

## COMPETITION POLICY: TOWARD A NEW APPROACH

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### A. INTRODUCTION

Recently many economists have pointed out the necessity of a closer focus on consumer welfare in the implementation of competition policy with specific reference to abuses of dominance. While antitrust legislation was written with this objective in mind, its concrete application has often been biased against market leaders and in defence of their competitors rather than toward the defence of competition and of the interests of consumers. The two objectives do not necessarily overlap. The development of the New Economy, characterised by very dynamic and innovative markets, has increased the pressure for a new approach, already somewhat developed in the US but just in progress in the EU. In July 2005 a EU Report by a group of important economists, Rey *et al.*,<sup>1</sup> argued in favour of an effects-based approach to competition policy which associates abuses of dominant positions with anti-competitive strategies that harm consumers. The proposal is an interesting starting point to build a new approach to antitrust.

A new approach to competition policy should be based on rigorous economic analysis, from both a theoretical and an empirical point of view. Rey *et al* emphasise this element in the antitrust procedure:

“a natural process would consist of asking the competition authority to first identify a consistent story of competitive harm, identifying the economic theory or theories on which the story is based, as well as the facts which support the theory as opposed to competing theories. Next, the firm should have the opportunity to present its defence, presumably to provide a counter-story indicating that the practice in question is not anti-competitive, but is in fact a legitimate, perhaps even pro-competitive business practice.”

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<sup>1</sup> P Rey, J Gual, M Hellwig, A Perrot, M Polo, K Schmidt and R Stenbacka, “An Economic Analysis to Article 82”, Report of the Economic Advisory Group for Competition Policy (European Union, 2005).

Moreover, any theory of the market structure able to provide guidance in detecting abuses of dominant positions should: (1) take into account the role and the strategies of dominant firms; (2) describe the equilibrium outcomes, taking into account the existence of barriers to entry and fixed costs of entry (which can endogenously determine entry of competitors), and in function of the demand and supply conditions; and (3) provide welfare comparisons under alternative set-ups. In other words, we need a simple theory of market leadership which is general enough to be applied to analyse markets under many possible situations: different demand conditions or production technologies characterised by different cost functions, possibly by network externalities or learning by doing, different modes of competition as “in prices” or “in quantities”, different strategic investments as in advertising, product differentiation or R&D, bundling strategies, multimarket and dynamic strategies, and so on.

Recent theories of the market leadership, inspired by the classic analysis of pioneers such as Stackelberg on leadership in duopolies, Schumpeter on innovation by monopolists and Modigliani on entry deterrence in oligopolies,<sup>2</sup> and generalised (and formalised in game theoretic terms) by recent theoretical works,<sup>3</sup> have provided a simple unified framework which matches these requirements. They are not the only available theories for this purpose, but they are simple and can provide comprehensive guidance for understanding whether any specific behaviour of a dominant firm is harmful to consumers or not. The general principle proved in this new research is that dominant firms may behave in an anti-competitive way, accommodating or predatory, in markets where the number of firms is exogenous, but they always behave in an aggressive way when entry into the market is endogenous, which should be the relevant case in most situations. More precisely, when entry of competitors endogenously depends on its own profitability, a dominant firm is forced to produce more, invest more to reduce costs or improve product quality, engage in more informative advertising, innovate more and so on. This allows it to increase its market share, reduce prices and gain from a reduction in the average costs of production, but it also disciplines competitors and keeps market prices at a low level, with unambiguous benefits for consumers.

Some factors make leaders even more aggressive and tend to increase their market share (eventually until other firms exit): these are scale economies, network effects and learning by doing in dynamic contexts, product homogeneity

<sup>2</sup> See J Schumpeter, *Capitalism, Socialism and Democracy* (New York, Harper & Row, Publishers, Inc, 1942); H Von Stackelberg, *Marktförm und Gleichgewicht* (Vienna and Berlin, Springer Verlag, 1934); F Modigliani, “New Developments on the Oligopoly Front” (1958) 66 *Journal of Political Economy* 215.

<sup>3</sup> See F Etro, “Innovation by Leaders” (2004) 114 *The Economic Journal* 281; F Etro, “Stackelberg Competition with Endogenous Entry” (2002) mimeo, Harvard University, available at <http://www.intertec.org>, accessed on 20 March 2006; F Etro, “Aggressive Leaders” (2006) 37 *The Rand Journal of Economics* forthcoming.

and rapid technological development, all factors typical of New Economy markets. The consequence is that markets with high concentration due to the presence of a dominant firm are perfectly consistent with efficiency. This has major implications for competition policy: while the old approach to abuses of dominant positions needs to verify dominance through structural indicators and the existence of a certain abusive behaviour, a new economic approach would just need to verify the existence of harm to consumers. As Rey *et al* correctly point out,

“the case law tradition of having separate assessments of dominance and of abusiveness of behaviour simplifies procedures, but this simplification involves a loss of precision in the implementation of the legal norm. The structural indicators which traditionally serve as proxies for ‘dominance’ provide an appropriate measure of power in some markets, but not in others.”

This applies notably to the New Economy.

The main policy implication of the theory of market leaders emerges under imperfect competition in prices. In this typical situation, while the traditional approach (the so-called post-Chicago approach) tends to associate aggressive pricing strategies with predatory (and hence anti-competitive and welfare-decreasing) purposes, the theory of market leaders proves that, whenever entry of firms into the market is endogenous (as often it is), an aggressive pricing strategy is a pro-competitive one which generally does not have an exclusionary purpose but, rather, can enhance allocative efficiency and consumer welfare. The same holds for other strategies which typically have exclusionary motivations in the traditional view, like bundling strategies. Clearly, when entry is not endogenous and the leader and its followers cannot be threatened by further entry, the behaviour of the leader could be anti-competitive in line with the post-Chicago approach, and antitrust should intervene in these cases (beyond its usual role against joint collusive behaviour).

Finally, notice that what matters is not only welfare of current consumers but also that of future ones. Rey *et al* provide a simple example on the problem of monopoly pricing:

“One response to the problem might be for the competition authority to intervene, citing excessive pricing by a monopolist as an infraction of the abuse-of-dominance prohibition in Article 82 of the Treaty. Another response might be to leave the matter alone, hoping that the profits that the monopolist earns will spur innovation or imitation and entry into the market, so that, eventually, the problem will be solved by competition.”

What the theory of market leaders suggests on this matter is that the dynamic gains in efficiency due to a leadership position in innovative markets can be quite high as long as entry in the market for innovation is endogenous: the leadership of a dominant firm may persist because of its high incentives to invest in R&D

under the threat of entry; nevertheless, this should be seen not as a signal of abusive conduct but, oddly enough, as the result of competitive pressure.

A recent Discussion Paper on the application of Article 82 of the Treaty on exclusionary abuses by the European Commission<sup>4</sup> is likely to inspire a wide debate on the proper aims and methods of antitrust policy in Europe. While the aim of this proposal is to enhance consumer welfare and to protect competition and not competitors, I have some concern that these principles are not fully carried through into certain aspects of the analytic framework. Currently, the proposal of the Commission appears to be partly in line with outdated views, eg when it stresses an excessive reliance on market shares in determining dominance. The novel part on the efficiency defences for dominant firms appears to be going in the right direction since it allows otherwise abusive strategies if they create a net efficiency gain (which benefits consumers). This can happen in two ways: through an *objective necessity defence*, “where the dominant company is able to show that the otherwise abusive conduct is actually necessary conduct on the basis of objective factors external to the parties involved and in particular external to the dominant company”, or by a *meeting competition defence*, “where the dominant company is able to show that the otherwise abusive conduct is actually a loss-minimising reaction to competition from others”.<sup>5</sup> Nevertheless, the effectiveness of these rules in safeguarding consumer welfare is weakened when it is stated that some firms are virtually excluded from the possibility of an efficiency defence.<sup>6</sup> In particular, a strange concept of market position “approaching that of a monopoly” is introduced and associated with market shares above 75%, something, as we will see, without any justification in economic theory: a firm is a monopoly or is not (in which case, its behaviour is constrained by competitors), but it cannot be an “almost monopoly” or a “near monopoly”.<sup>7</sup> From an economic point of view, the real missing concept, which defines firms with large market shares but not monopolising the whole market, is that of a Stackelberg leader with endogenous entry, which is the subject of the analysis of the theory of market leaders.

