EXPORTS IN AN IMPERFECT COMPETITION FRAMEWORK
AN ANALYSIS OF 1446 SMALL COUNTRY EXPORTERS

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SECTION I : A FEW THEORETICAL CONSIDERATIONS

Recent contributions to international trade theory tend to underline the impact of a set of factors expressing the key elements of domestic as well as foreign market structure upon exports : the size of firms and scale economies in the national production of a good, industrial concentration, product differentiation, the amount and type of information at the disposal of market participants, the alternative forms of international trade, including direct investment and licencing, are new elements that various authors have attempted to introduce into traditional explanations of comparative advantage (see especially Basevi (1970), Caves (1974), Caves and Khalilzadeh-Shirazi (1977), Drèze (1960), Frenkel (1971), Hufbauer (1970), Johnson (1967), Linder (1961).

Although we have the feeling that it is in the empirically oriented rather than in the theoretical literature that the main progress has been made, the influence is definitely present in the latter through the recognition of the relevance of market structure and real-life competition for understanding external trade. Indeed, L. White (1974) has recently proposed a very valuable theoretical analysis of the relationship that runs from domestic market structure to export and import-competing performance, regretting that "no one has yet explored the possibilities of such a reverse relationship" (p.1013).

The main purpose of this paper is to help filling that gap by testing the role of the main hypothese which emerge from recent research. In that respect, two types might be distinguished : on one hand, that related to the role of the structural characteristics of the domestic market and, on the other hand, those concerned with the features of the foreign market.

With reference to the *domestic market*, the following major propositions emerge (viz. Caves (1974), Basevi (1970), Frenkel (1971), White (1974)).

1. Exporting is likely to enable firms, especially in small countries, to reap economies of scale in production by relaxing the constraint of market size. Thus, a positive correlation can be expected between sales on the home and on the foreign market since entry to the export market raises the quantity sold at

home via the reduction in average cost.

2. A negative correlation is likely to occur between sales on the domestic market and the *share* of exports in domestic sales : if the main scale-economies are achieved by domestic sales and if exporters cannot effectively segment the less-competitive domestic from their international markets, then the incentive to export decreases, in contrast with point 1.

3. A high degree of domestic concentration could affect negatively the share of exports in total sales. First, it allows dominant firms to reap the possible economies of scale on the home market (see point 2), the remaining competitive fringe being unable to reach the critical size required for exports. Second, in as far as concentration means monopoly power, dominant firms can exploit the negatively sloped domestic demand, avoiding the possibility of increasing the demand elasticity and of becoming price-takers by weakening the oligopolistic interdependence and the facility of collusion associated with exporting. This is especially true when dumping is prohibited by international trading rules, as is the case for EEC members.

4. The location of the firm in the domestic market and the nature of the regional transport facilities (i.e. airport, harbor, infrastructure) directly determine transport costs. This could exercize a specific impact, distinct from the sectoral influence.

At the level of *foreign markets*, the major arguments are that (see Drèze (1960), Hufbauer (1970), Linder (1961) and Vernon (1966)) :

5. Nonstandardized (usually manufactured) products tend to find less easy outlets abroad, this being especially true for small countries who hold a comparative disadvantage in these goods, as they exert little influence on foreign taste (whereas a country like the U.S. largely succeeds in exporting its "way of life"). Small countries would thus turn to internationally standardized goods.

6. Given the high costs of information and the high risk associated with selling in international markets, a good technical, commercial and financial knowledge of foreign market increases export opportunities.

7. The existence of foreign subsidiaries is usually, for a given exporter, a support and not a substitute for exports to the extent that it increases the quality of information and facilitates adaptation to local conditions (pull on exports).

Interferences exist definitely between what we have considered as domestic and foreign market structural characteristics. We propose a relevant one which could go as far as qualifying strongly propositions 3 and 5. Although high domestic concentration and nonstandardized products would both affect negatively the export rate, the combination of a high domestic concentration and a nonstandardized product could exert a positive effect : once there is some product differentiation linked with a less elastic demand curve, the firms in concentrated sectors could be encouraged to export, as they would be more able to exercise some market power and to discriminate between markets. This hypothesis could be classified as proposition 5 bis.

