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THE COMPETITION BETWEEN COMPETITION RULES

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The Competition between Competition Rules

by

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Summary

Open borders imply systems competition. This paper studies the implications of systems competition for the national competition rules. It is shown that an equilibrium where all countries retain their antitrust laws does not exist, since abolishing this law makes it possible for a single country to establish a cartel that successfully appropriates foreign business profits. Instead of such an equilibrium, a deregulation race is likely to emerge in which all but the last country repeal their antitrust laws. The deregulation race results in a chain of Stackelberg leadership positions taken over by national cartels that renders lower profits and higher consumer rents than would have been the case with harmonization of the antitrust laws.

JEL classification: H7, D43, L43

1. A Tottering Credo

Europe, indeed the whole world, is now at the start of a new stage of development in which the landscape of its firms is being redrawn. The common European market has been created, and international competition has become far more intense in the process of globalization than anyone could have anticipated. In the years to come the world of large firms will be completely restructured. Economists have been astonished by the increasingly frequent news reports about mega mergers and "strategic alliances" which previously would have been quite unthinkable. Former bitter rivals are now amalgamating and creating conglomerates that occupy large shares of the domestic markets. European companies, in particular, have been caught up in the wave of mergers. These companies feel they must prepare for globalization and are now attempting to put themselves in the best possible position do this. The belief in the importance of getting a good start is widespread. The conglomerate which gets into position first can occupy ground before the others come. It enjoys a first mover advantage, forcing its followers to content themselves with the share of the market that remains.

In this situation, the national cartel authorities will face considerable pressure to distance themselves from their old established ideas and make it easier for strategic alliances and mergers between firms to take place by relaxing the restrictions on them as rapidly as possible. Domestic competition is now taking second place to international competition and this is forcing the cartel authorities to behave like competitors themselves.

It was the credo of German "ordo liberalism" and similar neo-liberal lines of thought in the US that, although an unconstrained competitive market economy would be able to ensure an efficient allocation of resources, this type of economy would be inherently unstable. The competing firms would always have an incentive to merge, because, by doing so, they could

impose limits on the quantities sold in the market, increase their prices and raise their profits. A cartel authority would be necessary to stabilize the competition and it would do so by prohibiting the collusion of firms. Competition could only function if it was subject to strict rules enforced by the state. The German Antitrust Law and the Federal Cartel Office were established as a result of this way of thinking, and other countries have chosen similar policies even though they have preferred to name them differently.

The ordo liberal recommendations obviously make sense in a closed economy. A government which endeavors to maximize the welfare of its citizens will try to establish effective monopoly controls in order to produce a workable form of competition. The question is, how will this incentive structure change in the era of globalization? How will the forces of systems competition influence the behavior of the cartel authorities and the decisions of the legislators, if these legislators are concerned with the welfare of their own people? Has an ordo liberal economic policy any chance of surviving in the competition between systems?

Interest in ordo liberal policies has already waned as a result of the globalization of the economy. Warnings about domestic mergers are usually pushed aside by arguing that international competition is fierce and that the domestic industries must be armed against this competition. The ordo liberal credo is tottering. It is not quite clear whether a retreat from the ordo liberal way of thinking is really wise from a national point of view and it is even less clear whether, if this retreat is universal, a rational international competitive equilibrium will follow. The direction that will be taken by the competition between competition rules and whether this competition will ever be workable are open questions.

In view of the ensuing theoretical difficulties, this analysis can only deal with these problems in a very rudimentary way and must limit itself to providing food for thought.

Theoretical rigor, freedom from value judgement and verifiability of the analysis must precede a balanced political judgement.

2. Regulating the Domestic Monopoly

Before analyzing the competition between competition rules, it will be useful to briefly review the ordo liberal arguments for putting restrictions on setting up domestic cartels and company mergers. For the well informed reader, in this introductory section it will be sufficient to go quickly over the definitions of the variables and certain simplified basic assumptions.

Restricting cartels is necessary because competitive firms always have an incentive to merge to the disadvantage of the consumer. The cartel reduces the quantity it sells and thus raises prices. Whether this will cause revenue to rise or fall is not clear. In any case, costs will fall and profits will rise because of the reduction in sales. The consumers get the worst of the bargain. They pay higher prices, and the consumer surplus becomes smaller. On balance, setting up cartels is a loss for society because the cartel gains less than the consumers lose. Ordo liberal policy prevents this happening by prohibiting cartels and mergers.

This relationship can be illustrated with the textbook oligopoly model with n identical firms, linear demand, constant marginal costs c, and homogeneous products. The individual firm i chooses its quantity supplied x_i under the Cournot-Nash assumption that it has no influence on the quantities planned by other firms, but that it can influence the common market price P to a limited extent through its own decision. A market equilibrium is reached when the market clears and all quantities are chosen so that no supplier has any incentive to change its quantity[1] . The goal of the firm i is to maximize profits,

[1] As Kreps and Scheinkman (1983) have shown, the Cournot- Nash model also can be substantiated very well in a two step game structure, where first the capacities, and then the prices, are set as in a Bertrand competition.

$$\max_{x_i} P(X)\cdot x_i - cx_i,\ \ i = 1,\ldots,n,$$

where

$$X = \sum_{i=1}^{n} x_i$$

is the total quantity sold, which, according to the linear demand function, determines the market price:

(1) $$P(X) = b(K - X) + c;\ \ b, K, c = const > 0.$$

Here $-b$ is the slope of the demand curve, and K the quantity that would be sold in a competitive market. In such a market

$$P(X) = c \qquad \text{(competition)}$$

and therefore

$$X = K \qquad \text{(competition)}.$$

The profit maximizing conditions for problem (1) are

(2) $$P(X) + P'(X)\,x_i = c \quad \forall \ \ i = 1,\ldots,n.$$

These say that the marginal revenue equals the marginal cost of production. The marginal revenue from the sale of one more unit of the product is equal to the price at which this unit can be sold minus the reduction in revenue resulting from the fact that the sale of the extra unit is only possible if the infra marginal units are sold at a lower price. It is expressed by the term $P'(X)x_i$ which is negative because $P' < 0$.

