COMPARED PERFORMANCE OF THE LARGEST EUROPEAN AND JAPANESE INDUSTRIAL FIRMS

by

Alex JACQUEMIN and Wistano SAËZ

Working Paper n° 7414

C.R.I.D.E

121, Parkstraat - B-3000 LOUVAIN
Belgique

COMPARED PERFORMANCE OF THE LARGEST EUROPEAN AND JAPANESE INDUSTRIAL FIRMS

by Alex JACQUEMIN and Wistano SAËZ(+)

Untill recently, there has been a widespread belief, in Europe, that the large size of corporations is an asset and may be the best way to meet the "American Challenge".

Large corporate organizations, it has been argued, can realize superior performance, because they have all of the options of small firms and, in addition, they can act in fields requiring such scale that small firms are excluded.

However, recent studies have cast some doubt on this belief. As far as the largest European firms are concerned, no evidence of increasing profits, faster growth or more intensive research efforts could be found to support the myth of "the bigger the better" (see for example J. ADAMS [1] and JACQUEMIN and CARDON [7]).

Today, Europe is confronted with what is called the "Japanese Challenge" [3].

From 1962 to 1972, the average annual rate of growth of the Japanese GNP has been 10,4 %, in 1963 prices, while the EEC rate of

---

(+) The authors are respectively Professor of Economics and Research Assistant at the Centre de Recherches Interdisciplinaires Droit-Economie (C.R.I.D.E.) of the University of Louvain. They express their thanks to C.C. VON WEIZSÄCKER, R. SCHMALENSEE, F.M. SCHERER and A. SINGH, for their helpful comments and criticisms. This paper has been presented at the First International Management Institute Conference on Economics of Industrial Structure, Deidesheim, West Germany, May 1974.

growth has been around 5 % and the British rate only 2,7 %.

Simultaneously, Japan is the country which has expanded its trade with the Community most quickly. From 1961 to 1972, the percentage of total real country exports and imports between the nine E.E.C. countries and Japan has grown from 6,9 % to 10,2 %, despite the fact that there are still numerous imports quotas and non-negligible tariffs on both sides.

Further, there has been the impressive entry of large Japanese firms into the European markets [3]. Several questions thus arise : how large are the Japanese giant firms as compared with the European ? To what extent does their size structure influence their performance ? What is the relative performance of European and Japanese firms ?

This paper is a first examination of the extent to which Japanese and European giant firms exhibit specific patterns in terms of size, growth and profitability, and if the differences between the national economies find an expression in the leading firms which represent a dominant share in these economies.

Our sample has been selected from Fortune's annual directories of the largest industrial companies outside the U.S., ranked according to sales. From 1962 to 1972, we have n = 123 firms. The following table gives the distribution of these firms by sector and by nationality (1).

---

(1) Among the 200 largest non-American firms in 1962, there are 166 EEC, U.K. and Japanese firms. From them, 114 are again in the 1972 list of the 200 largest and 9 in the 300 largest. Furthermore it is mentioned that 30 firms have been absorbed and we take them into account. The remainders may have been absorbed without any mention or disappeared.

TABLE I : THE LARGEST FIRMS BY NATIONALITY AND BY SECTOR [M], 1962-1972

Country	I_1	I_2	I_3	I_4	I_5	I_6	I_7	I_8	I_9	n
E.E.C.	13	5	0	12	4	5	8	7	4	58
U.K.	1	1	8	1	3	5	4	4	10	36
JAPAN	5	1	1	5	0	3	7	5	2	29
TOTAL	19	7	9	18	7	13	19	15	16	123

[M] I_1 = Chemicals, I_2 = Oil, I_3 = Food, I_4 = Iron and Steel, I_5 = Non-Ferrous Metal, I_6 = Machinery, I_7 = Electrical Engineering, I_8 = Vehicles, I_9 = Miscellaneous. The Fortune's industrial classification used is very broad. Still, many firms fall into several groups.

We shall use this sample for analyzing the compared growth and profit rates and their determinants. Besides, for studying profit rate we used from Fortune's list of the 300 largest non-American Firms in 1973, a sample of n = 223 firms, made of 87 E.E.C., 62 British and 74 Japanese firms.

