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THE JAPANESE CASE

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Alexis JACQUEMIN, Tsuruhiko NAMBU
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CENTRE DE RECHERCHES INTERDISCIPLINAIRES
DROIT ECONOMIE (C.R.I.D.E.)
INSTITUT DES SCIENCES ECONOMIQUES
29, rue des Wallons, B-1348 LOUVAIN-LA-NEUVE (Belgique)

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Alexis JACQUEMIN, Tsuruhiko NAMBU

and Isabelle DEWEZ*

Catholic University of Louvain and

Gakushuin University

The success of a cartel depends upon at least two main elements : its members should earn higher revenues than from any feasible alternative including competition; and it should be capable of solving its organizational problems such as defining the area of collusion, enforcing the agreement, which includes means of determining and detecting cheating, and specifying the distribution of gains among its members. There exists a link between these two aspects since the potential for profits determines the capability of the cartel's bearing the costs of maintaining collusion (see, for example Pindyck (1979) and Osborne (1976)).

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By prohibiting cartels, antitrust legislations tend to prevent cartelists from employing highly effective but all too visible devices of cartelization, thus increasing the cost of collusion, reducing its profitability and its stability.] ?

Export cartels are an important exception : indeed in none of the OECD legislations, including the EEC and the ECSE, are these cartels forbidden. The basic justification of this attitude is that, contrary to the general case, export associations are assumed not to impair, but to somehow improve competition. Most legislators want to sustain their domestic firms and argue that export cartels could help small and medium-sized firms to overcome the barriers to foreign trade, reduce the overhead cost of exporting and resist the power of foreign buying cartels. Japanese legislation takes another direction by justifying export cartels, not because they may improve the competitiveness of their members but as a way of temporarily avoiding excessive competition from Japanese exporters toward foreign industries : the implications of this policy could be important in the context of the difficult trade relationships between Japan, the European Community and the United States. 9

This paper is the first attempt to examine the extent to which the Japanese export cartels are really following a logic which is distinct from that of traditional cartel theory

or, on the contrary, one which fits the usual theoretical criteria developed for identifying industries in which successful collusions are likely. The way adopted to answer this question will be to consider the factors that could lead to export cartel stability over time. After a short presentation of the legal situation and its evolution (Section 1), a simple dynamic model providing a measure of the optimal duration of a cartel will be elaborated, and the main variables influencing the probability of continuing collusion will be identified (Section 2). A statistical analysis will then use existing data to test the model for the Japanese case (Section 3).

1. THE LEGAL SITUATION

The legal environment of export cartels is quite different from the system of control applied to domestic cartels in the sense that the possibility of their beneficial effects is explicitly recognized in the laws of most industrialized Western nations. Many countries permit totally "pure" export cartels, viz cartels which exclusively concern competition on foreign markets¹. Only four countries, namely West Germany, Japan, the United States and the United Kingdom, require notification in all cases, so that only in

¹For a general description, see OECD (1974) and J. Gribbin (1976).

these countries do the public authorities have information about the extent of cartelization in their export trade. But the United Kingdom, Germany and Japan have provisions for authorisation of domestic restraints connected with export cartels : "mixed" export cartels which affect competition both on foreign and domestic markets are not subject to the same rules as domestic cartels, contrary to the U.S. provisions.

The *British Restrictive Trade Practice Act* (1956) is not applicable to agreements which relate solely to United Kingdom exports (Section 8 (8)). Hence mixed export cartels are a priori as regulated as domestic cartels (a registration with the Director General of Fair Trading is required according to the Fair Trading Act, 1973, Section 94). However they may benefit from an exemption. Indeed the Act provides a specific 'gateway' to the presumption that a restrictive agreement is contrary to the public interest : one of the circumstances in which an agreement may be found to have beneficial effects is where "the removal of the restriction would cause a reduction in exports"¹. By contrast, the U.S. Webb-Pomerene (Export Trade) Act of 1918 is stricter as there exists no such gateways².