We should like to emphasize at this point the acute need for as complete a specification as possible, neglecting none of the variables mentioned from 1 through 7 above (including 5 bis). If e.g. we pay no attention to either size or the presence of foreign affiliates, the coefficient of the remaining variable will be biased as a high correlation between size and the existence of foreign affiliates is expected.

In that respect, the reader might wonder why "comparative costs" is not listed above. He may consider that it stands there but as a hypothesis we want to *disprove* (as will appear later) for the following reasons :
- we do believe like Linder (1961) and Balassa (1976) that the role of that variable has been grossly overplayed by accepted wisdom ;
- the data we use do not allow us to measure the genuine potency of the theory of comparative advantage : agriculture e.g. is not disaggregated and we do not consider services like tourism where one would expect it to play a dominant role.

This last remark brings us to a discussion of our sample. We feel that the latter has a "comparative advantage" over all the studies mentioned above which are either purely theoretical or test the theories with aggregated (macro or sectoral) data mixing heterogeneous components. In fact micro-data are required by the very logic of the problem at hand. We succeded, thanks to the

assistance of official authorities to gather, to the best of our knowledge for the first time, such micro-data : answers to a question form by 1446 Belgian exporters belonging to 35 sectors have been combined with various information, mainly from the National Institute of Statistics[1]. We have used these data to test the statements above.

The organization of the paper is as follows :
Section II deals with arguments 1 and 2 above i.e. distribution of exports between and within sectors, and their rank correlation with firm size : in this context we shall emphasize the role of large firms.
Section III, which is the heart of the paper deals with the variables mentioned under 1 through 7, essentially by means of regression analysis.

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(1) At the end of March 1974, some 6.000 questionnaires were sent to the Belgian exporting firms (or departments of firms) registered by the Official Belgian Foreign Trade Promotion Office (Office Belge du Commerce Extérieur). We received approximately 2.000 answers of which 1.446 were usable for our purpose. However it should be emphasized here that no comparable data is available on firms that do not export at all, which of course qualifies our conclusions. For more details viz. M. Gérard and H. Glejser (1976).

SECTION II : EXPORT AND FIRM SIZE

This section will deal with the volume and the rate of export and their variance both within and between sectors.

Table 1 provides the first information on the sample average export rate for each sector and on the sample variance of that rate inside each sector calculated over all the firms of our sample (1446). Two definitions have been used for the average of exports per sector : first, $\Sigma X_i/\Sigma T_i$ where X_i represents exports of firm i and T_i its total turnover, and second $n^{-1}\Sigma_i(X_i/T_i)$ where n is the number of firms in the sector : the first definition stresses the situation of the sector, the second that of the firms inside the sectors.

As can be seen readily, the second definition yields in most cases figures smaller than the first which would seem (falsely as we shall see further on) to indicate a higher average export ratio for firms with a large turnover. The fluctuations of the mean export rates across sectors surely does not come as a surprise : they go from a minimum of .2443 for vehicles (except cars and ships) to a maximum of .9153 for arms and ammunition according to the first definition and from .2492 for pharmaceutical products to .6796 for carpets following the second. One can also notice that the dispersion of the mean export rates is larger in the first definition than in the second.

If we now look at the variance of the rates inside each sector, we are astonished by the large figures : the standard deviation is indeed of the order of magnitude of .3 on the average, and this seems to hold wether the number of firms in the sector is large or small. The Bartlett test which consists in the ratio of the sum of calculated variance to their product also shows that, in both case, the variances differ significantly as between sectors.

Table 2 presents the Spearman rank correlation coefficient between a few couples of variables : in column (1), i.e. the correlation between X_i and T_i, we obtain only positive coefficients. This correlation could of course be spurious because X_i is a part of T_i, so that, for given figures of $T_i - X_i$, drawings of X_i's from any random distribution would produce T_i's positively correlated with the X_i's.