These theoretical and applied considerations may emphasise the need for a better understanding of the role of market leaders and of industrial policy toward market leaders, which is the subject of this article. In section B the traditional approaches to competition policy are surveyed, while in section C the innovations associated with the theory of market leaders are presented. Section D applies the new approach to general issues of abuse of dominance, and

<sup>4</sup> *DG Competition Discussion Paper on the Application of Article 82 of the Treaty to Exclusionary Abuses* (Brussels, European Union, 2005).

<sup>5</sup> *Supra* n 4, 78.

<sup>6</sup> *Supra* n 4, 90–92.

<sup>7</sup> For a more detailed analysis of the debate on the reform of the application of Art 82 within EU Competition Law see F Etro, “The EU Approach to Abuse of Dominance” (2006) Intertic Working Paper, available at <http://www.intertic.org>.

section E deals with bundling issues. Sections F and G move to competition *for* the markets and hence to policy for innovation, and section H concludes.

## B. THE TRADITIONAL APPROACHES TO COMPETITION POLICY

In this section I review the traditional approaches to antitrust policy on abuse of dominance and start comparing them with the insights of the recent theoretical attempts to build a comprehensive theory of market leadership and competition policy. A fully fledged model of the behaviour of market leaders is a necessary toolkit for deriving implications for antitrust policy, but it is not necessarily part of the endowment of the traditional theories.

The traditional “pre-Chicago” approach was mostly based on simple models of imperfect competition, associating market power, large market shares and abusive conduct with the typical behaviour of monopolists. Such a naive view was challenged in the 1960s and 1970s by the “Chicago approach”,<sup>8</sup> the main merit of which was to show that, when there are potential entrants into a given sector, aggressive strategies that would be suspect, such as bundling, price discrimination and exclusive dealing, are not necessarily anti-competitive but may instead have a strong efficiency rationale. More recent theories, often associated with the so-called “post-Chicago” approach, have, however, shown that in the presence of pervasive market imperfections, the above strategies can be anti-competitive because they are aimed at deterring entry in the short run and protecting monopolistic rents in the long run. Broadly speaking, US antitrust authorities have been highly influenced by all these approaches over time, while it is hard to claim that the same is true of the EU antitrust authorities. As has been pointed out recently:

“in Europe it has taken longer for new developments in economic theory to affect competition policy. While U.S. antitrust has been influenced by Chicago school and post-Chicago school theories, pre-Chicago school considerations still play a role in Europe, albeit at times dressed up in post-Chicago clothing.”<sup>9</sup>

I believe that these traditional approaches give important insights into many antitrust issues, but they fail to provide a complete understanding of the behaviour of market leaders. The Chicago approach limited most of its analysis to either monopolistic or perfectly competitive markets, and, in a few cases, to markets characterised by a monopolist and a competitive fringe of potential entrants. It provided a number of important insights which presented fundamental challenges for subsequent research. However, it was developed

<sup>8</sup> See R Posner, *Antitrust Law: An Economic Perspective* (Chicago, IL, University of Chicago Press, 1976).

<sup>9</sup> C Ahlborn, D Evans and A Padilla, “The Antitrust Economics of Tying: a Farewell to per se Illegality” (2004) 49 *The Antitrust Bulletin* 287.

before game theory became the standard tool in industrial organisation, and it failed to provide results that were robust enough to withstand fully fledged game-theoretic analysis of dynamic competition between incumbents and entrants.<sup>10</sup> Somewhat related with this approach is the initial literature on entry deterrence associated with the so-called Bain–Modigliani–Sylos–Labini framework. However, even if the initial theoretical contributions by Bain, Sylos Labini and Modigliani<sup>11</sup> took into consideration the effects of entry on the behaviour of market leaders, these were not developed in a coherent game-theoretic framework and were substantially limited to the case of competition with perfectly substitutable goods and constant or decreasing marginal costs.

In the 1980s and 1990s, post-Chicago research on industrial organisation studied more complex market structures within a solid game-theoretic framework and introduced welfare considerations so as to derive sound normative implications. The introduction of such a well-founded welfare-based approach to competition policy represents one of the main contributions of the post-Chicago approach. However, in most cases, this literature studied the behaviour of incumbent monopolists facing a single potential entrant. To cite the most famous works with strong relevance for antitrust issues, this was the case of the Dixit model of entry deterrence, of the models by Kreps and Wilson and by Milgrom and Roberts of predatory pricing, of those by Fudenberg and Tirole and by Bulow *et al* of strategic investment, of the Bonanno and Vickers model of vertical restraints, of the Whinston model of bundling for entry deterrence purposes,<sup>12</sup> and of many other works, often based on analysis of Stackelberg duopolies (that is, markets with one leader and one follower). In addition, most of

<sup>10</sup> For instance, according to the Chicago school there is not such a thing as predatory pricing, that is, reducing prices below costs to induce exit by the competitors so as to compensate the initial losses with future profits: if the incumbent can sustain such initial losses, any other competitor can do it as long as credit markets are working properly, hence predatory pricing would not be effective to start with. The post-Chicago school has shown that, in the presence of asymmetric information between firms of credit market imperfections and of strategic commitments to undertake preliminary investments, the above argument breaks down and predatory pricing can be an equilibrium strategy for the incumbent and deter entry.

<sup>11</sup> See J Bain, *Barriers to New Competition: Their Character and Consequences in Manufacturing Industry* (Cambridge, MA, Harvard University Press, 1956); P Sylos-Labini, *Oligopoly and Technical Progress* (Cambridge, MA, Harvard University Press, 1962); and Modigliani, *supra* n 2. Somewhat related to these theories is the theory of dominant firms with a competitive fringe, which, however, has not been formalised in coherent game-theoretic terms.

<sup>12</sup> G Bonanno and J Vickers, “Vertical Separation” (1988) 36 *Journal of Industrial Economics* 257; J Bulow, J Geanakoplos and P Klemperer, “Multimarket Oligopoly: Strategic Substitutes and Complements” (1985) 93 *Journal of Political Economy* 488; A Dixit, “The Role of Investment in Entry-deterrence” (1980) 90 *The Economic Journal* 95; D Fudenberg and J Tirole, “The Fat Cat Effect, the Puppy Dog Ploy and the Lean and Hungry Look” (1984) 74 *The American Economic Review, Papers and Proceedings* 361; D Kreps and R Wilson, “Reputation and Imperfect Information” (1982) 27 *Journal of Economic Theory* 253; P Milgrom and J Roberts, “Predation, Reputation and Entry Deterrence” (1982) 27 *Journal of Economic Theory* 280; M Whinston, “Tying, Foreclosure and Exclusion” (1990) 80 *The American Economic Review* 837.

the standard results on the behaviour of incumbents in terms of pricing, R&D investments, quality choices, and vertical and horizontal differentiation are derived from models of Stackelberg duopoly, where the incumbent chooses its own strategies in competition with a single entrant. While this analysis simplifies the interaction between incumbents and competitors, it can be highly misleading, since it assumes away the possibility of endogenous entry and hence limits its relevance to situations where the incumbent already has an exogenous amount of market power.<sup>13</sup>

It is not surprising that the results of the post-Chicago approach are systematically biased toward an anti-competitive role by incumbents: these engage in aggressive pricing, threaten or undertake overinvestments in complementary markets, impose exclusive dealing contracts or bundle their goods with the sole purpose of deterring competitor entry. Otherwise they engage in accommodating pricing, underinvest in product improvements and differentiation, and stifle innovation. In such a simple world, what antitrust authorities should do is fight unambiguously against the incumbents by punishing aggressive pricing strategies as predatory, and likewise accommodating pricing strategies (but in this case as monopolistic strategies), punish investments in complementary markets as attempts to monopolise them, forbid bundling strategies, and so on. The bottom line is that antitrust authorities should sanction virtually all behaviours of the incumbents which do not conform to those of their competitors.

The fallacy of this line of thought, in my view, derives from a simple fact: it is based on a partial theory which does not take into account that, at least in most cases, entry by competitors is not an exogenous fact but an endogenous decision. Virtually all the research by the post-Chicago school examines the behaviour of incumbents on the assumption that one competitor (or a fixed exogenous number of competitors) could enter their markets, but completely disregards the possibility that other firms would choose to enter these markets: in other words, this school does not endogenise entry of competitors.<sup>14</sup> This leads to misleading results. Whether entry is more or less costly, it is an endogenous decision by the potential competitors (except for cases of natural monopoly or legal barriers to entry, which should not be the subject of antitrust analysis), especially in global markets (as most markets in the New Economy are).