¹For a general analysis, see B. Yamey (1976) and K. George and C. Joll (1975).

²The consequences of this Act have nevertheless been severely criticized (see D. Larson (1970)).

The *German* legislation goes further. The *Act against Restraints of Competition* (1974) states that the cartel authority shall, upon applications, directly authorise an agreement which serves to protect or to promote exports. The authorization must be given even if the agreement extends to trade in goods or commercial services within the domestic market, insofar as such an extension is necessary to ensure the desired effect in the foreign markets. According to Section 6 (3), however, no authorization shall be granted if the agreement may lead to a substantial restraint within the area to which this Act applies and if there is an overriding interest in preserving competition¹.

Before the amendments of 1955 to the *Export and Import Trading Act* of 1952, Japanese legislation required various conditions before allowing export cartels. These conditions were based on the idea that export cartels could be justified by the necessity of avoiding *temporary* deficiencies in the market mechanism in international trade and as short-run measures. Cartels were allowed when one of the following conditions is fulfilled :

- export prices were abnormally low or very large quantities were exported;
- there was a likelihood of great losses for foreign importers because of wide fluctuations in export prices;
- competition was unfair in the importing trade of the

¹The agreement must also respect the international treaties.

country of destination or in the exporting trade, and capable of injuring the foreign partners ...

Under the amended 1955 Act, only very broad conditions are imposed on export cartels. The agreement is accepted as long as there is no fear of violating international treaties or other arrangements concluded with foreign governments or international agencies, no fear of affecting international confidence in Japanese exporters and a sound development of export trade, no unjustifiable discrimination, no unjustifiable rule restricting participation in or withdrawal from the agreement, and finally no fear of unjustifiably injuring the interests of any domestic enterprise in agriculture, forestry and fishery, any concerned enterprise or consumers in general¹. Simultaneously, producers or sellers might collude in exporting with respect to price, quantity, quality, design and others, so that Japanese cartels can and indeed do appear in a very wide range of strategies and commodities. In terms of control, the 1952 Act was intended to be a very limited exemption from the 1947 Antimonopoly Law² and it was required to obtain the consent of the Fair Trade Commission (FTC) as well as the approval of the Minister of the International Trade and Industry (MITI) to form legally an export cartel. Since the amendments,

¹Export and Trading Act (Act n°299). For a comment, see T. Negishi (1972).

²For a general view of the Japanese government policy toward industry, see R. Caves and M. Uekusa (1976), chapter 8. See also H. Iyori (1973).

members of the cartel have only to notify the MITI, instead of obtaining prior approval and the Minister may approve the cartel after a simple consultation of the FTC. Consequently, the difficulty of forming cartels has been largely reduced.

In the light of this evolution of the legal situation, one can investigate whether the Japanese export cartels are characterized by a short life linked with specific temporary disequilibria in the international markets or possess a stability resulting from the usual factors identified by the theory of collusive oligopoly. This is the subject of the two following sections.

2. A SIMPLE DYNAMIC MODEL OF CARTEL STABILITY

Given the potential benefits that are present, the success of a cartel will depend on the ability to solve the organization and sustainability problems. Three of these are especially relevant for export cartels : the initiative for organizing the cartel, the technical difficulties in defining the content and the geographical scope of the cartel, the degree of convergence in the expectations of the members confronted with the international market.

a. It is usually recognized that the larger the number of sellers in an industry and the more equal their sizes, the

higher the costs of coordinating their activities and the lower the probability of an initiative by some firm in organizing the cartel; reciprocally a high degree of concentration indicating a small number of firms and/or a high degree of asymmetry is expected to favor cartelization. However, in the case of export cartels this effect could be suppressed because the government or the regulatory authority encourages the creation of a cartel, helping to overcome the handicap caused by the existence of many symmetrical firms. First, it will be easier for a firm to persuade competitors to collude as the process of communication and of defining a common goal will be highly articulated by explicitness. Second, contrary to tacit understandings where the presumed minimum amount of loyalty by the participants is very fragile, this explicitness favored by the legal conditions and official meetings provide an opportunity for suspicions to be allayed. "If a firm is found to be cheating, he can be faced with the combined hostility of the whole group. Formal agreements also reduce uncertainty and therefore lessen the tendency to cheat. Furthermore, the association facilitates the marketing of any new supplies in an orderly fashion. It also assists in reaching agreements with new competitors"¹.