The reduction in revenue with the infra marginal units obviously implies that $P(X) > c$, that is, that price is above marginal cost and the quantity sold is below the competitive quantity K. The effect is stronger, the larger the market share of the individual firm, because the share of the total detriment resulting from the price reduction that the individual firm has to bear is larger. This can be seen at once when it is considered that (2) implies a symmetrical equilibrium in which

$$n\,x_i = X \qquad \forall\, i = 1,\ldots,n.$$

Equation (2) then becomes

(3) $$P(X) + \frac{1}{n} P'(X) \cdot X = c$$

where $1/n$ is the market share. Applying equation (1), it follows from (3), with a little transformation, that

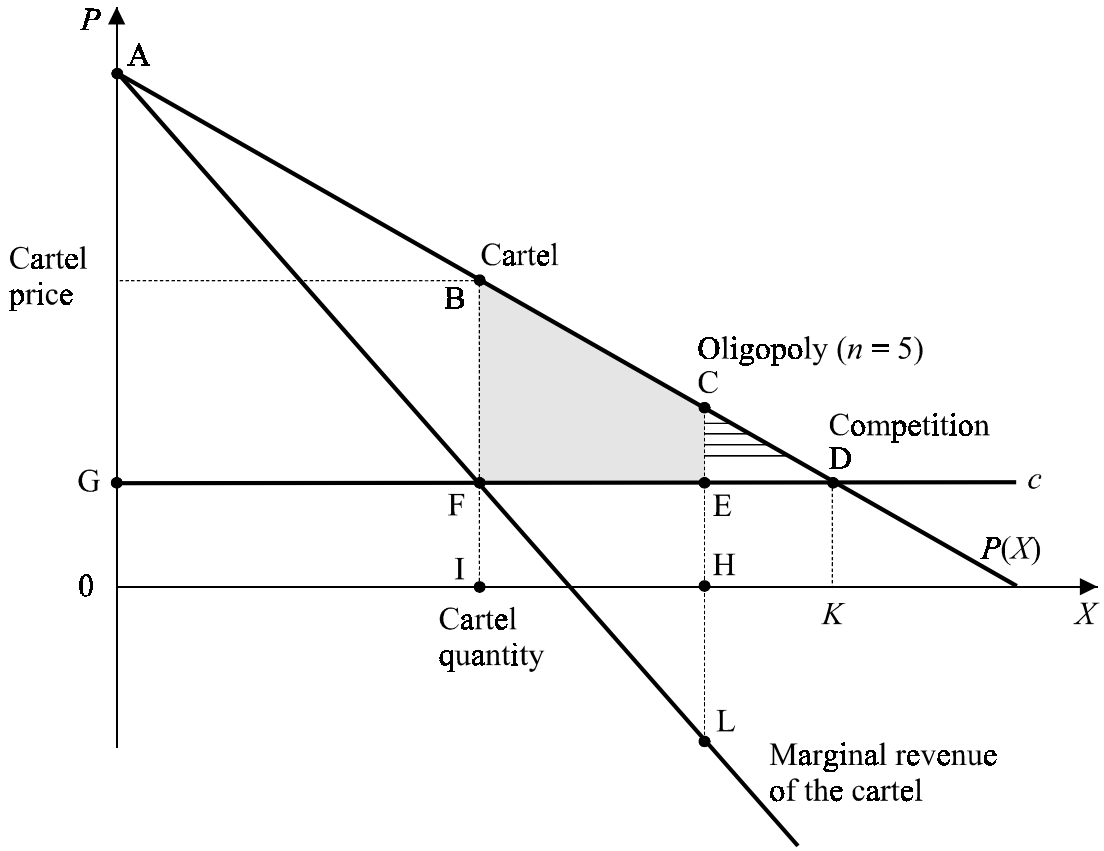
(4) $$X = \frac{1}{\frac{1}{n} + 1} K$$ (competition, Cournot-Nash behavior).

This expression shows that, with linear demand, the quantity sold is a simple falling function of the market share of the single firm. In the extreme case of a monopoly, ($1/n = 1$), the quantity sold is half the competitive quantity $X = K/2$, and in the other extreme case where the market share approaches zero, $1/n \rightarrow 0$, it is equal to the competitive quantity $X = K$.

The deeper reason for this implication of alternative market shares is negative externality the single firm imposes on other firms by forcing them to lower their price if it decides to increase its sales. The smaller the market share the smaller is this externality and lower is the single firm´s incentive to deviate from the monopoly quantity. The externality can be internalized by merging with other firms or by establishing a cartel. With perfect collusion, there is no externality, and with a linear demand curve and constant marginal costs, only half the competitive quantity is produced.

