

EEI POLICY NOTE



**EUROPEAN
ENTERPRISE
INSTITUTE**

15-17, Rue de Belliard
B-1040 Brussels, Belgium

www.european-enterprise.org

In collaboration with



COMPETITION POLICY: TOWARD A NEW APPROACH[^]

FEDERICO ETRO*

[^] Published in *European Competition Journal* (2006, Vol.2, April)

* Etro (UCSC, Etro Consulting and Intertic) is grateful to Kreso Zigic, Yannis Katsoulakos, Massimo Motta and Meir Pugatch for discussions. He is currently member of the Task Force on Competition of the International Chamber of Commerce of Paris, but the views expressed here are his own and are not necessarily shared by the institutions he is affiliated with and by the ICC. Email: fetro@intertic.org.

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, characterized by very dynamic and innovative markets, has increased the pressure for a new approach, already somewhat developed in the United States, but just in progress in the European Union. In July 2005 a EU Report by a group of important economists, Rey *et al.*,¹ 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.* emphasize 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 anticompetitive, but is in fact a legitimate, perhaps even pro-competitive business practice.”

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

¹ 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).

the strategies of dominant firms; 2) describe the equilibrium outcomes taking into account the existence of barriers to entry and of 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 analyze markets under many possible situations: different demand conditions or production technologies characterized 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,² and generalized (and formalized in game theoretic terms) by recent theoretical works,³ 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, while 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, dominant firms are 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 them to increase their market shares, reduce prices and gain from a reduction in the average costs

² See J. Schumpeter, *Capitalism, Socialism and Democracy* (Harper & Row, Publishers, Inc, New York, 1942); H. Von Stackelberg, *Marktform und Gleichgewicht* (Vienna and Berlin: Springer Verlag, 1934); F. Modigliani, “New Developments on the Oligopoly Front” (1958), *Journal of Political Economy*, 66, 3, June, pp. 215-32.

³ See F. Etro, “Innovation by Leaders” (2004), *The Economic Journal*, April, 101, 495, pp. 281-303; F. Etro, “Stackelberg Competition with Endogenous Entry” (2002), mimeo, Harvard University, available on line at the Intertic website www.intertic.org; F. Etro, “Aggressive Leaders” (2006), *The Rand Journal of Economics*, 37, Spring, in press.

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 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”, notably in 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 in the market is endogenous (as often it is), an aggressive pricing strategy is a pro-competitive strategy 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 not be seen as a signal of abusive conduct, but, oddly enough, as the result of competitive pressure.

A recent Discussion Paper on the application of Art. 82 of the Treaty on exclusionary abuses by the European Commission⁴ 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. As of now, the proposal of the Commission appears partly in line with outdated views, for instance 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 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”.⁵ Nevertheless, the effectiveness of these rules in safeguarding consumer welfare is weakened

⁴ DG Competition Discussion Paper on the Application of Article 82 of the Treaty to Exclusionary Abuses (Bruxelles, European Union, 2005).

⁵ # 78, *supra* n. 4.

when it is stated that some firms are virtually excluded from the possibility of an efficiency defence.⁶ 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”.⁷ From an economic point of view, the real missing concept, which defines firms with high market shares but not monopolizing the all 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 emphasize the need of a better understanding of the role of market leaders and of industrial policy toward market leaders, which is the subject of this article. Section B will survey the traditional approaches to competition policy, while Section C will present the innovations associated with the theory of market leaders. Section D will apply the new approach to general issues of abuse of dominance and Section E will deal with bundling issues. Sections F and G will move to competition *for* the markets and hence to policy for innovation. Section H will conclude.

B. The traditional approaches to competition policy

In this section I am going to 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. In our view, 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 basic models of imperfect competition associating market power, high market shares

⁶ # 90-92, *supra* n. 4.

⁷ 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 on line at www.intertic.org.

and abusive conduct with the typical behaviour of monopolists. Such a *naïve* view has been challenged in the 60s and 70s by the “*Chicago approach*”⁸ whose main merit has been to show that, when there are potential entrants in 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 protect 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 recently been pointed out, “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”.⁹

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 characterized 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 before game theory became the standard tool in industrial organization, and it failed to provide results that were robust enough to withstand fully-fledged game-theoretical analysis of dynamic competition between incumbents and entrants.¹⁰

⁸ See R. Posner, *Antitrust Law, An Economic Perspective* (Chicago, University of Chicago Press, 1976).

⁹ C. Ahlborn, D. Evans, and A. Padilla, “The Antitrust Economics of Tying: a Farewell to per se Illegality” (2004), *The Antitrust Bulletin*, Spring-Summer, pp. 287-341.

