerge. As an example, R. Porter (1983), in his study of the US railroad cartel in the 1880s, concluded that collusion had led to mark-ups consistent with static Cournot competition. However, G. Ellison (1994), working on the same data set and using a more careful model of the stochastic process driving demand, obtains the conclusion that prices were close to perfect collusion (quoted by K.V. Kühn and X. Vives, 1994).

In spite of these uncertainties about the robustness of the theoretical models and the enormous difficulties of obtaining the relevant statistical evidences, the European Court and the Commission are increasingly open to new economic analyses.

³ According to a "Folk theorem", under general conditions, repetition of any individually rational outcome in the stage game can be supported as a supergame equilibrium with sufficiently little discounting.

⁴ Another important aspect is the asymmetric information between the antitrust authorities and the firms which have the relevant data on costs and consumer demand (principal-agent relationship). See D. Besanko and D. Spulber (1989), who consider the optimal design of antitrust policy when collusive behaviour is unobservable and production costs are private information. See also H. Smets and P. van Cayseele (1995) who explore the best division of competence between national and supranational antitrust authorities, when these authorities are affected by asymmetric information.

The Wood Pulp case illustrates such a move. According to the Judgment of the European Court (31 March 1993), "*since the Commission has no documents which directly establish the existence of concertation between the producers concerned, it is necessary to ascertain whether the system of quarterly price announcements, the simultaneity or near-simultaneity of the price announcements and the parallelism of price announcements as found during the period from 1975 to 1981 constitute a firm, precise and consistent body of evidence of prior concertation... It is necessary to bear in mind that, although Article 85 of the Treaty prohibits any form of collusion which distorts competition, it does not deprive economic operators of the right to adapt themselves intelligently to the existing and anticipated conduct of their competitors*".

The conclusions of the Court are clear: "*It must be stated that, in this case, concertation is not the only plausible explanation for the parallel conduct.*⁵ *To begin with, the system of price announcements may be regarded as constituting a rational response to the fact that the pulp market constituted a long-term market and to the need felt by both buyers and sellers to limit commercial risks. Further, the similarity in the dates of price announcements may be regarded as a direct result of the high degree of market transparency, which does not have to be described as artificial. Finally, the parallelism of prices and the price trends may be satisfactorily explained by the oligopolistic tendencies of the market and by the specific circumstances prevailing in certain periods. Accordingly, the parallel conduct established by the Commission does not constitute evidence of concertation. In the absence of a firm, precise and consistent body of evidence, it must be held that concertation regarding announced prices has not been established by the Commission.*

Without referring specifically to the concept of Nash equilibrium, which was invoked by the defense and by the Advocate-General, the European Court, for the first time, has in fact utilized it.

In a very interesting comment, K.U. Kühn and X. Vives (1994), agree with the fact that, if information exchange would not raise the possibility of price fixing, it is hard to make a good economic case against it. But they argue that information exchange can be an independent infringement of Article 85(1). Their argument is based on the fact that the knowledge of industry characteristics required by the models to prove the existence of a tacit collusion are usually not available. For example, it is almost impossible to verify the type of demand and cost uncertainty that firms face in a particular industry.

⁵ In fact, in competitive markets with homogeneous products, equilibrium prices must be uniform, in spite of different costs. Similarly, differences in price elasticities across regions lead to less price discrimination in case of competition than with collusion.

In order to overcome these difficulties, the authors suggest forbidding as such some forms of information sharing, such as direct private information sharing on prices among producing firms, that facilitate the establishment of tacit collusion. This is in line with the new approach in industrial organization, according to which market conduct can transform market structure in order to reduce competition and make easier collusion. It also reflects the fact that given the complexities of the recent economic research in the field of tacit collusion, a pragmatic approach based on typologies can be useful.

