Introduction

George Norman and Jacques-François Thisse

In his doctoral thesis published in 1962, Louis Phlips argued that European firms in the cement industry attempted to coordinate their actions by using basing-point pricing systems and more or less formal agreements about geographical markets. At the time that Louis was formulating his ideas, European competition policy was still in its infancy. It is perhaps no surprise that those who were formulating policies at that time paid little attention to the work of a doctoral student. It is somewhat ironic that these have come to centre stage at the end of Louis' distinguished academic career. It is also amusing to note that after a long and productive detour through consumption analysis, applied econometrics and industrial economics, Louis himself has chosen to return to his original love as shown by his *Competition Policy: A Game-Theoretic Perspective*.

Game-theoretic methods are now indispensable in the design, formulation and testing of competition policy in Europe and anti-trust policy in the United States. Until very recently, the connection was from market structure through market behaviour, as explained by game-theoretic tools, to competition policy. We can see this timeline, for example, in the formulation of merger policy and policies with respect to cartels. What is new is the realisation that this is a two-way street. Just as market structure affects competition policy, competition policy equally affects market structure. As European competition policy is becoming more active, it has become increasingly endogenised in the strategic decisions of the firms whose behaviour the policy is intended to affect. It is dangerous for policy makers to ignore this change in behaviour. For example, we are now aware that in some circumstances making a market more competitive is not necessarily beneficial to consumers. Rather, the additional competition may increase market concentration and may facilitate tacit or even explicit coordination among the surviving firms. This connection from competition policy to market structure and the welfare effects of policy is a recurrent theme of this book.

Louis' early interest in basing-point pricing extended to spatial price policy when he wrote a report for the European Commission in 1976. This culminated in his book on *The Economics of Price Discrimination* that had a significant influence on scholars and policy makers alike. An essential preliminary to any discussion of price discrimination is that we should be able to define what we mean by 'discriminatory prices'. The conventional definition prior to Louis' analysis was that price discrimination exists when the same product is sold to different consumers at different prices but this is unsatisfactory, for at least two reasons. First, such a definition might lead us to conclude that price discrimination exists when a company sells its product in two different cities – say, New York and London – at different prices. Clearly this conclusion would be wrong since it ignores the different costs of supplying these two cities. Secondly, we might conclude that there is no price discrimination if the firm sells its product in London and New York at the *same* prices. This is equally wrong since the prices now do *not* reflect the different costs of supplying these two cities. Louis was able to circumvent these problems by providing us with the following definition:

> Price discrimination should be defined as implying that two varieties of a commodity are sold (by the same seller) to two buyers at different *net* prices, the net price being the price (paid by the buyer) corrected for the cost associated with the product differentiation. (Phlips, 1983, p. 6, emphasis in the original)

Applying this to our example, price discrimination exists if the difference between the London and the New York prices is not equal to the difference in the seller's marginal costs of supplying London and New York.

Starting from this definition, Louis was one of the first to point out that price discrimination is a pervasive marketing practice that survives despite the attempts by regulators to limit or eliminate its use. This might come as no surprise if we were to consider only situations where firms are able to exercise considerable market power since price discrimination provides the firm with a remarkably efficient means by which consumer surplus can be converted into profit. What was more surprising and influential was Louis' clear demonstration that price discrimination is widespread in oligopolistic and more generally imperfectly competitive markets. Moreover, he showed through both theory and evidence that the degree of price discrimination present in such markets is, if anything, *stronger* than would characterise a monopolist in the same markets. This analysis set an agenda that remains current and active today.

European cement manufacture provides a classic case study of many of Louis' ideas. The price and competition policies of the major manufacturers are under scrutiny by the European Commission. Chapter 1, by d'Aspremont, Encaoua and Ponssard shows how the questions that motivated Louis Phlips in his doctoral dissertation can be revisited using modern game-theoretic techniques. In particular, these authors discuss the relationship between spatial pricing policies and market behaviour and performance in an industry characterised by high transport costs. Their analysis provides an important illustration of the connection noted above between competition policy and market structure. Denying cement firms the use of, for example, basing-point pricing, has increased price competition but has also been associated with a dramatic increase in market concentration.