<sup>13</sup> Note that my critique applies not only to models of duopolies but also to any model with a fixed number of firms (or of competitors beyond the incumbent). Note also that by endogenous entry I mean not just free entry in the traditional sense (which is also a particular case of endogenous entry), but also any situation where entry is constrained, and hence endogenously determined, by any kind of barriers or fixed costs.

<sup>14</sup> All the papers cited above—and, for instance, the full chapter on abusive practices of M Motta, *Competition Policy. Theory and Practice* (Cambridge University Press, 2004)—study duopolies and do not take in consideration the existence of profitable opportunities which would induce other firms to enter the market. Taking this into consideration, as we will see, can completely change the nature of the equilibria and hence the policy implications to be drawn.

There are two kinds of constraints on entry: *barriers to entry* are traditionally defined as sunk costs of entry for the competitors which are above the corresponding costs of the incumbent (or have been already paid by the incumbent), while simple *fixed costs of entry* are equally faced by the incumbent and the followers to produce in the market. While there is a fundamental difference between the two concepts, their role in constraining entry, and hence in endogenising it, is basically the same. Only a comprehensive understanding of the behaviour of incumbents both when entry is endogenous and when it is not can provide the required tools to judge real-world markets. Unfortunately, the endogeneity of entry makes a lot of difference and overturns most of the results of the post-Chicago school, which, I argue, suggests that a revision of the traditional approach to antitrust policy is required.<sup>15</sup>

In recent theoretical research,<sup>16</sup> I have developed a comprehensive theory of market leadership which can take into account the endogeneity of entry in the market. Its simple framework allows most phenomena to be examined in a unified framework and permits unambiguous policy implications to be drawn in most cases.<sup>17</sup> While I will describe this general framework in the next section, specific applications will be discussed in subsequent sections.

### C. THE THEORY OF MARKET LEADERS: TOWARD A NEW-CHICAGO APPROACH TO COMPETITION POLICY

The general theory of market leaders clarifies the role of market leaders by studying their incentives to undertake preliminary investments and other market strategies to gain advantage over their competitors. Since at least the seminal contribution of Fudenberg and Tirole,<sup>18</sup> the post-Chicago approach taught us that when competition in quantities takes place between two firms, one of them would usually gain by overinvesting to reduce costs, which allows it to be aggressive in the market (expanding production and inducing its rivals to produce less), but under competition in prices, the same firm would prefer to

<sup>15</sup> There is a relation between this theory and the “bounds approach” by J Sutton, “Market Structure: The Bounds Approach” in M Armstrong and R Porter (eds), *Handbook of Industrial Organization*, vol 3 (Amsterdam, North Holland, 2005). Sutton’s approach is largely based on the concept of endogenous sunk costs as strategic investment. However, his focus is more on explaining market concentration rather than leadership strategies. Consequently, his results are more useful in approaching antitrust issues about collusion and mergers rather than abuse of dominance. Nevertheless, the two approaches could be seen as complementary.

<sup>16</sup> Etro (2006), *supra* n 3.

<sup>17</sup> I will not deal with another aspect of industrial policy which is concerning exporting firms. Nevertheless, the theory of market leaders can also be applied to those international issues with interesting results (see F Etro, “Strategic Export Promotion” (2002), mimeo, Harvard University, available at <http://www.intertec.org>).

<sup>18</sup> Fudenberg and Tirole, *supra* n 12.

underinvest in cost reductions so as to be accommodating (increasing its price so as to induce its rivals to raise price). The theory of market leadership, however, shows that when entry is endogenous, a firm will always prefer to undertake investments to be aggressive in the market; that is, to expand production under competition in quantities and decrease prices under competition in prices. For instance, a leader will always find it optimal to overinvest in cost reductions (in jargon, to adopt a “top dog” strategy) to be able to produce more and to reduce its price below the price of its competitors. This outcome emerges in many other contexts with surprising results with respect to investments in quality improvements, production of complementary goods, bundling of goods and so on. In any market where entry is endogenous, the leader always overinvests to gain a strategic advantage and gain a larger market share. However, this results in a reduction in prices with a net gain for consumers! This happens under any form of competition (including in prices and in production levels) as long as entry for competitors is endogenous. As long as this condition applies, the competitors’ fear induces the leader to be aggressive: its best strategy requires reducing costs, improving product quality, advertising heavily, producing complementary products and so on. This allows the leader to lower its price, gain market share and gain from a reduction in the average costs of production, but it also disciplines competitors and keeps prices at a low level, with unambiguous benefits for society.

I have also derived simpler and even more radical results in a more basic context where the leader does not undertake a preliminary strategic investment but directly decides its own strategy before the other firms.<sup>19</sup> In general, the leader in a market where barriers to entry or fixed costs constrain entry will produce more, and in a more efficient way, and will set lower prices than its competitors. To see why this happens, imagine a market of homogeneous products where production requires a fixed sunk cost and a constant marginal cost of production. Moreover, imagine that firms choose their production level and the market price just equates demand and supply. Such a simple structure approximates the situation in many sectors where product differentiation is not very important but there are high costs to starting production (this is typical of energy and telecommunication industries and some hi-tech sectors).<sup>20</sup> In the absence of a leader, a number of competitive firms could share production and sell at a price equal to the average cost. However, if there is a leading firm, this firm could increase its own production up to a level which makes it unprofitable for other firms to operate. The leader would keep low prices and would produce high quantities to deter entry (higher prices would allow entry by competitors

<sup>19</sup> Etro (2002), *supra* n 3.

<sup>20</sup> See *T-Mobile (UK)’s response to Ofcom consultation document. Strategic Review of Telecommunications* (London, 2004, available at <http://www.intertic.org>) for an application of our approach in the telecommunications sector.

and shift some profits toward them). Formally, following an example introduced by the recent theory of market leaders,<sup>21</sup> assume  $B$  is the sunk cost of entry,  $c$  is the marginal cost and  $D = a - p$  is the market demand at price  $p$ . In equilibrium with endogenous entry, the leader sells at the price  $p = c + 2\sqrt{B}$  and none of the potential competitors finds it profitable to enter the market.

Paradoxically, such apparently monopolistic markets completely dominated by a single firm are perfectly competitive and represent the only possible equilibria. Moreover, they are extremely efficient since they save in costs of entry, making the productive process much cheaper, and consequently keep prices at a low level. With this kind of market leadership, society gains from greater cost efficiency and lower prices. Hence, a proper competition policy in this situation should not obstruct the market leader and should limit its intervention to promote entry. Notice that most of the barriers to entry in a market are exogenous and given by technological constraints; however, one may imagine that some of them are endogenous.<sup>22</sup> For instance, in the above example where the gross profit of the leader was  $\pi = 2\sqrt{B}(a - c - 2\sqrt{B})$ , if this leader could endogenously create the barriers to the entry  $B$  at a cost  $\lambda B$ , the optimal endogenous level of barriers would be

$$B^* = \left( \frac{a - c}{4 + \lambda} \right)^2$$

Notice that when  $\lambda = 0$  the leader would adopt the monopolistic price  $p = (c + a)/2$  associated with monopolistic profits, while for  $\lambda \rightarrow \infty$  endogenous barriers would become negligible and the equilibrium would approximate the marginal cost pricing  $p = c$  associated with zero profits. In this situation, of course, competition policy should intervene to reduce this kind of endogenous barrier to entry (formally increasing the marginal cost of creating them,  $\lambda$ ).

Now, to extend the analysis to other contexts, imagine that goods are not homogeneous but differ in quality. This happens when consumer needs or tastes are quite differentiated, as is the case in many sectors where the design and inner quality of products play important roles. Under these circumstances, firms often compete in prices by choosing different mark-ups for different products. When quality differs, it is important to have a number of firms producing different varieties of goods. A competitive market typically satisfies this requirement, but it tends to induce excessive proliferation of products. The presence of market leaders is again beneficial: they will not conquer the entire market as before, but they will expand production and consequently reduce their prices below the prices of their competitors, some of which will be driven out of the market. Consumers will then face a smaller variety of alternative products but pay less

<sup>21</sup> Etro (2006), *supra* n 3.