II.3. Cooperative R&D and cartels

According to Article 85 para. 3 of the Rome Treaty, some collusive behaviour restricting competition in a non minor way may be exempted because of sufficient beneficial effects. Four conditions are required :

- (a) the agreement must contribute to the improvement of the production or distribution of goods or promote technical or economic progress;
- (b) it must allow ultimate buyers a fair share of the resulting benefits;
- (c) the restriction must be necessary for the attainment of the objective;
- (d) the firms concerned must be unable to eliminate competition with respect to a substantial part of the product in question.

What Williamson (1977) calls a "naive trade-off model" is a good way of illustrating these conditions. This model indicates that, in order to appreciate whether the cartel can benefit from the "efficiency defence", it is sufficient to compare the surface corresponding to the "deadweight loss", i.e. the loss of consumer welfare created by the cartel, and the surface corresponding to its savings in resources which become available for alternative use.

This "naive" static partial equilibrium model, with its cost-benefit analysis limited to two-dimensional terms requires a number of qualifications which strongly reduce its operationality. These qualifications include matters of timing, non-price competition, X-inefficiency, response of firms non-participating to the cartel and income distribution effects. What is in fact suggested by such a model is the difficulty of identifying precisely the efficiency consequences of business conduct and of advocating fine-tuned optimal antitrust roles. The conditions of article 85 para. 3 cannot rely on a strict welfare analysis and will often require compromise between conflicting and incommensurable values.

One way which has been used to reduce the burden of the trade-off is to implement Article 85 para.3, not so much on a case by case basis, but by granting group (or block) exemptions dealing with important types of agreements for which there exists a presumption that a situation of market failure can occur.

This system of exempting certain classes of agreements from the notification requirement avoids the necessity of a detailed analysis of each conduct. It creates codes of conduct that can increase the credibility of the policy and limit the discretionary power involved in the Article. At the same time, it preserves the Article's valuable message that antitrust policy must be sensitive to economies and that in some circumstances cooperative behaviour can restrict competition in a non-negligible way and still produce socially desirable results.

A clear illustration is the block exemption regulation of R&D agreements, which came into force in March 1985. To appreciate its content, it is necessary to examine in some depth the role of cooperative R&D.

The main arguments in favour of socially beneficial effects of cooperative research is based on a problem of market failure, bound to the appropriability of returns. The starting point is that the amount of research made by private firms and the diffusion of the knowledge generated by them may be socially inefficient over a broad range of market structure including competition. Two situations can be distinguished.

Assume first that there are no spillovers or externalities so that each firm's R&D influences only its own costs. Nevertheless, as long as firms in the pre-innovation market would not expect a perfect discriminating monopoly in the post-innovation market, appropriation of the entire social value from innovation will not be expected. Even the pre-innovation monopolist would not generally invest the socially optimal amount in R&D.

Now suppose that there are substantial R&D externalities or spillovers : the benefits of each firm's R&D flow without payment to other firms. This leads to underinvestment in R&D relative to the social optimum and to a structure of knowledge supply which is determined by the different degrees of appropriability of the various types. Incentives to innovate will also be reduced as the potential innovator knows that competitors will be freely strengthened by its own R&D investments. Some estimates of these positive externalities on other firms and industries put the social return on R&D at 20% to 25%, whereas the internal return is no more than 10% to 12% (A. Torre, 1990). The externalities have a geographical dimension too. D. Coe and H. Helpman (1993) conclude from a wide-ranging econometric survey that about a quarter of the benefits of R&D investment in the seven largest economies (the G-7) are appropriated by their trading partners.

It can then be argued that cooperative R&D can alleviate the following trade off. The incentives of a firm to do R&D requires a sufficient degree of appropriability of the benefits, and thus a limited diffusion of knowledge; but on the other hand a near-perfect appropriability (whether created by circumstances or policy) impedes spillovers of the results of R&D to other firms, at no-cost, and hence does not allow a sufficient decrease in aggregate R&D costs.