¹⁰ 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, also any other competitor can do it as long as credit markets are properly working, hence predatory pricing would not be effective to start with. The post-Chicago school as shown that in presence of asymmetric information between firms, of credit

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 Modigliani¹¹ 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 '80s and '90s, post-Chicago research on industrial organization 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 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,¹² and of many other works, often based on analysis of Stackelberg duopolies (that is, markets with one leader and one follower). Also most of the standard results

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.

¹¹ See J. Bain, *Barriers to New Competition: their character and consequences in manufacturing industry* (Cambridge, Harvard University Press, 1956); P. Sylos-Labini, *Oligopoly and Technical Progress* (Cambridge, Harvard University Press, 1962) and Modigliani, *supra* n. 2. Somewhat related with these theories is also the theory of dominant firms with a competitive fringe, which, however, was not formalized in coherent game theoretic terms as well.

¹² G. Bonanno and J. Vickers, "Vertical Separation" (1988), *Journal of Industrial Economics*, 36, 257-265; J. Bulow, J. Geanakoplos and P. Klemperer, "Multimarket Oligopoly: Strategic Substitutes and Complements" (1985), *Journal of Political Economy*, 93, 3, pp. 488-511; A. Dixit, "The Role of Investment in Entry-Deterrence", *The Economic Journal*, 90 (1980), pp. 95-106; D. Fudenberg and J. Tirole, "The Fat Cat Effect, the Puppy Dog Ploy and the Lean and Hungry Look" (1984), *The American Economic Review, Papers and Proceedings*, 74, 2, pp. 361-68; D. Kreps and R. Wilson, "Reputation and Imperfect Information" (1982), *Journal of Economic Theory*, 7, pp. 253-79; P. Milgrom and J. Roberts, "Predation, Reputation and Entry Deterrence" (1982), *Journal of Economic Theory*, 27, pp. 280-312; M. Whinston, "Tying, Foreclosure and Exclusion" (1990), *The American Economic Review*, 80, pp. 837-59.

on the behaviour of incumbents in terms of pricing, R&D investments, quality choices, vertical and horizontal differentiation are derived in 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 has already an exogenous amount of market power.¹³

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 unambiguously to fight against incumbents: punish their aggressive pricing strategies as predatory, and their accommodating pricing strategies as well (but in this case as monopolistic strategies), punish investments in complementary markets as attempts to monopolize 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

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

other words, this school does not endogenize entry of competitors.¹⁴ This leads to misleading results. Whether entry is more or less costly, entry is an endogenous decision by the potential competitors (except for cases of natural monopoly or legal barriers to entry, which should not be a subject of antitrust analysis), especially in global markets (as most markets in the New Economy are).

There are two different 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 endogenizing it, is basically the same. Only a comprehensive understanding of the behaviour of incumbents 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, as we will argue, suggests that a revision of the traditional approach to antitrust policy is required.¹⁵

In recent theoretical research,¹⁶ 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

¹⁴ All the papers cited above - and for instance the full chapter on abusive practices of M. Motta, *Competition Policy. Theory and Practice* (Cambridge: 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 in consideration, as we will see, can completely change the nature of the equilibria and hence the policy implications to be drawn.

¹⁵ There is a relation between this theory and the “*bounds approach*” by J. Sutton, “Market Structure: The Bounds Approach” (2005), in M. Armstrong and R. Porter Eds., *Handbook of Industrial Organization* (Vol. 3, North Holland). 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.

¹⁶ Etro, 2006, *supra*, n.3.

most cases.¹⁷ 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,¹⁸ 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 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 conquer 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, engaging in a lot of advertising, producing

¹⁷ 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 on line at www.intertic.org).

¹⁸ Fudenberg and Tirole, *supra*, n.12.

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.¹⁹ It turns out that in general, a 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 high-tech sectors).²⁰ 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 and shift some profits toward them). Formally, following an example introduced by the recent theory of market leaders,²¹ assume B is the sunk cost of entry, c is the marginal cost and $D = a - p$ is market demand at the 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

¹⁹ Etro, 2002, *supra*, n.3.

²⁰ See *T-Mobile (UK)'s response to Ofcom consultation document. Strategic Review of Telecommunications* (London, 2004, available on line at www.intertic.org) for an application of our approach in the telecommunications sector and K. Johansen and N. Damm, "Research and Development in Transition. The Effects of Market Liberalization"(2004), Stockholm School of Economics, Thesis on the energy sector.

²¹ Etro, 2006, *supra*, n.3.

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.²² 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 λB , 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 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, λ).

