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PRICE-COST MARGINS IN DUTCH MANUFACTURING***

EFFECTS OF CONCENTRATION, BUSINESS CYCLE AND INTERNATIONAL TRADE

BY

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1 INTRODUCTION

This study is concerned with the explanation of differences in price-cost margins of manufacturing industries using a longitudinal data set consisting of averaged data from 66 Dutch industries from 1974 through 1986. Our major concern is investigating whether price-cost margins are more procyclical in concentrated than in unconcentrated industries.

The relation between the size of the mark-up of price over marginal cost and the degree of imperfect competition has received considerable attention in the industrial organisation literature. See Cubbin (1988) and Schmalensee (1989) for almost exhaustive surveys of the empirical literature. One of the main indicators of the degree of imperfect competition is seller concentration. The correct measurement of the influence of seller concentration on the size of the mark-up depends on the level of demand pressures (see section 2 for a discussion). This influence can be best measured using a panel data set covering a period including various stages of the business cycle. Recently, Domowitz, Hubbard and Petersen (DHP) presented some related studies focusing on the relationship between seller concentration and price-cost margins during the

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business cycle.[1] In the descriptive part of our analyses (section 3) we follow their main lines of reasoning and compare our results with theirs. In the analytical part (section 4) special attention is paid to three additional aspects which are important when investigating differences in industry price-cost margins. Firstly, effects of various measures of both local and aggregated business cycles are considered. Secondly, effects of international trade, such as competing imports and export share, are investigated. International trade plays a much greater role in small open economies like The Netherlands than, for instance, in the United States.[2] We assume that there are two influences of the level of international trade on price-cost margins: a direct one and an indirect one adjusting the influence of seller concentration. The domestic seller concentration measure becomes less meaningful when firms are operating on an international market. Therefore, we have to adjust the concentration figure. However, our seller concentration ratio cannot be adjusted for international trade (which is measured by sales) because the concentration ratio is measured in employment instead of sales. Hence, we apply a different correction method by considering cross-effects between seller concentration and international trade. Thirdly, we take into account the considerable differences between the buying market of producer goods and consumer goods.

An extensive empirical investigation of the relationship between price-cost margins and seller concentration in manufacturing industries and its development over time is new for The Netherlands. As far as we know, only two studies investigated parts of this relationship before. Pagoulatos and Sorensen (1976) performed cross-section analyses using data for the year 1965 for a limited number of industries. In that study, in which the industry sample consisted of 38 manufacturing industries uniformly defined for Belgium, Germany, France, Italy and The Netherlands, a negative, but not statistically significant, relationship was found between the four-firm concentration ratio and price-cost margins. De Wolf (1987) studied the relationship between industry concentration and several measures of profitability using data for 33 two-digit and 58 third-digit industries also for one year only, *i.e.* 1983. In De Wolf (1987) the regression results led to the conclusion that a positive relationship exists between the level of industry concentration and the degree of profitability.

In the following section we briefly review some important studies in-

1 See DHP (1985, 1986a, 1986b, 1987 and 1988). The study presented in 1985 was a preliminary investigation for the studies of 1986a and 1986b. In both 1986 studies the intertemporal (in)stability of the relationship between concentration and price-cost margins is studied. The study published in 1987 focused on the behaviour of prices and margins of oligopolies involved in repeated games. Two supergame models which generate different predictions about the cyclical behaviour of price-cost margins are examined. In the 1988 study a method for estimating industry mark-ups of price over marginal cost is presented, and its importance for explaining observed procyclical movements in total factor productivity is discussed.

2 For the U.S. the percentages of exports and imports of GDP (1986) are 7.4 and 10.6, respectively. For The Netherlands these percentages are 54.2 and 49.7, respectively.

vestigating the cyclical behaviour of margins. A description of the data set and some preliminary analyses are given in Section 3. In Section 4 the effects of the business cycle, international trade and buying market are introduced into the model, and regression results are presented. We also present regression results using an estimation method which partitions the slope coefficients into intertemporal (time-serial) and inter-industry (cross-sectional) coefficients. Concluding remarks can be found in Section 5.

