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DO SMALL FIRMS' PRICE-COST MARGINS FOLLOW THOSE OF LARGE FIRMS?

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ABSTRACT

The paper investigates the extent to which small firms' price-cost margins follow those of large firms. A two-equation model is used with data for 36 Dutch three-digit manufacturing industries over the period 1975–86. The effects of market structure characteristics are also examined. The main result is that small firms (10–50 employees) appear to have the freedom to set prices above cost independently of larger firms in the same industry.

I. INTRODUCTION

Industrial economists have generally assumed that firms in a particular industry are engaged in a similar set of activities. Clearly, firms within an industry are not all alike. Systematic differences in firms' strategies may lead to different strategic groups forming within an industry, and hence different performance levels. Differences in firms' strategies often go along with differences in scales of activity. Hence, price-cost margins vary between large and small firms (Porter, 1979; Bradburd and Ross, 1989). On the other hand, it is often argued that small firms simply observe the price-setting behaviour of large firms and follow them as a general rule. In 1960, Fog found that: 'Frequently small firms take the prices of big firms for granted and set their prices accordingly' (p. 129). Also Roberts (1984) found some tentative support for price-taking behaviour of the small firms. Large firms have the opportunity (money, knowledge, and possibly a special department) to study their market, as well as future developments

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therein, and to calculate prices based on their costs. Small firms producing similar products or substitutes can ask prices similar to those set by their larger counterparts. These prices can be adjusted by developments in the specific small firms' market. Then, there is (barometric) price leadership by the large firms.

The purpose of this paper is to investigate to what extent small firms' price–cost margins follow those of their larger counterparts. We use a two-equation model and averaged panel data for 36 three-digit Dutch manufacturing industries over the 12-year period 1975–86. At the same time we are able to examine whether market structure characteristics have disparate effects on price–cost margins for small and large firms. As far as we know, this is the first report on the explicit modelling of the relationship between small and large firms' price–cost margins.

II. INDUSTRY'S PRICE–COST MARGINS

Our definition of the price–cost margin is identical to that used in a recent, extensive study of cyclical movements in US manufacturing price–cost margins by Domowitz *et al.* (1986). Price–cost margins are defined as the value of production minus input and labour costs divided by the value of production. The ability of an industry to raise price above costs is traditionally expected to increase with *seller concentration*. In the present study, seller concentration is measured by the share of employment accounted for by the largest four firms. At the other end of the firm-size distribution the *presence of small business* is measured. A high small business presence implies a high level of competition, which squeezes price–cost margins.

Capital intensity is considered as one of the sources of barriers to entry. Incumbents can set prices above competitive levels according to the height of the entry barriers. Entry barriers are expected to have a greater impact on small firms' price–cost margins than on those of large firms since most entrants are small firms. Furthermore, in a full-cost approach as considered in Strickland and Weiss (1976) and Kwoka (1979), capital intensity will control for capital costs which are not taken into account in our computation of the price–cost margins.

The availability of panel data allows us to focus on the *cyclical behaviour* of price–cost margins. In particular, the intertemporal stability of the relationship between seller concentration and price–cost margins has drawn attention: see, for example, the studies of Domowitz *et al.* (1986) for US manufacturing and Prince and Thurik (1992) for Dutch manufacturing. Price–cost margins are expected to be higher in business cycle upswings than in downturns. Procyclical demand impact on price–cost margins is to be expected on the basis of both a cost and a price effect.

Given procyclical productivity, upswings will lead to higher margins. Given capacity constraints, upswings will lead to higher prices. In the present study the stage of the business cycle is measured by the degree of capacity utilization.

International trade cannot be neglected in a small open economy like that of the Netherlands; see Pugel (1980) for a short overview of empirical studies on *import* effects. Foreign competition raises the degree of competition on the domestic market and is likely to squeeze performance. Yamawaki (1986) gives a survey of previous empirical studies on the *export* effects on price–cost margins, which have been performed for several countries. These empirical studies find diverse results on the influence of exports on price–cost margins.

Our dataset contains 36 three-digit Dutch manufacturing industries over the period 1975–86 with a division into small and large firms. We have a total of $36 \times 12 \times 2 = 864$ data points. Firms with fewer than 10 employees are not included: the advantage of the exclusion of these very small firms is that they cannot bias the results by their volatility (entry and exit). So 'small' here refers to firms employing 10–50 employees and 'large' to those with 50 or more employees. The average small firms' size is about 23 employees and that of large firms about 180 employees. The coverage ratio is substantial: 47 per cent of the total employment in firms employing 10 or more employees in the manufacturing sector is covered (1986). Our sample is biased in the sense that no three-digit representation is available of the following two-digit groups: textiles, wearing apparel, footwear and leather, wood products, and rubber and plastic products. For these industries separate data for small and large firms are not available for the entire period. Furthermore, notably difficult two-digit industries like the petroleum industry and the so-called miscellaneous manufacturing industries (not elsewhere classified) are not included.

Our model measures to what extent price–cost margins of small firms (PCM_{small}) move according to those of large firms (PCM_{large}). Furthermore, small firms' price–cost margins are allowed to vary with market structure characteristics (MS_{small}). Large firms' price–cost margins are explained by a vector of variables describing the market structure (MS_{large}). In short:

$$\begin{aligned} PCM_{\text{small}} &= \alpha PCM_{\text{large}} + (1-\alpha)\gamma MS_{\text{small}} + \varepsilon_{\text{small}} \\ PCM_{\text{large}} &= \beta MS_{\text{large}} + \varepsilon_{\text{large}} \end{aligned} \tag{1}$$

where ε is an error term. The coefficient α measures the degree to which small firms' price–cost margins follow those of large firms. If α approaches unity there is price–cost margins leadership of the large firms. If α approaches zero small firms' price–cost margins tend to be set independently of the large firms. The disparity in influences of market structure characteristics on small and large firms' price–cost margins is captured by the difference of the coefficients γ and β.

