

Competition and Environmental Policy in the EU: Old Foes, New Friends?

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Abstract European competition authorities consider environmental and competition policy to be complementary, as each has the objective of improving social welfare. Naturally, one would imagine that environmental considerations have already been accounted for in competition policy practice, but thus far, only in the case of voluntary environmental agreements. This paper analyzes the extent to which the two types of policy are complementary by examining the legal framework of competition policy, voluntary environmental agreements and three competition cases with equal relevance to the environment and then examines the basic theoretical economic observation that less competition implies lower pollution levels relative to more competition. This trade-off between the benefits of reduced emissions on the one side and increased competition on the other implies that disregarding environmental considerations in the implementation of competition policy entails a negative externality, which can be eliminated if environmental considerations are internalized in competition policy. The impact of the externality is found to depend on the emission level, the emission damage, and market size. Further, this implies that if competition authorities were to adopt a broad definition of the relevant market in competition cases, then environmental considerations would play a limited role in competition policy, whereas a narrow definition implies that environmental considerations should have a much more important place than competitive considerations in competition policy.

Keywords Environmental policy · Competition policy · Optimal market structure · Environmental damage · Social costs · Competition analysis

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1 Introduction

In many ways, environmental policy and competition policy are complementary in that they share the objective of enhancing social welfare. Competition authorities extend the argument somewhat by contending that competition is instrumental for correcting externalities (OECD 2011; NCA 2010). Moreover, environmental policy is regarded as potentially detrimental to competition by leading to increased fixed or sunk costs, which may, in turn, produce increased concentration and barriers to entry and thus result in decreased competition and social welfare (NCA 2010). In addition, firms may attempt to exclude or disadvantage rivals through the increased rent-seeking opportunities that environmental policy entails (*ibid*). Although considered complementary policies, this only appears to be the case if environmental policy is restricted or subordinated to competition rules, or as the European Commission (EC) concludes in its contribution to the OECD roundtable documents on horizontal agreements in an environmental context,

The Commission acknowledges the need to set environmental targets and maintain a high level of environmental protection. This does not relieve the Commission from the task to enforce competition in those markets which are shaped or influenced by the environmental context. For the competition analysis environmental factors are taken into account to the extent that they can be subsumed under the existing criteria of the EU competition rules. There is no need to adapt these legal standards for agreements in the environment context (OECD 2011;126).

The two policies should be more attuned as both are mentioned in the EU Treaty (EUT). Environmental considerations can be found in the preamble of the EU Treaty environmental protection and environmental development are mentioned as objectives of the EU, and in article 21.2.d EUT, the environment is mentioned in relation to developing countries and in article 21.2.f EUT it is stated that the EU should engage in developing international measures to preserve and improve quality of the environment and sustainable management of global resources. In addition environmental considerations are also part of the Lisbon strategy of 2000, which regards them as a condition for sustainable economic growth. Sustainable growth is considered to occur through the efficient use of resources and low carbon emissions (OECD 2010; 121). The EC considers competition to be instrumental in this regard and therefore states, as one of its goals, that competition should occur within a framework that maintains high levels of environmental protection. However, the EC does not consider it necessary to incorporate environmental considerations into competition analysis or alter the existing legal standards of analysis in competition cases (*ibid*; 126).

This paper examines the extent to which the two policies are complementary and the degree to which environmental considerations will affect competition policy and legal standards. We believe that there is evidence that the two policies are not being treated as complementary and it will be necessary to adapt the existing legal standards of analysis to embrace environmental considerations.

We place voluntary environmental agreements (VEA) between firms at the center of our analysis and discussion of the EU. VEAs establish the standards for emissions in or the conduct of an entire industry and, in many cases, have been adopted by industries in an attempt to avoid direct regulation. In recent years, the number and importance of VEAs have been increasing worldwide (Karamanos 2010). VEAs are important, as they are subject to the scrutiny and objections of competition authorities to a greater extent than direct regulations.

If environmental and competition policies are compatible, one would imagine that environmental considerations are already involved in European competition policy and particularly in the case law regarding those instances in which competition cases contain a clear environmental aspect. The EC have addressed the role of environmental consideration in competition policy for example in relation to the liberalization of the energy sector where competition is seen as a facilitator for finding cleaner energy alternatives. In the context of this article we have only been able to identify two instances that originate in a VEA and where the environmental implications are so clear that they could have prompted the EC to include environmental considerations in its assessments, but where both were investigated for cartel activity without environmental considerations being mentioned.

The absence of environmental considerations in EU competition practice in this relation may suggest two things: 1) That environmental considerations are not fully integrated in the assessment of competition infringements and will not be so unless this is an explicit desire of policymakers, and 2) that the two policies can best be described as environmental policy being subordinate to competition policy, which also seem to characterize US antitrust policy as suggested by Adler (2004, 2005). A related question is whether competition considerations are or have been involved in environmental policy.