Figure 1 illustrates these relationships. In a price – quantity diagram it shows the marginal cost curve c, the demand curve $P(X)$ and the marginal revenue curve for the cartel. The last mentioned graphs the left hand side of equation (3) for the case where $n = 1$. Using the particular linear demand curve (1), the marginal revenue curve starts at the same place on the ordinate as the demand curve, that is, at point A, and it is twice as steep as the latter. In the cartel optimum, F, the marginal revenue equals the marginal cost and the price is above the marginal cost by the amount BF. With an oligopoly of five suppliers, on the other hand, the markup would be only CE and the quantity sold would increase by IH.

Figure 1: *The Ordo Liberal Creed*



Setting up the cartel benefits the suppliers because profit increases by the area FEL. (Since the revenue can be measured by the area under the marginal revenue curve and cost by the area under the marginal cost curve.) At the same time social welfare falls. Social welfare can be defined as the sum of all economic surpluses, which are equal to the difference between the consumers' maximum willingness to pay – the area under the demand curve – and the production costs – the area under the marginal cost curve. With perfect competition, where price equals marginal cost, social welfare is measured by the triangle ADG, with the oligopoly (with five members) it is measured by the area ACEG, and with the cartel by the area ABFG. Establishing a cartel obviously brings about a reduction in the total surplus of BCEF, although profit, which is

part of this total, increases. The cake is smaller but the producers can cut themselves an absolutely bigger piece of it.

The economic inefficiency of setting up a cartel proved in this way is the basis of the ordo liberal credo. The economy can be protected from the damaging effects of empowering the market by means of effective antitrust controls. In the present example, antitrust regulation would prevent welfare from falling by the area BCEF.

3. The Retreat from Ordo Liberal Policy in the Open Economy

The question of whether an ordo liberal equilibrium exists in the competition between systems will now be examined. Equilibrium is defined as a situation in which a parliament acting in the national interest prohibits cartels if all other governments do the same. For use in a theoretical model, the term "cartel" will be defined here in the classical sense. The members of the cartel make binding arrangements about the quantities produced and ensure that these are kept to by including appropriate sanctions in the contract. Everybody finds these arrangements credible. No credible quantity commitments would be possible without the cartel. The cartel may also be taken to reflect approximately other forms of amalgamations, such as takeovers, mergers, or strategic alliances.

Assume that there is a limited number of identical countries over which the identical firms are equally distributed. As in the initial model, constant average costs and linear demand curves are assumed. Parliaments chose their competition laws so as to maximize national social welfare.

Where the countries' borders are closed, all parliaments will prohibit cartels. As was shown in the previous section, such a prohibition on cartels leads to a higher level of national welfare than where cartels are permitted. The question is whether prohibiting cartels will also

maximize national welfare when the borders are opened and there is a common international market for all the firms of a branch[2]. A positive answer to this question is necessary for the existence of an ordo liberal equilibrium in the competition between competition rules.

The existence of such an equilibrium can only be usefully studied when it is assumed that setting up cartels is damaging to competition. This sounds more trivial than it really is. If the number of firms in the international market is large enough for genuine competition to take place despite setting up cartels in one of the countries, at least partial erosion of the antitrust laws would not be damaging. This would be the case when, for example, the convenient, and for many purposes permissible, assumption of a small country unable to affect the world market price through its own actions is made. A problem worth studying only arises when in the initial situation there are already sufficiently few firms for expecting that establishing a cartel of the firms in one country will have a significant influence on the price level. This is the case that will be considered in what follows.

Stackelberg position through lifting the prohibition on cartels

The model initially used is sufficient for analyzing the strategic situation of the supervisory authorities and/or the legislators in a systems competition. It is assumed that n firms are equally distributed over z countries between which free trade in goods is allowed. The first m firms are located in various countries where the ordo liberal economic policies are in place. The remaining $n - m$ firms may belong to a certain country, which we will call ”Germany”, which is considering lifting the prohibition on cartels.

[2] In what follows, national welfare will be defined as the sum of national profits and consumer surpluses. Little would change in the following model when it is assumed that the national parliament maximizes the profits of the domestic firms rather than the national welfare, which Olson’s (1965) theory of the political dominance of the producers interests would imply.

If Germany lifts its ban on cartels, it creates a starting advantage for the German firms. The starting advantage comes from their now being able to credibly set their production capacity by means of a reciprocal cartel agreement, so that the firms in the other countries are now only able to adapt as best they can. In this case the government helps the German firms to occupy the position of a Stackelberg leader, while the firms in the other countries are prevented from setting their own quantities by the cartel prohibition. The Stackelberg leader knows how its rivals would react to its own behavior and uses this knowledge to arrive at the best possible, profit maximizing, decision. Unlike in the Cournot-Nash model, where all the players are in symmetrical positions, the leader does not assume that it must adapt to the quantity set by the others. It knows that it can confront the others with its own production capacity and, to this extent, present them with a fait accompli.