The set of market structure variables contains:

(a) The four-firm seller concentration ratio ($C4$), defined as the employment share accounted for by the largest four firms.
(b) The capital intensity (K), measured by the ratio of the value of the cumulative investments in the preceding 10 years (deflated) and the value of output (deflated).
(c) The capacity utilization (CU), which is computed by plotting time series of average value-added. The straight line through the peaks is assumed to correspond to a capacity utilization of 100 per cent. The capacity utilization is then defined as the ratio between the average value-added and the corresponding value of the straight line.
(d) The export share (EX), i.e. foreign sales divided by total sales.
(e) The competing imports divided by the total sales in the domestic market (CI).
(f) The small business presence (SBP), defined as the share of number of firms accounted for by firms employing 10–50 employees.

In both equations a vector of ones is included to allow the computation of an intercept. All variables are indexed i for industry and t for year. Different values for small and large firms are available for two explanatory variables: the degree of capacity utilization and the export share; that is why a discrimination is made between MS_{small} and MS_{large}. The remaining variables are identical for small and large firms.

III. RESULTS

The two-equation model (1) is estimated using nonlinear 3SLS with adjustment for first-order autocorrelation and heteroscedasticity: see Prince and Thurik (1993) for details of a similar adjustment procedure. The results are presented in Table 1.

The most striking result concerns the imitation coefficient α. Small firms' price–cost margins do not follow those of large firms at all. The coefficient α measuring the extent of imitation of large firms' price–cost margins by small firms does not differ significantly from zero (a 5 per cent level of significance is used). In other words, small firms' price–cost margins move independently of the height and development of large firms' price–cost margins.

Apart from this result we are able to examine whether the market structure variables have disparate effects on price–cost margins of large and small firms. *Seller concentration* affects the price–cost margins of both small and large firms, but the negative sign of the coefficient is not in accordance with our hypothesis. Small and large firms' price–cost margins

TABLE 1
Regression results (t-values in parentheses)

	Small firms $\hat{\alpha}, \hat{\gamma}$		*Large firms* $\hat{\beta}$	
PCM_{large}	−0.004	(−0.1)		
Intercept	0.085	(3.7)	0.110	(4.2)
Seller concentration	−0.051	(−2.0)	−0.074	(−2.1)
Small business presence	−0.039	(−1.8)	−0.048	(−1.9)
Capital intensity	0.100	(4.6)	−0.003	(−0.2)
Capacity utilization	0.103	(8.3)	0.119	(10.5)
Export share	0.016	(0.7)	0.030	(1.4)
Competing imports	0.003	(0.8)	0.001	(0.3)
Adjusted R^2	0.708		0.380	
Number of observations	432		432	

The regression results are corrected for first-order autocorrelation and heteroscedasticity.

are squeezed when a few giant firms play a dominant role within an industry. The negative sign is probably due to the dominant short-run effect of changing concentration reported earlier in both Thurik and van der Hoeven (1989) and Prince and Thurik (1992). The *share of small business* presses the level of price–cost margins of both large and small firms, but not significantly so. The entry barrier raised by the *capital intensity* of an industry influences price–cost margins of small firms only. The higher the capital intensity of an industry, the higher small firms' price–cost margins. That an entry barrier affects price–cost margins of small firms rather than those of large firms is obvious since most entrants will be small. As expected, price–cost margins are higher in *business cycle* upswings than in downturns for small as well as for large firms. *Exports* have a positive influence on price–cost margins, however not significantly so. Competition from abroad, as shown by the coefficient of the *competing imports*, leaves price–cost margins unaltered. Furthermore we notice that the individual market structure influences do not differ significantly between small and large firms except in one case: the coefficient of capital intensity is significantly higher for small firms than for large firms. However, a statistical test of the null hypothesis of equality of the coefficients of all market structure variables (i.e. $\gamma = \beta$ excluding the intercept) shows that the null hypothesis has to be rejected: the test-statistic T^0 described in Gallant and Jorgenson (1979, p. 279) equals 21.3 and the corresponding critical value is 12.6. This indicates that the separate explanation of small and large firms' price–cost margins by the corresponding market structure variables is worthwhile.

IV. EPILOGUE

The empirical results of a two-equation model in which we let the model decide to what extent small firms' price–cost margins follow those of large firms show that small firms' price–cost margins do *not* follow those of large firms. Apparently, small firms have the freedom and are able to set prices above (variable) cost independently of those set by their larger counterparts in the same industry. This result supports the strategic group theory raised in Porter (1979), and rejects a general follower-and-leader relationship as observed by Fog (1960). Of course, individual industries may deviate from this general pattern. In other words, support is found for small and large firms acting in different strategic groups.

Caves and Pugel (1980) and Bradburd and Ross (1989) argue that differences in activity mix may permit small firms to find niches characterized by specialist strategies achieving high product differentiation in which performance equals or exceeds that of large firms, which follow broad strategies achieving lower product differentiation. A close look at the level of Dutch manufacturing price–cost margins shows that in 255 of the 432 observations (59 per cent) small firms' price–cost margins are higher than those of large firms, supporting the existence of strategic groups. In 1984, Piore and Sabel argued that the shift from mass production towards craft production would favour flexible small firms producing a range of specialized products.

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