There is a related issue that also recurs in a number of chapters in this book: the role of *information*. d'Aspremont, Encaoua and Ponssard discuss the impact on prices of facilitating practices such as most-favoured customer clauses or meet-the-competition promises. Recent analyses suggest that this kind of information exchange between firms changes the resulting market equilibria from Bertrand to Cournot, with the surprising result that consumers lose out. These authors show that this is a short-run effect only that ignores the connection between the competitive environment and long-run market structure. The idea behind this is in fact very simple and general. If firms expect tough competition (e.g. *à la* Bertrand) we are likely to see greater industry concentration and higher prices than if they anticipate soft competition (e.g. *à la* Cournot).

Competition policy is still evolving in the European Union, perhaps because such a policy is relatively young in Europe by historical standards. This is in sharp contrast with the long history of anti-trust policy in the United States. Neven in chapter 2 correctly points out that European policy makers could benefit from applying some of the lessons that have been learned in the United States. There are some common elements. For example, on both sides of the Atlantic, the principle is emerging that the possession and exercise of market power is not of itself evidence of violation of competition or anti-trust rules. Rather the appropriate courts have to find evidence of explicit coordination when there are several firms involved, or evidence of attempts to extend market power when the market is effectively monopolised. Microsoft was not being investigated because it has an effective monopoly of operating systems. It *was* being investigated to see whether it has tried to use its operating system monopoly to extend its market power into browser markets. By contrast, there are some sharp distinctions between United States and European policies. Neven points to two of these. First, it is reasonably common practice in the United States to take the existence of market power as an indication of the possibility that there is coordination between firms. Secondly, the United States anti-trust authorities tend to take the existence of facilitating practices as a presumption of coordination. Neither principle is yet established in Europe.

There is a major difficulty confronting the Commission in its pursuit of coordinating practices that is well articulated by Friedman in his insightful discussion of the Folk Theorem in chapter 3. This can be simply stated. Once firms recognise that they interact repeatedly, then it is possible for them to settle on a non-cooperative dynamic equilibrium that looks very like a market outcome that would emerge from explicit coordination. This is an example of what Louis Phlips has referred to as the 'indistinguishability problem'. The theory of repeated games suggests that firms can form non-cooperative strategies that support collusive outcomes. These strategies always involve some credible threats to punish deviations. It is difficult to see how these threats can be made credible without their being communicated between the relevant firms since in principle they are never actually observed. The act of communication is in violation of competition policy, but is remarkably difficult to observe.

An equally difficult issue facing both the Commission and the international trading community is the design and implementation of effective anti-dumping (AD) legislation. These problems are eloquently addressed by Tharakan in chapter 4 and draw together two important themes of Louis' work: price discrimination and the design of competition policy, in this case at the supra-national level. A particularly interesting feature of the use of AD measures is the dramatic proliferation in the number of countries initiating such measures. In 1990 four groups launched around 82 per cent of AD investigations: Australia, Canada, the European Union and the United States. By 1997 this proportion had fallen to less than 49 per cent with AD actions being actively used by a number of developing and Newly Industrialising Countries (NICs). There is a danger that the strategic use of AD measures will seriously undermine movement towards multilateral trade liberalisation. Indeed, there is the real-risk that these measures will lead to the escalation of protectionism under the guise of measures purported to ensure some kind of 'level playing field' in international trade.