The behavior of the firms in the other countries which can only react must be examined next in order to determine the optimal policy of the Stackelberg leader. This behavior will be determined by the rules set out in the previous section, i.e. by condition (2). Now, though, the aggregate amount of sales, which according to equation (1) determines the product price, is given by

$$X = X_R + X_G \tag{5}$$

where

$$X_R \equiv \sum_{i=1}^{m} x_i \text{ and } X_G \equiv \sum_{i=m+1}^{n} x_i \tag{6}$$

are the total quantities supplied. Here *G* stands for Germany and *R* stands for the rest of the countries. Using (1), it follows from (2) that the supply of an individual firm which is located in the other countries is determined by the equation

(7) $$x_i = K - X \quad \forall i = 1,\ldots,m \ .$$

The gap between the total supply and the competitive quantity is thus just equal to the supply of the individual firm which behaves as a Cournot-Nash adapter. Given the quantity supplied by all the other firms, the individual firm can still vary the total supply within a certain range up to the competitive quantity. As it is faced with a decision problem like that of a monopolist it will cover half of this range with its supply, that is, it will leave a gap between the total quantity and the competitive quantity equal to the quantity it supplies itself.

Summing all *m* equations of type (7), and taking (5) and (6) into account, gives the total supply of the firms (which are not in cartels) in the rest of the countries, formally like in (4), as

(8) $$X_R = \frac{1}{\frac{1}{m}+1}(K - X_G) \ .$$

This reacts negatively to the quantity supplied chosen by the German cartel and covers a fixed share, $1/\left(\frac{1}{m}+1\right)$, of the difference between the competitive supply and the German supply.

Knowing this reaction pattern, the German cartel can choose its quantity X_G so as to maximize its profits. The decision problem of the German cartel is

(9) $$\max_{X_G} P(X)X_G - cX_G$$

subject to (5) and (8).

Applying the demand function (1), (9) becomes

$$\max_{X_G}\left(bK + c - bX_G \frac{1}{1+m} - b\frac{m}{1+m}K \right)X_G - cX_G .$$

From the first order condition of this optimization problem it follows that

(10) $$X_G = \frac{K}{2}$$

which means that the German cartel provides half the competitive quantity just as a monopolist does. The firms of the rest of the world, which are not in a cartel, comply with rule (8), and thus, because of (10), supply a quantity given by

$$X_R = \frac{1}{\frac{1}{m}+1} \cdot \frac{K}{2} \quad .$$

The total quantity supplied is

(11) $$X = X_G + X_R = \frac{1+2m}{1+m}\frac{K}{2}$$ (Stackelberg).

National Welfare Gain

Taking a Stackelberg position can increase the "German" profits and the "German" welfare but it does not have to. Because of the revealed preference theorem, the profits increase when the quantity sold changes compared to the Cournot game. And the consumer surplus obviously only rises when the price falls and this requires there to be higher total sales. When taking a Stackelberg position results in the same aggregate quantity sold as in the case where the antitrust laws are retained, then neither German profits nor German welfare change[3]. When the aggregate quantity sold falls, the German profits increase but the consumer surplus falls. Only when the quantity sold increases when a cartel is established can an increase in both the profits of the German firms and the German consumer surplus be expected, providing strong incentives for the German legislator to abolish the antitrust law.

The change in the quantity sold as a result of establishing a cartel is the net effect of two counteracting forces. On the one hand, the cartelization of the German firms leads to a reduction in the number of competitors in the international market and this tends to reduce the quantity sold. This effect is similar to the one that makes it wise not to permit cartelization in a closed economy. On the other hand, in an open economy, the Stackelberg leader may be able to expand sales at the expense of his rivals, increasing the aggregate quantity sold. This effect resembles the one emphasized by the strategic trade literature[4]. If there were sufficiently many German firms initially relative to the number of firms in the rest of the world, the first effect would dominate, and the aggregate quantity sold would fall. If, on the contrary, there was only *one* German firm initially, and if this firm was now able to position itself ahead of the other firms, that is, to change from a Cournot- Nash player to a Stackelberg player, there would certainly be

[3] The profits and the welfare of the other countries also remain constant.
[4] See Brander and Spencer (1981).

an increase in the aggregate quantity. In which direction the quantity supplied will change when the number of German firms is between the two extremes is not obvious.

Letting X_A stand for the quantity sold which results when all antitrust laws are in force and X_S stand for the quantity which, in the case of the Stackelberg game, results from abolishing the German antitrust law, then, after a little transformation,

$$X_S \left\{ \begin{matrix} > \\ = \\ < \end{matrix} \right\} X_A \Leftrightarrow m+1 \left\{ \begin{matrix} > \\ = \\ < \end{matrix} \right\} n-m \tag{12}$$

follows from (4) and (11). The result says that establishing a cartel of German firms leads to an increase in total sales, and thus to a fall in price, when the number of firms in the other countries, *m*, is larger than, or equal to, the number of German firms before the cartel was set up, *n-m*. Only when in the initial situation there are at least two more firms in Germany than there are in the rest of the world, will the quantity sold fall and the price level rise. Because identical countries were assumed, this case is not possible here, and of course, it is not realistic where a country like Germany is being considered. Thus the national consumer surplus unambiguously increases as a result of setting up the cartel. The following consequences emerge.

Proposition 1: *In autarchy each country maximizes its own welfare when it imposes an effective antitrust regulation. However, once the borders are opened, it is in the national interest of any single country to repeal this regulation and make it possible for the national firms to form a cartel. Using binding quantity commitments, the cartel will take on a Stackelberg leadership position if the other countries continue to stick to ordo liberal policies. The leadership position*

results in an increase of national welfare by lowering prices and shifting profits from foreign to domestic pockets. Therefore, an ordo liberal equilibrium does not exist in systems competition.