Section 1. Comparative growth

A preliminary aspect is the growing importance of the Japanese position among the giant firms over the period. Table II shows that the number of giant Japanese firms among the largest non-american firms has risen from 19 % of the total, to 31 %, while the E.E.C. has fallen from 48 % to 43 % and the British, from 33 % to 26 %.

TABLE II : EVOLUTION OF THE NUMBER OF LARGEST EUROPEAN AND JAPANESE FIRMS AMONG THE 200 NON-AMERICAN GIANT FIRMS

Country	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
E.E.C.(6)	80	75	73	70	68	68	69	69	66	72	71
U.K.	55	54	57	56	57	53	48	49	47	44	44
JAPAN	31	37	34	34	38	43	45	45	51	48	51
TOTAL	166	166	164	160	163	164	162	163	164	164	166

Such a differential evolution is in agreement with the respective growth of the national economies (2), and cannot be explained by the weak difference in the rates of inflation (3).

---

(2) Let us notice that regressions between the annual rates of growth of the G.N.P., for the period 62-72, as the dependent variable, and the annual rates of growth of the corresponding group of firms, indicate that for the E.E.C. there is indeed a neat convergent move, as well as for Japan (but with a higher constant term and a lower regression coefficient). On the other hand, the expansion of the giant British firms, although already relatively slow, is independent of the still slower growth of the whole economy. (see the table, p. 5).

(3) see p. 5.

We may then ask if firm's size has exercised a positive influence upon the rate of growth and if Japanese firms have or not followed a specific pattern as compared with the European situation.

...

$g_{G.N.P.}$	Constant	g sales	R^2	Sr
E.E.C.	5,97	0,33	0,62	1,4
	(5)	(3,6)		
U.K.	2,59	0,4	0,13	4,8
	(0,7)	(1,1)		
JAPAN	12,58	0,16	0,29	2,2
	(6)	(1,9)		

(t-values are in parentheses, Sr is the standard error of the regression and R^2 is the coefficient of determination). The inverse regression confirms these results with positive and significant regression coefficients around 1,8 for E.E.C. and Japan.

(3) From 1962 to 1972, the price indexes show the following evolution

	1962	1963	1972
E.E.C.	95,1	100	147,8
U.K.	98	100	161,5
Japan	95,8	100	151,5

(Source : statistical Office of the European Communities, National Accounts, 1951-1972). Since sales are in $, some differences might also be associated with the evolution of the relative exchange rates. These factors will be taken into account by introducing into our regressions a dummy variable for nationality.

Let us assume that growth rate of the firms, g, is a function of initial size, S and nationality D. Growth is measured by the annual average percentage change in sales over the period 1962-1972. The logarithm of sales, expressed in $ thousand is the measure of initial size, theoretical and empirical findings suggesting the existence of a nonlinear relationship between growth and firm size. A dummy variable is used for nationality : D = 1 for a European and o for a Japanese firm.

Furthermore, we test the influence of the initial profit rate on sale, π, upon growth. There are two aspects of the relationship between profit and growth. First, the rate at which a firm can grow depends on its rate of profit : a growing firm requires finance for expansion, and the finance supply, whether originating internally from ploughed - back profits or externally from new issues, is related to the firm's profit record. Secondly, several managerial models (see for example [6]),suggest that beyond a certain level, superior growth could be related to a reduced profitability : the firm faces a trade-off between the two objectives (4). The following estimation has been obtained :

$$g_{62\text{-}72} = \underset{(4.1)}{29.69} - \underset{(1.91)}{1.08} \log S_{62} + \underset{(2.2)}{0.32}\,\pi_{62} - \underset{(5.8)}{5.66}\,D$$

$$R^2 = 0.32 \qquad Sr = 4.3 \qquad n = 123$$

---

(4) As we shall see in section II, π is then selected as the dependent variable and g as the independent variable. But it has been argued that the variance of the error term in this last relation is likely to be much larger. Such an economic specification would indeed depend closely upon each individual firm and would therefore vary a great deal between firms, while the effect of profitability on growth would tend to be more similar for quoted companies, since it is determined partially by the state of the capital market. See [4], [10].

First, the coefficient relating size to growth is significantly different from zero : growth is clearly a decreasing function of size, confirming previous research [6].