b. Another difficulty in organizing cartels is related to the definition of the area of collusion and the range of

¹See S. Larson (1970), p.497. For a dynamic model where the effects of regulatory restraint are analysed, see O.E. Williamson (1965).

agreement. A priori, a cartel which does no more than set a common price and allocate output quotas to its members will be less stable than a cartel which covers the whole spectrum of business policy. According to L. Telser (1972), "the wider the range of agreement the more a cartel approximates outright merger of its constituents" (p.180): it is harder to undo a merger than to dissolve a cartel. The multidimensional nature of international competition in which non-price aspects are as important as the price dimension, makes this argument crucial for export cartels. A related predisposition of a market to effective cartelization is the homogeneity of the product. If a commodity is homogeneous, it is easier to reach agreement on the price to be set, on the uniform quality or design, or on a single trade mark, thus reducing the transaction costs. Besides, the more homogeneous a product is, the less easy it is to cheat by altering product quality.

The solidity of a cartel is also linked with its geographical area. In the case of an export cartel, the ability to spread the efforts of the agreement to the domestic market (mixed cartel) is a radical way of stabilizing the cartel and it is to be expected that mutually interdependent oligopolists will behave in this fashion. As C. Wilcox (1960) has pointed out, "it may be doubted that firms can combine when selling abroad and compete with undiminished vigor when selling at home ... Competitors with common offices, adopting common policies, may not attain the singleness of purpose

that the law assumes" (p.367).

c. For the cartel to last for some period, there must be an approximate unanimity of expectations among members. The most favorable situation is when market conditions and sales are stable¹. But if the conditions of demand or technological knowledge are changing, divergent expectations are probable. In particular, a high growth rate of demand could make it especially difficult to determine together future prices and markets shares and will induce independent behavior which is more rewarding² and less likely to be detected than under conditions of stagnant markets. This is reinforced in an international framework where it is often impossible for a group of domestic sellers to forecast unanimously and to control the dynamic of the market.

The above arguments lead us to the following model. The cartel is assumed to pursue a joint profit maximization strategy taking into account the cartelization cost as well as the production cost C . It is also assumed that in export cartels, the members agree to accept the price

¹See L. Telser (1972), p.201 who analyses the effect of random fluctuations of demand and who concludes that a well-established product free from fluctuations makes a good candidate for a cartel agreement.

²Empirical studies suggest that a high growth rate of demand enhances the profitability of individual firms, mainly through a unitary cost decrease linked with a better capacity utilization.

of the product determined in the international market, p , and to avoid undercutting it through competition between them, although their production cost is only a fraction of the cost of their foreign competitors. This price is the expected value during the planning period : $p = \bar{p}$.

Let the cost involved in the organisation and maintenance of a cartel be :

$$C_L = \alpha^g e^{\beta t}, \quad \alpha, \beta, > 0 \text{ and constant} \\ t \geq 0$$

where t is time. The initial cost of cartelization, which is given by α^g , is dependent on the factors mentioned above. These are included by allowing α to be dependent on CR, R, S, H, where

CR : a measure of the degree of concentration;

R : the degree of encouragement by the public authority;

S : the technical difficulties of cartelization corresponding to the various kinds of cartels (viz. the area of collusion and the range of the agreement);

H : the degree of homogeneity of the product.