Oligopoly of national cartels

The result just derived is a negative one. It says that with ordo liberal policies no equilibrium exists in the competition between systems. It does not say that a country will be able to take on the position of a Stackelberg leader thanks to a liberal cartel policy. It should probably be assumed that the other countries will also get rid of their antitrust laws and allow their own firms to form national cartels. In this case, the German cartel may not achieve the position of a Stackelberg leader, so that the different national cartels interact again in the sense of a Cournot-Nash equilibrium.

The total quantity sold, will, analogously to (4), be given by the equation

$$X = \frac{1}{\frac{1}{z}+1} K \qquad \text{(simultaneous deregulation in all countries)}$$

where z is the number of national cartels or countries. Since there are fewer supplying countries than firms, $z < n$, a comparison with (4) shows that such an equilibrium would be associated with smaller quantities, and thus higher prices, than in the initial equilibrium where ordo liberal policies were chosen in all countries. The welfare in every country would be smaller in a symmetrical equilibrium than in the case of a uniform ordo liberal policy.

If it were assumed that the countries taking part in the systems competition are collectively rational, the prospect of getting such an equilibrium after abolishing the antitrust laws

would be off putting enough to cause them to stick with their ordo liberal policies. However, the assumption of collective rationality is not only a long way from reality, it is also inadmissible for the analysis of the competition between systems. Competition is an activity where the actors exhibit individual rationality and selfish goals and where they neither make arrangements with one another nor coordinate their actions. From this perspective, it cannot be expected that a single country will refrain from abolishing its antitrust laws.

4. The Deregulation Race

It is not very likely, though, that the result of a systems competition in which ordo liberal policy is generally given up can be described by a Cournot oligopoly model, because, under realistic conditions, the repeal of the antitrust laws will occur sequentially not simultaneously. Countries with strong powerful governments will reject the policy first, those with weak governments will follow after a delay, and some countries will first have to overcome the impediments to a reform of the antitrust laws even after many other countries have deregulated. In such a situation, it counts to be quick in order to achieve the position of a Stackelberg leader. A country which, thanks to rapid deregulation, is able to establish universally respected conglomerates of firms more quickly, than other countries can, has created facts which the firms of all successive countries must take into account in planning their own capacities. Speed is important. First come, first served — but those who come second or third may still be better off than those who come even later because they, too, can create unalterable facts for the latecomers. The later you come, the more ground is already occupied and the smaller the position that you must be content with. A deregulation race starts because the starting position will decide long term success.

A sub-game perfect equilibrium

The order in which the countries' governments make the decision about repealing the national antitrust law depends on national features which are not considered here and, indeed, it is not important to do this. What *is* important is to know how the parliaments decide when it is their turn and how the private firms behave as a result. The parliament has three choices.

- It may repeal its antitrust law immediately.
- It may repeal its antitrust law later, after other parliaments have done so.
- It may decide never to repeal its antitrust law.

Firms also have similar decision opportunities, because setting up a cartel is a right, but not a duty. If the national antitrust law is not repealed (and possibly before it is repealed), the firms in the country are not in a position to make binding quantity agreements and thus they behave like Cournot-Nash competitors, adapting themselves to the quantities fixed by the national cartels of the other countries. Once the national antitrust law is repealed, the firms of a country

- may immediately build a national cartel,
- may decide to build such a cartel later or
- decide not to cartelize at all.

As assumed above, all countries are the same size and have the same number of firms m, $m \geq 2$, with the same constant average and marginal cost c. The buyers are distributed equally over all countries.

A deductive solution to the game structure just described is extremely difficult because of the large number of possible decisions. Another method will therefore be used here. We start with a conjecture about the behavior of the parliaments and firms (a), continue with a recursive calculation of the details of the game among the firms which results from the parliaments'

conjectured decisions (b), and conclude with the proof that no parliament can make its country, and no firm can make its owners, better off when they make policy decisions different from those conjectured (c).

(a) The conjecture is that each national parliament uses its scope for decision making to repeal the antitrust law as soon as the chance arises and as long as there is at least one other parliament that has not yet decided to repeal the law. The repeal makes it possible for the national firms to establish cartels and to credibly set the quantities they sell in advance of other firms in order to shift profits to their own pockets. It is conjectured that only the parliament that is the last to decide does not repeal, because by doing so it will not bring about a profit transfer but only a reduction in the consumer surplus. It is also conjectured that the firms immediately use the right to establish a national cartel as soon as their parliament allows them to.

(b) In order to analyze the behavior of the firms in detail, given the conjectured behavior of the parliaments, the decision situation of the players must be looked at recursively. Technically speaking, the task is finding a sub-game perfect solution for the quantity planning of the firms. The players are the firms of the z countries. The countries will be numbered in reverse order of their decision to repeal the national antitrust law, where the last country, which is conjectured to retain the law, will be number 1. The last country will produce the quantity x_1, the second last x_2, the third last x_3, and so on. The total quantity that the i last countries produce is X_R^i and the total quantity that the z-i previous countries produce is X_A^{z-i}.

For the moment, it will still be assumed, in accordance with the conjecture described, that the firms use the right to form a cartel as soon as they are allowed to. At the moment, it is not a question of whether they will use it, but how they use it when they do.