<sup>22</sup> See Sutton, *supra* n 15.

for some of them. Again market leadership with endogenous entry creates a net gain for society.

An analogous situation appears when we relax the other assumption adopted in the basic example, that of constant marginal costs. When the average cost function has a standard U-shape due to increasing marginal costs (at least beyond a certain production level), the leader again produces more than each competitor. In such a case, the price of the market leader is also equal to its marginal cost:<sup>23</sup> hence, the theory of market leaders confirms that, in this situation, the theoretical price above which there cannot be predatory purposes corresponds to the marginal cost, which, according to the traditional Areeda–Turner test, is best approximated with the average variable cost.<sup>24</sup> The adoption of other standard price levels above which predation should not be an issue in general (as the average avoidable cost or the long run average incremental cost adopted in the Discussion Paper on Article 82) is not consistent with our analytical results.

This discussion implies two main conclusions. First, a leading market position associated with aggressive strategic investments can be the consequence of a competitive market environment and not the result of market power. Secondly, whenever firms engage in price competition, the post-Chicago approach associates aggressive pricing or other aggressive strategies (including bundling) with a predatory purpose, while the theory of market leaders provides arguments that an aggressive strategy is generally pro-competitive and without exclusionary purposes. This creates strong doubts about the traditional approach to predatory pricing and other exclusionary behaviours that characterise EU competition policy.<sup>25</sup>

In a sense, with the theory of market leaders, we are drawing conclusions similar to those of the Chicago School, while generalising the theoretical framework of the post-Chicago approach: hence we could talk of a “New-Chicago approach”.

<sup>23</sup> And to the average cost of the competitors. The larger scale of production allows the leader to obtain positive profits while pricing at marginal cost. The proofs of these results are in Etro (2002), *supra* n 3.

<sup>24</sup> See P Areeda and D Turner, “Predatory Pricing and Related Practices under Section 2 of the Sherman Act” (1975) 88 *Harvard Law Review* 637; and, for an economic commentary, W Baumol, “Predation and the Logic of the Average Variable Cost Test” (1996) 39 *Journal of Law & Economics* 49.

<sup>25</sup> In spelling out the concept of foreclosure, *DG Competition Discussion Paper* (*supra* n 4) states that “it is sufficient that the rivals are disadvantaged and consequently led to compete less aggressively” (58). This proposition is not consistent with economic theory, which has made clear that an aggressive behaviour of the market leader inducing less aggressive competition from its competitors is not sufficient to create any harm to consumers (in fact, the net effect is typically the opposite).

#### D. MARKET LEADERSHIP VERSUS MARKET DOMINANCE

The new theory of market leaders provides insights into what constitutes a dominant position in a market and what an abuse of that position consists of. First of all, it would be better to differentiate market leaders from dominant firms: market leaders have some strategic competitive advantage over their competitors, but only when they can use it to prevent effective competition and harm consumers should they be considered to be dominant and their behaviour potentially abusive. The point is to understand when market leaders can prevent effective competition and when they cannot. As noted previously, the behaviour of market leaders tends to be pro-competitive whenever entry of competitors into their markets is constrained by entry barriers or fixed costs of entry.

Secondly, there should be no presumption that a certain market share amounts necessarily to dominance. The theory of market leaders shows that, paradoxically, the correlation between market share and effective market power can be negative. Consider a market where a leader and its rivals compete on price. According to the post-Chicago approach, the leader could try to deter entry with a predatory strategy or just be accommodating, sharing the market with competitors, in which case its market share may be even smaller than that of its competitors. However, when entry into the market is endogenous and constrained solely by technological conditions, the leader has to adopt a strategy of aggressive pricing and, by undercutting its competitors, it acquires a larger share of the market. In this case, the market share of the leader is increasing when product differentiation is weaker, when fixed costs of production are higher and when variable costs do not increase too much as the production level goes up. As we have seen above, the theory of market leaders describes the conditions under which endogenous entry induces the leader to be so aggressive as to conquer the whole market. However, this implies that the same possibility of entry and hence lack of effective market power is associated with the largest market share for the leader.<sup>26</sup>

Consider the software market as a case study where we can apply our arguments. The technological conditions in this market are well known. Producing software (whether an operating system or a particular application) takes a very large up-front investment and a constant marginal cost which is close to zero. The entry conditions in this market are more contentious, but there are good reasons to believe that even though entry into the software market may entail large costs, it is substantially open, ie endogenous. First of all, many firms are already active in this sector, and there are even more potential entrants—think of the giants in adjacent sectors of the New Economy (hardware

<sup>26</sup> In the current version of *DG Competition Discussion Paper* (*supra* n 4) the stress on market shares in the evaluation of dominance appears in clear contrast with these results.

and telecommunications in particular). Secondly, it is hard to think of a market which is more “global” than the software market: demand comes from all over the world, transport costs are virtually zero, the knowledge required to build software is easily accessible worldwide and competition is just as widespread. Nevertheless, it has been claimed that in the market for PC (or client) operating systems the large number of applications developed by many different firms for *Windows* represents a substantial barrier to entry. Unfortunately, such a claim usually leads to misleading conclusions. It is true that competitors need to offer (as some already do) a number of standard and technologically mature applications upon entry to match the high quality of the *Windows* package, but the cost of offering these applications is unlikely to be prohibitive compared with the global size of the market.<sup>27</sup> There are at least two reasons for this. First, notice that the alleged “applications barrier to entry” is often erroneously associated with thousands of applications written for *Windows*, while it is actually limited to a handful of applications such as word processing, spreadsheet, graphics and communications software, which really satisfy the needs of most active computer users.<sup>28</sup> Secondly, the competitors of Microsoft should not (and the existing ones do not) need to develop all the required applications: as Microsoft did in most cases, they should just fund other firms and encourage them to write applications for their operating system (or have old applications originally written for other operating systems “ported” to theirs). Finally, it is important to emphasise that if we look at competition in the software market in a dynamic sense, that is, competition *for* the market (as opposed to competition *in* the market) or through innovations, there is no doubt that the opportunity to invest in innovations for future, better software is widely open not only to large companies in the New Economy, but even to smaller ones.

Summarising, the software market is characterised by high entry costs, constant marginal costs close to zero and substantially open access by competitors able to create new software. According to the new theory of market leaders, these are the ideal conditions under which we should expect a leader to produce for the whole market with very aggressive (low) prices. Hence, it should not be surprising that, at least in the market for operating systems, a single firm, Microsoft, has such a large market share. We can look at this from a different perspective: since entry into the software market is endogenous, the leader has to keep prices low enough to expand its market share to almost the whole market. Note that network externalities require these prices to be even lower because

<sup>27</sup> In addition, file formats for these applications can be developed on the basis of standards, such as the XML standards, and even Microsoft has developed its new Office file formats on the basis of the XML standard.

<sup>28</sup> See RB McKenzie, *Trust on Trial. How the Microsoft Case is Reframing the Rules of Competition* (Cambridge, Perseus Publishing, 2001).

competitors could (and indeed try to) offer their alternative software at even lower prices to build their own network effects.<sup>29</sup>

The extremely low price of *Windows* represents a double proof of our arguments above. Assume, for simplicity, that the marginal cost of producing *Windows* is zero, and that the price of hardware is constant and independent from the price of *Windows*. Standard economic theory implies that the monopolistic price for an operating system should be the price of the hardware divided by  $\varepsilon - 1$ , where  $\varepsilon$  is the elasticity of demand for PCs (including both hardware and software).<sup>30</sup> This means that a 1% increase in the price of PCs reduces demand by  $\varepsilon\%$ . Now, the above relationship tells us that, if the basic price of the hardware is €1000, which is about the current average price for a PC, the monopolistic price for *Windows* would be €1000 if  $\varepsilon = 2$ , €500 if  $\varepsilon = 3$ , €333 if  $\varepsilon = 4$  and so on. It would take really unreasonable values of demand elasticity to even get close to the real price of *Windows*, which is around €50. Moreover, this is a very conservative estimate of the monopolistic price. In the real world, we can imagine that the price of hardware is not independent from the price of *Windows*: if the latter were to double tomorrow, hardware producers would be forced to reduce their prices somewhat (eventually switching to lower-cost techniques and/or lower-quality products).<sup>31</sup> Even if this effect were limited by the high level of competition in the hardware sector, it goes in the direction of increasing the monopolistic price of *Windows* further, that is, even beyond the real price of *Windows*.