2 PREVIOUS RESEARCH OF CONCENTRATION AND CYCLICAL BEHAVIOUR OF PRICE-COST MARGINS

In the structure-performance area of industrial organisation several empirical studies focused on the cyclical behaviour of price-cost margins in relation to the level of seller concentration. Procyclical price-cost margins in more concentrated industries are found in DHP (1986a), DHP (1986b), Qualls (1979) and Odagiri and Yamashita (1987). In DHP (1986a and 1986b) the impact of business cycle fluctuations on the relationship between seller concentration and price-cost margins is investigated using a panel data base consisting of 284 U.S. manufacturing industries over the period 1958–1981. A sample of U.S. manufacturing industries is also used in Qualls (1979). The trend-adjusted cyclical variability of price-cost margins for a sample of 79 manufacturing industries over the period 1958–1970 is investigated. Japanese data over the period 1958–1982, which is divided into six recession and six expansion periods, is used in Odagiri and Yamashita (1987). A positive influence of seller concentration on price-cost margins in business cycle upswings can only be found in Neumann, Böbel and Haid (1983). The impact of various market structure variables on the price-cost margin during the business cycle is investigated for 283 West German manufacturing industries during the period 1965–1977. This period of thirteen years includes three recessions and four business cycle upswings. However, in Wachtel and Adelsheim (1977), where data is used for over a 100 U.S. manufacturing industries during five postwar recession periods, price mark-ups tend to rise during recessions especially in the more concentrated industries. And Frantzen (1986), using second-digit quarterly data for Belgian[3] manufacturing industries over the period 1964–1978, found little evidence of important procyclical adjustments in the mark-up over cost.

Procyclical price-cost margins may be due to a delayed transmission of cost variations into prices. In Ginsburgh and Michel (1988) various references are made to explanations for both more and less rapid transmissions of cost variations into prices in more concentrated industries. A rationale for more rapid transmission is that: 'secret cutting of prices is easier to detect by others when there are few firms, and will thus be avoided; for the same reason, in concen-

3 Belgium, like The Netherlands, is a small open economy.

trated industries, firms will avoid lagging prices behind costs' (Ginsburgh and Michel (1988), p. 477). Three reasons are referred to for less rapid transmission '(1) an oligopolist expects his competitors to react differently to an increase and to a decrease of his price; while a decrease will be followed, an increase will not; this leads to a discontinuity in the marginal revenue curve and variations in the cost curve will not be passed onto prices; (2) concentrated industries are often associated with increasing returns to scale and hence large irreversible investments, which induce firms to peg their prices on long run objectives rather than follow short run cost; (3) in oligopolistic industries, prices do not react to costs continuously, but in discrete steps' (Ginsburgh and Michel (1988), p. 477).

The hypothesis that more concentrated industries have more inflexible prices is known as the administered price hypothesis, because concentrated industries are supposed to be able to 'administer' their prices largely independent of the stage of the business cycle. 'Administered' prices are defined as prices set by administrative action and held constant for a period of time. When demand is declining, prices in concentrated industries tend to fall less than in less concentrated industries or may even rise. In business cycle upswings prices in more concentrated industries rise less rapidly or may even fall. See Wachtel and Adelsheim (1977) and recent textbooks by Scherer (1980), Semmler (1984) and Waterson (1984) for arguments and references why prices remain rigid or rise in depressed periods. Wachtel and Adelsheim argue that 'firms in concentrated industries will increase their price markups during recessions to the extent they can, in order to recapture revenues lost from declining sales..... Theoretically, firms are constrained primarily by the extent to which increases in the price markup will result in a loss of sales due to the higher price of the product. If the firm faces a highly elastic demand for its product – that is, if an increase in price evokes a markedly negative response by consumers, resulting in a more than proportionate loss in sales – then its ability to increase its price markup is severely limited. Under the theory of economic competition it is assumed that all firms face just such an elastic demand curve for their products. But in a more concentrated economy, firms, induced by the normal motivation on the part of corporate executives to mitigate their constraints, can set their price markups in order to attain their target profits' (Wachtel and Adelsheim (1977), p. 7). Scherer states: 'Why prices might remain rigid or rise in a depression can be illuminated in part by elementary theory. Under pure competition, one would expect the price to fall..... Under pure monopoly, however, price stability or even an increase in price is compatible with the absence of cost increases under certain recession conditions. Specifically, if marginal costs are constant over a wide range of outputs and the elasticity of demand is unaltered by a leftward demand function shift, the short-run profit-maximizing price remains the same. If marginal costs are constant and the elasticity of demand falls owing to recession, or if marginal costs are higher at low outputs than at high outputs (*e.g.*, because of scale economies) and demand shifts leftward with no change

in elasticity, the profit-maximizing reaction is in fact a price increase' (Scherer (1980), pp. 350–351).