Cooperative R&D can then be viewed as a means of simultaneously internalizing the externalities created by significant R&D spillovers - hence improving the incentive problem and providing a more efficient sharing of information among firms. D'Aspremont and Jacquemin (1988) have used a model to study the impact of R&D spillovers on a firm's optimal R&D investment. In comparing the symmetric cooperative and non-cooperative solutions, they find that large spillovers lead to higher R&D expenditures and production levels under the cooperative scenario: this behaviour is superior from a social welfare point of view.⁶

Contrasting with these potential advantages of cooperative R&D, effects leading to a harmful reduction of competition must also be considered.

First, let us assume that it is feasible to limit the extent of the agreement solely to aspects of R&D and to exclude coordination at the level of the final product (pre-competitive level). The dangers of anticompetitive consequences are then strongly reduced. Still, one danger is that cooperative R&D could be a way for a dominant firm to avoid competition through innovation, by co-opting potentially very innovative rivals and by controlling and slowing down the innovation race (Reinganum, 1983). Coordinating the R&D process so as to avoid duplication can reduce initiative and lead to inflexibility and to waste in dead-end research, when multiple, not perfectly correlated research strategies could have been feasible. At the other extreme, incumbent firms with market power can, through concerted pre-emptive operations, excessively accelerate their programmes of R&D and innovation in order to exercise a dissuasive impact of potential entrants (Gilbert and Newbery, 1982).

⁶ These results have been generalized. For references, see d'Aspremont and Jacquemin (1990).

A second situation involves an extended collusion between partners, resulting from their action in R&D and creating common policies at the product stage (competitive level). Discussions about R&D can for example spill over into illegal discussions on pricing policy. Cooperative R&D can also provide a ready mechanism for side payments in the sense that it is useful for cartel members to redistribute the revenues earned by the firms as a result of product market division. What makes these dangers probable is again the difficulty of appropriating technological breakthroughs. Partners who have achieved inventions want to control the processes and products which embody the results of their collaboration, in order to recuperate jointly, and as quickly as possible, their R&D investments. If the firms are prevented from such a joint exploitation and if the benefits of cooperative R&D are expected to be very quickly dissipated through intense product market competition, firms will be tempted either to avoid R&D cooperation and to maintain wasteful competition in the pre-innovation market or to use their cooperation to limit unduly their R&D. If this is true, a regulation of R&D cooperation excluding any cooperation at the level of the final markets could discourage or destabilize many valuable agreements. However, allowing an extension of cooperation from R&D to manufacturing and distribution encourages collusive behaviour which impedes competition.

Again, we may conclude that the models produced by the new Industrial Organisation in this domain have improved the quality and the relevance of our analysis. Nevertheless, simultaneously, they have made the dilemma faced by the Antitrust Authorities more complex.

The text of the European Regulation 418/85 expresses the compromise that has been adopted. It covers joint research and development of products or processes and joint exploitation of the results of that R&D.

Art. 1(2)(d) specifies that "exploitation of the results" means the manufacture of the joint venture product or the licensing of intellectual property rights to third parties. However joint marketing is not covered. An exemption could still have been obtained on the basis of Article 85 para. 3, following a notification. In 1990, the Commission granted such an exemption to the cooperation agreement on the research, development, production and marketing of certain electronic components for satellites, concluded by Alcatel (France), the second largest world manufacturer of communication equipment and systems, and ANT, one of the leading companies in Germany in the field of telecommunications (see EC Commission, XXth Report on Competition Policy, 1991).

One of the arguments was that, in the particular field of satellites, the nature of demand means that the benefits of joint R&D and manufacturing can be obtained only if they are combined with some joint marketing. Finally, in 1993 (Regulation n° 151/93, OJ n°L021, 29/01/93), the 1985 Regulation was amended so as to extend cover to joint distribution of specialized products or products resulting from joint research and development.

However, various conditions limit the exemptions.