In environmental policy, the effects on competition are not more important than environmental considerations. In most cases, the focus and important policy question concerns how to identify the appropriate policy instruments to cope with environmental problems (Pearce 1991). Many theoretical arguments advance market-based instruments, such as taxes or tradable permits, as being superior to other approaches that do not employ price mechanisms to cope with environmental problems (Baumol and Oates 1988). As such, environmental taxation is generally emphasized as an instrument to enhance efficiency (Pigou 1920), and Coase (1960) found that externalities could be addressed through well-defined property rights. While theoretical contributions on environmental standard setting highlight market-based instruments, such approaches are not always the first choice of policymakers. The deviation from the theoretical suggestions is explained as a result of lobbying activities by the regulated industries and policymakers' attempts to reduce uncertainty in outcomes by continuing to employ older, established instruments (Buchanan and Tullock 1975). Elinor Ostrom (winner of the 2009 Nobel Prize in economics) has studied the problem of the commons and finds that despite arguments advancing the notions of both the state control and privatization of resources, neither the state nor the market has been uniformly successful in solving common pool resource problems. Using institutional analysis, she finds that common pool problems are occasionally solved by voluntary organizations rather than by a coercive state (Fennell 2011).

Against this line of direct regulation, policymakers 'encourage' firms to organize themselves in ways that 'solve' the problems of externalization by entering into more or less voluntary environmental agreements. VEAs require approval under the EC guidelines for horizontal agreements if they are not already part of the existing EU block exemptions (EU 2004; Slaughter and May 2010; Maks 2002). Until 2001, the VEAs had their own chapter in the EC guidelines on horizontal agreements, but with the revision in 2010, VEAs are now, according to the European Commission (EC), more appropriately assessed under the relevant chapters of the guidelines, which are: Research and Development (R&D), Production, Commercialisation, or Standardisation agreements (EC 2011a; 7).

VEAs may affect competition between firms, as the agreements have benefits and costs for the participating, as well as non-participating, firms (Karamanos 2010; Lehmann 2004; Brau and Carraro 2001; Segerson and Miceli 1998; Glachant 2007; Lyon and Maxwell 1999; Lyon

2013). As non-regulatory arrangements, VEAs could be regarded as the intersection between environmental policy and competition policy. As such, voluntary agreements are of particular interest here, and they form the basis of the case studies of EU and US competition practice in this area that we consider, and are used to highlight the interaction between competition and environmental policy.

The numerous different attempts to regulate and self-regulate environmental problems shape environmental policy, and as in many other policy areas, environmental considerations have to interact with myriad other political considerations, competition policy being only one of them. However, what is competition policy and how does it interact with other policies?

The objective of EU competition policy is to reduce the negative impacts of unbridled market power, especially in those cases in which the dominant firm seeks to restrict competition or firms agree to coordinate prices by forming a cartel and at the same time promote market integration between the EU member states (articles 101 and 102 of the EU Treaty). Price coordination is *per se* illegal, as such little evidence of attempts to coordinate is sufficient to conclude that cartelization is present and whether the coordination have any negative effects is unnecessary to establish. Another important task of competition policy is to preserve and protect a sufficient level of competition. Competition policy encourages beneficial cooperation, for example in the form of joint ventures in research and development activities, provided that the firms compete in their primary market (EC 2011a). Competition authorities are not only concerned with infringements of competition laws but also whether any law has potential anti-competitive effects (article 106 of the EU treaty). Thus, competition policy is more than merely safeguarding competition but also represents considerations with which other policies and laws have to be aligned. As assessments of the degree of alignment are the responsibility of the competition authority, one could contend that all industry-relevant policies are subordinated to competition policy.

The remainder of the paper is organized as follows. The difference between competition and environmental policy is important and shapes the ways in which VEAs are perceived within the two policy areas. This forms the background for the more analytical sections that follow. To examine the issue of compatibility between the two policies, we consider three cases that are relevant to competition and the environment, two on the EU and one from the US. We then attempt to examine and analyze the basic theoretical economic observation that monopolies imply lower pollution levels relative to perfect competition. The trade-off between the benefits of reduced emissions on one side and increased competition on the other is analyzed using a theoretical economic model, and the interaction between and consequences for environmental and competition policy are examined.

2 Background

There seems to be a lack of consensus on the goals of EU competition policy (Kingston 2011; 9), but it can be deduced from the EU Treaty and case law that the aim of modern EU competition policy is the enhancement of consumer welfare. This aim is stated clearly in the guidelines on the application of Article 101(3) TFEU as enhancing consumer welfare and of ensuring an efficient allocation of resources. However, the precise meaning of “welfare” is unclear. Should welfare be understood in a purely economic theoretic context, or should non-economic considerations also be considered? The answer to this question is complex and unclear.

Kingston (2011) contends that one's response to this question depends on which school of competition theory one belongs to, such as the Harvard school, Chicago school or Ordoliberalism, or a combination of elements from these schools, and in this sense, she emphasizes that competition policy should be understood in the correct historical context. Competition policy is built on the understandings and ideals of all of the various schools. After analyzing the different schools of competition theory, she concludes that there is room for other considerations within the schools, but with various degrees of influence. This means that it should be possible for EU competition policy to include other, more societally related objectives, such as environmental considerations. This is also the EC's conclusion, but only to the extent that environmental considerations do not interfere with the objectives of competition policy (OECD 2011; 121).