Martin (1988) provides arguments suggesting that at intermediate levels of concentration, prices will be more rigid in the face of changing market conditions than under very low or very high levels of market concentration: 'The argument that price flexibility will result from the fragility of oligopolistic coordination has no relevance when concentration is low; oligopolistic coordination is then absent. Nor does this argument have much relevance when concentration is high; this is near monopoly, and firms will probably know each other well enough so that kinks in firm demand curves smooth out. The conclusion is that price inflexibility will be most pronounced at intermediate concentration levels' (Martin (1988), p. 365) and 'oligopolists who have worked out a comfortable industry equilibrium will be reluctant to disturb that equilibrium by changing the price in response to minor shifts in demand and costs. The argument that prices are likely to be rigid in the presence of market power is reinforced if there are transaction costs associated with changing price. If it is costly to change price, the benefits of doing so will have to exceed a threshold level before price-making firms begin to move' (Martin (1988), p. 372).

Theoretically, there are pros and cons for more rigid prices in concentrated industries. However, most empirical studies found evidence for more procyclical price-cost margins in more concentrated industries. For the moment, our main hypothesis is that price-cost margins are more procyclical in concentrated than in unconcentrated industries.

3 DATA AND SOME PRELIMINARY ANALYSES

In this study we use a data set covering 66 Dutch industries over the period 1974–1986. The data set is based mainly on information as published in the *Production Statistics Manufacturing Industry*, the *Statistics on Fixed Capital Formation in Industry* and the *Monthly Bulletins of Price Statistics* published by The Netherlands Central Bureau of Statistics.[4] In these statistics only firms with 10 or more employees are included. We collected the data on SBI[5] third-digit level. In 1986 our coverage of the manufacturing sector with firms employing 10 or more employees is 81% in terms of value added and 87% in terms of employment.[6]

4 The authors thank Kees Bakker and Sjaak Vollebregt for collecting and elaborating the enormous amount of data. See Bakker and Prince (1990) for detailed information on sources, variables, industries and coverage ratios of our data set when compared to the entire Dutch manufacturing industry.

5 Systematic classification of enterprises developed by The Netherlands Central Bureau of Statistics. See the Appendix for a comparison between Dutch SBI codes and American SIC codes.

6 Our set is less disaggregated than that of DHP. However, we have a high coverage of the entire Dutch manufacturing sector. Notoriously difficult second-digit groups like the multinational petroleum industry (28) and other manufacturing industries (39) are left out. Unfortunately, data for the instrument engineering industry (38) first became available in 1980. So it had to be left out.

The measure used most frequently in empirical analyses of performance and competitiveness is the price-cost margin. To facilitate comparison we calculate the price-cost margin (PCM) according to the definition in DHP (1985, 1986a, 1986b, 1987). This definition allows for changes in inventories, Δinventories.[7]

$$PCM = \frac{value\ of\ sales + \Delta inventories\text{-}labour\ cost\text{-}cost\ of\ materials}{value\ of\ sales + \Delta inventories}$$

In this section we present some preliminary analyses using the data set. The three main items of this paper are the price-cost margin, the seller concentration and the business cycle. Therefore, we first focus on the relationship between price-cost margins and seller concentration levels over time. Secondly, we distinguish between producer and consumer goods industries. Thirdly, the price-cost margins in relation to the export share are considered.

Business cycle and concentration levels

To analyse our data set in relation to our main hypothesis mentioned in the foregoing section, we present the price-cost margins by level of concentration for each year separately. The concentration measure we use is the four-firm concentration ratio ($C4$), *i.e.* the share of total employment accounted for by the largest four firms in an industry. We define five intervals of equal length between 0.0 and 1.0. The industries are classified in each of these five intervals, according to the level of $C4$. See Table 1.

The price-cost margins for all 66 industries fall in 1975 but are relatively stable throughout a period of 5 years, 1976–1980. In 1981 the PCMs decline again but are now followed by an upward drift from 1983 up to 1986. What business cycle was apparent in the period 1974–1986? The business cycle measured by the aggregated capacity utilization reveals the following restless shape: an extreme downfall from 1974 to 1975 followed by a one-year recovery, a downfall till 1978, a recovery till 1980, a slow downturn up to 1983, a strong upswing between 1983 and 1985, and again a little downfall in the last year, which in 1986 leads to a higher level of aggregated capacity utilization than represented by the peaks in 1976 and 1980. Thus the period 1974–1986 includes both a few upswings and a few downturns. The question is to what extent the movement of PCMs follows the movement of the business cycle over time. We calculated the simple correlation coefficients between the PCMs of all industries and two different business cycle measures: aggregated capacity utilization and aggregated sales growth (see section 4.1 for the definition of these business cycle measures). The correlation coefficient between the PCMs and aggregated capacity utilization is .63. The correlation coefficient between the PCMs and aggregated sales growth is .50. We may say that there is indeed a

7 Ignoring changes in inventories can cause biases in price-cost margins. Depending on the stage of the business cycle, the value of sales may differ considerably from the value of output because of changes in inventories.