Tharakan points out that the welfare effects of AD legislation are at best ambiguous – a conclusion that applies equally to legislation intended to prevent price discrimination. Indeed, most of the analysis that has been conducted has concluded that AD legislation actually imposes large welfare losses on both the exporting country *and* the importing country that initiates the AD investigation. The solution that is suggested to correct the detrimental strategic and welfare consequences of AD actions is to change the regulations developed by the World Trade Organisation (WTO) and individual nation states on AD legislation, restricting their application to cases of predatory price dumping. This type of dumping does have detrimental welfare effects and needs to be corrected. Identifying such dumping suffers from many of the same problems that confront the anti-trust authorities in trying to prove predatory pricing *within* a country: another application of Louis' 'indistinguishability problem'. Tharakan points out, however, that a number of new methods have been developed for detecting attempted predation. One particularly useful such test involves a 'two-tier approach'. First, assess the market power of the supposed predator: only if such power exists is predatory power either feasible or likely. For those cases that 'pass' the first test, consider price–cost and other factors. It is a relatively simple matter to extend this type of test to the international arena. If this had been done, Tharakan notes that its impact would have been to reduce significantly the number of AD complaints that reach the second-tier test.

We noted above that there is an important link from competition policy to market structure that has been neglected by policy makers, both in Europe and in the United States. The next group of chapters focuses on this link from different perspectives. Norman and Thisse in chapter 5 argue that the naive application of the idea that competition is always and everywhere desirable may have unforeseen and harmful effects. Policies that create too tough a competitive environment may be detrimental to consumers and social welfare through their impact on firms' medium- and long-run decisions. The stronger are the structural effects of competition policy, the more likely is it that blind adherence by the anti-trust authorities to the benefits of competition is misguided. In particular, these authors show that consumers are likely to lose from price deregulation in markets characterised before deregulation by high levels of concentration. This suggests a role for regulators that has not been considered, despite the fact that it lies at the heart of the Folk Theorem of repeated games: the regulator should impose a minimum period of time over which prices cannot be changed. Such a slowing in the speed of response undermines the effectiveness of the punishment that supports the tacitly collusive outcome.

The same trade-off between tough competition and concentrated market is also at the centre of d'Aspremont and Motta's work and concerned Phlips in the introduction to *Applied Industrial Economics*. In chapter 6, they develop a similar set of policy conclusions, using a different setting. Specifically, they consider a situation in which anti-trust authorities attempt to break down price coordination to create an environment in which prices are set competitively. In so doing, the variety of products is reduced, prices are increased and consumers are worse off.

Hamilton in chapter 7 considers a related but somewhat different set of ideas. In the United States, the Federal Trade Commission (FTC) regulates advertising. In particular, it has developed policies to prevent the use of 'bait-and switch' tactics. If a firm advertises a low price, it must also be able to show that it has sufficient inventory to meet anticipated demand. This can be a significant constraint on the firm but it can be circumvented if the firm offers a 'raincheck'. This is a promise to supply at the sale price once new inventory has been received. What Hamilton shows is that the requirement that rainchecks be offered deters vigorous competition. Again, a policy designed to protect consumers may actually harm them.

The idea that competition policy may drastically affect market structure is illustrated in chapter 8 by Martin in a yet different context. Suppose that firms can undertake R&D that leads to process innovations. The firms may also collude and the competition authorities take market performance as a signal of the potential existence of collusion. Martin shows that a stronger competition policy reduces both pre-innovation and post-innovation profits, but the latter relatively less than the former. Consequently, tougher competition policy induces additional R&D spending. The additional R&D, by reducing costs, also reduces the probability of investigation by the authorities. This is not necessarily beneficial to the collectivity. There is an inverted U-shaped relationship between competition policy and expected net welfare. Once again, a moderately strict competition policy improves welfare; excessively strict competition does not.

Regulation remains one major dimension of competition policy, particularly in its application to the behaviour of previously state-owned monopolies that have been privatised, or the creation of new natural monopolies such as cable television. The interesting issues are, first, the design of regulatory policy itself and, secondly, whether it is possible to create a competitive environment in some industries. De Fraja in chapter 9 discusses some of the main issues that arise in the design of regulatory regimes. Recent analyses have discussed how competition and regulation affect industry performance and how the interaction between the regulator and the regulated affects industry structure in ways that are determined by the regulatory rules. What De Fraja shows is that a wide variety of outcomes can arise, leading to the need for a case-by-case approach to the modelling of the interplay between the regulator and the regulated.