However, it is not only the overarching opinions of the EC that are important when examining competition policy but also the ways in which competition infringements are addressed by caseworkers. The guidelines and existing competition practice of the EC form the basis for analyzing any competition case, and this information is clear and available to all firms, practitioners and caseworkers. A team of economists and lawyers analyzes the infringements in any competition case, and all cases are addressed with reference to economic theory (Bishop and Walker 2010). In other words, as the EC expresses it, '*...EU competition policy is based on economic criteria*' (OECD 2011; 121). Thus, competition policy should be interpreted as having a basis in economics, but in practice it is constrained by conditions relating to legal procedures and practices and the skills, knowledge, experience and education of the caseworkers involved.

If we agree that competition policy should be interpreted within the realm of economic theory, the objective of any competition policy can be regarded as Pareto efficiency and welfare maximization. A Pareto efficient allocation of resources is achieved if the production of goods and factors are subject to perfect competition. Perfect competition depends on a number of highly restrictive assumptions regarding firm and consumer behavior, which is very difficult to observe or achieve in any market in practice. Competition policy is a combination of various measures intended to achieve perfectly competitive markets, through competition advocacy, competition law and enforcement (Bishop and Walker 2010). EU competition policy and the objectives thereof have always been influenced by the various theoretical economic approaches to understanding industrial organization (Kingston 2011). By contrast, environmental economics is a relatively new field of research within industrial organization and naturally had no influence when Competition policy was created and has thus far had no influence on contemporary EU competition policy (ibid).

The primary goal of environmental policy is to limit the harmful effects of production or consumption on the environment. Various policy instruments can be used to achieve this, and in general, the instruments can be divided into two categories: market-based instruments, which are intended to operate through price signals, and non-market instruments, which are intended to operate through means other than price signals. Market-based instruments are: environmental taxes, charges and fees, tradable pollution permits, and subsidies. Non-market-based instruments are: command-and-control regulations, policies to support green technologies and innovation, and encouraging voluntary cooperation between the government and industry or consumers (Turner et al. 1994).

On the one hand, the threat of regulation may induce the threatened firms to consider self-regulation, as well as other options such as lobbying (Anton et al. 2004). This represents a trade-off for the firms involved between complying with the wishes of policymakers and

retaining control over the content of the regulation, irrespective of whether it involves full regulation or the industry agrees on self-regulation. In such situations, over-compliance becomes an issue, presenting opportunities for product differentiation to capture the higher willingness to pay for environmentally friendly products among higher-income consumers (ten Brink 2002). The intense struggle over the content of VEAs in the political realm is in many ways more a struggle for establishing the standard for what is voluntary and gaining political approval of the extent of price premiums than a struggle to reduce pollutants.

On the other hand, industry self-regulation can also serve to influence, rather than pre-empt as above, government regulations (Lyon 2013). Unfortunately, there is no guarantee that such influence is socially beneficial, as it depends on the actual environmental improvements achieved through the VEA. Another issue is that VEAs increase the risk of green-washing, in which firms adopt a VEA, but due to, e.g., insufficient monitoring, the agreement is nothing more than a symbolic gesture that conceals the need for more substantive measures and delays the passage of effective mandatory regulation. In relation to this, when the VEA is concluded, rent-seeking incentives among the firms involved may serve to reduce the level of commitment to establish the standard in practice and therefore the efficiency of the VEA in terms of improving the environment (Glachant 2007; Hansen 2005).

From economic theory and a wide range of empirical studies, we know that competitive pressure for different standards or firms being more competitive or more numerous outside the agreement, will only act to destabilize any cooperative solution reached among firms (Levenstein and Suslow 2002; Pindyck 1979; Slade 1989 and 1990; Stigler 1964; Suslow 2005). Despite this barrage of theories and studies that find cooperation to be highly difficult or at best flawed, the existence of numerous VEAs, joint ventures, interest organizations, occasional mergers and even cartels suggest that firms are more than eager to cooperate if given an, even limited, opportunity.

Characteristic of most voluntary environmental agreements is that government involvement is limited or non-existent and the industry is responsible for implementing the policy goals of the arrangement and solving subsequent coordination and free-riding problems. As such, these agreements often result in sophisticated institutional structures and cooperation and coordination features similar to those created when firms form a cartel (Lehmann 2004; Suslow 2005) and thus run the risk of scrutiny from the competition authority, and if they are found to infringe on competition rules, VEA members would be fined up to 10 % of their annual global turnover in each year of infringement. When the government is involved it effectively approves a VEA making a kind of co-regulation, which is the case in for example the Netherlands and Denmark.

The framework for the assessment of VEAs is Article 101 TFEU. Article 101 (1) stipulates a general prohibition of all agreements or concerted practices designed to distort competition with the exceptions stated in Article 101 (3).