TABLE 1 : EXPORT RATIOS AND THEIR VARIANCES

Sector	Number of observations	(1) $\frac{\Sigma X_i}{\Sigma T_i}$	(2) $n^{-1}\Sigma \frac{X_i}{T_i}$	(3) Variance of $\frac{X_i}{T_i}$ inside each sector
1. Crops and livestock products	132	.5033	.5980	.1133
2. Fats and oils	10	.8700	.5197	.0974
3. Food products	114	.3666	.3350	.0905
4. Combustible minerals	38	.5417	.5050	.0815
5. Non-combustible minerals	14	.5285	.4643	.0836
6. Basic chemicals	51	.7694	.6047	.0946
7. Pharmaceuticals	6	.5235	.2492	.0647
8. Artificial fertilizer, soap	50	.7748	.5405	.0822
9. Explosives, photographic products	14	.8877	.5701	.0872
0. Plastics	111	.7087	.4291	.1014
1. Leather, fur and hide	32	.6459	.4340	.1135
2. Wood, woodcork and allied products	60	.4792	.3603	.0895
3. Paper and allied products	59	.7385	.3974	.1114
4. Silk, synthetic and artificial textiles	75	.6413	.6085	.6654
5. Woolens	28	.6036	.6018	.0866
6. Vegetable fibers	69	.6689	.6207	.0654
7. Carpets	78	.6916	.6796	.0852
8. Clothing	215	.5064	.4078	.0904
9. Shoes, umbrellas	38	.3793	.3596	.0793
20. Stone and pottery	63	.4550	.3923	.0985
21. Glass	27	.6607	.6419	.0900
22. Jewelry	21	.6806	.5902	.1229
23. Steel and iron	138	.6845	.3752	.0945
24. Non-ferrous metal	61	.6309	.3720	.0830
25. Cutlery and base metal products	70	.5685	.3750	.0820
26. Mecanical machinery	174	.6126	.4824	.1132
27. Electrical machinery	53	.3352	.3825	.0991
28. Rolling-stock	13	.2443	.2495	.0396
29. Automobile	32	.8273	.4294	.1175
30. Aircraft, ships and boats	9	.4017	.5152	.0980
31. Precision instruments and mechanical measuring devices	38	.7952	.4239	.1081
32. Arms and munitions	4	.9153	.5430	.2208
33. Furniture	114	.4468	.3848	.0749
34. Brushes, toys and others	43	.6630	.4341	.1575
35. Industrial designs	22	.7014	.3883	.0968

TABLE 2 : SPEARMAN RANK CORRELATIONS COEFFICIENTS BETWEEN A FEW PAIRS OF VARIABLES

Sector	Number of observations	X_i and T_i (1)	X_i and (T_i-X_i) (2)	$\frac{X_i}{T_i-X_i}$ and T_i-X_i (3)
1	132	0.875	0.621	-0.725
2	10	0.745	0.382	-0.067
3	114	0.763	0.453	-0.0239
4	38	0.804	0.557	-0.498
5	14	0.873	0.763	-0.301
6	51	0.922	0.463	-0.374
7	6	0.486	0.371	-0.086
8	50	0.933	0.581	-0.181
9	14	0.987	0.393	-0.253
10	111	0.858	0.480	-0.234
11	32	0.855	0.626	-0.036
12	60	0.713	0.347	-0.265
13	59	0.859	0.568	-0.142
14	75	0.928	0.618	-0.480
15	28	0.847	0.533	-0.652
16	69	0.950	0.665	-0.381
17	78	0.945	0.404	-0.498
18	215	0.802	0.461	-0.172
19	38	0.831	0.556	-0.087
20	63	0.753	0.421	-0.416
21	27	0.902	0.517	-0.552
22	21	0.894	0.573	-0.456
23	138	0.821	0.451	-0.114
24	61	0.817	0.571	-0.125
25	70	0.830	0.476	-0.183
26	174	0.892	0.402	-0.210
27	53	0.828	0.447	-0.287
28	13	0.736	0.731	0.104
29	32	0.689	0.011	-0.441
30	9	0.583	0.267	-0.683
31	38	0.832	0.412	-0.230
32	4	0.800	0.400	-0.400
33	114	0.748	0.488	-0.287
34	43	0.779	0.183	-0.356
35	22	0.700	0.531	0.284

However, when looking at column (2) of Table 2, we notice everywhere the same (although generally lower) positive rank correlation between X_i and T_i-X_i. Here any spurious effect would be *negative* as, for a given value of T_i, drawings of X_i's would generate a variate T_i-X_i negatively correlated with the former. Column (2) does thus obviously support argument 1 of section II.