Now, to extend the analysis to other contexts, imagine that goods are not homogeneous but they differ in quality. This happens when consumer needs or tastes are quite differentiated, as is the case in many sectors where the design and the inner quality of products plays an important role. 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 lower variety of alternative products but pay less for some of them. Again market leadership with endogenous entry creates a net gain for society.

²² See Sutton, *supra*, n.15.

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 cost²³: 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.²⁴ 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 Art. 82) is here inconsistent 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. Second, 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 conducts that characterises EU competition policy.²⁵

²³ 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).

²⁴ See P. Areeda and D. Turner, "Predatory Pricing and Related Practices under Section 2 of the Sherman Act" (1975), *Harvard Law Review*, 88, pp. 637-733, and, for an economic commentary, W. Baumol, "Predation and the Logic of the Average Variable Cost Test" (1996), *Journal of Law & Economics*, 39, April, pp. 49-72.

²⁵ 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 a less aggressive competition of its competitors is not sufficient to create any harm to consumers (actually the net effect is typically the opposite).

In a sense, with the theory of market leaders we are back to similar conclusions as those of the Chicago School, while generalizing the theoretical framework of the post-Chicago approach: that is why we could talk about a sort of *New-Chicago approach*.

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 should consist 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 previously noticed, the behaviour of market leaders tends to be pro-competitive whenever entry of competitors in their markets is constrained by entry barriers or fixed costs of entry. Second, there should be no presumption that a certain market share amounts necessarily to dominance. As a matter of fact, 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 just 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 production level goes up. Actually, as we have seen before, 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. But 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!²⁶

As a case study where we could apply our arguments, consider the software market. The technological conditions in this market are well known. Producing software (whether it is an operating system or a particular application) takes a very high up-front investment and a constant marginal cost which, as is well known, is close to zero. The entry conditions in this market are more debated, but there are good reasons to believe that even though entry into the software market may entail large costs, it is substantially open, *i.e.* endogenous. First of all, there are already many firms active in this sector, and even more potential entrants – think of the giants in adjacent sectors of the New Economy (hardware and telecommunications in particular). Second, 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 global. Nevertheless, it has been claimed that in the market for PC (or client) operating systems, the high 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 (and some do offer already) 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 to the global size of this market.²⁷ 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.²⁸ Second, the competitors of Microsoft should not (and the existing ones do not) even finance the development of all the needed applications: as Microsoft did in most

²⁶ 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.

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

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

cases, they should just fund and encourage other firms 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 emphasize 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.

Summarizing, the software market is characterized 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 see the same fact 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. Notice that network externalities require these prices to be even lower because competitors could (and indeed try to) offer their alternative software at even lower prices to build their own network effects.²⁹

The extremely low price of Windows represents an 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 ε is the elasticity of demand for PCs (including both hardware and software):³⁰ it means that a 1% increase in the price of PCs reduces

²⁹ Low prices in presence of network effects are very common and often extreme: most email services as *Yahoo*, search engines as *Google* and social networks 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, and, for sure, their leaderships have nothing to do with dominance.

³⁰ Here we assume that the price of the hardware is fixed and independent from that of the software. Given a demand $D(b+w)$ decreasing in the price of the hardware b plus the price of Windows w , the gross profit of a monopolist in the operating system market

demand by $\varepsilon\%$. Now, the above relationship tells us that, if the basic price of the hardware is 1000 Euros, which is about the current average price for PCs, the monopolistic price for Windows would be 1000 Euros if $\varepsilon = 2$, 500 Euros if $\varepsilon = 3$, 333 Euros 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 Euros. 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 would double tomorrow, hardware producers would be forced to reduce somewhat their prices (eventually switching to lower cost techniques and/or lower quality products).³¹ Even if this effect may be limited by the high level of competition in the hardware sector, it goes in the direction of increasing further the monopolistic price of Windows, 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 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 suggested about leaders in markets with price competition was 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

would be $wD(h+w)$ and would be maximized by a price of Windows w^* such that $D(h+w^*)+w^*D'(h+w^*)=0$ or:

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

³¹ Simply think that the price of hardware $h(w)$ is decreasing in that of Windows (we could endogenize 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 absence of this translation effect (remember that $h'(w^*) < 0$): a monopolist would price Windows even more because part of the potential reduction in demand due to a higher price would be avoided thanks to an induced reduction in the price of the hardware.

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 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. Where other theories cannot, 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 high 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 high 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, the combination of two separate products in a single one sold alone. Notice that tying refers to selling one product (the tying product) conditional on the purchase of another one (the tied product), but there will not be any substantial difference between the two for our purposes. 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.³²

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. Actually, 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.³³

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 in the tied product market to expand monopolistic power and reduce consumer welfare, at least in the long run.³⁴ Summarizing 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”.³⁵

³² See Ahlborn, Evans and Padilla, *supra*, n.9, and Motta, *supra*, n.14 (Ch. 7) for excellent surveys on this issue.