Moreover, it is assumed that the effects of these variables on the initial cost are amplified by a high (constant) growth rate of demand g . Finally, the coefficient β also depends on g , so that the cost of cartelization can be written as

$$C_L = C_L(0) e^{\beta t}, \quad C_L(0) = \alpha^g, \quad \alpha = f(CR, R, S, H), \quad \beta = \phi(g).$$

with

$$\frac{\partial C_L(0)}{\partial CR} < 0, \frac{\partial C_L(0)}{\partial R} < 0, \frac{\partial C_L(0)}{\partial S} > 0, \frac{\partial C_L(0)}{\partial H} < 0,$$

$$\frac{\partial C_L(0)}{\partial g} > 0, \frac{d\beta}{dg} > 0.$$

For a given finite time horizon, T , the present value of the expected joint profit equals :

$$V = \int_0^T e^{-it} (\bar{p}x - C - C_L) dt,$$

where i is the discount rate for the cartelizers. Some additional assumptions can be made :

- (a) demand is growing at a constant rate g : $X_t = X_0 e^{gt}$;
- (b) production cost is proportional to total production :
 $C = \bar{m} \cdot X$, $\bar{m} > 0$ and constant being the expected marginal (and average) production cost during the planning period;
- (c) the rate of increase in cartelization cost β is proportional to the growth rate of demand : $\beta = kg$.

Combining the above assumptions, the joint profit is given by :

$$\begin{aligned} (1) \quad \pi_t &= \bar{p} \cdot X_t - C_t - C_{L_t} = (\bar{p} - \bar{m}) X_0 e^{gt} - \alpha e^{gkt} \\ &= \bar{v} e^{gt} - \alpha e^{gkt}, \end{aligned}$$

where $\bar{v} = (\bar{p} - \bar{m}) X_0$.

The present value is therefore :

$$(2) \quad V = \int_0^T e^{-it} (\bar{v}e^{gt} - \alpha g_e^{kg t}) dt.$$

The cartel's objective is to determine the optimal planning horizon. By differentiating V with respect to T , the first-order conditions for a critical point are obtained¹:

$$(3) \quad \bar{v}e^{(g-i)T} = \alpha g_e^{(kg-i)T},$$

so that the optimal time duration of the cartel is given by :

$$(4) \quad T^* = \frac{\log(\alpha g_e^g / \bar{v})}{(1-k)g}.$$

We require that T^* be a maximum as well as an interior solution, i.e., strictly positive. The former need is satisfied when¹ :

$$\bar{v}e^{(g-i)T^*} (g-i) - \alpha g_e^{(kg-i)T^*} (kg-i) < 0.$$

Given (3), this reduces to :

$$(1-k)g < 0$$

viz. for $g > 0$, the growth rate of the cost of cartelization must be larger than that of demand. Subject to this condition, T^* will be strictly positive if :

¹ The following optimal solution does not depend upon the specification adopted for the collusion cost. Any form of collusion cost is in fact acceptable as long as the marginal gain equals zero at the optimal time duration and any further additions are negative :

$$\text{given } \pi_t = \bar{p} \cdot x_t - C_t - C_{Lt}, \pi_{T^*} = 0 \text{ and } \pi_t < 0, t > T^*.$$

$$\log(\alpha^g/\bar{v}) < 0 \quad \text{or} \quad \alpha^g/\bar{v} < 1,$$

that is the initial feasible joint profit must be strictly greater than the initial cost of cartelization.