On the other hand, argument 2 is succesfully tested in column (3) of Table 2 where a negative correlation shows up between $\frac{X_i}{T_i-X_i}$ and T_i-X_i in all sectors but two : rolling-stock (except cars and ships) and industrial designs. Those are in fact sectors where we could expect *a priori* that the main economies of scales are not achieved on the domestic market contrary to the general assumption of argument 2. It is also interesting to remark the sectors for which the rank correlation in column (3) is highest is absolute value : crops and livestock products(-.725), ship and boat building (-.683), woolens (-.652), carpets (-.498), silk and synthetic textiles (-.480) and jewelry (-.456) : except for glass and ship and boat building those are indeed industries where increasing returns to scale are limited to a small portion of the firms' marginal supply curve. Of course, our test is not foolproof because, as in the discussion above, a spurious negative correlation would appear between $\frac{X_i}{T_i-X_i}$ and T_i-X_i if for any fixed X_i,T_i-X_i were random numbers.

Nevertheless, another approach suggests that those results are economically founded. We examined the dispersion of the calculated means $n^{-1}\Sigma\frac{X_i}{T_i}$ and the calculated variances inside each sector when, for each sector, we dropped the firm with the *highest domestic turnover* (T_i-X_i), afterwards the three and finally the seven firms with the highest domestic turnover.

The reader will find in table 3 :

- the calculated variances of the mean export ratios of 31 sectors (4 had to be dropped because of the low number of observations).
- the Bartlett coefficients which are indicators of heterogeneity of the sector variances (the higher they are, the larger the probability that the variances differ significantly as between sectors).

TABLE 3 : EFFECTS OF THE ELIMINATION OF FIRMS WITH LARGEST TURNOVER

	All observations	Without firms with largest domestic turnover	Without 3 firms with largest domestic turnover	Without 7 firms with largest domestic turnover
Calculated variances of the mean export ratios (all of them significant at the 1% level)	0.120	0.123	0.135	0.136
Bartlett coefficients (all of them significant at the 1% level)	27.49	26.46	25.73	23.51

The elimination of the firms with the highest domestic turnover (domestic turnover being a variable negatively correlated with the export ratio in almost all sectors, as said above), thus *increases* the dispersion of the mean export ratios of the sectors and tends to homogenize the variances of the export ratio of the various sectors. An explanation of those findings would be that firms reaping their economies of scale mostly in the domestic market and selling only a small fraction of their output abroad tend to push down the mean export rate of each sector towards lower and closer values. Therefore, their elimination increases the differences between the sector means which for each sector, now tends towards a (probably different) value which could be determined inter alia, by comparative advantage. In the same way, the variances around the sector means tend to become more homogeneous as one component of the variance related to the presence of a certain (possibly different for each sector) number of firms with high domestic turnovers vanishes.

A look at the data does show indeed that for an enormous majority of sectors, export rate means go up and also that variances tend to increase in sectors where it was low and vice versa. Those findings strengthen the evidence in favor of argument 2 which will be tested again in the more elaborate form of multiple regression in the next section.

SECTION III : TESTING SIMULTANEOUSLY THE PROPOSITIONS OF SECTION I

In this section, we shall test the assumptions proposed in section I, on 970 firms pertaining to 14 sectors[1].

Our basic structural equation is the following, all the variables being used in the form of deviation from their means and ranked according to the order of the propositions in section I :

$$(I)\quad \ln \frac{X_{ij}}{T_{ij}-X_{ij}} = \beta_j S_j \ln(T_{ij}-X_{ij}) + \gamma H_j + \delta R + \nu_1 PF + \nu_2 PF.H_j + \mu K + \kappa_1 EX + \kappa_2 EXO + u_{ij}$$

$$i = 1, 2, \ldots, n$$
$$j = 1, 2, \ldots, 14,$$

where

- the regressand, i.e. the natural logarithm of the rate of export, is expressed so that it can vary between $-\infty$ and $+\infty$;
- $S_j \ln(T_{ij}-X_{ij})$ is the domestic size expressed in natural logarithm, multiplied by a dummy, S_j, corresponding to the firm's industry, so that β_j is the size elasticity (supposed to differ as between industries) ;
- H_j is the Herfindahl measure of concentration. Most of the previous studies, including those which introduce international factors such as export to explain market structure and performance, use concentration ratios based on total shipments so that, for an open economy, there is a substantial overestimation of monopoly power. On the contrary, we have computed new concentration ratios for Belgium[2] corrected by substracting exports from both numerator and denominator of the market shares measured by turnover[3] :

$$H_j = \sum_{j=1}^{14} \sum_{i=1}^{n} \left(\frac{T_{ij}-X_{ij}}{T_j-X_j}\right)^2 .$$

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(1) These sectors have the following numbers in tables I and II : 6, 7, 10, 11, 14, 15, 17, 18, 21, 22, 23, 24, 28, 33. The reason we have to drop 21 sectors was that, given differences between official industrial classifications, we had no reliable data on concentration for those 21.