The firms of the last country, 1, are confronted with fixed quantity X_A^{z-1}, $X_A^{z-1} < K$ given by the earlier players, where K is once again the competitive quantity, that is, the quantity at which the international demand curve cuts the horizontal marginal cost curve. The firms in country 1 play a Cournot-Nash game because of the cartel ban and thus choose, analogously to (8), the aggregate quantity

(13) $$X_R^1 \equiv x_1 = \frac{1}{\frac{1}{m}+1}(K - X_A^{z-1})$$

where m is now the number of firms in country 1. The second last country, 2, has, as conjectured, a cartel which is confronted with the given aggregate quantity chosen by the previous cartels X_A^{z-2}, $X_A^{z-2} \leq X_A^{z-1}$. The cartel knows from (13) and

(14) $$X_A^{z-1} \equiv x_2 + X_A^{z-2}$$

that it can influence the quantity chosen by the firms of country 1. It solves the maximizing problem

$$\max_{x_2} P(X)\cdot x_2 - c\,x_2\,, \quad X = X_R^1 + x_2 + X_A^{z-2}$$

subject to (13) and given X_A^{z-2}.

Because of (1) and (14)

(15) $$x_2 = \frac{1}{2}\left(K - X_A^{z-2}\right)$$

follows from this, which then determines

(16) $$X_R^2 \equiv x_2 + X_R^1 \ .$$

The cartel of the third last country is faced with the fixed quantity $X_A^{z-3}, X_A^{z-3} \leq X_A^{z-2}$ given by the $z - 3$ earlier cartels and knows from (13), (15) and

$$X_A^{z-2} \equiv x_3 + X_A^{z-3}$$

how it can influence the behavior of the succeeding countries with its quantity decision. It solves the maximization problem

$$\max_{x_3} P(X) \cdot x_3 - c\, x_3 \,, \quad X = X_R^2 + x_3 + X_A^{z-3}$$

subject to (13) and (15) given X_A^{z-3}

which, because of (1), (15) and (16), determines

(17) $$x_3 = \frac{1}{2}(K - X_A^{z-3})$$

and therefore also

$$X_R^3 \equiv x_3 + X_R^2 \ .$$

The chain of decisions continues in a similar fashion. The cartel of the *i*-th last country solves the problem

$$\max_{x_i} \quad P(X) \cdot x_i - c\, x_i \ , \quad X = X_R^{i-1} + x_i + X_A^{z-i}$$

once again subject to the solutions for all succeeding countries and given the decisions of all preceding ones as summarized by X_A^{z-i}. It chooses the quantity

(18) $$x_i = \frac{1}{2}(K - X_A^{z-i})$$

which determines

$$X_R^i \equiv x_i + X_R^{i-1} \ .$$

This formula also holds for the cartel of the first country, $i=z$, where, of course,

$$X_A^0 = 0 .$$

The simple decision rule in such a sub-game perfect equilibrium is that country *i* covers with its production half the range $K - X_A^{z-i}$ between the competitive level and the quantity given by the previous cartels. This decision rule can once again be understood by comparing it with the profit maximizing decision rule of a monopolist. The monopolist, too, supplies exactly half of the range available to him when the demand curve is linear. The difference from the monopoly case is only that the range no longer starts at zero but at the quantity given by the previous cartels, and that the perceived demand curve is flatter because it also takes account of the fact that the cartel can partly drive out the quantities of the following countries if it decides to expand its own quantity. As the slope of the perceived demand curve, given the competitive quantity *K* where the demand curve intersects the marginal cost curve, has no influence on the quantity planning, the number of countries that follow plays no role for a particular cartel´s decision. In every case, it will itself cover half of the range still open to it.

Country 1 is the only exception to the rule that the quantity supplied is exactly half the still available range up to the competitive quantity because no cartel will be set up in that country. The oligopoly of the *m* firms in this country also covers a fixed share of the range $K - X_A^{z-1}$, but this share is $m/(1+m)$ which, because $m \geq 2$, is more than 1/2 (at least 2/3). Interestingly, the number of firms in this country has no influence on the prior cartels although the total sales quantity is an increasing, and the product price is a falling, function of this number. An increase in the number of firms in country 1 would only make the perceived demand curves of the prior cartels flatter, but it would not influence those cartels' profit maximizing quantities. Even if country 1 permitted a monopolistic policy with $m = 1$, this would have no influence on the

quantity planning of the previous cartels. This can be easily seen as x_2, x_3 *and* x_i in (15), (17) and (18) are independent of m .

(c) It is now time to prove that the conjectured behavior of the national parliaments and firms does actually maximize their national welfare. Consider the parliaments first. There are, in principle, three options open to the parliament of a particular country at the exogenously fixed time of decision. It can repeal the antitrust law. It can decide to enter the time hierarchy after a country that comes later and then repeal the law. And it can refrain from repealing the law at all. For the moment, it is still assumed that the firms use the right to set up a cartel as soon as they are allowed to.

Let us begin once more with the parliament which decides last. This parliament does not have the three options, because there is no other parliament whose decision it can wait for. It can only choose between repealing and retaining its antitrust law. It was conjectured that it retains the antitrust law.

Suppose, to the contrary, that the law is repealed. In this case the firms in the country set up a cartel and decide as a monopolist would in relation to the remaining range, that is, they fix a quantity $\frac{1}{2}\left(K - X_A^{z-1}\right)$ rather than $\frac{m}{1+m}\left(K - X_A^{z-1}\right)$. This means a price increase, ΔP, which lowers the country's consumer surplus and increases its profits. The key question for the parliament is which effect predominates. Only if the former does, such that there is a net welfare loss, will our conjecture that the country does not repeal its antitrust law be correct.