By imposing conditions concerning the duration of the venture and the importance of the market share, the regulation aims to prevent agreements that might result in the elimination of competition in the relevant market. If the joint venture is of the conglomeral or vertical type, i.e. if the participants do not compete on the relevant product market, the exemption applies for five years, regardless of market share. If the joint venture is of the horizontal type, the exemption also applies for five years, but only if the parties' combined share of the relevant product market does not exceed 20%. A comprehensive list of permissible clauses (the so-called white list) and prohibited (the so-called black list) is also included.

The main aspect of the Regulation is that the European authorities, confronted with the above dilemma, take into account the factors identified by economic analysis but adopt a pragmatic approach. They consider that cooperation in R&D, in many cases, cannot be limited to the sole level of pure R&D, and that it will generally lead to joint exploitation of the results in order to stabilize the agreements and to solve the appropriability problem. A priori, this approach has not a strong economic foundation given that external effects are more likely in basic, upstream research. But this could be challenged if one implies that R&D is an endogenised process, responding to the pressures of end users. Today this "non-linear" view of the innovation process exercises growing influence on the European R&D policy (see the Green Paper on Innovation, 20/12/95).

II.4 Mergers and efficiency defence

Many economists give weight to the arguments that mergers and acquisitions are able to enhance efficiency by exploiting economies of scale and scope, learning economies, and also by improving the efficiency of management through the market for corporate control. However, the empirical evidence for this view is not strong. Coley and Reinton (1988) looked at U.S. and British companies in the *'Fortune'* 250 list and the *'Financial Times'* 500 which in the past had made acquisitions to enter new markets. They conclude that only 23% of the 116 firms analysed were able to recover the cost of their capital or, better still, the funds invested in the acquisition programme. It also appears that the higher the degree of diversification, the smaller the likelihood of success. For horizontal mergers in which the acquired firm is not large, however, the success rate is around 45%. The main reasons for failure appear to be: too high a price paid for the acquisition, over-estimation of the potential of the acquired business in terms of synergies and market position, and inadequate management of the process of integration after the acquisition.

More generally, there is a striking contrast between ex ante event studies of the corporate mergers' potential gains and the ex post evaluations of the effective results. In his introduction to a special issue of the *International Journal of Industrial Organisation* on 'mergers', Mueller (1989) concludes that prior to the mergers the shares of acquiring firms tend to outperform the market. At the time of the announcement, there is little change in the acquiring firm's share price. The post-acquisition performance of acquiring company share prices is below their pre-merger performance, and in many studies below that of the market. This post-merger performance matches the constant or declining performance of the acquired units measured in profitability, market shares or productivity. 'This pattern appears to be characteristic of mergers in the United States over at least the last 60 years, and probably the last century. It also appears characteristic of mergers in Europe and Japan.'

This suggests that, in many cases, there is no real trade-off between efficiency gains from mergers, notably in the form of cost reductions and an increase in monopoly power, because in the first place efficiency gains are simply not there. Still there are situations where the trade-off can be relevant.

In that case, the antitrust authority has the task of deciding whether efficiencies outweigh the increased risk of collusion. Indeed a horizontal merger reducing the number of independent firms permits coordinated use of previously independent productive assets (capital, patents, trademarks...) and increases concentration in the relevant market. This can lead to higher prices.

At this stage, we again meet the situation created by the development of economic analysis. On one hand, industrial organisation economics has improved the criteria and the tools that can be used for evaluating the effects of a merger. However, on the other hand, the new dimensions to be taken into account are very complex and sensitive, and the information that antitrust authorities possesses is generally inadequate to permit a full-blown cost-benefit analysis.

Two important examples, calling into question the "naïve" trade-off analysis mentioned in the previous section, support that view.

The first one concerns the static case. J. Farrell and C. Shapiro (1990) provide a model where they analyze the output and price effects of a merger among Cournot oligopolists, emphasizing the effects on nonparticipant firms. Their main contribution is an identification of the role of the response of these nonparticipant firms, to any output reduction by the merging parties. If nonparticipating firms reduce their output, the merger may well lower welfare even though it is profitable. On the contrary, if nonparticipant firms with large mark-ups expand their output noticeably in response to the merger, a significant welfare gain can be provided.⁷ More generally, a merger's effect on total welfare is made of three components: the change in joint profits of the merging firms, the change in profits of the nonparticipant firms and the change in consumers' surplus.