Differentiating equation (4), we can obtain some comparative static results with respect to the model's parameters.

$$(5) \quad \frac{\partial T^*}{\partial CR} = \frac{1/\alpha}{(1-k)} \frac{\partial \alpha}{\partial CR} > 0 \quad (\text{concentration ratio})$$

$$(6) \quad \frac{\partial T^*}{\partial R} = \frac{1/\alpha}{(1-k)} \frac{\partial \alpha}{\partial R} > 0 \quad (\text{governmental encouragement})$$

$$(7) \quad \frac{\partial T^*}{\partial H} = \frac{1/\alpha}{(1-k)} \frac{\partial \alpha}{\partial H} > 0 \quad (\text{homogeneity of the product})$$

$$(8) \quad \frac{\partial T^*}{\partial g} = \frac{\log \bar{v}}{(1-k)g^2} < 0 \quad (\text{growth rate of demand})$$

$$(9) \quad \frac{\partial T^*}{\partial (\alpha^g/X_0)} = \frac{1/\alpha^g}{(1-k)g} < 0 \quad (\text{average initial cartelization cost})$$

$$(10) \quad \frac{\partial T^*}{\partial S} = \frac{1/\alpha}{(1-k)} \frac{\partial \alpha}{\partial S} < 0 \quad (\text{technical difficulties of cartelization})$$

In the following section we shall show how this simple model of a cartel maximizing the present value of future joint profits over a finite horizon can yield a framework for the empirical analysis of the duration of the Japanese export cartels.

3. THE EMPIRICAL ANALYSIS

The statistical sample

Our sample is based on the FTC annual reports for the years 1967 to 1972. These five years represent a good period of reference in the sense that no crisis or exceptional event occurred during them; they follow a recession (1966) and precede a crisis (1973-1974). Among the industries cartelized during the whole period or a part of it, we retain only those for which data about concentration, production and exports are available. The sample thus consists of 40 cartelized sectors¹. These sectors correspond to a 6 digits degree of aggregation, according to the industrial classification of MITI, and to a 4 digits degree according to the Japanese standard industrial classification.

The *time duration of the cartels* has been defined as the average duration of the cartels existing in each sector (TI). In order to determine if the results are biased by the aggregation, we have also used the duration of the most successful, that is the most stable, cartel in each sector (TI).

Two types of variables are utilized in accounting for initial cartelization costs : one concerns the characteristics

¹As it is well-known, any empirical study of collusion is confronted to formidable data problems. For example it has not been possible to obtain information at the firm level and therefore to analyse the role of firm's size and/or market share. Analyses of this type can be found in A. Jacquemin and W. Saëz (1976) and in T. Nambu (1979).

of the industry and the other the nature of the cartel.

Concentration (CR) is measured by the four-firm-value-of production ratios compiled by the FTC for 1970.

Homogeneity of the product (HO) is treated by a dummy variable taking the value one for a production good and zero for a consumer good.

Growth rate of demand (g) is measured by the variation of the sectoral amount of shipment over the period 1967-1972. The data come from the Industrial Census of MITI.

In order to account for the effect of the "newness" of the product - the fact that a cartel could have a longer life simply because the corresponding product has a longer history - we built a dummy variable (NEW) with a value of one when it is a new product and of zero otherwise. The criterion used is based on the history of Japanese exports, characterized by some structural change. In the fifties, Japanese exports were chiefly made up of light products such as textiles and other labor-intensive commodities. But in the beginning of the sixties, the government promoted exports of high value added products and the structure of Japanese exports gradually shifted from light industries to heavy industries such as electrical machinery, automobile, steel, chemicals and petrochemicals, optical and precision instruments (see Appendix, Table 1). This is the reason why we have classified the heavy products as "new" products and the light products as "old" products.

The last industry variable is the rate of exported production of each sector (EP), viz total exports divided by total domestic production. As noticed in Section 2 (a), the fact that export cartels are legally encouraged contributes to the stability of all of them. But it could also be argued that the higher the opening of the sector to international trade, the higher will be the support by MITI. Therefore, variable EP could partly reflect the role of official encouragement (R) and influence positively the time duration.

The type of cartel has been introduced through two variables. First, the range of the agreement is defined by the ratio of the number of price and/or quantity cartels to the total number of cartel agreements, for each sector (PRI); second, the geographical area is expressed by the ratio of the number of mixed cartels to the total number of cartels, for each sector (MIX).