For the size of the loss of consumer surplus, ΔV ,

(19) $$\Delta V > \Delta P \cdot \frac{1}{z}\left[X_A^{z-1} + \frac{1}{2}\left(K - X_A^{z-1}\right)\right]$$

holds as can easily be concluded, since the share 1/z of the consumers lives in country 1 and since the right hand side of (19) contains the part of the loss of consumer surplus that results from the price increase with a given quantity, but not the part that results from a fall in quantity with a given price. Considering that the optimal decision rule of the cartels according to (18) implies

(20) $$K - X_A^{z-1} = \frac{1}{2^{z-1}} K$$

it follows from (19), after a little transformation, that

(21) $$\Delta V > \Delta P \cdot \frac{1}{z} K\left(1 - \frac{1}{2^z}\right).$$

On the other hand, taking (20) into account, the estimation

(22) $$\Delta G < \Delta P \cdot \frac{1}{2}\left(K - X_A^{z-1}\right) = \Delta P \cdot \frac{1}{2^z} K$$

holds for the increase in the firms' profits, ΔG, because the right hand side of (22) only covers the profit increasing effect of a price increase with given quantity, and not the profit reducing

effect that results from a reduction in quantity with a given price. It obviously follows from (21) and (22) that $\Delta V > \Delta G$, when

$$\Delta P \cdot \frac{1}{z} K \left(1 - \frac{1}{2^z} \right) > \Delta P \cdot \frac{1}{2^z} K$$

or, what amounts to the same thing, when

$$2^z > 1 + z .$$

Since this condition is satisfied for all $z \geq 2$ it is clear that country 1 will, as assumed, really not repeal its antitrust law. The repeal would increase the profits but would lower the sum of the national consumer and producer rents.

Next, whether country 2 could improve its position by choosing a different policy must be examined. Let us first consider the case where it retains its antitrust law while country 1 does so, too. In this case, country 2 is clearly worse off than when it repeals its antitrust law. It is sufficient here to outline the proof because the result can be derived analogously to Proposition 1. In the case of a cartel ban, the firms of country 1 and country 2 are in the same situation as the *n* firms in the whole economy which was considered when deriving this proposition. The only difference is that the range available to the firms is narrowed by the quantity X_A^{z-2} already given. Taking into account that $2 \cdot m$ rather than n firms take part in the Cournot game, it is found analogously to (4) that

$$X_R^2 = \frac{1}{\frac{1}{2m} + 1} \left(K - X_A^{z-2} \right) \qquad \text{(Cournot)}$$

and, analogously to (11), it can be worked out for the case where country 2 is the Stackelberg leader that

$$X_R^2 = \frac{1+2m}{1+m} \cdot \frac{1}{2}\left(K - X_A^{z-2}\right) \qquad \text{(Stackelberg).}$$

Analogously to (12), it is immediately obvious from the comparison of the two magnitudes that the last two countries taken together produce a bigger quantity with the Stackelberg solution and, because of the revealed preference theorem, this indicates both a higher profit and a higher consumer surplus for country 2. Country 2 will therefore not renounce its Stackelberg position when it believes that country 1 will continue to play a Cournot game.

A fortiori, country 2 will not renounce its Stackelberg position when doing so would lead to country 1 preceding it and taking the Stackelberg position itself. Since the Stackelberg leader chooses a higher quantity and makes a larger profit than its followers and since the change of places will affect neither the aggregate quantity supplied nor the price the consumers have to pay, it certainly never pays to leave the leadership position to another country. Country 2 will thus also behave as conjectured, that is, it will repeal its antitrust law when it can do so.

Let us now look at country 3, which is the country that can decide before country 2. Its situation is clear. If it does not use its opportunity to decide and repeals its antitrust law so late that country 2 precedes it, its firms experience a reduction in profits. Changing places does not alter the aggregate quantity supplied, the sales price or the consumer surplus. However, it cuts the sales quantity and the profit of the domestic firms in half. If the country does not repeal its antitrust law at all, it slips behind even country 1. Country 2 will now behave as country 3 would

otherwise have, and country 1 as country 2 would have, thus taking a Stackelberg position in relation to country 3. Because, as was shown, country 2 would lose if it changed places with country 1 by not repealing its antitrust law, country 3 would lose a fortiori . Country 3, too, will therefore repeal its antitrust law as quickly as possible and use the decision opportunity it has been offered.

The conclusion we can infer for country 4 and the countries which are able to decide even earlier is obvious. Each individual country will behave exactly as conjectured in (a) because any other economic policy would lead to lower national welfare.

Finally the conjecture that firms cartelize as soon as they can has to be proved. This is trivial since the firms' decision possibilities, given the decisions of their parliaments, are similar to the three decision possibilities of the parliaments. The firms can set up the cartel, they can postpone the decision to set up the cartel until after the establishment of another cartel, or they can choose not to set up a cartel at all. As postponing and doing without a cartel, would, as just shown, reduce profits, the firms in each country will set up a cartel as soon as the national antitrust law is repealed.

Proposition 2: *The competition between competition rules is a race to repeal the national antitrust law as quickly as possible. The aim is to give the own economy a lead in achieving an early Stackelberg position, which it then exploits, as soon as it is allowed to. The quantity sold and the profit of the firms are smaller the later in the succession of countries this country decides to repeal its antitrust law. All countries except the last one repeal their antitrust laws. The last country retains its law and thus forces its firms to behave like Cournot-Nash players. The*

deregulation race between the national parliaments just described is a sub-game perfect equilibrium in systems competition.