Environmental considerations are not mentioned but could be interpreted as a factor that promotes technical or economic progress, as the objective of a VEA is to manage externalities. VEAs may also ensure that consumers receive a fair share of the benefits, but not in the traditional sense of lower prices, which is the typical interpretation of consumer benefits, but as an improvement in the environment. VEAs seem problematic with respect to the last two criteria, as they are most likely not indispensable and have the potential to restrict or eliminate competition in parts of the common market. It is difficult to interpret environmental standards as not being anti-competitive in nature, as they increase firms' sunk costs, among other effects. As Lehmann (2004) explains, on the one hand, voluntary environmental agreements have the

object of reducing the level of externalities in an industry, but on the other hand, competition authorities often suspect that they promote collusive practices among the participating firms.

Thus, competition authorities' primary concern with respect to environmental policy are the instances in which environmental policy increases barriers to entry or exit and firms' sunk costs. If firms freely commit to industry standards to protect the environment, those standards must, according to the EC, be proportional to their aims (EC 2011a). According to the guidelines on horizontal agreements from 2001, this implied that the measures undertaken by VEAs had to result in net economic benefits in terms of a reduction in environmental pressure, relative to the situation in which had no action been taken, and the expected economic benefits had to outweigh the costs. The costs in this case were regarded as including, among other aspects, the effects of reduced competition, in addition to the compliance costs for economic operators and effects on third parties (ibid). Although the procedures have been omitted from the newest guidelines, they seem to accord with the ideas of this paper, but existing EC practice and the actual calculations for determining the benefits and costs are entirely absent from the EC case lists and documentation.

The absence of environmental considerations suggests that environmental considerations do not currently factor into competition cases. The same pattern can also be found in US antitrust policy (Adler 2004 and 2005). To highlight the consequences of this, we consider the following three cases of voluntary environmental agreements. The cases are from different sectors of production and is illustrative of the wide scope for environmental considerations in the economy and for competition analysis.

3 Case Studies

Lehmann (2004) studies voluntary environmental agreements among waste management firms in Germany with respect to competition policy. The voluntary agreements encompass a number of firms and have the effect of improving waste management. The findings indicate that the agreements may have, from the perspective of competition policy, undesirable effects in the form of decreased competitive pressure among the parties to the agreement. The author thus proposes that it is necessary to carefully analyze such agreements using a case-by-case approach to remove the worst cases. Although finding that VEAs are beneficial for the environment, he fails to observe beneficial effects on pollution levels resulting from a collusive agreement among the parties.

This section considers three additional cases of privately voluntary (environmental) agreements. The first case is the 2011 European Commission (EC) Decision, case Number 39579 (Consumer detergents) a cartel case and an example of a VEA in the consumer detergent industry, a product all consumers has on their shopping list and is associated with many ecological problems to rivers, lakes and streams due to the phosphate content in detergents (Köhler 2006); the second case is a VEA related to insurance and is the Protection & Indemnity (P&I) Clubs in international shipping. As with the consumer detergent case P&I clubs were investigated by the EC suspected for cartel activities. The clubs not only seek to reduce individual liabilities related to pollution but also in relation to passengers, crew, and cargo and thus the case is not only related to environmental issues but to issue regarding safety at sea; and finally the conservation cartels in US fisheries a case with equally importance and relevance for the EU as it is about the use of a natural resource that albeit being renewable can become depleted if overused.

3.1 Consumer Detergents

In 1998, producers of household laundry detergents concluded an agreement concerning good environmental practices for detergents (EC 2011b). The producers, by being members of the AISE (*Association Internationale de la savonnerie, de la détergence et des produits d'entretien*) environmental initiative, committed themselves to a set of reduction targets concerning the energy consumption per wash cycle, weight of consumed detergents, weight of packaging and poorly biodegradable organic ingredients.

The initiative resulted in the creation of the Code of Good Environmental Practice for Household Laundry Detergents, a voluntary initiative designed to promote more sustainable consumption of laundry detergents in 15 Member States, Iceland, Liechtenstein, Norway and Switzerland. Any producer of consumer detergents could become a member of the AISE. The content of the agreement asked producers, among other suggestions, to reduce their packaging, in the belief that consumers would consume less and thus help to reduce the overall level of pollution in the industry (*ibid*).

In practice, both the dosage recommendation and reduced package size for heavy-duty detergent powder, and the corresponding decline in packaging material, would help to reduce total industry emissions. To provide for an implementation phase, the producers agreed to maintain current prices and commercial activities. As such, the AISE's environmental initiative neither foresaw nor necessitated price discussions, but nevertheless turned in that direction. Upon receiving information from Henkel AG, an AISE member, the European Commission opened an infringement investigation based on the competition rules on cartels (*ibid*). The EC (2011b) argued that the agreement between the AISE members provided an opportunity for anticompetitive behavior to emerge and develop.

The producers identified in the infringement case were Henkel AG & Co. KGaA, Procter & Gamble International S.à.r.l. and Unilever PLC. Meetings and other contacts were organized among Henkel, P&G and Unilever at the European level on a regular, continuous basis on the occasion of the AISE environmental initiative. The ultimate goal of this coordination was to achieve market stabilization by ensuring that no party would exploit the environmental initiative to gain a competitive advantage and market positions would remain unchanged (*ibid*).