What does all this tell us? Simply that Microsoft is not an unconstrained price-setter, while its prices are limited well below the monopolistic price to compete aggressively with the other firms active in the operating system market

<sup>29</sup> Low prices in the presence of network effects are very common and often extreme. For example, most email services such as Yahoo, search engines such as Google and social networks such as aSmallWorld are free because this is the best strategy available for their leading suppliers under the constraint of effective competition. All these market leaders gain from collateral services; their leaderships have nothing to do with dominance.

<sup>30</sup> Here we assume that the price of the hardware is fixed and independent from that of the software. Given a demand  $D(h + w)$  decreasing in the price of the hardware  $h$  plus the price of *Windows*  $w$ , the gross profit of a monopolist in the operating system market would be  $wD(h + w)$  and would be maximised by a price of *Windows*  $w^*$  such that  $D(h + w^*) + w^*D'(h + w^*) = 0$  or:

$$w^* = \frac{h}{\varepsilon - 1} \text{ where } \varepsilon = \frac{h + w^*}{D(h + w^*)} D'(h + w^*)$$

<sup>31</sup> Say the price of hardware  $h(w)$  decreases with that of *Windows* (we could endogenise the actual effect, but this is beyond the scope of this discussion). Then we can rework the monopolistic price of *Windows* as:

$$w^* = \frac{h(w^*)}{\varepsilon [1 + h'(w^*)] - 1}$$

which is higher than in the absence of this translation effect (remember that  $h'(w^*) < 0$ ): a monopolist would price *Windows* even higher because part of the potential reduction in demand due to the higher price would be avoided by the induced reduction in the price of the hardware.

and with the potential entrants in it. However, we can say more than just that Microsoft is not a monopoly. What the post-Chicago approach suggests about leaders in markets with price competition is that they should be accommodating and exploit their market power, setting higher prices than competitors, or otherwise engage in predatory pricing and, after having conquered the whole market, increase prices. But in the last 10–15 years of global leadership, Microsoft has done neither of these things. Microsoft has been constantly aggressive, as any firm under the threat of competitive pressure would be. The theory of market leaders has shown that a market leader in these conditions would price above marginal cost in such a way as to compensate for the fixed costs of investment and obtain a profit margin (over the average costs of production) thanks to the economies of scale derived from the large (worldwide in this case) scale of production. Its (quality-adjusted) price should be slightly below that of its immediate competitors or just low enough to avoid that they can exploit profitable opportunities increasing their prices. Whereas other theories are unable to, the theory of market leaders can make perfect sense of Microsoft's large share of the software market, large profits and relatively low prices.

In conclusion, the market share of market leaders can be very large because their behaviour is forced to be extremely aggressive by strong competitive pressure: this remains mostly potential (and does not create massive entry in the market) when the leaders are particularly aggressive and efficient. In this case, firms with large market shares have nothing to do with monopolists: they are leaders but not dominant firms.

#### **E. AN APPLICATION OF THE THEORY OF MARKET LEADERS TO BUNDLING**

One of the issues where the new theory of market leaders applies and provides new insights for antitrust policy is bundling, that is, combining two separate products into a single one that is sold alone. Although bundling is different from tying, which refers to selling one product (the tying product) conditional on the purchase of another one (the tied product), for our purposes there is no substantial difference between the two. Virtually any product is a bundle since it combines multiple basic products which could be or are sold separately: a car bundles many separate components; a dinner at a restaurant bundles food and drinks of different brands; Coke bundles many ingredients (covered by trade secret protection); a computer bundles hardware, an operating system and basic software of general interest; Sunday issues of many newspapers bundle the basic journal with a magazine or special offers.<sup>32</sup>

<sup>32</sup> See Ahlborn *et al*, *supra* n 9, and Motta, *supra* n 14 (ch 7) for excellent surveys on this issue.

The Chicago school has advanced efficiency rationales in favour of bundling with positive, or at worst ambiguous, consequences on welfare, including production or distribution cost savings, reduction in transaction costs for customers, protection of intellectual property, product improvements, quality assurance and legitimate price responses. Moreover, according to the so-called “single monopoly profit theorem”, as long as the secondary market is competitive, a monopolist in a separate market cannot increase its profits in the former by tying the two products. On the contrary, in the presence of complementarities, it can only gain from having competition and high sales in the secondary market to enhance demand in its monopolistic market. This phenomenon is reinforced by network effects, as made clear by Economides in his recent discussion of the software market.<sup>33</sup>

The post-Chicago approach has shown that, when the bundling firm has some market power, bundles can have a predatory purpose, that is, they can deter entry into the tied product market to expand monopolistic power and reduce consumer welfare, at least in the long run.<sup>34</sup> Summarising the past economic research in the field, Tirole has pointed out that the impact of tying on competition in the tied market ranges from a negligible impact on rivals’ ability to compete to entry deterrence, depending on a number of factors like

“the marginal cost of manufacturing the tied product; the rivals’ ability to differentiate horizontally or vertically their offering from the tied product (that is, to offer some features that are not available in the tied product); and, if the market is multi-sided, the ability to differentiate, in the side where there is no tie, through technological features, in-house supply, or exclusive contracts with third-party vendors, and the ease with which users on the tying side can multi-home”.<sup>35</sup>

According to Tirole, and we agree on this, tying should be submitted to a rule-of-reason standard, since it can have both efficiency and anti-competitive purposes.

The theory of market leaders emphasises that bundling by the incumbent (1) is just an aggressive (pro-competitive) strategy of the incumbent for a competitive tied product market; (2) may not have a specific entry deterrence purpose; and (3) may increase welfare even without taking efficiency reasons into account.

To derive the intuitions of these results, let us adopt the strongest bias against the bundling firm by imagining that it is a monopolist in a primary market with the possibility of entering a secondary market, and that there are no technological efficiencies emerging from bundling goods in the two markets. The Chicago school has studied such a situation when the secondary market is perfectly competitive, that is, firms price at marginal cost and earn no extra

<sup>33</sup> N Economides, “The Microsoft Antitrust Case” (2001) 1 *Journal of Industry, Competition and Trade* 7.

<sup>34</sup> Whinston, *supra* n 12.

<sup>35</sup> J Tirole, “The Analysis of Tying Cases: A Primer” (2005), mimeo, University of Toulouse.

profits: in such a case, the monopolist has no incentives to bundle because this could only reduce demand in the primary market. The post-Chicago approach has studied the same situation when the secondary market is not perfectly competitive and where there is only a single firm active strategically with no possibility for other firms to enter:<sup>36</sup> in this case, the only reason why the monopolist would elect to adopt a bundling strategy is to induce the exit of the rival in the secondary market.

Finally, the new theory of market leaders has studied again the same situation but with an imperfectly competitive secondary market, where firms decide “endogenously” whether to enter or not. In this case, the purpose of bundling has nothing to do with entry deterrence, it is just an aggressive strategy (but not a predatory one) which has pro-competitive effects: it reduces the combined price level and increases welfare. Technically, the market leader can exploit a larger scale of production for the bundle to offer it at a competitive price: bundling the two products works as a commitment device to be aggressive, that is to produce more for the secondary market and hence to be able to adopt a lower price. As a consequence, the leader can exploit larger scale economies, reduce the average price level for consumers and hence increase welfare.<sup>37</sup>

Summarising, when approaching a bundling case we need to verify the entry conditions of the secondary market. If there is a dominant firm in this market as well, the main problem is not the bundling strategy, but the lack of competition in the secondary market, and it should be addressed within that market: punishing the bundling strategy would just guarantee the monopolistic (or duopolistic) rents of the dominant firm in the secondary market. However, things are different when the secondary market is not monopolised but open to endogenous entry (even if it is not perfectly competitive in the sense that firms do not price at marginal cost). In such a case, bundling is a pro-competitive strategy and punishing it would hurt consumers. Finally, notice that we achieved these conclusions ignoring the possibility that the bundling firm could create *per se* technological efficiencies by bundling its products, excluding that this firm could have a somewhat limited market power in the primary market and even ignoring the benefits from bundling in case of complementarities between the products: taking these factors in consideration could only strengthen the results against the punishment of a bundling strategy.