5. An Uncomfortable Proposition

The result derived confirms the judgement that once the borders between countries are opened and competition between competition rules starts the day of ordo liberalism is over. The question now is how is this result to be judged in allocative terms? Intuitively one would tend to reach a negative judgement, because "cartelizing the national markets" does not sound exactly confidence inspiring. But semantics may not lead very far.

It follows from (13) that the range $K - X_A^{z-1}$ which the z-1 first countries leave for the last country, will be covered by that country's own production with the share m/ (1+m). The share of this range not covered is therefore 1/(1+m). Moreover it follows from (20) that the range, which the first z-1 countries leave for the last country, itself has a share of the competitive quantity K equal to $1/2^{z-1}$. Taking these pieces of information together shows that in the deregulation race the gap between the competitive quantity and the actual production is

(23) $$K - X = \frac{K}{2^{z-1}} \cdot \frac{1}{1+m}$$ (deregulation race) .

The cartelization of the market made possible by the deregulation race can be prevented either by harmonizing the regulation policies of all the individual countries or by creating a single antitrust authority which covers all the countries. Such measures would force the firms in all countries to behave in a Cournot-Nash manner, and, in accordance with (4), there would then be a gap between the competitive quantity and total production equal to

(24) $$K - X = \frac{K}{z \cdot m + 1}$$ (cartel ban covering all countries)

where the number of firms n is replaced by the product of the number of countries and the number of firms per country.

It obviously follows from (23) and (24) that total sales with the deregulation race are larger than with the overall cartel ban, if

$$2^{z-1}(1+m) > 1 + z\,m$$

or, which comes to the same thing, if

$$2^{z-1} - 1 > m\left(z - 2^{z-1}\right) .$$

This inequality will obviously hold when there are at least two countries and at least two firms per country as was assumed. The following result is therefore obvious.

Proposition 3: *The deregulation race, which leads to a sequential repeal of the antitrust laws of the individual countries, and which allows these countries' firms to set up national cartels, results in higher total sales, lower prices, a higher consumer surplus and lower firm profits than would be expected in the case of a cartel ban covering all countries.*

Surprisingly, an all clear is appropriate for the allocation problem. Paradoxical and uncomfortable as it may sound, a deregulation race that results in the cartelization of the national markets does not threaten to be at the expense of the consumers or to lower the welfare of all countries combined. On the contrary, at least in the symmetrical case of equally sized countries, the deregulation race has a very positive effect from an allocative point of view.

This does not mean that the race for the starting position does not create problems. One of the most serious of these is the very different distribution of profits which occurs in equilibrium. The disadvantaged industries will find it difficult to accept the unequal distribution and will attempt to achieve an equal distribution by means of centralized policy measures. The falling aggregate sum of profits will also lend support to such a policy measure.

One of the measures to achieve an equal profit distribution would be the establishment of an international antitrust board, preventing the single countries from taking on Stackelberg leadership positions. Another one would be an international agreement to build one big cartel covering all countries coupled with a sharing rule for the profits. However, all of this would violate our basic assumption that governments are welfare maximizers. Welfare maximizing governments would not agree to such centralized policy measures.

6. Reconsideration of Regulation Policy

Europe is now at a new establishment stage in which new conglomerates of firms will be set up in a big way in order to be prepared for an economy without borders. This applies particularly to branches like banking and finance, for which a large European market where homogeneous banking services can be supplied in the various countries has been created abruptly with the introduction of the euro. But very many other branches will be affected too and will be

reorganized in order to get a good starting position in the new common market. In this situation the interest in mergers is scarcely controllable and the national monopoly authorities and the legislators will be under enormous pressure to liberalize the antitrust laws.

In fact, it is in the national interest to plan for more liberal antitrust laws than there could have been in the old national states. A country which allows cartels to be set up by its own firms while all other countries continue to carry out ordo liberal economic policies can place itself in an absolutely better position. It paves the way for credible quantity agreements in cartel contracts which the firms can exploit as Stackelberg leaders. The result is a shift of profits from foreign to domestic firms which does not hurt the national consumers. An equilibrium in the competition between systems where all countries continue to carry out traditional antitrust policies in their own interest can thus scarcely exist.

It is more likely that there will be a deregulation race in which each country tries to create the best possible starting position for its firms in the new Europe by repealing its antitrust law. In that event, the deregulation race will lead to a cartelization of the national markets.

Such a cartelization is, however, more a problem for the distribution of profits than an allocative worry that would endanger the provision of the European consumers. It is possible, if not likely, that a race for the starting position will result in an increase of aggregate supply, falling prices and falling profits. Looked at in this way, a verdict about whether a competition between competitive rules is workable would be premature. This competition leads to an erosion of these regulatory systems, but this may be less bad than it appears at first.

This paper is highly theoretical and should be seen as a stimulus for further debates rather than a balanced judgement on the future of ordo liberalism. It must be left to future scientific discussions to show whether there are other models which confirm the pessimistic prejudice of

the ordo liberal economist. A critical judgement about the competition between systems would have to be made if, instead of the race for starting positions modeled here, there were to be a concerted loosening of the European antitrust laws, because then a classical oligopoly with a smaller number of participants might be established. It is not clear what the national interest would consist of with this solution, and, incidentally, because of the international arrangements, this situation could hardly be called a systems competition.

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