The EC found that Henkel, P&G and Unilever had engaged in anticompetitive practices, such as publicly maintaining constant prices during the implementation of the various phases of the environmental initiative and privately agreed to indirect price increases, by not reducing prices in proportion to the reduction in product quantity or packaging (less quantity for a lower price) (*ibid*). If they had done so, they would have reduced the beneficial environmental impact and the purpose of creating a common code of environmental practices, at the expense of decreased consumer welfare.

The parties also agreed to restrict their promotional activity, such as excluding various types of promotions during the implementation of the various phases of the environmental initiative. They further agreed to a direct price increase near the end of 2004 targeted at specific markets. To create trust, the parties exchanged sensitive information on prices and trading conditions and coordinated packaging decisions. As a result, the mentioned firms were found to have infringed EU competition rules and were subsequently fined (*ibid*).

While the cooperation among the producers shows clear signals of a cartelization of the market, it also had a beneficial effect on industry emissions, e.g., through the reduction in

package sizes or adjustments in dosage recommendations. Nevertheless, the case material does not mention any such benefits, and it is likely that none were considered in the case (*ibid*).

3.2 P&I Clubs

Bennett (2000) describes the second example. Since the 1850s, Protection & Indemnity (P&I) Clubs have been established in the United Kingdom as non-profit mutual associations of ship owners who pool their liabilities (i.e., environmental liabilities and third-party liabilities). As the insurance fee paid in any given year and for any issue depends on the claims made by all of a Club's members in the policy year, it is in all members' interests that others minimize the risks of possible liabilities, by increasing environmental and security standards within their fleets. Fourteen of these Clubs entered into a further scale of mutuality by collectively reinsuring one another to minimize the risk of large, unexpected claims by one of their members (e.g., due to an oil spill). However, as this group of P&I Clubs contained approximately 90 % of the world's merchant fleet, in 1997, the EC issued a "Statement of Objections" that the International Group Agreement breached Art. 85(1) of the Treaty of Rome. Thus, the EC regarded the P&I clubs as attempts at cartelization.

At the center of the objection was the agreement among the members to fix prices. The EC also argued that although trust was necessary for the P&I clubs to function properly, there are means of doing so other than a formal, international agreement. In contrast, the P&I Clubs claimed that an international agreement was necessary to avoid price competition among the individual clubs and thereby produce the classical lemon market phenomenon. While the clubs are non-profits, an increase in the number of members lead to more widespread liability risk, thereby leading to competition among members with good risk histories, which would inevitably would lead to a pooling of 'bad risk' ship owners in certain clubs and a race-to-the bottom for insurance rates. However, due to the binding agreement among the P&I clubs, ship owners cannot 'hide' from risk reduction measures induced in their fleets by their P&I club by simply changing insurance providers if their old one were to force them to invest in preventative measures. This power wielded by the insurance provider, in turn, reduces membership fees for ship owners and the overall incidence of environmental liabilities. Thus, international agreement is necessary for the P&I Clubs to enforce better safety and environmental performance in the shipping industry (*ibid*).

In August 2012, some 15 years after the issuance of the Statement of Objection, the EC closed the on-going infringement investigation against the International Group Agreement (IGA) of the P&I Clubs by concluding that market investigations were not sufficiently conclusive to confirm the Commission's initial concerns of violations of Art. 85(1) of the Treaty of Rome. As a result, the P&I Clubs were awarded a temporary exemption from Art. 85(1). Thus, despite being environmentally beneficial, this voluntary agreement among P&I clubs was subject to 15 years of on-going debate among the EC competition authorities (*ibid*).

3.3 Conservation Cartels in US Fisheries

The third example is an agreement among competitors in US fishery markets, which has been analyzed by Adler (2004). Adler generally finds that, in many cases, the existing competition policy pursued by US antitrust authorities allowed the fishing stocks to be depleted at a much higher rate than would have otherwise been the case. The basic arguments build on the notion that excessive competition in industries with apparent externalities has adverse effects.

In the 1930s, local canneries in California refused to purchase fish from a local entrepreneur who had only recently become a fisherman. A decade later, the fisherman filed suit against Monterey Sardine Industries, Inc., a cooperative association of fishing boat owners, and the Del Mar Canning Company for allegedly conspiring to set prices and restrict entry into the Californian sardine fishery. The association of boat owners and the canning company had concluded an agreement under which the association set fish prices and, in turn, the canneries agreed to exclusively purchase fish from the association. Adler (2004) argues that the agreement has all of the key indicators of a cartel but the agreement between the association and the canneries also served the fishermen's pecuniary interests (a fair allocation of income) and conservation purposes. The agreement helped to increase all of its members' prices and profits and restrict entry. Moreover, it helped to conserve fish stocks, which are a renewable resource provided they are not overfished, by limiting the harvest.