Could this notable improvement in the identification of the effects of mergers lead automatically to a better merger policy? In their reply to a comment by G. Werden (1991), the authors (1991) adopt a prudent attitude and underline three limitations of their analysis:

- "whether or not the Cournot model is helpful for merger policy is very hard to know ex ante: clearly the assumptions are false, but it is much less clear whether they are false in such important ways that the conclusions are misleading";
- the analysis "relies heavily on the assumption of homogeneous products";
- "the Cournot model ignores the possibility of explicit collusion".⁸

And they conclude: "it would shock us... if the Department of Justice and the Federal Trade Commission were to decree that, henceforth, proposed mergers should be analyzed solely using the Farrell-Shapiro model". It remains that their analysis could contribute to a better antitrust policy toward mergers.

⁷ Let us recall that, in a Cournot equilibrium, large mark-ups are associated with large market shares, and large firms have lower marginal costs.

⁸ Another limit has been identified by P. Barros and L. Cabral (1994). They analyse the case of an open economy where the regulator is only concerned with domestic welfare, i.e. the impact on consumers and domestic firms. One of their conclusions is that the criterion proposed by Farrell and Shapiro should not be followed "literally" in such a case.

A second illustration of the limits of the traditional "trade-off" concerns the dynamic effects of a merger.

J. Ordober and W. Baumol (1988), in their analysis of mergers in high-technology industries, conclude that mergers in high-technology industries, in which technologies and products are short-lived, should raise fewer concerns than similar mergers in industries which have entered their stable phase. This suggestion holds as long as high-technology mergers do not combine firms with large shares of substitute R&D assets that also require large shares of market specific assets for their effective exploitation. On the whole the message here is that, when there is a trade-off between static and dynamic efficiency, it is wise to favour the long-run dynamic performance that is expected to ultimately overcome any static loss.

Still, the existence of such a trade-off can be questioned. Some evidence suggests that R&D is not characterised by substantial economies of scale and that monopoly power can be expected to inhibit R&D and technological advance in the long run. Furthermore, avoiding wasteful duplication, internalising external effects and ensuring a large dissemination of knowledge could be obtained through less dangerous devices than full mergers, such as R&D cooperation at the "precompetitive stage". What can be effectively argued, in the application of merger policy, is that in industries characterised by short-lived high-technology and rapidly expanding demand, all other things being equal, the prospect of efficiency gains is enhanced and the danger of monopoly power is limited.

It is in that context that we shall look at the European Regulation of mergers. The absence of such a control provision was, for a long period, a major gap in EC competition policy. The Commission finally succeeded in getting the Council of Ministers to adopt a Regulation in December 1989. It applies to mergers having a Community dimension as defined by a combination of criteria relating to total turnover and geographical distribution of turnover within the Community - aggregate worldwide turnover must exceed Ecu 5.000 million, and aggregate EC turnover of each of at least two firms has to exceed Ecu 250 million.

As we have seen, considerations of efficiency are expected to enter into merger appraisal. For example, under the 1984 revision of the US Guidelines, mergers likely to raise prices will be permitted if the parties can demonstrate by "clear and convincing evidence" that the merger is "reasonably necessary" to create significant cost savings or other efficiency benefits.

In contrast, the European Regulation has adopted a strict approach: the wording suggests that the regulation contains no defence similar to the one stated in Article 85 par. 3 for cartels, and that effective competition is the only reference. The wording also implies that only the consumers' surplus, and not the producers' surplus, is retained: apparently some sacrifice of consumer interest for the sake of higher profits is not accepted.⁹

It is hard to believe that in practice such a strict policy will be fully implemented and that the role of potential efficiency gains will be ignored.