(2) Based on 1970 fiscal data from the National Institute of Statistics.

(3) It is commonly admitted that the Herfindahl index is a theoretically better measure of concentration than alternative indexes such as the share of the largest n firms because of its link with oligopoly theory.

- R is a dummy that takes the value one only if the firm is located in East or West Flanders (where important harbors and channels are available to industry).
- PF is a dummy variable indicating product differentiation and taking the value one when the firm produces for final demand, and zero when its output consists of intermediate goods ; $PF.H_j$ is simply the product of PF and H_j as defined above.
- K is a dummy taking only the value one if the firm states that it is handicapped by a lack of information about foreign outlets.
- EX and EXO are dummies taking the value one only if the firm states that its affiliates abroad increase (EX) or leave unchanged (EXO) its export volume. Taken together, these dummies express the influence of having a foreign subsidiary as their values are both zero where there is no foreign affiliate.

Attempts at introducing a special dummy variable for each sector as a proxy for comparative advantage were counterproductive : R^2 did not increase significantly (more on this when we shall discuss our regression residuals in detail).

We used ordinary least squares to estimate the parameters of equation (1) with the firm intention of utilizing an error component model of the type : $u_{ij} = v_j + w_{ij}$ $\quad i = 1, 2, \ldots, n \quad j = 1, 2, \ldots, 14.$

This very type of model is suggested by our conclusions on intra-sectoral variances in section II. But to our surprise, no trace of heteroskedasticity across sectors showed up in our residuals vindicating the assumption that the differences found there were essentially due to the effects of the explanatory variables used in equation (1) so that our sample satisfies the conditions of the Gauss-Markov theorem[1]. The regression results, presented in table 4, all have the expected sign and are significant in the worst-case at the 5% level of the one-tailed t-test.

Having retained only the size variables which are statistically significant, we notice that all the signs are negative. This confirms the results of table 2 where the whole set of 35 sectors was taken into account and strengthens them as the specification is much more "complete" in our multiple regression.

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[1] The estimated standard errors of the residuals inside each sector all lie in the short interval 3.28 (for woolens - 29 observations) and 4.77 (for pharmaceuticals - 6 observations). A F test leads to acceptance of the hypothesis of equality of variances as F (28,5) amounts to 2.11 whereas the critical value $F^*_{0.05}$ (28,5) lies at 4.5.

All $\hat{\beta}_j$'s lie in the interval -1.1 and -4, the highest absolute values being obtained for Carpets, toys and miscellaneous, Woollens and glass (see in that respect our comments on column (3) of table 2).

The coefficients $\hat{\gamma} = -3.89$ is significant at the 0.1% level. Given that the upper and lower-bounds of H are respectively 1 and $\frac{1}{n}$, this implies a negative elasticity, so that proposition 3 of section I is accepted[1]. This result is also compatible with previous empirical studies[2] according to which export, X, and concentration, C, have respectively a negative and a positive relationship with the price-cost margin π. Indeed, we have that :

$$\pi'_X.X'_C = \pi'_C > 0 \text{ implies } X'_C < 0$$

where our symbols designate partial derivatives.

As to the impact of location characteristics, the results indicate that (again at the 0.1% significance level) the harbors of Ghent and Zeebruges, and the canals (especially the one linking Ghent to Terneuzen) have tended to attract export-prone firms[3].

PF has a negative effect (significant at the 2.5% level). Product differentiation thus reduces export opportunities : hence small open economies like that of Belgium tend to enjoy comparative advantages in semi-manufactured goods, as postulated by assumption 5 of section I.

However the combined variable $PF.H_j$ exercises a specific positive effect (significant at the 5% level). Our maintained hypothesis (proposition 5 bis) was indeed that, given the negative separate effects of concentration and differentiation on the export ratio, firms in concentrated sectors where there is also a high degree of product differentiation have a comparative advantage in exploiting export opportunities as compared to firms producing more

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(1) Computing elasticities, we obtain the following two extreme values : -2.10 (rolling-stock) and -.002 (furniture).