A US federal district court held that the association was 'not freed from the restrictive provisions of the anti-trust act "merely because it sought" the conservation of important food fish.' In other words, the conduct was no less exclusionary because it served in part to conserve fish stocks (*ibid*). As such, the association and canneries were found guilty of conspiracy to restrain trade under the Sherman Act, which contains several US antitrust laws. Although the court had considered the conservation 'defense', the penalty levied on the conspirators was no different than would have been imposed had no environmental or conservation claims been made. Further, the court did not consider whether the special conditions of an industry dependent on a renewable, but also vulnerable to depletion, resource would make the scope for competition far less than what one would observe in normal markets (*ibid*).

The consequences of the abolition of the cartel were precisely what the association had cautioned against: a depletion of the fish stocks from 500,000 t of fish per year in the 1930s to below 20,000 t in the early 1950s as the fishery began to collapse (*ibid*).

Commercial activity or changing environmental conditions might have depleted the fish stocks even if the conservation cartel had been allowed to persist, but the rapid decline in the stocks after the enforcement of antitrust laws certainly indicates that the introduction of a more competitive environment helped to hasten the inevitable. In other words, it seems that there are instances in which antitrust litigation inhibits attempts to develop cooperative solutions to common problems of coordination and the preservation of natural resources in industries dependent on them.

Adler (2005) concludes that collusive arrangements have real detrimental effects on consumers, but no more so than the costs of resource depletion and environmental ruin. He argues that the adverse effects on the environment resulting from competition policy in maritime commons are greater than the threat posed by conservation cartels.

This perspective can be regarded as the disjuncture between the short-term views of antitrust jurisprudence and the long-term views of conservation, and this is by nature an inter-temporal problem that is rarely observed in most policy areas (Kiew 2005). The problem perceived by static antitrust jurisprudence is antithetical to the dynamic, long-term goals of oil unitization and conservation. The inter-temporal conflict between antitrust and conservation jurisprudence reflects a failure to account for the future costs of increased competition for resources and the decreased incentives to, for example, create a VEA (*ibid*).

Environmental economists have widely discussed the necessary characteristics of voluntary approaches to reduce environmental damages and incentivize active participation by polluters and thereby reduce pollution. However, what is often neglected is that these voluntary approaches may be forbidden in practice by competition authorities, particularly if the

agreement restricts competition among the firms involved. The competition authorities’ scrutiny of a VEA and the likelihood of being fined may decrease the scope of cooperation and completely discourage certain voluntary attempts to improve the environment. Further, although VEAs may be beneficial for the members and the environment, they are legally forbidden in certain instances.

In the following, we develop a theoretical approach in which we can assess the circumstances in which decreased competition is more beneficial than increased competition when social welfare and environmental damage are considered.

4 The Trade-Off Between Environmental and Competition Considerations

In a neoclassical world, perfect competition implies the maximization a society’s output. As pollution is directly linked to output, this also means that pollution is maximized. In contrast, monopoly implies lower industry output than under perfect competition, and under the same assumption of a direct linkage between output and pollution, this entails that we would observe less pollution in markets with less competition, provided the monopoly uses the same production technology as firms under perfect competition. Thus, a trade-off exists between improving social welfare by reducing the level of industry output by decreasing competition and the concurrent decline in social welfare. To examine this trade-off and its importance for policy, we quantify all elements relating to emissions, emission damage, competition and impacts on social welfare in a single model. The framework for the model is neoclassical economic theory, as this approach has helped to shape competition policy and currently forms the basis for competition analysis and environmental economic analysis. Although neoclassical theory is clear on the relationship between output and pollution it is still debatable whether increased output necessarily leads to increased pollution in practice.

To simplify matters to the greatest extent possible, we begin our analysis by assuming that the firms in the industry are producing a homogenous good using the same or similar technologies.

Proposition 1 A trade-off exists between the level of competition and environmental damage from pollution.

Proof To demonstrate this, we consider the two extremes: monopoly and perfect competition. As our interest lies in the impacts of different levels of competition on social welfare and environmental damage, we define social welfare according to neoclassical theory under perfect competition in terms of consumer surplus, CS^* , and producer surplus, PS^* , and add environmental damage, I^* , from an emission, e , at the industry output level, Q^* as,

$$W^* = CS^* + PS^* - I(e(Q^*)) \tag{1}$$

This can also be written in terms of monopoly CS_M , PS_M and the deadweight loss associated with monopoly, DW , which is,

$$W^* = CS_M + PS_M + DW_M - I(e(Q^*)) \tag{2}$$

Social welfare under monopoly is,

$$W_M = CS_M + PS_M - I(e(Q_M)) \tag{3}$$

The difference in social welfare is then,

$$\begin{aligned} \Delta W &= W_M - W^* = CS_M + PS_M - I(e(Q_M)) - [CS_M + PS_M + DW - I(e(Q^*))] \Rightarrow \\ \Delta W &= CS_M + PS_M - I(e(Q_M)) - [CS_M + PS_M + DW - I(e(Q^*))] \Rightarrow \\ \Delta W &= I(e(Q^*)) - I(e(Q_M)) - DW \end{aligned} \tag{4}$$

Now define ‘excess’ environmental damage as the difference in environmental impact between the two regimes as $EDI^* = I(e(Q^*)) - I(e(Q_M))$. Using this, we can write the change in welfare as $\Delta W = EDI^* - DW$. Thus, whether perfect competition is preferable to monopoly depends on whether,

$$EDI^* \begin{matrix} > \\ = \\ < \end{matrix} DW \tag{5}$$

This result indicates that a trade-off between environmental and competition considerations exists, but there may also be corner solutions, in which EDI^* dominates DW or vice versa. This depends on the specific circumstances related to the market under consideration.