<sup>36</sup> The same limitation applies to the models by D Carlton and M Waldmann, “The Strategic Use of Tying to Preserve and Create Market Power in Evolving Industries” (2002) 33 *The Rand Journal of Economics* 194 and B Nalebuff, “Bundling as an Entry Barrier” (2004) 119 *Quarterly Journal of Economics* 159. Nalebuff assumes that one single competitor could have a random chance to enter in the tying market or in the tied one, a situation which does not have any clear realistic counterpart in the real world. Moreover, his results would immediately collapse if this firm or other firms had the chance to enter the tied market endogenously.

<sup>37</sup> See Etro (2006), *supra* n 3.

Looking at the Discussion Paper on the application of Article 82, it appears that its positive principles are not fully carried through into the discussion on bundling.<sup>38</sup> For instance, the standard of proof the Commission is required to meet to establish harmful foreclosure effects is too low, particularly in light of the fact that the analysis of foreclosure effects can be speculative in nature. In the case of bundling, actual market foreclosure effects are not required by the Discussion Paper: it is enough that such effects are “likely” to occur. In other words, the mere risk of foreclosure can result in a finding against a dominant company. A standard of proof that requires convincing evidence will help ensure that companies will not be deterred from bringing new products to market as a result of concerns about remote, potential foreclosure effects.

## F. COMPETITION FOR THE MARKET AND INNOVATION POLICY

Competition in the hi-tech markets is dynamic in the Schumpeterian sense that it takes place as competition *for* the market in a so-called “winner-takes-all race”, and such an element requires an even deeper rethinking of competition policy than suggested in the analysis of the previous sections, which were mostly focused on a static concept of competition *in* the market.

Since the work of the Austrian economist Schumpeter,<sup>39</sup> economic research has repeatedly emphasised the positive relationship linking patents to investments in innovation and these investments to technological progress and growth. In hi-tech sectors (such as hardware, software, pharmaceuticals, biotechnology) firms compete mainly by innovating. This is possible as long as there are

<sup>38</sup> I have doubts on the same definition of tying, which places too much emphasis on consumer demand for the tied product. Such demand does not shed light on whether there exist distinct products for the purposes of tying analysis, which uses the distinct products test as a proxy for determining whether the tying arrangement produces efficiencies. In other words, while there is clearly consumer demand for shoelaces, this should not mean that shoes and shoelaces are distinct products for the purposes of tying analysis. This issue can only be addressed by asking whether there is consumer demand for shoes without shoelaces. In sum, whether or not consumer demand exists for the tied product is the wrong question; the correct question is whether there is any significant consumer demand for the tying product *without* the tied product. Unless the analysis focuses on this question, there is a danger that the mere existence of consumer demand for the tied product may prevent the emergence of efficient tying arrangements and end up protecting suppliers of tied products at the expense of consumers and innovation. Moreover, in the case of technical integration of two products that were previously distinct, the distinct products test itself may not be helpful for understanding the market dynamics because, by definition, this test is backward-looking. A better approach in these cases would be simply to ask whether the company integrating the previously distinct products can make a plausible showing of efficiency gains: since technical tying is normally efficient, market leaders would be able to continue producing innovative products benefiting consumers without running afoul of the prohibitions on tying. Finally, since tying usually enhances price competition, it should never be abusive when it is standard commercial practice (which is also indirect evidence that such tying generates efficiencies, or that there is no demand for the unbundled product).

<sup>39</sup> Schumpeter, *supra* n 2.

well-defined intellectual property rights (IPRs), and especially patents, protecting their innovations and investments, which is ultimately what leads to technological progress in our economies. Moreover, even if most economists are used to thinking about market leaders as firms with weaker incentives to invest in R&D, recent theoretical and empirical research has also found that market leaders play a crucial role in the innovative activity. According to a recent Economic Focus article in *The Economist*,

“Joseph Schumpeter, an Austrian economist, pointed out many years ago that established firms play a big role in innovation. In modern times, it appears that many product innovations, in industries from razor blades to software, are made by companies that have a dominant share of the market. Most mainstream economists, however, have had difficulty explaining why this might be so. Kenneth Arrow, a Nobel prize-winner, once posed the issue as a paradox.<sup>40</sup> Economic theory says that a monopolist should have far less incentive to invest in creating innovations than a firm in a competitive environment: experience suggests otherwise. How can this be so?”<sup>41</sup>

Indeed, wide empirical evidence shows that dominant firms invest a lot in R&D and obtain relatively more innovations.<sup>42</sup> An important economist in the field, Segerstrom talks about “Intel economics”, evoking the example of a technological leader in the chip market that in 2000 invested 11.5% of its total sales in R&D.<sup>43</sup> High investments can also be found in many other major firms in the hi-tech sectors. In the same year, the R&D/sales ratio was 15% for Pfizer and 5.8% for Merck, two leaders in the pharmaceutical sector; 16.4% for Microsoft, the leading firm in operating systems; 5.8% for IBM, and 5.4% for Hewlett Packard, two leaders in computer technologies and services; 11.8% for Motorola and 8.5% for Nokia, leaders in wireless, broadband and automotive communications technologies; 10% for Johnson & Johnson, the world’s most comprehensive manufacturer of healthcare products and services; 6.6% for 3M and 6.3% for Du Pont, which are leading actors in many fields; and 5.6% for both Xerox (mostly focused on the legendary Palo Alto Research Center) and Kodak, leaders in the markets for printers and photographs. The fact that these companies remain at the top of the technological frontier in their respective industries may not be the sign of a monopolistic position in the traditional sense, but the fruit of their investments and of the competitive threat deriving from other firms and potential entrants.

<sup>40</sup> See K Arrow, “Economic Welfare and the Allocation of Resources for Invention”, in R Nelson (ed), *The Rate and Direction of Innovative Activity* (Princeton University Press, 1962).

<sup>41</sup> Economic Focus, “Slackers or Pace-setters? Monopolies May Have More Incentives to Innovate than Economists Have Thought”, *The Economist*, 22 May 2004, 84.

<sup>42</sup> P Aghion and R Griffith, *Competition and Growth. Reconciling Theory and Evidence* (Cambridge, MA, The MIT Press, 2005); R Blundell, R Griffith and J Van Reenen, “Market Share, Market Value and Innovation in a Panel of British Manufacturing Firms” (1999) 66 *Review of Economic Studies* 529.

<sup>43</sup> P Segerstrom, “Intel Economics” (2006) 47 *International Economic Review* forthcoming.

The recent theories of market leadership<sup>44</sup> have clarified the mechanics of these results. In a sense, patents drive competition through innovation in these markets and induce technological progress led by market leaders. For instance, I have shown<sup>45</sup> that dominant firms have more incentives to invest in innovation than the outsiders when the market for innovation, or what sometimes is called the patent race, is characterised by endogenous entry (as long as the dominant firms have a leadership, which in economic jargon just means that they can commit to an investment choice before the other firms). The crucial thing here is that dominant firms often remain dominant thanks to their investments. However, this should not be seen as evidence of inefficiency or of monopolistic power, but rather as a proof of the opposite: the competitive environment spurs investment by leaders and consequently induces a chance that their dominance persists. Clearly, this has strong implications for industrial policy. What the above theory suggests is that dominant firms in hi-tech sectors investing a lot in innovation may create an efficient situation:

“antitrust authorities should be especially careful when trying to stamp out monopoly power in markets that are marked by technical innovation. It could still be that firms like Microsoft are capable of using their girth to squish their rivals; the point is that continued monopoly is not cast-iron evidence of bad behaviour . . . when one company dominates a market, people should be careful in assuming that it is guilty of sloth. It may be fighting for its life.”<sup>46</sup>

Whether large or small, all firms have a role in investing in R&D and contribute to innovating. To understand the crucial role of IPRs in promoting such a process, we rely on an old argument by Nordhaus.<sup>47</sup> In general, the argument goes, patents create a temporary monopolistic power for the innovators which creates price distortions and hence carries a social cost, but also constitutes an incentive for many firms to invest and try to gain market leadership. The latter also leads to social benefits through technological progress and growth. Clearly social benefits and costs can be different for different inventions and in general for different fields of technology. For simplicity, and to avoid discriminations between fields of technology, patents typically have a uniform length. Nevertheless, from a strictly economic point of view, one may question this uniformity and consider the advantages of providing different terms of protection in different sectors (at least this could avoid the inefficient choice of radically

<sup>44</sup> See Etro, *supra* n 3; Aghion and Griffith, *supra* n 40; PC da Costa Vieira and AC Teixeira, “Computer Technological Lock in or Firms’ Strategy?” (2006) mimeo, Universidade do Porto, Portugal; L Wiethaus, “Excess Absorptive Capacity and the Persistence of Monopoly” (2006) mimeo, University of Hamburg; K Zigic, V Vinogradov and E Kovac, “Persistence of Monopoly, Innovation, and R&D Spillovers: Static versus Dynamic Analysis” (2005) mimeo, CERGE-EI, Prague; available at <http://www.intertic.org>.