A second result of our multiple regression is the positive influence of profits on growth. However, we may wonder to what extent the profitability depends upon industrial sectors, so that the specific effect will vanished once these sectors are explicitely taken into account. To test this hypothesis, let us introduce in our general equation a set of dummy variables for industry (5):

$$g_{62-72} = 29.54 - 1.14 \log S_{62} + 0.32\,\pi_{62} + 1.85\,I_1 + 0.97\,I_2 + 0.34\,I_3$$
$$(4.)\quad (1.94)\quad (2.1)\quad (1.3)\quad (ns)\quad (ns)$$
$$+ 0.40\,I_4 + 1.92\,I_5 - 2.30\,I_6 + 1.00\,I_7 + 3.20\,I_8 - 5.45\,D$$
$$(ns)\quad (ns)\quad (1.4)\quad (ns)\quad (2.)\quad (5.4)$$
$$R^2 = 0.40 \qquad Sr = 4.2 \qquad n = 123$$

The coefficient of π is as significant as before and its absolute value has not changed. Correspondingly the effect of sectors is not very significant (n. s = t value less than one), underlining the fact that very large firms may possess unifying characteristics accross industry boundaries.

The third result is that European nationality has, for given sizes, sectors and profitabilities, an important and significant negative effect on growth. To disentangle the explanatory role of nation size from the other firm-specific size effects, we regressed separately $\bar{g}$ on the 1962 E. E. C. and U. K. gross national products and on the firm's initial size :

---

(5) The dummy for an arbitrary industry (miscellaneous) assumed to be industry m, is excluded for avoiding a linear dependence in the data matrix, so that we test the following equation :

$$g = a + b \log S + c\pi + \sum_{i=1}^{n} d_i D_i + \sum_{j=1}^{m-1} e_j I_j + u$$

$$\bar{g}_{62-72} = 17.41 - 0,76\ GNP_{EEC} - 1,66\ GNP_{UK}$$

(21) (5,8) (6,6)

$R^2 = 0,29$ $S_r = 4,4$ $n = 123$

$$\bar{g}_{62-72} = 40,33 - 2,14 \log S_{62}$$

(4,9) (3,4)

$R^2 = 0,09$ $S_r = 5$ $n = 123$.

Bringing together the two sets of results, we find that nation size effect accounts for the lion's share of the variation in the firm's growth rate and that the British negative impact is the most important.

It is then useful to run separate regressions for the two groups (table III), in order to compare the obtained results and to test their homogeneity by setting up a covariance analysis.

TABLE III

Country	Constant	$\log S_{62}$	π_{S62}	I_1	I_2	I_3	I_4	I_5
EUROPE	27.14 (3.5)	-1.31 (2.2)	0.23 (1.5)	1.95 (1.3)	0.59 (n.s)	-0.24 (n.s)	-1.55 (n.s)	1.20 (n.s)
JAPAN	8.52 (n.s)	0.34 (n.s)	-0.03 (n.s)	4.10 1.5	3.65 (n.s)	3.40 (n.s)	6.38 (2.)	

I_6	I_7	I_8	R^2	S_r	N
-4.64 (2.7)	1.62 (1)	2.68 (1.5)	0,3	4	94
7.48 (1.7)	2.19 (n.s)	7.62 (1.6)	0,32	4.4	29

Again, it appears that firm's size has not a positive influence on the rate of growth. The effect is significantly negative in the European case. It is negative but not significant in the Japanese case, while the role of some sectors has become important : it is indeed often considered that the Japanese growth is a result mainly of very successful development in sectors which have a particular high growth potential in the world sphere, especially in chemicals, carindustry and machinery[2].

As for the rate of profit, its positive influence is slightly significant, only in the European case. Hence, it seems that the effect of profiton growth is different for the more rapidly growing Japanese firms. But a test for homogeneity yields a variance ratio F=2,1 which does not exceed the critical value for the slopes of the size as well as of the profit variables : thus, by conventional standards, we must accept the null hypothesis that the differences in observed national group slope coefficients could have arisen by chance from a homogeneous population.

For the intercepts, on the other hand, the F ratio is around 13 (6). The equality of slopes and the inequality of intercepts then suggest that although the levels of performance are different, the nature of the effects considered here does not seem to differ systematically.

Section 2. Comparative profitability

Another important dimension of the firm's performance is the rate of profit on assets.