If we assume that the emissions result in a constant level of environmental damage per unit of emissions produced and environmental damage exhibits constant returns from emissions, there does not seem to be scope for corner solutions.

The assumption regarding constant returns in emissions production does not seem reasonable in all instances of industrial production. The typical theoretical assumption is that production exhibits decreasing returns. Decreasing returns implies that the drain on resources is greater for monopolies than firms in a perfectly competitive setting and may also imply that monopolies have increasing returns in the production of emissions, such that certain monopolies produce higher levels of emissions than would prevail under perfect competition.

On the other hand, if environmental damage declines at a greater rate than emissions, we may obtain the opposite result that the lowest possible emission level and environmental damage coincides with monopoly.

Proposition 2 Incorporating environmental considerations in competition policy analysis implies an optimal market structure that is similar to monopoly when the market size is small relative to the environmental damage from emissions or one similar to perfect competition when the market is large relative to the environmental damage from emissions, given linear demand and constant returns to scale in production, emissions and environmental damage.

Proof Assume that we have defined the relevant market as an n-firm industry with marginal costs of $MC=0$. The demand on this market is characterized by the demand function $D(Q)=A - p$, where A is the size of the market in terms of demand and p is the market price. Assume that all firms has constant returns to scale in production, which in addition to producing q-units of a good also has the side effect of producing polluting emissions per unit of the good

produced of α , and causes environmental damage of β per emission produced. In an n-firm world, the total amount produced can be written as,

$$Q = \sum_{i=1}^n q_i \tag{6}$$

The optimality condition of an n-firm equilibrium is $MR=MC$.

This implies total revenue of,

$$TR = pQ \Rightarrow TR_i = \left(A - \sum_{j=1}^n q_j \right) q_i \Rightarrow$$

$$TR_i = \left(A - \left(q_i + \sum_{j=1}^{n-1} q_j \right) \right) q_i = Aq_i - q_i^2 - \sum_{j=1}^{n-1} q_j q_i \tag{7}$$

The marginal revenue is then,

$$MR_i = A - 2q_i - \sum_{j=1}^{n-1} q_j \tag{8}$$

Employing the optimality condition we obtain,

$$MR_i = A - 2q_i - \sum_{j=1}^{n-1} q_j = MC = 0 \tag{9}$$

The assumption of symmetric production conditions implies that firms produce the same amount of output in equilibrium. Thus, the optimal level of production for each individual firm is,

$$A - 2q_i - (n-1)q_j = 0 \Rightarrow A - 2q_i - (n-1)q_i = 0 \Leftrightarrow$$

$$q_i = \frac{A}{n+1}, \tag{10}$$

Total market supply is,

$$Q = nq_i = \frac{nA}{n+1} \tag{11}$$

The resulting market price is,

$$p = \frac{A}{n+1} \tag{12}$$

Thus, the n-firm emission level is,

$$e_n = \alpha Q_n \Rightarrow e_n = \alpha \frac{nA}{n+1} \tag{13}$$

The environmental damage of an n-firm industry is,

$$ED_n = \beta \alpha \frac{nA}{n+1} \tag{14}$$

The consumer surplus in the n-firm industry is,

$$CS_n = \frac{1}{2} \frac{nA}{n+1} \left(A - \frac{A}{n+1} \right) = \frac{1}{2} \left(\frac{nA}{n+1} \right)^2 \tag{15}$$

The producer surplus of the n-firm industry is,

$$PS_n = \frac{nA}{n+1} \left(\frac{A}{n+1} - 0 \right) = n \left(\frac{A}{n+1} \right)^2 \tag{16}$$

The social welfare in the n-firm industry without environmental considerations is,

$$W_n = CS_n + PS_n \Rightarrow W_n = \frac{1}{2} \left(\frac{nA}{n+1} \right)^2 + n \left(\frac{A}{n+1} \right)^2 = \left(\frac{n^2}{2} + n \right) \left(\frac{A}{n+1} \right)^2 \tag{17}$$

The optimal market structure is characterized by the number of firms at which the loss in social welfare resulting from deviating from a perfectly competitive market structure is equal to the gain in social welfare from doing so. To achieve this, we consider the welfare level and emission damage under perfect competition.