The final three chapters of this book open new avenues for research in which competition policy, while not yet developed, will undoubtedly have an important role to play. It is fair to say that time is at best implicit in many game-theoretic contributions to the design of competition policy. Yet, entry and exit of firms arise in real-time and seems to exhibit some robust stylised facts: (1) entry is frequent and relatively easy; (2) entry tends to be associated with innovation; (3) entrants suffer a high failure rate and (4) exit follows successful entry. Ponssard in chapter 10 develops a dynamic model of competition that has the potential of exhibiting many of these features. The main message to be drawn from his analysis is that the outcome of the entry/exit dynamics will be determined by the interplay between competitive advantage that tends to favour entrants and mobility barriers that tend to favour incumbents.

The banking industry has often been considered as a prototype of a competitive market. However, the large number of mergers observed in recent years suggests that it is now more appropriate to see these markets as being oligopolistic. Although the banking sector has been and is still very regulated, very little attention has been paid to the process of competition between banks. In order to develop appropriate tools in competition policy, one must develop a better understanding of the future working of this sector because of its new more concentrated structure. In this perspective, de Palma and Gary-Bobo in chapter 11 present one of the first modellings of oligopolistic competition of the banking sector. They show that the behaviour of banks is potentially unstable in that a small change in the underlying parameters can induce a sharp change in equilibria – for example, from safe to risky. Their contribution thus sheds light on the importance of determining the role of the central bank as a regulator of competition in this sector.

The spirit of chapter 12 by Wauthy and Zenou is similar in that it invites us to think of other institutions as possible actors in the design of competition policy. It draws our attention toward the interaction between the product and labour markets. By affecting the product market, the anti-trust authorities may influence the choice of technologies and, therefore, the need for skilled or unskilled workers. One is not accustomed to think in these terms but their contribution leads us to think of the possible implications for workers of competition policy as well as of the connections between competition policy and training.

1 Competition policy and game-theory: reflections based on the cement industry case

Claude d'Aspremont, David Encaoua and Jean-Pierre Ponssard

1 Introduction

Is the main objective of competition policy the *maintenance of competition per se* or the *promotion of economic efficiency*? These two goals do not necessarily have the same basis or the same implications.[1] The goal of maintaining competition *per se* can be justified morally, politically and legally by the wish to protect individual freedom and rights, and by limiting the power of agents. This faith in the democratic virtues of interacting competitive forces is grounded in a political philosophy which sees regulatory mechanisms resulting from *impersonal* market forces as a guarantee against the arbitrariness of authority, whether public or private. In this sense, competition is a right which warrants protection. Economically, competition is not considered as an end in itself but rather as a mechanism for allocating resources which in many, if not all cases, promotes economic efficiency. The question the economist has then to answer is whether or not, depending on the circumstances, competition promotes the reduction of costs, the selection of the most efficient businesses, the welfare of consumers, the creation of new products, the entry of new enterprises, the development of technological progress and innovation and so on.

To what extent do these two goals of competition policy overlap? Before setting out our framework to formulate an answer to this question, let us introduce the basic issues.

Clearly, if competition policy adopted an exclusively normative approach, consisting of the decentralised inducement of an efficient

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[1] See, for example, Jenny (1993); Encaoua (1997).

allocation of resources, based on the perfectly competitive behaviour of firms, the convergence between the above two goals would be total, according to the First Welfare Theorem. Such an approach means, however, that each business would be obliged to comply with the rule of maximising profits by taking the environment in which it operates as fixed – an outrageous requirement. We know that that is not how competition policy functions. Rather than decreeing rules *a priori*, free competition limits itself to prohibiting certain types of behaviour judged to be reprehensible in so far as they hinder the free play of market forces. However, the interpretation of this notion is tricky since no precise system of reference exists for judging deviant behaviour.