A first characteristic of the largest European and Japanese firms is the strong persistence in profitability over time. This is shown in table IV where are presented simple intertemporal regressions between the average rate of profit for 1962-67, P_{t-1} and the average rate of

(6) Given the fact that slopes are homogeneous, we can use the same standard covariance analysis to test the equality of intercepts.

profit for 1967-72, P_t (7).

TABLE IV

	Constant	P_{t-1}	R^2	S_r	n
GENERAL	-0.34 (1,5)	0,93 (16,5)	0,71	1,24	114
E.E.C.	-0,23 (n.s)	0,897 (9,6)	0,65	1,5	51
U.K.	-1,18 (2,5)	1,09 (11)	0,79	0,97	34
JAPAN	-0,17 (n.s)	0,91 (7,9)	0,71	1,06	28

The observed persistence of the level of corporate profitability suggests the non-random distribution of relevant forms of economic advantage among firms, in terms of the continuity of good management and/or monopoly power. Notice also that the value of the regression coefficient fluctuates around unity, indicating, at least for E.E.C. and Japanese firms, the persistence of a given level; for the British firms, the significant intercept precludes such a conclusion.

The next step is to test the effect of the average growth rate of sales over the period, upon the 1972 rate of profit, recalling that we have already noticed the obvious theoretical complexity of this function as compared with the one which uses profitability as the independent

(7) For this regression, our sample had to be reduced to n = 114 firms which stay in the list over the period.

variable (8). Table VI gives the results.

TABLE VI

	Constant	$\bar{g}$	I_1	I_2	I_3	I_4	I_5	I_6	I_7
GENERAL	1.49 (n.s)	0.06 (n.s)	-1.29 (n.s)	-1.36 (n.s)	1.01 (n.s)	-2.78 (1.7)	-6.50 (3.4)	-0.34 (n.s)	-0.21 (n.s)
E.E.C.	5.55 (1.7)	-0.23 (1.2)	-1.14 (n.s)	-1.03 (n.s)		-3.84 (1.3)	-5.18 (1.5)	-1.92 (n.s)	0.22 (n.s)
U.K.	0.10 (n.s)	0.40 (3.1)	3.02 (1.2)	-2.37 (n.s)	1.36 (n.s)	-5.51 (1.7)	-8.40 (4.)	3.3 (1.6)	0.25 (n.s)
JAPAN	-1.04 (n.s)	0.19 (2.3)	-0.41 (n.s)	-1.85 (n.s)	-1.38 (n.s)	-1.90 (1.3)		-1.94 (n.s)	0.93 (n.s)

I_8	D_1	D_2	R^2	S_r	n
1.22 (1.8)	0.95 (n.s)	2.43 (1.8)	0.21	4.2	123
-1.82 (1.4)			0.19	5	58
-1.82 (n.s)			0.56	3	36
-0.01 (n.s)			0.40	1.6	29

(8) See note (4) and the model in [6] where it is assumed that $\pi = f(g)$, $f'' < 0$, and $f' > 0$ for low g, $f' < 0$ for high g.

It seems that while for the British and the Japanese giant firms, the average growth rate has exercised a positive and very significant impact on the current rate of profit, the E.E.C. giants have faced a trade-off, such that there is a negative, but not significant relationship between the two variables.

Finally, we check if thereexists a positive relationship between the rate of profit on assets and size on the Baumol's assumption that larger firms can benefit from several advantages that are out of reach for small firms, and the extent to which Japanese firms reveal specific results as compared with the European firms. We use the extended sample of n=223 (9).

$$\pi_{72} = 9.61 - 0.45 \log_{S62} - 1.90\, I_1 - 2.20\, I_2 - 0.04\, I_3 - 3.64\, I_4$$

(2.8) (1.8) (3) (2.5) (n.s) (4.6)

$$-4.31\, I_5 - 1,64\, I_6 - 0,35\, I_7 - 1.27\, I_8 + 0.92\, D$$

(5.8) (2.3) (n.s) (1.8) (2.4)

$$R^2 = 0.25 \qquad S_r = 2.7 \qquad n = 223$$

First, it appears that firm size has a negative and significant effect upon profitability. For the largest non-American firms, size seems to increase average costs, because of control loss or some other form of "X-inefficiency", so that any scale economies are more or less compensated for.