The list of the cartelized sectors is given in the second table of the appendix; the values of the preceding variables for the 40 sectors are also presented. From this table, four aspects can be underlined;

(a) the average duration of export cartels, viz ten years, clearly extends beyond what should be considered as a short-run period;

(b) the cartelized sectors possess a degree of concentration which is not significantly lower than that of the whole manufacturing sector : the market share of the largest four firms

is, on the average 59,5% for the cartelized sectors and 62,7% for the whole manufacturing industry;

(c) the percentage of pure cartels (48%) is close to the percentage of mixed cartels (52%), but there is a clear majority of price and/or quantity cartels (71%) as compared with other types;

(d) mixed export cartels tend to go together with price-quantity cartels. (This is substantiated by using a χ^2 test for determining the significance of the degree of association between the two types of cartels : the probability associated with the occurrence under H_0 of values as large as the observed value of $\chi^2 = 5.01$ is less than 5%.) We have therefore thought that it would be worthwhile to introduce a measure of their joint presence in the regression analysis.

The regression model

The simple export cartel model we have constructed is to be tested with observations from a cross-section of industries.

Equation (4) may be written as :

$$T^* = \frac{\log \alpha}{(1-k)} - \frac{\log \bar{v}}{(1-k)g} .$$

If we accord the following specification for α :

$$\alpha = \exp \{ \gamma_0 + \gamma_1 CR + \gamma_2 H + \gamma_3 EP + \gamma_4 PRI + \gamma_5 Mix \}$$

then¹

$$T^* = \frac{\gamma_0}{1-k} + \frac{\gamma_1}{1-k} CR + \frac{\gamma_2}{1-k} H + \frac{\gamma_3}{1-k} EP + \frac{\gamma_4}{1-k} PRI \\ + \frac{\gamma_5}{1-k} Mix - \frac{\log \bar{v}}{1-k} g^{-1},$$

or

$$T^* = \beta_0 + \beta_1 CR + \beta_2 H + \beta_3 EP + \beta_4 PRI + \beta_5 Mix + \\ \beta_6 g^{-1}.$$

The corresponding econometric investigation has been based on OLS multiple regression.

Table 1 presents the major findings. Equation 1 where the dependent variable is defined as the average time duration of the cartels ($\bar{T}$), generally supports our previous theoretical expectations. The coefficient of the concentration variable is negative and statistically insignificant. This result is in agreement with the idea that for cartels sustained by governmental authorities, a low degree of concentration is not such a handicap to stability². Industries dominated by price and/or quantity export cartels are

¹ $\bar{v}$ and k are unobservable and are assumed constant among industries.

² According to the model of Section 2, we expect that a low degree of concentration will induce a high level of governmental intervention to compensate the difficulty stemming from the existence of a large number of firms. Hence CR and R are not independent of each other : $R = R(CR)$ with $\frac{dR}{dCR} < 0$, so that the total effect of CR on C_L is indeterminate :

$$\frac{dC_L}{dCR} = \frac{\partial C_L}{\partial CR} + \frac{\partial C_L}{\partial R} \cdot \frac{\partial R}{\partial CR}.$$

characterized by collusion of significantly shorter duration. But as indicated by the significant positive coefficient of the combined variable PRI·MIX, in an industry where the price/quantity cartel covers the domestic as well as the international market, the stability is greatly improved.

Equation 1 also suggests that most successful associations will be found in industries that sell a homogeneous product : the positive coefficient of H is statistically very significant and the presence or absence of product differentiation affects strongly the time duration of export cartels.