(2) See e.g. E. Pagoulatos and R. Sorensen (1971) who find support to the hypothesis that in European sectors, exporting opportunities and reliance on export markets may have constrained producers to more competitive pricing and output decisions.

(3) Regressions including also regional dummies for locations in Antwerp (major harbor) and Brussels (the capital) failed to produce significant coefficients. In the perspective of foreign market structure, we have also investigated another aspect of the location problem. We have tested the significance of the variables on the right-hand side of equation (1) on the share of the main importing country in the firm's total export and also on the share of the

(continued on p.13)

TABLE 4 : ESTIMATES OF THE PARAMETERS OF EQUATION (1)

Explanatory variables	Estimated coefficient	Estimated standard error	t-statistic
$\ln(T_{ij}-X_{ij})$ for plastic industry..	-0.710	0.228	-3.110
$\ln(T_{ij}-X_{ij})$ for leather industry..	-0.981	0.399	-2.460
$\ln(T_{ij}-X_{ij})$ for silk & synthetic textiles industry.....	-1.065	0.251	-4.241
$\ln(T_{ij}-X_{ij})$ for woollens industry.	-0.603	0.199	-3.029
$\ln(T_{ij}-X_{ij})$ for carpet industry...	-0.870	0.327	-2.665
$\ln(T_{ij}-X_{ij})$ for iron & steel industry.....	-0.420	0.223	-1.886
$\ln(T_{ij}-X_{ij})$ for playgoods, brushes & miscellaneous wood industry.....	-1.007	0.265	-3.802
H_j.....	-3.891	1.205	-3.229
R.....	0.835	0.245	3.414
PF.....	-0.558	0.275	-2.029
$PF.H_j$.....	4.156	2.466	1.686
K.....	-1.507	0.292	-5.154
EX.....	3.753	0.680	5.521
EXO.....	2.531	0.781	3.241

$R^2 = 0.124$ n = 970 F = 9.666

(3) ... five main importing countries. We found a significant (at the 5% two-tailed test) influence of the following variables in *both* regressions :
- 0.474 elasticity of the firm size in the iron and steel industry
(0.197)
- 2.931 for the coefficient of $PF.H_j$
(1.211)
- 1.940 for the coefficient of EX1, a dummy taking the value 1 only if the
(0.698)
exporter stated that his affiliate(s) abroad *reduce* his sales abroad. The figures reported here pertain to the share of the main importing country ; R^2 amounts to only 0.057.

homogeneous goods[1].

A comparison with the coefficients of H_j, PF and $PF.H_j$ is now in order : if we look at the first two, we see that concentration, if it goes from zero to one, exerts a significantly (at the 5% confidence level) stronger influence on the rate of export than differentiation. The coefficient of $PF.H_j$ is larger in absolute value than the coefficient of either H_j or PF : the *sum* of the latter is however higher than the coefficient of $PF.H_j$: the total of the three coefficients is indeed -0.292 which can be interpreted as follows : the unique Belgian firm supplying the Belgian market ($H_j = 1$) and producing a differentiated good has an export rate, $\frac{X}{T-X}$, that amounts ceteris paribus to only 0.746 (i.e. $e^{-0.292}$) of that of the firm submitted to perfect Belgian competition in the Belgian market and producing a good which is either undifferentiated or slightly differentiated.

We also ran a (less collinear) regression similar to (1) but for the omission of the variable $PF.H_j$ on the right-handside : the new coefficients differed but slightly from those of table 3 (e.g. $\hat{k}_1$, the coefficient of EX, moved from 3.753 (0.680) to 3.726 (0.680)) except, of course, those of H_j and PF : the former moved from -3.891 to -2.886 and the latter from -0.558 to -0.714.
(1.205) (1.048) (0.275) (0.259)
As can be seen the estimated impact of concentration declines and that of product differentiation rises. R^2 goes down from 0.126 to 0.123.

Insufficient information about foreign outlets as subjective felt by the firm appears to play an important negative role, vindicating the exporters' opinion (significantly at 0.01% level).

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(1) It has often been argued that the elements of market structure are not entirely independent of one another, this being especially true for concentration and product differentiation (see for instance A. JACQUEMIN and H. de JONG (1977)). We looked therefore at the possible relationships between our explanatory variables : the correlation matrix is given in the Appendix. The highest interdependence is the negative correlation between H_j and PF so that concentration appears to be more important in sectors producing semi-manufactured, i.e. more standardized, goods.