Secondly the European group is, ceteris paribus, much more profitable than the Japanese : such a finding is in agreement with the view that the Japanese firms work with narrow profit margins, in order to encourage the growth of demand [5].

Still, we must remember that previous studies have indicated that

---

(9) Similar results are obtained with the reduced sample, n=123.

the variance of profit rates among small firms is greater than among larger firms (see for example [7] and [9]), so that our results could be biaised. It is then useful to fit weighted regressions in order to correct our results for heteroscedasticity.

Deflating both the independent and the dependent variables by the square root of sales, we obtain the following table V (10).

TABLE V

	$\frac{1}{\sqrt{S_{72}}}$	$\frac{\log S_{72}}{\sqrt{S_{72}}}$	$\frac{I_1}{\sqrt{S_{72}}}$	$\frac{I_2}{\sqrt{S_{72}}}$	$\frac{I_3}{\sqrt{S_{72}}}$	$\frac{I_4}{\sqrt{S_{72}}}$	$\frac{I_5}{\sqrt{S_{72}}}$
General	11.41 (2.7)	-0.61 (1.9)	-1.44 (2.7)	-2.68 (3)	-0.19 (n.s)	-3.79 (4.7)	-3.20 (5.2)
Europe	14.18 (2.6)	-0.73 (1.8)	-1.28 (1.7)	-3.11 (2.3)	0.29 (n.s)	-4.32 (4.3)	-3.26 (4.2)
Japan	49.09 (1.7)	-3.86 (1.6)	-1.59 (2.2)	-1.82 (1.5)	-1.46 (1.7)	-2.51 (1.9)	-3.01 (3.1)

$\frac{I_6}{\sqrt{S_{72}}}$	$\frac{I_7}{\sqrt{S_{72}}}$	$\frac{I_8}{\sqrt{S_{72}}}$	$\frac{D}{\sqrt{S_{72}}}$	R^2	S_r	n
-1.65 (2.8)	-0.33 (n.s)	-1.73 (2.8)	1.23 (3.6)	0,38	0,27 (10^{-2})	223
-1.49 (1.98)	0,001 (n.s)	-2.21 (2.5)		0,41	0,29 (10^{-2})	149
-2.09 (2.3)	-0,64 (n.s)	-1.35 (1.7)		0,31	0,21 (10^{-2})	74

(10) see p. 14.

The general regression confirms that size is a negative and significant determinant of profits, while European nationality affects positively the level of profitability. Furthermore, sector membership exercises a particular strong influence.

Running weighted regressions for the two separately confirms that profitability is not an increasing function of size, in the case of the largest Japanese firms as well as in the European case. Testing for homogeneity between the two groups gives, for the slopes, a variance ratio F= 1, 2 so that we have to accept the null hypothesis; on the other hand, it is confirmed that intercepts are significantly different, the F value being 12, 4.

As it is the case for the rate of growth, it then appears that there is an equality of slopes and an inequality of intercepts.

Finally, we introduce into our general equation a dummy variable, C=1 for the highly-concentrated sectors and C=0 for the less highly-concentrated (11). The multiplicative specification suggests a multiplicative interaction between size and concentration variables :

$$\frac{\pi_{72}}{\sqrt{S}} = \underset{(2.7)}{18.52}\,\frac{1}{\sqrt{S}} - \underset{(2.2)}{1.14}\,\frac{\log S}{\sqrt{S}} + \underset{(3.6)}{0,87}\,C.\frac{\log S}{\sqrt{S}} - \underset{(1.5)}{13.06}\,\frac{I_1}{\sqrt{S}}$$

$$- \underset{(1.6)}{14.39}\,\frac{I_2}{\sqrt{S}} - \underset{(n.s)}{0.21}\,\frac{I_3}{\sqrt{S}} - \underset{(1.7)}{15.56}\,\frac{I_4}{\sqrt{S}} - \underset{(3.2)}{3.18}\,\frac{I_5}{\sqrt{S}} - \underset{(2.8)}{1.63}\,\frac{I_6}{\sqrt{S}} - \underset{(1.4)}{12.05}\,\frac{I_7}{\sqrt{S}}$$

$$- \underset{(1.5)}{13.33}\,\frac{I_8}{\sqrt{S}} + \underset{(1.3)}{1.23}\,\frac{D}{\sqrt{S}}$$

$$R^2 = 0,39 \qquad S_r = 0,27\,(10^{-2}) \qquad n = 223$$

---

(10) For choosing the weighting scheme, we regress the residuals on different weighting schems. The only one which is slightly significant is the square root of sales : $|\varepsilon| = 1.33 + 0.32\,(10^{-2})\,\sqrt{S_{72}}$, $R^2 = 0,007$, n= 223.