³³ N. Economides, “The Microsoft Antitrust Case” (2001), *Journal of Industry, Competition and Trade*, 1, pp. 7-39.

³⁴ Whinston, *supra*, n.12.

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

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 emphasizes 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, imagining that it is a monopolist in a primary market with the possibility to enter 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 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 there is actually one single firm active strategically and no possibility for other firms to enter:³⁶ then, the only reason why the monopolist would elect to adopt a bundling strategy is to induce 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

³⁶ The same limitation applies to the duopoly models by J. Choi, “Preemptive R&D, Rent Dissipation, and the ‘Leverage Theory’” (1996), *Quarterly Journal of Economics*, November, 1153-1181, D. Carlton and M. Waldmann, “The Strategic Use of Tying to Preserve and Create Market Power in Evolving Industries” (2002), *The Rand Journal of Economics*, 33 (Summer), 194-220 and B. Nalebuff, “Bundling as an Entry Barrier” (2004), *Quarterly Journal of Economics*, 119, 1, pp.159-87. 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 has not any clear realistic counterpart in the real world. Moreover, his results would immediately collapse if this firm or other firms had the chance to endogenously enter in the tied market.

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.³⁷

Summarizing, 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 monopolized 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.

Looking at the Discussion Paper on the application of Art. 82, it appears that its positive principles are not fully carried through into the discussion on bundling.³⁸ For instance, the standard of proof the Commission is required to

³⁷ See Etro, 2006, *supra*, n.3.

³⁸ 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 demands 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

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 high-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,³⁹ economic research has repeatedly emphasized the positive relationship linking patents to investments in innovation and these investments to technological progress and growth. In high-tech sectors (think of hardware, software, pharmaceuticals, biotechnology) firms compete mainly by innovating. This is possible as long as there are well defined 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

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 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).

³⁹ Schumpeter, *supra*, n.2.

theoretical and empirical research has also found that market leaders play a crucial role in the innovative activity. As an Economic Focus of the *Economist* has recently written, “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.⁴⁰ 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?”⁴¹

Indeed, wide empirical evidence shows that dominant firms invest a lot in R&D and obtain relatively more innovations.⁴² 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.⁴³ High investments can also be found in many other major firms of high 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, and 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 health care products and services, 6.6% for 3M and 6.3% for Du Pont, which are active in many fields with a leading role, 5.6% for Xerox (mostly focused on the legendary Palo Alto Research Center) and for 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

⁴⁰ 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, Princeton, 1962).

⁴¹ *Economist*, “Slackers or Pace-setters? Monopolies may have more incentives to innovate than economists have thought” (2004), *Economic Focus*, 22nd-28th May, p. 84.

⁴² P. Aghion and R. Griffith, *Competition and Growth. Reconciling Theory and Evidence* (Cambridge, 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), *Review of Economic Studies*, 66, pp. 529-54.

⁴³ P. Segerstrom, “Intel Economics” (2006), *International Economic Review*, forthcoming.

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.

The recent theories of market leadership⁴⁴ 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 shown⁴⁵ 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 characterized 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, but 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 high-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.”⁴⁶

Whether large or small, hence, 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 a old argument by Nordhaus.⁴⁷ In general,

⁴⁴ See Etro, *supra*, n.3; Aghion and Griffith, *supra*, n.40; P. C. da Costa Vieira and A. C. Teixeira, “Computer Technological Lock in or Firms’ strategy?” (2006), mimeo, Oporto; 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 on line at www.intertic.org.

⁴⁵ See Etro, 2004, *supra*, n.3.

⁴⁶ Economist, *supra*, n.39.

⁴⁷ W. Nordhaus, *Invention, Growth, and Welfare* (Cambridge, MIT Press, 1969).

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 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 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 sector⁴⁸ and the New Economy.⁴⁹ Economic research underlying

⁴⁸ In the pharmaceutical sector the role of patents on new drugs is, to say the least, at the basis of competition in the market and of scientific progress in the world. These kinds of patents have been often criticized for jeopardizing 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 and some of them to invent new drugs which are now available, something which would have hardly 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 pay part of the prices. They may even directly buy the same patents from the innovators and produce the drugs (or outsource their production) and sell them at lower prices. Finally, western governments could redirect their international aids toward similar initiatives in favour of developing countries.