Thus, in many oligopolistic sectors the reference to 'perfect competition' is totally unrealistic. Market forces are not impersonal and the limited number of actors naturally leads firms to adopt strategic behaviour in which they anticipate their competitors' reactions. We have thus to ascertain which rules would need to prevail on these markets in order to ensure that the discrepancy was not too great between the principle of maintaining rivalry, implicit in the free play of market forces, on the one hand, and the concern to enhance economic efficiency and the social optimum, on the other.

The independent behaviour of the different actors is one of the guiding principles of all competition policies; they defend this rule by opposing anything which may indirectly facilitate collusion between firms (agreements or information exchange concerning prices, quantities produced or capacities, etc.). However, this type of approach is soon limited without an appropriate conceptual model to analyse imperfect competition as such. It results, for example, in only explicit agreements being condemned while tacit collusion becomes acceptable, the latter being seen as an expression of rational behaviour between independent agents with a common perception of their environment.[2]

With the formalisation of imperfect competition by means of game-theory, another step forward can be taken. The ambiguous notion of parallel behaviour is replaced by the more precise one of non-cooperative equilibrium. It then becomes possible to reflect on the interaction between

[2] Wood pulp is a case in point. The alignment of prices among about 50 wood pulp producers was judged by the European Commission to be an expression of a concerted practice. The European Court of Justice (ECJ), however, regarded wood pulp to be an homogeneous product for which the market is perfectly transparent. It considered that the firms may have reacted identically to modifications in their environment without any formal agreement. For the European Commission decision (19 December 1984), see the *Official Journal of the European Communities*, *L*851, and for the ECJ judgement in the appeal case (31 March 1993), see *Recueil de la Jurisprudence de la Cour de Justice et du Tribunal de Première Instance*, I, 1993, 3. For a case study, see Phlips (1995, pp. 131–6).

certain rules of the game and the degree of economic inefficiency of the non-cooperative equilibrium which may result from it. Some rules may then appear to be less effective than others and be condemned as such, whereas others will be encouraged. This approach thus provides a more powerful frame for examining competition policy.

The present chapter develops this type of analysis in relation to the cement industry. It considers several rules concerning price policy, the exchange of information and external growth operations (mergers and acquisitions), with particular reference to models derived from game-theory.

The cement industry is a typical example of an oligopolistic sector. Cement is an homogeneous good for which the price elasticity of demand is weak, production requires heavy investments and distribution involves high transport costs. Consequently, there are often few local competitors. They are, however, subject to competitive pressure from the outside, from distant firms which try to sell at marginal costs.

The sector has a rich history of anti-trust cases in the United States, Europe and Japan, which have provided subject-matter for an extensive literature on the various standpoints taken. In the present chapter we draw essentially on the cases referenced in the historical analysis by Dumez and Jeunemaître (2000). In some of these cases there is clear proof of agreement while in many others the questions concern practices with far less obvious effects – e.g. the choice of price regulation (the use of points of parity, for instance), the role of information exchange between competitors and the choice of the relevant market for analysing concentration.

We shall consider these questions of principle in the light of several theoretical developments which are particularly relevant to a study of the cement industry.

First, what is the impact of a *pricing system*, in relation to its degree of discrimination, in a context of horizontal differentiation? Numerous studies have focused on this question since the first articles by Spence (1976) and Salop (1979). Most reached the classical conclusion that more competitive pricing had a positive impact on welfare (Phlips, 1983). Norman and Thisse (1996) examined the same question by considering the role of the irreversibility of investments. They show that highly competitive pricing may lead to greater market concentration and ultimately to a loss of welfare for the economy as a whole.

The second question concerns *information exchange* – or, more generally, trade practices which shape competition. How are they justified and what is their impact? Information exchange usually concerns commitments to align prices on advance notification. But there are other facilitating