(11) On the basis of several studies of two-digit-concentration ratios, we consider that C = 1 for I_1, I_2, I_4, I_7 and I_8, C = 0 for I_3, I_5 and I_6. The sectors included in I_9 are mainly not highly concentrated.

As expected, the concentration variable combined with size has a strong positive effect on profitability, while the specific negative size effect becomes more significant and more important (12).

Section 3. Variability of profitability and growth

Finally, we investigate the extent of the stability of the large firm's performance, in terms of profit and growth (13).

A first aspect is the relationship between the average rate of return on total assets (which could be considered as an estimate of the expected value) and its dispersion measured by the variance of the firm's yearly profit rates about the mean value of the profit rate for the years 1962-1972. The hypothesis to be tested is the extent to which large firms have indeed the option of trading off mean profits for an increased amount of the "quiet life". Table VI presents the estimated equations.

---

(12) However, let us notice that the net sum of the two coefficients is negative, suggesting that size has also a negative effect in the concentrated sectors.

(13) For computing the variances used in the following tests, we retain the firms which, from 1962 to 1972, are present in the list, at least eight times.

TABLE VI

σ_π^2	Const.	$\bar{\pi}$	I_1	I_2	I_3	I_4	I_5	I_6
GENERAL	-0.50 (1.)	0.39 (4.9)	0.31 (n.s)	0.03 (n.s)	-0.11 (n.s)	0.52 (n.s)	0.20 (n.s)	0.42 (n.s)
GENERAL	-0.54 (1.)	0.36 (4.5)	0.26 (n.s)	0.62 (1.3)	-0.33 (n.s)	0.74 (1.4)	0.15 (n.s)	0.42 (n.s)
EUROPE	-0.69 (1.2)	0.39 (4.)	0.54 (1.)	0.31 (n.s)	-0.40 (n.s)	1.06 (1.7)	0.34 (n.s)	0.61 (n.s)
E.E.C.	-0.80 (1.)	0.60 (4.8)	0.02 (n.s)	-0.51 (n.s)		0.85 (1.)	0.31 (n.s)	1.73 (1.6)
U.K.	0.56 (n.s)	0.05 (n.s)	-0.38 (n.s)	1,54 (1.7)	-0,04 (n.s)	0,99 (1.)	-0,52 (n.s)	-0.42 (n.s)
JAPAN	-0.28 (n.s)	0.37 (1.84)	0.92 (n.s)	0.19 (n.s)	0,29 (n.s)	0,06 (n.s)		0.12 (n.s)

I_7	I_8	D_{EEC}	D_{UK}	D	R^2	S_r	N
0.46 (n.s)	1.98 (1.1)	0.28 (n.s)	--0.43 (1.1)		0,35	1.3	113
0.59 (1.3)	2.16 (4.4)			0.04 (n.s)	0.32	1.4	113
0.77 (1.4)	2.31 (4.)				0.31	1.4	85
0.04 (n.s)	2.06 (2.4)				0.48	1.4	51
1.03 (2.)	1.32 (2.2)				0.41	0.91	34
0.08 (n.s)	1,73 (1.5)				0.42	1.5	28

In all equations, except U.K., the profit variable has the predicted positive and significant effect on firms' profit variance. Hence, for these giant firms, there exists a trade-off between high profits and less risk. The nationality effect, on the other hand, has no systematic impact. Indeed the F-ratios of 0,011 (Japan - Europe) and 1,6 (E.E.C. - U.K. - Japan) for the intercepts indicate that the international differences are quite clearly statistically insignificant. Furthermore, the F-ratios of 0,28 (Japan-Europe) and 0,86 (E.E.C. - U.K. - Japan) for the slope coefficients confirm that the differences in observed national groups could have arisen from a homogeneous population.