The growth rate of demand is inversely related to the time duration of cartels : our statistical evidence is consistent with our theoretical expectation. However the t coefficient does not give as strong a confirmation as we might like. There are two possible reasons for this. One is the manner in which we have modelled the effect of the growth rate of demand in the theoretical model. When g instead of its inverse is introduced into the regression, it has a significant effect on the optimal time duration while marginally affecting the other coefficients¹. However, a non-significant negative coefficient is perfectly compatible

¹The corresponding equation is the following :

$$\begin{aligned} \overline{TI} = & 13.32 - 0.02CR4 - 7.72PRI + 4.73PRI \cdot MIX + 3.85H - 0.13g \\ & (6.25) \quad (0.84) \quad (3.24) \quad (2.83) \quad (2.55) \quad (1.98) \\ & - 0.93NEW - 0.02EP \\ & (0.56) \quad (0.56) \end{aligned} \quad R^2 = 0.46 \quad F = 3.81.$$

The only coefficient on which there is an important effect is NEW. The correlation is indeed higher between g and NEW

with the model if one remembers that it involves the unobservable $\bar{v}$. For lack of information on $\bar{v}$, we have been obliged to assume that it does not vary accross industries and absorb it into the coefficient.

The newness of the product carries the expected negative sign and is significant at 10%. This result is improved in the last specification.

Finally, the coefficient of the rate of exported production X is negative and insignificant : sectors largely opened to international trade do not seem characterized by a higher degree of official support.

Equation 2 is similar to equation 1 except that the variable MIX has been introduced under an additive form and the multiplicative variable $PRI \cdot MIX$ has been dropped to avoid a too high collinearity. The mixed nature of the cartel exerts an important and positive direct effect on cartel duration, while all the other results confirm those obtained with the previous specification.

In equation 3, the dependent variable (TI) is defined as the duration of the most stable export cartel in each sector. The results obtained with this specification are fully consistent with those of the first. Furthermore, the

(0.46) in this last equation than when the inverse of g is used (-0.25). In both cases, this suggests that "new" products have a high growth rate. A regression where NEW is dropped shows a less insignificant effect of g^{-1} . NEW is also correlated in both equations with the degree of concentration (0.46), probably because the new products for which cartels have been organised are mainly in heavy and capital-intensive industries (see Appendix, Table 1). An examination of the correlation matrix does not reveal any other particular problem.

Table 1. CARTEL STABILITY ANALYSIS

(Dependent variable : average and maximum time duration of cartels)

Dependent variable	Constant	CR4	PRI	MIX	PRI•MIX	H	1/g	NEW	EP	R ²	F
n°1 TI	12.39 (5.32)	-0.02 (-0.61)	-7.24 (-2.68)		4.68 (2.46)	4.01 (2.35)	0.26 (0.74)	-2.51 (-1.51)	-0.004 (-0.11)	0.35	2.46
n°2 TI	11.55 (4.97)	-0.02 (-0.54)	-5.13 (-2.11)	4.13 (2.13)		3.18 (1.85)	0.25 (0.69)	-2.54 (-1.50)	-0.006 (-0.2)	0.32	2.28
n°3 TI	15.74 (6.07)	-0.04 (-1.00)	-8.24 (-2.74)		4.50 (2.12)	3.89 (2.05)	0.08 (0.20)	-3.68 (-2.00)	0.02 (0.57)	0.34	2.36

Figures in parentheses are t-statistics.

coefficient of NEW is higher and its effect is now significant at the 0.05 level.

Hence the empirical relationship between maximum time duration of export cartels and our explanatory variables confirms totally the relationship derived for average time duration.

CONCLUSION

The purpose of this study has been to investigate Japanese export cartels in the light of (a) their legal background compared with the situation prevailing in other industrialized Western nations, (b) a simple dynamic model and (c) a related statistical analysis. In contrast with what should be expected on the basis of official justification of these cartels, the logic behind them seems to be perfectly compatible with the usual joint profit maximization strategy characterizing the theory of collusion. This conclusion calls in question the legal discrimination in favor of Japanese export cartels and justifies recent changes in the liberal attitude adopted by the MITI.