<sup>45</sup> See Etro (2004), *supra* n 3.

<sup>46</sup> *The Economist*, *supra* n 39.

<sup>47</sup> W Nordhaus, *Invention, Growth, and Welfare* (Cambridge, MA, The MIT Press, 1969).

excluding certain innovations from patentability rather than allowing a more limited protection). More importantly, an evaluation of the social benefits and costs of patents for different fields is essential in judging the net benefit of a patents system.

Two fields in which patents are particularly valuable are the pharmaceutical sector<sup>48</sup> and the New Economy.<sup>49</sup> Economic research underlying patents in these fields<sup>50</sup> allow us to draw a number of conclusions and suggestions for the future debate on rules for hi-tech patents, with particular reference to the European debate: (1) protecting IPRs is necessary to properly promote innovations, but an optimal patent system should trade off social benefits and costs, eventually enforcing more IPRs in those fields like the New Economy, where the net benefits of patents are higher, or those fields like the pharmaceutical sector,

<sup>48</sup> In the pharmaceutical sector the role of patents on new drugs is, to say the least, fundamental to competition in the market and of scientific progress in the world. These kinds of patents have been often criticised for jeopardising health defence around the world and especially in developing countries, where western drugs are very important but very expensive; in other words, the social cost of patents on drugs can be high. Nevertheless, one should not forget that those same patents induced many firms to invest in the search for new drugs, some of which are now available, something which would not have happened otherwise; in other words, the social benefit of patents on drugs is very high as well. Fortunately there are ways to reduce the problems related with the pricing of drugs and their adoption depends mostly on the public sector. For instance, governments could buy drugs and distribute them at lower prices through the medical system, or just subsidise the prices. They may even buy the patents from the innovators and produce the drugs themselves (or outsource their production) and sell them at lower prices. Finally, western governments could redirect their international aid toward similar initiatives in favour of developing countries.

<sup>49</sup> In recent years the EU has tried to complete a process of harmonisation of the patent system for computer-implemented inventions (CIIs). After a long procedure, the Common Position adopted by the European Council in March 2005 proposed the patentability of CIIs when they provide a technical contribution to a field of technology. While this positive proposal simply reaffirmed the requirements already adopted in Europe for the last two decades and excluded from patentability any pure software, business methods and consulting practices (which are patentable in US), part of the European Parliament proposed a number of amendments aimed at radically changing the current situation which excludes most of the innovations in the information and communications technology field from patentability. As a consequence of such a confusing situation, the European Parliament ended up rejecting the Directive on CIIs in July 2005. I believe that the rationale for patents on CIIs is quite strong: while the main social gain from these patents is to promote innovation in the most dynamic sectors, the social cost is smaller than for other patents since in these sectors competition mainly works through frequent price-reducing and quality-improving innovations. Neglecting these traditional economic insights, opponents of the patent system have often claimed that patents stifle innovation—see L. Lessig, *The Future of Ideas. The Fate of the Commons in a Connected World* (New York, Vintage Books, 2002) as an example of poor understanding of economic incentives—but there is no serious theory or evidence behind these claims. In the US, the extension of patent protection to CIIs started in 1980 (the first patent of this kind was granted by the US Patent and Trademark Office in 1981) and was associated with a clear increase in R&D investment throughout the eighties. The R&D/sales ratio for US firms innovating on computer, telecommunications and electronic components (the relevant field here) increased from 5.5% to above 8% in 1989. Nevertheless a misleading interpretation of this experience has created a lot of confusion in the European debate.

<sup>50</sup> See F. Etro, "Innovation, Growth and the Role of Patents for Computer-Implemented Inventions in the European Union" (2005) Intertic Working Paper, available at <http://www.intertic.org>.

where social benefits are higher and there are proper policies which can reduce the social costs; (2) restrictions to the patentability of innovations in hi-tech sectors in one country or a group of countries could severely jeopardise investment in innovation and technological progress in the leading hi-tech sectors, with negative consequences on growth and competition in the global economy, and would shift investments toward other countries where IPRs are better protected; (3) limitations to the enforcement of the current patent system would open doors to foreign low-cost producers who, in the absence of patent protection, would be free to imitate even hi-tech production, with negative consequences on employment and on innovative firms; (4) improvements of the effectiveness of the current patent systems should rather promote access to patents, especially for small and medium-sized enterprises, traditionally less able to exploit this opportunity; and (5) enhancement of the spillovers created by the patent system on the diffusion of knowledge could be obtained through further requirements on a disclosure of the patented inventions which should be sufficiently clear and complete to be carried out by a person skilled in the art.

In conclusion, a proper industrial policy promoting competition *for* the market (beyond competition *in* the market) should adequately protect R&D investments and at the same time guarantee open access to the markets for innovations.

The Discussion Paper on the application of Article 82 briefly touches on this subject in the part on refusals to supply, that is, situations where a dominant company denies a buyer access to an input, in order to exclude that buyer from participating in an economic activity. Four conditions have to be fulfilled in order to find a termination of such a supply relationship to be abusive: the behaviour must be properly characterised as a termination of the supply arrangement; the refusing undertaking must be dominant; the refusal must be likely to have a negative effect on competition; and the refusal must not be justified objectively or by efficiencies. Only when the dominant supplier has not previously supplied the input to a potential buyer, as for IPRs, an additional criterion is added: the input must be “indispensable” to carry on normal economic activity in the downstream market (a so-called “essential facility”). However, the proposal clearly states the priority of IPR protection,<sup>51</sup> and correctly states that imposing

<sup>51</sup> It is correctly pointed out that

“to maintain incentives to invest and innovate, the dominant firm must not be unduly restricted in the exploitation of valuable results of the investment. For these reasons the dominant firm should normally be free to seek compensation for successful projects that is sufficient to maintain investment incentives, taking the risk of failed projects into account. To achieve such compensation, it may be necessary for the dominant firm to exclude others from access to the input for a certain period of time. The risks facing the parties and the sunk investment that must be committed may thus mean that a dominant firm should be allowed to exclude others for a certain period of time in order to ensure an adequate return on such investment, even when this entails eliminating effective competition during this period” (*supra* n 4, 235).

“on the holder of the rights the obligation to grant to third parties a licence for the supply of products incorporating the IPR, even in return for a reasonable royalty, would lead to the holder being deprived of the substance of the exclusive right”.

Moreover, another more restrictive criterion is added in the case of a refusal to license IPRs: the undertaking which requests the licence should intend to produce new goods or services not offered by the owner of the IPRs and for which there is a potential consumer demand. This additional criterion is in line with established case law, but the Commission introduces an exception to this criterion. It states that a refusal to license IPR-protected technology which is indispensable for follow-on innovation may be abusive even if the licence is not sought to directly incorporate the technology in clearly identifiable new goods and services. However, this exception is not motivated by economic analysis and is inconsistent with the mainstream theories discussed above: there are no serious economic arguments supporting the view that weakening IPRs would strengthen innovation in the long run.

### G. IPRs, TRADE SECRETS AND INTEROPERABILITY

New ideas are often protected with patents, but these are not the only form of protection for innovations. Not all inventive and innovative activities fall under the scope of patentability, and it is not always in the interest of a firm to patent every single innovation. In most hi-tech sectors, firms adopt a combination of patents and trade secrets to protect products which are the result of multiple innovations. Defending (intellectual or material) property rights is one of the fundamental conditions for a proper functioning of the market economy: defending trade secrets has a not negligible role in this context.