Similar results are obtained in analysing the relationship between average rate of growth and growth variability measured by the variance of growth rates (Table VII).

TABLE VII

σ_g^2	Const.	$\bar{g}$	I_1	I_2	I_3	I_4	I_5	I_6
GENERAL	-0.85 (6.3)	0.72 (6.4)	.0183 (1.)	-.0087 (n.s)	-.0147 (n.s)	-.0495 (2.5)	-.0028 (n.s)	.0217 (1.)
GENERAL	-0.79 (5.8)	0.67 (5.8)	.0023 (n.s)	-.022 (n.s)	-.0034 (n.s)	.034 (1.7)	-.0035 (n.s)	.018 (n.s)
EUROPE	-1.00 (6.)	0.91 (6.1)	-.0036 (n.s)	-.0241 (n.s)	.0021 (n.s)	.05.30 (2.2)	.0218 (n.s)	.0500 (1.8)
E.E.C.	-0.67 (3.7)	0.61 (3.8)	.0156 (n.s)	-.0157 (n.s)		.02.30 (n.s)	.0123 (n.s)	.0370 (1.)
U.K.	-0.34 (1.9)	0.37 (2.)	-.0210 (n.s)	-.0203 (n.s)	-.0060 (n.s)	0.4898 (11.)	-.0045 (n.s)	.0083 (n.s)
JAPAN	-0.13 (1.5)	0.12 (1.7)	-.0043 (n.s)	-.0104 (n.s)	-.0137 (n.s)	.0032 (n.s)	(n.s)	-.0111 (n.s)

I_7	I_8	D_{EEC}	D_{UK}	D	R^2	S_r	N
.0089 (n.s)	-.0085 (n.s)	.05.51 (3.7)	.0913 (5.2)		0.35	5.5	113
.0020 (n.s)	-.018 (n.s)			.065 (4.5)	0.31	5.6	113
.0004 (n.s)	-.0194 (n.s)				0.38	6.1	85
.0092 (n.s)	-.0093 (n.s)				0.33	4.5	51
.0023 (n.s)	-.0070 (n.s)				0.92	3.3	34
-.0071 (n.s)	-.0112 (n.s)				0.26	1.6	28

The average growth rate has the anticipated effect. Its coefficient is always positive and significant, indicating that a firm's exposure to risk increases with its level of performance. Furthermore European nationality has a positive effect on the variability of the growth rate : indeed the F-ratios for the intercepts are 8,7 (E.E.C. - U.K. - Japan) and 17 (Europe - Japan), and thus highly significant. But on the other hand, the F-ratios for the slopes are not significant (0,4 for E.E.C. - U.K. - Japan, 0,60 for Europe - Japan).

As the reward of being a large firm is not a higher prospective rate of profit or rate of growth, we can then expect that it will achieve a greater degree of security.

In our sample itself, the coefficient of profit and growth variation are indeed negatively and significantly correlated with size (Table VIII).

For a given level of expected profit or growth, a firm's exposure to risk clearly decreases as its size increases. At the national level however, the size coefficient becomes less significant or not significant.

Furthermore, there are no systematic differences between the European and Japanese groups, except for the intercepts in the second set of equations ($F \simeq 5.2$).

TABLE VIII

$\log \frac{\sigma_\pi}{\bar{\pi}}$	Const.	$\log S_{72}$	I_1	I_2	I_3	I_4	I_5	I_6	I_7	I_8	D	R_2	S_r	n
GENERAL	5,29 (4.6)	-0,16 (1.81)	0,26 (1.3)	0,36 (1.2)	-0,19 (n.s)	0,92 (4.1)	-1,16 (3)	0,33 (1.4)	0,3 (1.4)	0,57 (2.6)	0,05 (n.s)	0,32	0,6	113
EUROPE	5,20 (3.9)	-0,16 (1.6)	0,25 (1.1)	0,27 (n.s)	-0,33 (1.2)	1,17 (4.7)	-1,64 (3.5)	0,36 (1.3)	0,34 (1.4)	0,68 (2.7)		0,44	0,61	85
JAPAN	2.39 (1.1)	0;09 (n.s)	0,16 (n.s)	0,66 (1.3)	0,66 (1.3)	0,07 (n.s)		0,09 (n.s)	-0,09 (n.s)	0,14 (n.s)		0,22	0,4	28