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APPENDIX

Table 1. Industries controlled by the export-import trading act

INDUSTRIES	1960	1965	1970
agriculture, fishery and food products	16	20	12
fishery textiles	89	75	56
and wood products and miscellaneous manu- facturing	23	23	16
light industries pottery and stone	14	15	13
Subtotal	142 (82,6%)	133 (67,5%)	97 (55,1%)
chemistry	6	15	16
heavy and non-ferrous, steel and metal products	15	22	26
chemical machinery	8	21	30
industries electrical machinery	1	6	7
Subtotal	30 (17,4%)	64 (32,5%)	79 (44,9%)
TOTAL	172 (100,0%)	197 (100,0%)	176 (100,0%)

Source : Survey of Fair Trade Commission (1972)

Table 2. Characteristics of the cartelized sectors

Cartelized sectors	TI	TI	CR4	PRI	MIX	H	g	NEW	EP
Cotton textile	14	19	10.3	0.5	0.25	1	-4.33	0	19.7
Cotton thread	14.5	18	25.4	0	0.5	1	0.8	0	0.8
Woolen textile	9.5	15	15.7	1	0	1	4.24	0	17.5
Fillet	2	2	35.4	1	0	1	7.23	0	32.9
Camera	8	15	54.1	0.18	0.36	0	15.7	1	86.4
TV set	8.5	9	57.3	1	0.5	0	14.2	1	58.9
Bicycle	6	9	39.5	0.57	0	0	12.8	0	31
Clothes, shoes	7	9	65.3	1	0.5	0	-5.4	0	44.1
Colored board	7	7	47.3	1	0	1	12.5	1	0.7
Vynil leather	7	7	38	1	0	1	8.6	1	16.5
Mosaic & porcelain tiles	7	8	24.3	0.8	0.6	0	7.4	0	36.5
Electric wires	19	19	46.4	0	0	1	9.04	1	6.7
Plywood	4	5	18.9	0.67	0.67	0	14.7	1	5.6
High quality paper	12.5	18	55.7	1	0.5	0	11.8	0	17.7
Paper	10	10	43.3	0	0	0	8.11	0	3.9
Canned foods	6	6	42.8	1	0	0	3.96	0	1.4
Titanium oxyde	8	10	85.6	1	0.67	1	9.2	1	29.4
Polyvynil alcohol	7	7	95.6	1	0	1	10	1	31.7
Polyethylene	5	5	48.9	1	0.5	1	14.3	1	40.3
Rayon thread	15	15	88.4	1	1	1	-9.6	0	50.3
Rayon staple	16	16	46.8	1	1	1	0.08	0	43.3
Polyester staple	9	9	88.3	1	1	1	15.1	1	14.8
Acrylic staple	10	10	80.8	1	1	1	17.1	1	15.6
Nylon	6	6	80.8	1	1	1	9.8	1	23.2
Cellophane	11	11	59.1	1	1	1	2.2	1	15
Aluminium ingot	6	6	100	1	1	1	21.6	1	0.4
Hot rolled steel	15	15	77.5	1	1	1	5.5	1	20.3
Wire rod	9	13	75.8	1	1	1	10.3	1	29.2
Tinplate	15	13	99	1	1	1	10.3	1	74.8
Stainless steel	9	9	57.7	1	1	1	10.4	1	37.8
Cement	17	17	49.3	1	1	1	9.3	0	3.6
Paints	16	16	36.5	1	1	1	10	1	2.5
Caustic soda	13	13	28.4	1	1	1	11.96	1	8.3
Vynil chloride resin	15	15	39	1	1	1	8.9	1	13
Acetic acide	7	7	80.3	1	1	1	20.9	1	3.6
Auto tires & tubes	6	6	85.3	1	1	1	13.8	1	8.5
Acid glutanic soda	10	10	96	1	1	0	3.96	1	38.9
Electric table computer	3	4	67	0.33	0.33	0	58.6	1	92.5
Anhydride phtallique	4	4	82.5	1	1	1	9.6	1	10.6
Polypropilene	1	1	66.6	1	1	1	29.5	1	31.1