In fact, the danger is that instead of an explicit cost-benefit analysis, surreptitious compromises would be sought within the Commission. This already appears in the first negative decision taken by the Commission. In that case, it prohibited the acquisition of de Havilland, a Canadian subsidiary of Boeing, by Aérospatiale of France and Alenia of Italy. The Commission argued mainly that the merger would have given de Havilland and ATR (the Franco-Italian joint venture) 50 percent of the world market and 67 percent of the EC market for commuter aircraft with 20 to 70 seats. This would have created a dominant position, affecting even the largest producers (such as British Aerospace and Fokker), with no competition from the United States or Japan. Whatever its specific merits and problems (especially the definition of the relevant market), it can be argued that this decision is important: even in a "special" sector such as aerospace, the Commission seems to stick to the principle that mergers and takeovers should be judged purely on competitive grounds.

However, there are some ambiguities about the role of economies in the decision. Having established that the ATR/de Havilland merger would lead to a reduction in competition, the Commission states: "without prejudice as to whether cost saving considerations are relevant for the assessments under article 2 of the Merger regulation, such cost savings would have a negligible impact on the overall operations of the ATR/de Havilland, amounting to around 0.5% of the combined turnover". According to Jenny (1992), "this decision offers some solace to the economists in that, although the Commission refuses to say explicitly whether productive efficiency gains are relevant for considering whether or not a merger is compatible with the common market, it nevertheless does discuss the importance of the manufacturing cost reductions alleged by the parties in a way that, at least implicitly, suggests that productive efficiency gains must be compared to the potential losses of consumer surplus due to the increase in concentration brought about by the merger." (p. 95).

⁹ Assuming that a merger must be profitable for the firms that are willing to be part of it, this implies that an increase of the sum of the consumers' surplus and profits by firms not participating is not a sufficient condition for allowing a merger.

In another decision on the acquisition of NCR (a computer manufacturer) by ATT (January 1991), the Commission seems to go further and argue that the merger could have been illegal because it would yield economies, and hence create or strengthen a dominant position. Its conclusion was that the potential advantages which ATT hopes to gain from this concentration are for the moment theoretical and have yet to be proved in a future market place. This suggests that had the Commission believed that the merger was likely to contribute to economic progress, it would have considered opposing it.

An implication of such a situation is that a strict and apparently rigorous approach emphasising the preservation of effective competition could lead to perverse effects according to which subreptice compromises between competition policy and industrial policy are made (see P. Buigues, A. Jacquemin and A. Sapir, 1995).

Conclusion

The complexity of human behaviour is especially evident in the world of economics and corporate strategies. In this domain, simple mechanic laws and repetitive processes lose part of their relevance as a result of strategies that transform and manipulate the existing environment. Productive and organisational structures are not simply the outcome of some sort of natural necessity. They result largely from deliberate choices.

In this context, Industrial Organisation economics has, over time, elaborated important concepts, models and typologies that reveal the richness of corporate conducts. Simultaneously, however, it is far from an exact science, and its results remain fragile.

Implications for the regulators, and more specifically the Antitrust Authorities, are ambiguous. On the one hand, they can rely on the new theoretical and empirical analyses, to the extent that they identify more and more effectively the diverse characteristics of our real industry economy. On the other hand, the very limited information at the disposal of these Authorities and the difficulty in coping with complex tradeoffs, especially for the Court, constrain the effective use of the new knowledge.

Our illustrations of the European policy towards concerted practices, cooperative R&D and mergers have shown how the Commission and the Court are trying more and more to adopt a workable approach, combining "science" and pragmatism, relying on presumptions and shortcuts that reflect current economic knowledge and belief.

An important implication of this approach is that the "experts" involved in a case are expected to be modest. As R. Schmalensee (1987) wrote, *"economists cannot testify with the confidence of experts on ballistics and fingerprints."*, and, we may add, even if they are very well paid.

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