$\log \frac{\sigma_g}{\bar{g}}$	Const.	$\log S_{72}$	I_1	I_2	I_3	I_4	I_5	I_6	I_7	I_8				
GENERAL	-0,75 (n.s)	-0,15 (1.82)	0,3 (116)	-0,27 (1)	0,04 (n.s)	0,46 (2.2)	0,10 (n.s)	0,24 (1.1)	0,30 (1.5)	0,17 (n.s)	0,31 (2.2)	0,14	0,56	113
EUROPE	-0,28 (n.s)	-0,17 (1,72)	-0,27 (n.s)	0,46 (2.1)	0,14 (n.s)	0,52 (2.1)	-0,01 (n.s)	0,3 (1.1)	0,34 (1.4)	0,2 (n.s)		0,17	0,60	85
JAPAN	-2,58 (1.3)	0,05 (n.s)	-0,62 (1.3)	-0,68 (2.1)	-0,99 (2.1)	-0,32 (1)		-0,44 (1.2)	-0,44 (1.3)	-0,45 (1.4)		0,29	0,38	28

CONCLUSIONS

To summarize, our statistical results include the following :

(I) As far as the influence of size on the rate of growth and on the rate of profit is concerned, the myth of "the bigger the better" is not supported for the giant Japanese firms, or for the giant European firms. The large firms which continue to increase their size, as is indicated by the recent large-firm mergers, could not on the average justify such a policy by a higher prospective rate of profit or rate of growth, although the combined effect of size and concentration is favorable to profitability.

(II) There is a significant inverse relationship between the average rate of profit and growth, and the variability of these performance indices : the large firms have to reduce the level of their performance in order to enjoy a greater certainty. As the reward of being a large firm is not a higher profitability or growth, our findings consistently show also a statistically significant inverse relationship between a firm's size and its coefficient of profit and growth variation : the main consequence of a larger size is to reduce the firm's exposure to risk.

(III) The slope coefficients of size and profit are the same for the Japanese and the European group, indicating that the marginal effects of these variables on profitability and growth are fundamentally similar and that a specific Japanese pattern does not appear.

(IV) The intercepts of the regressions are significantly different between the national groups. This indicates that the Japanese firms have a systematically higher average level of sales growth, and a lower average profit margin than the European firms.

(V) The level of corporate profitability is persistent over time, both for the Japanese and the European groups, suggesting the existence, for the very large firms, of well stabilized advantages.

(VI) There usually exists a good, though somewhat erratic, reciprocal relationship between growth and profitability of these giant firms : the relationship is always positive and significant in the British case, negative or not significant in the E.E.C.. case and positive or not significant in the Japanese case.

REFERENCES

[1] J. ADAMS, Firm Size and Research Activity : France and the United States, Quarterly Journal of Economics, August 1970, 84.

[2] Bulletin of European Communities, Dec. 1969, vol. 2, n° 12, Chapter II, Japan-Economic Power and Partner for Common Market.

[3] Business Week, Japan comes on strong in Europe, nov. 15, 1969.

[4] J. EATWELL, Growth, Profitability and Size : The Empirical Evidence, in R. MARRIS and A. WOOD, The Corporate Economy, Harvard University Press, 1971.

[5] G. GREGORY, Le modèle Japonais, perspectives d'avenir, Analyse et Prévision, juillet-août 1971; Ce Japon qui continue, l'Usine Nouvelle, octobre 1972.

[6] HEAL G. M. and SILBERSTON A., Alternative Managerial Objectives : An Exploratory Note, Oxford Economic Papers, June 1972.

[7] JACQUEMIN A. and CARDON M., Size Structure, Stability and Performance of the Largest British and E.E.C. Firms, European Economic Review, vol. 4, n° 4, Dec. 1973.

[8] M. LOCKE and H. BINNENDIJK, Japon-Europe, un mariage de raison, 30 Jours d'Europe, n° 189, avril 1974.

[9] J. SAMUELS and D. SMYTH, Profits, Variability of Profits, and Firm Size, Economica, May 1968.

[10] A. SINGH and G. WHITTINGTON, Growth, Profitability and Valuation, Cambridge University Press, 1968.