Under perfect competition social welfare is,

$$W^* = \frac{A^2}{2} \tag{18}$$

The emission damage is,

$$ED^* = \beta\alpha A \tag{19}$$

The deadweight loss of having an n-firm industry is then,

$$DW = W^* - W_n \Leftrightarrow DW = \frac{A^2}{2} - \left(\frac{n^2}{2} + n \right) \left(\frac{A}{n+1} \right)^2 = \left(\frac{A}{n+1} \right)^2 \tag{20}$$

In the n-firm industry, the environmental damage as a function of the number firms is,

$$\Delta ED = ED^n - ED^1 \Rightarrow \Delta ED = \beta\alpha \frac{nA}{n+1} - \beta\alpha \frac{A}{2} = \alpha\beta A \left[\frac{(n-1)}{2(n+1)} \right] \tag{21}$$

The trade-off between competition and environmental policy, in terms of the number of firms, when social welfare is defined as the sum of consumer and producer surplus, is

$$\begin{aligned} DW &= \Delta ED \\ \Downarrow \\ \left(\frac{A}{n+1} \right)^2 &= \beta\alpha A \left[\frac{(n-1)}{2(n+1)} \right] \Leftrightarrow n = \sqrt{\frac{2A}{\beta\alpha}} + 1, \quad n \geq 1 \end{aligned} \tag{22}$$

European competition does not consider producer surplus, and the focus is entirely on consumer welfare or consumer surplus (Kingston 2011; EU 2004). This differs from the traditional focus in welfare economics of including both consumer and producer welfare when calculating social welfare.

In this case, the optimal market structure in terms of the number of firms is,

$$DW = \Delta ED$$

$$\Downarrow$$

$$\frac{A^2[2n+1]}{2(n+1)^2} = \frac{\alpha\beta A(n-1)}{2(n+1)} \Leftrightarrow \frac{n^2-1}{2n+1} = \frac{A}{\alpha\beta}, \quad n \geq 1 \quad (23)$$

It is also clear from both of the results that the optimal market structure depends on the level of emissions, the emission damage, and market size. By examining the various elements of the above condition, it is clear that the parameters can be divided into those relevant for competition authorities and those relevant for environmental planners.

To determine the level of competition and whether a potential infringement applies to one or a group of firms, the competition authorities attempt to define the relevant geographic and product market, which in practice amounts to establishing the correct market size of an industry, as well as identifying the firms supplying the market (EC 1997). Thus, the parameter of interest for competition authorities is the market size parameter, A . Environmental planners are concerned with marginal emissions and need to determine the market size to calculate the environmental damage. Thus, the relevant parameters in this case are α , β , and the market size parameter, A . Linking this to the two results above allows us to make further inferences regarding the interaction between environmental and competition policy.

Both of the results suggest that market size is important. If market size is very large relative to the marginal environmental damage, a focus on competition policy is preferable, as the relative level of social welfare outweighs any environmental considerations. Conversely, if the size of the market is very small or the marginal environmental damage is large, social welfare is not as important as environmental damage and environmental policy is preferable to competition policy.

Notice that reintroducing firm efficiency only serves to limit the size of the market and, hence, reduce the resulting optimal market structure. The result suggests that there is a limit to competition and competition policy for industries in which externalities are present. Comparing the two results on market size, we note that including producer surplus when calculating social welfare implies a higher level of competition than when it is not considered.

When competition authorities define the relevant market, they seek to determine the smallest possible market in which the product under consideration is ‘unique’, in the sense that all substitutable products and producers of significance are included in this market (EC 1997; Massey 2000; Amelio and Donath 2009).

Pollution is not generally unique to any given product, but can be a by-product of many different production processes for many different products. For example, the number of products that generate CO₂ emissions as a by-product is far larger than any market the EC would consider relevant in competition cases. Thus, it is reasonable to conclude that incorporating environmental considerations without changing the existing market definitions in competition cases would imply a much greater focus on environmental considerations. It would also imply that some concerted and anti-competitive behaviors prohibited under contemporary competition practice, would not exist under a greener competition policy. This suggests that environmental considerations should play a much greater role in competition policy than they do at present.

5 Conclusion

Informed by three case studies, this paper argues that environmental policy is subordinated to competition policy in the EU's casework. However, our theoretical model demonstrates that the interaction between policies and the emphasis of one policy over another depends on the definition of the relevant geographic and product market. As the environmental damage of the pollutant is constant and independent of the market definition employed by competition authorities, a larger market tends to place greater emphasis on competition and a smaller market definition implies a greater inclusion of environmental considerations in competition policy.

Environmental and competition policy may share the objective of improving social welfare, but as we have shown, this does not necessarily imply that the policies are complementary or compatible. The results reported above reveal that the two policies are, in practice and in theory, to some degree mutually exclusive and as such suggest that a much clearer priority should be determined between safeguarding the environment and promoting competition.

The dominant view in the EC is that environmental policy can harm competition, but the view that competition policy can harm the environment is entirely absent. Our results indicate that competition policy may harm the environment because there is a trade-off between lower environmental damage and increased competition. Apart from suggesting that it may be a more efficient and rapid way to reduce pollution through industrial organization, this also suggests that environmental considerations should play a more prominent role in competition policy.

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