Finally the observed effects of having foreign subsidiaries are positive and significant at the 0.1% level. There is however, no significant difference between the two coefficients (although, as could be expected $\hat{\kappa}_1 > \hat{\kappa}_0$) so that the irrelevance of the exporters'subjective opinion on the impact of such subsidiaries is a hypothesis that is not rejected by our results. The correlation matrix (see the Appendix) shows a positive correlation between size and the existence of foreign affiliates suggesting that large firms are more likely to supply through foreign subsidiaries than by direct export.

Albeit all the regression coefficients of (1) are significant, at worst at a 5% one-tailed t-test, our variables explain but one eight (R^2 = 0.126) of the variance of the logarithms of the export rates[1]. There is little doubt that observed export ratios of firms for a given year contain errors and an important transitory component.

As far as the theory of comparative advantage is concerned, a careful examination of the regression residuals show relatively little systematic sector deviance in one way or another : the 14 calculated means of the residuals for the various sectors differ significantly from zero at the 5 percent level only in four cases[2].

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[1] Of course a R^2 of 0.126 obtained with 970 observations is significant even much below the 0.1% level.

[2] By decreasing order of magnitude of the absolute values of the coefficients, those are : rolling stock (-3.25 which corresponds to a t_{12} = -3.44) ; silk and artificial textiles (1.51 and t_{74} = 3.70) ; carpets (1.50 and t_{77} = 3.71) ; basic chemicals (1.05) and t_{50} = 2.43). The theory of comparative cost would thus give Belgium a considerable disadvantage for rolling-stock where Belgian governmental orders are dominant, and an important advantage for the three other sectors mentionned above, where there is an old tradition of Belgian know-how.

FINAL REMARKS

The purpose of this paper has been to empirically explore how export-competing performance is related to domestic and foreign market structure. Enlarged approaches could be considered in the future : function (1) could be viewed as one equation in a simultaneous equation model which takes into account exporters'preference functions, considers the role of trade and antitrust policies in the various sectors, etc. At this stage however, our attempt at testing a selection of recent propositions linking together elements of international and industrial economics on a vast sample of microdata appears successful. Firm size, industrial concentration, product differentiation, location, insufficient information and foreign subsidiaries are important elements in explaining the Belgian exporters' behavior. Comparative advantage, on the other hand, seems to matter much less than in textbooks.

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APPENDIX

CORRELATION MATRIX OF THE EXPLANATORY VARIABLES

	$\ln T.S_{06}$	$\ln T.S_{07}$	$\ln T.S_{08}$	$\ln T.S_{09}$	$\ln T.S_{11}$	$\ln T.S_{14}$	H	PF	H.PF	R	EX	EXO	K
$\ln T.S_{03}$	0.0009	0.0060	0.0065	0.0021	-0.060	-0.0040	-0.030	-0.050	-0.0060	-0.058	0.0386	0.096	-0.049
$\ln T.S_{06}$		-0.0020	-0.0022	-0.0007	-0.002	-0.0001	0.010	0.017	0.0034	0.029	0.045	0.0552	0.056
$\ln T.S_{07}$			-0.014	-0.0048	0.0134	0.0009	0.039	-0.1190	0.0286	-0.0869	0.0246	0.0713	-0.0430
$\ln T.S_{08}$				-0.0052	0.0145	0.0009	0.0767	-0.1287	-0.0114	-0.0104	0.0714	0.0470	0.0446
$\ln T.S_{09}$					-0.0047	0.0003	-0.011	-0.0423	0.0448	-0.0134	0.0914	-0.0032	-0.0002
$\ln T.S_{11}$						-0.0009	0.2428	-0.1131	0.0395	-0.0546	0.0663	0.0606	-0.0372
$\ln T.S_{14}$							-0.0058	0.0080	0.0048	-0.0254	0.0444	0.0175	-0.0041
H								-0.4264	-0.5641	-0.2138	0.0464	-0.0182	-0.0181
PF									0.1018	0.2146	-0.0216	-0.1110	0.369
H.PF										0.0591	0.0011	-0.0271	0.0259
R											-0.0279	-0.0559	0.0705
EX												-0.0359	-0.0015
EXO													-0.0487