One of the most famous trade secrets, the formula of Coca-Cola (or Coke),<sup>52</sup> represents a competitive advantage for Coca-Cola. Many companies around the world invest to prepare new and original soft drinks competing with Coke: while there is at least one well-known global competitor, Pepsi, which has created a

<sup>52</sup> In 1886, in Atlanta, the pharmacist Dr John S Pemberton prepared the popular syrup which he added to carbonated water for the first time in his backyard. At first he distributed the new product by carrying Coca-Cola in a jug down the street to Jacobs Pharmacy. The bookkeeper of the pharmacy, Frank M Robinson, suggested the name and penned Coca-Cola in the unique flowing script that now is well known worldwide. As the company expanded, the new owner, Asa Candler, was unable to prepare all of the syrup by himself, so he labelled the ingredients 1–9 and told the managers at the branch factories only the proportions required and the mixing procedure. Today, the secret of Coke lies in a safe deposit vault at the Trust Company of Georgia (USA) and, it is said, only the company directors can authorise the opening of the vault. Although numerous outlets around the world have a franchise to bottle or can and distribute the beverage, none knows the precise ingredients. They are simply supplied with syrups and other ingredients from the Coca-Cola company and mix them with carbonated water.

similar successful drink,<sup>53</sup> the market for soft drinks is quite competitive,<sup>53</sup> and there is substantially free entry at the local level. Many competitors have tried to discover Coke's trade secret.<sup>54</sup> Now imagine that Coca-Cola was required to disclose its secret formula. Anybody could reproduce the very same drink—"clone" it under a different name—but it is hard to believe that this would create large gains for consumers. Close substitutes to Coke already exist and there are small margins to substantially reduce prices. However, the incentives for any other firm to invest and create new products could be drastically reduced if trade secrets were not protected.

Things get more complicated in hi-tech sectors. In these sectors trade secrets often cover fundamental innovations and protecting them amounts to promoting new fundamental innovations, which are the main engine of growth. In some fields, however, there may be, at least apparently, a trade-off between trade secret protection and "interoperability" between products, which is, broadly speaking, the ability to exchange and use information and data, especially in networks. For instance, consider the leading online search engine in the world, Google. We may look at its patented innovations, but after that, we would need to know its trade secrets to fully discover the mechanism of its precious algorithms. This would help many software companies and websites to interoperate with Google even better than they already do, as it would allow other search engines to improve their performances relative to that of the leading search engine. But after that, few companies would be likely to invest major resources or take substantial risks to create their own leading search engine when they can just "free ride" on others' ideas. The same argument would apply for the trade secrets of Microsoft on the source codes of its successful operating system *Windows* and to many other trade secrets of innovative leading companies.<sup>55</sup> Any forced disclosure of similar trade secrets represents an expropriation of legitimate investments and establishes inappropriate legal standards with perverse effects on the incentives to innovate.

<sup>53</sup> As as well known, behind the vanilla, coca and cola tastes, Coke is more orange-biased, while Pepsi is more lemon-flavoured and sweeter.

<sup>54</sup> Apparently, the basic ingredients of Coke are: (1) sugar; (2) caramel; (3) caffeine; (4) phosphoric acid; (5) coca leaf extract and cola nut extract; (6) citric acid and sodium citrate; (7) lemon, orange, lime, cassia, nutmeg oils and probably others; (8) glycerine; and (9) vanilla. Although the proportions of some of these ingredients all mixed with carbonated water can be discovered by chemical analysis, the most important and most elusive is the mixture of essential oils in ingredient (7). The flavour of the mixture is not simply the sum total of the oils, because other flavours are created by the interaction of the oils. Anyone trying to reproduce the mixture would need to know the exact ingredients, which are difficult to analyse with certainty, and their precise proportions.

<sup>55</sup> For an analysis of the interoperability part of the EU–Microsoft case see G Mastrantonio, "A Story of the Interfaces at the Intersection between Mythology and Antitrust: the *European Commission v Windows Server O.S.*" (2006), mimeo, Luiss University, Rome, available at <http://www.intertec.org>.

Fortunately, sacrificing trade secrets, or other IPRs, is not the only way to promote innovation or solve interoperability challenges. The market can do it much better: valuable ideas can be selectively commercialised on a *voluntary* basis through licences. Coase has clarified that whenever there is social value to generate, the market will properly allocate all property rights, including intellectual ones,<sup>56</sup> ensuring the accessibility of the information that fuels interoperability and acknowledging legitimate ownership rights of the innovators, and hence enhancing R&D investments.

Moreover, as Cremer, Rey and Tirole have recently shown,<sup>57</sup> since interoperability enhances network effects, it is often in the interest of the largest firms to promote it adequately to strengthen demand for its products. Finally, in the presence of network effects, dynamic market forces can do even more: as long as IPRs are well protected and firms can invest knowing that successful innovations will be rewarded, market forces can select the best standard when multiple standards are available and interoperability is only partial. In a famous book, Liebowitz and Margolis<sup>58</sup> have shown that this was the case in many episodes. An example is the adoption of the QWERTY keyboard (whose name is derived from the first five letters on the top left row): for years it has been claimed that the allocation of letters of this keyboard was an inefficient standard, whereas these researchers found that all the evidence suggests that the QWERTY keyboard, somehow selected by the market, is no worse than any other alternative.

In conclusion, also in this field, markets can properly balance the short- and long-run interests of consumers better than policy makers, promoting innovation, enabling an efficient degree of interoperability and selecting the best standards.

The approach of the European Commission on this subject in the proposed guidelines for the application of Article 82 is quite ambiguous. In the section on refusal to supply, they state that although “there is no general obligation even for dominant companies to ensure interoperability, leveraging market power from one market to another by refusing interoperability information may be an abuse of a dominant position”.<sup>59</sup> It is added that even if such information may be considered a trade secret, it may not be appropriate to apply to such refusals to supply information the same high standards for intervention as those regarding

<sup>56</sup> R Coase, “The Problem of Social Cost” (1960) 3 *Journal of Law and Economics* 1.

<sup>57</sup> J Cremer, P Rey and J Tirole, “Connectivity in the Commercial Internet” (2000) 48 *Journal of Industrial Economics* 433. Their analysis is based on M Katz and C Shapiro, “Network Externalities, Competition and Compatibility” (1985) 75 *The American Economic Review* 424.

<sup>58</sup> See S Liebowitz and S Margolis, *Winners, Losers, and Microsoft: Competition and Antitrust in High Technology* (Oakland, CA, The Independent Institute, 1999) and “The Fable of the Keys” (1990) 33 *Journal of Law and Economics* 1.

<sup>59</sup> *Supra* n 4, 241.

IPRs. However, there is no guidance on the lower standards that the Commission should apply or on the definition of “information needed for interoperability”, and this statement appears to open the door to a systematic possibility that innovative firms are forced to reveal trade secrets. In my view, even the uncertainty induced by this ambiguous wording is likely to jeopardise the incentives to invest in R&D, with dangerous consequences for (future) consumer welfare.

## H. CONCLUSIONS

In this article I have presented arguments in support of a new economics-based approach to competition policy which is potentially useful in the current European debate on competition policy for exclusionary abuses. I have suggested that the new theory of market leaders gives a coherent and comprehensive set of tools to approach competition policy, and have emphasised the differences between the post-Chicago approach and the new theory. The latter implies that:

1. market leaders always adopt aggressive pricing strategies (set lower prices and hence have larger market shares) when entry is endogenously constrained: hence, under these conditions, a large market share for an industry leader is more likely to be a symptom of a competitive environment rather than of market power;
2. markets characterised by high fixed costs and constant variable costs (or, more generally, by decreasing average costs) generate absolute or near-absolute dominance by leaders facing endogenous entry: hence, under these conditions, even an apparently monopolistic market share may not be a reliable indication of market power, but instead evidence of a competitive environment;
3. aggressive introductory pricing, bundling strategies and overinvestments in complementary markets are part of the natural competitive behaviour of leaders in markets where entry is endogenous: hence, under these conditions, aggressive pricing and other aggressive strategies are not likely to have an exclusionary purpose but instead generally have a purely competitive purpose;
4. dominant firms invest more in R&D when threatened by competitive pressure, while they tend to stifle innovation in the absence of such pressure: hence, under these conditions, the persistence of a leadership position in hi-tech sectors is consistent with effective dynamic competition *for* the market, which leads to a faster rate of technological progress in the interest of consumers.

While some of these statements and their policy implications may appear quite extreme compared with traditional approaches, I hope I have managed to show that the new theory of market leaders offers an alternative reading of antitrust cases and suggests the need for a more careful economic analysis of markets where entry can be regarded as an endogenous phenomenon.