⁴⁹ In the last years the European Union tried to complete a process of harmonization 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 it 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 ICT from patentability. As a consequence of such a confusing situation, the European Parliament ended up rejecting the all Directive 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

patents in these fields⁵⁰ allow us to draw a number of conclusions and suggestions for the future debate on rules for high-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, as the New Economy, where the net benefits of patents are higher or those fields, like the pharmaceutical sector, where social benefits are higher and there are proper policies which can reduce the social costs; 2) restrictions to the patentability of innovations in high-tech sectors for one country or a group of countries could severely jeopardize investment in innovation and technological progress in the leading high-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 high-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 size enterprises, traditionally less able to exploit this opportunity; 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

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* (Vintage Books, New York, 2002) as an example of poor understanding of economic incentives - but there is not serious theory or evidence behind these claims. In 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 it was associated with a clear increase in R&D investment during 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.

⁵⁰ Etro, 2002, *supra*, n.3.

investments and at the same time guarantee open access to the markets for innovations.

The Discussion Paper on the application of Art. 82 briefly touches 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,⁵¹ and correctly states that imposing “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 license 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

⁵¹ 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” (# 235, *supra* n. 4).

is inconsistent with 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 high-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,⁵² 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 similar successful drink,⁵³ the market for soft drinks is quite competitive and there is substantially free entry at the local level. Many competitors have tried to discover Coke's trade secret.⁵⁴ Now imagine that Coca-cola was required to

⁵² In 1886, in Atlanta, the pharmacist Dr. Pemberton's prepared the popular syrup added of 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 Candler could not prepare the syrup all himself, so the ingredients were all simply labelled 1 to 9 and the managers at the branch factories were only told the proportions required and the mixing procedure. Today, the secrete 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 to 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.

⁵³ As well known, behind the vanilla, coca and kola tastes, Coke is more orange-biased, and Pepsi is more lemon-flavoured and sweeter.

⁵⁴ Apparently, the basics ingredients of Coke would be: 1) sugar, 2) caramel, 3) caffeine, 4) phosphoric, 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, 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

disclose its secret formula. Anybody could reproduce the very same drink, “clone” it under a different name if you like, 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 high-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 on line 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 compared to that of the leading search engine. But after that, we can bet that few companies would invest major resources or take substantial risks to create a leading search engine or other brilliant ideas like Google 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.⁵⁵ 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.

Fortunately, sacrificing trade secrets, or other IPRs, is not the only way to promote innovation or solve challenges. The market can do it much better:

mixture of essential oils is merchandise 7). The flavour of the mixture is not simply the sum totals 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.

⁵⁵ 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 on line at www.intertic.org.

valuable ideas can be selectively commercialized on a *voluntary* basis through licenses. Coase has clarified that whenever there is social value to generate, the market will properly allocate all property rights, including intellectual ones,⁵⁶ insuring 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,⁵⁷ 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 Margolis⁵⁸ 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 not worse than any other alternative.

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

⁵⁶ R. Coase, “The Problem of Social Cost” (1960), *Journal of Law and Economics*, 3, pp 1-44.

⁵⁷ J. Cremer, P. Rey, and J. Tirole, “Connectivity in the Commercial Internet” (2000), *Journal of Industrial Economics*, 48, pp. 433-72. Their analysis is based on M. Katz, and C. Shapiro, “Network Externalities, Competition and Compatibility” (1985), *The American Economic Review*, 75, pp. 424-40.

⁵⁸ See S. Liebowitz and S. Margolis, *Winners, Losers, and Microsoft: Competition and Antitrust in High Technology* (The Independent Institute, Oakland, CA, 1999) and also S. Liebowitz and S. Margolis, “The Fable of the Keys” (1990), *Journal of Law and Economics*, 33, pp. 1-26.

The approach of the European Commission on this subject in the proposed guidelines for the application of Art. 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”.⁵⁹ 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 IPRs. However, there is no guidance on the lower standards that the Commission should apply and 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 own view, even the uncertainty induced by this ambiguous wording is likely to jeopardize 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 economic-based approach to competition policy which is potentially useful in the current European debate on competition policy for exclusionary abuses. I suggested that the new theory of market leaders gives a coherent and comprehensive set of tools to approach competition policy and I emphasized 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 higher 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 characterized by high fixed costs and constant variable costs (or, more generally, by decreasing average costs), generate absolute or close to absolute dominance by leaders facing endogenous entry: hence, under these

⁵⁹ # 241, *supra* n. 4.

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 over-investments 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 high-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 to the 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 of a more careful economic analysis for markets where entry can be regarded as an endogenous phenomenon.

*This document is an EEI Policy Note. Opinions expressed above does not necessarily represent the belief of the EEI.