TABLE 1 - AVERAGE PRICE-COST MARGINS (UNWEIGHTED) BY FOUR-FIRM CONCENTRATION RATIO, 1974–1986 (ALL INDUSTRIES)[a]

	all (66)	$0.00 < C4 \leq 0.20$ (16)	$0.20 < C4 \leq 0.40$ (24)	$0.40 < C4 \leq 0.60$ (15)	$0.60 < C4 \leq 0.80$ (8)	$0.80 < C4 \leq 1.00$ (3)
1974	0.186	0.168	0.162	0.181	0.267	0.290
1975	0.166	0.158	0.151	0.163	0.190	0.283
1976	0.174	0.170	0.156	0.178	0.201	0.250
1977	0.170	0.172	0.148	0.178	0.192	0.228
1978	0.169	0.173	0.149	0.173	0.192	0.230
1979	0.169	0.171	0.151	0.173	0.190	0.227
1980	0.167	0.168	0.149	0.173	0.178	0.241
1981	0.160	0.161	0.142	0.183	0.156	0.190
1982	0.158	0.163	0.142	0.184	0.151	0.144
1983	0.166	0.171	0.149	0.190	0.173	0.132
1984	0.177	0.179	0.160	0.196	0.198	0.158
1985	0.179	0.186	0.163	0.200	0.196	0.121
1986	0.191	0.192	0.173	0.219	0.224	0.109
1974–1986	0.172	0.172	0.153	0.184	0.193	0.200

[a]The number of industries within each interval is in parentheses.

moderate correlation between the business cycle measures and the price-cost margins.

The industries classified in the interval $0.80 < C4 \leq 1.00$[8] deviate from the pattern of all industries. Their price-cost margins appear to decrease during the whole period (from .290 to .109) apart from two short recoveries in 1980 and 1984. In 1974 the difference between the PCMs of the most concentrated industries and the least concentrated industries is relatively large (.290–.168 = .122). Following this difference in time, we see that the gap between the PCMs declines considerably. In 1986 this difference is even negative (.109–.192 = –.083). For the greater part this decline can be ascribed to the strong decline of the PCMs in the most concentrated industries. If we compare our results with the results of DHP,[9] we notice that the decline of the difference between the PCMs of the most and the least concentrated industries in DHP (1986b) is limited to .072 (= .128–.056) over a period of 24 years and can be ascribed to increasing PCMs in the least concentrated industries.

Contrary to another finding in DHP (1986b), the level of the price-cost margins does not simply appear to increase with the level of concentration. This becomes apparent from the PCMs of the industries in the interval $0.20 < C4 \leq 0.40$ which are consistently less than the PCMs of those in the interval $0.00 < C4 \leq 0.20$, and from the bottom row in Table 1 which shows the average PCMs over the period 1974–1986.

We conclude that price-cost margins move over time, that there is mild correlation with the business cycle, that the gap between the highly concentrated high-PCM industries and the unconcentrated low-PCM industries disappears over time, and that the image of the relation between PCM and concentration given in Table 1 is certainly not monotonic.

Producer goods industries and consumer goods industries

Next, we classify the industries according to their primary output category. We divide the 66 industries into those which manufacture producer goods and those which manufacture consumer goods. We make this distinction because of the different buying market characteristics of the consumer goods and producer goods industries. The producer goods market has certain characteristics

8 The three most concentrated industries are (SBI code in parentheses):
- manufacture of fertilizers (29.1);
- manufacture of office machinery except data-processing equipment (35.8);
- manufacture and assembly of automobiles and car parts, and aircraft construction and repair industry (37.1,3,7).

9 If we compare the percentages of the number of industries in each of the five intervals with the distribution of the 284 U.S. industries in DHP (1986a, 1986b) there are no striking differences: 24.2 *versus* 22.5 in the interval $0.00 < C4 \leq 0.20$, 36.4 *versus* 32.4 in the interval $0.20 < C4 \leq 0.40$, 22.7 *versus* 25.4 in the interval $0.40 < C4 \leq 0.60$, 12.1 *versus* 14.4 in the interval $0.60 < C4 \leq 0.80$ and 4.6 *versus* 5.3 in the interval $0.80 < C4 \leq 1.00$.

that contrast sharply with the consumer goods market (see Kotler (1980), pp. 267–269), such as:
- purchasing by few buyers;
- purchasing by large buyers;
- professional purchasing;
- direct purchasing (not through middlemen).

Producer goods industries tend to 'know' their buyers. This can hardly be said of the consumer goods industries which may have innumerable buyers. In other words, in consumer goods industries the buyer concentration is generally low, whereas it is generally high in the producer goods industries.

The impact of buyer concentration on the relation between seller concentration and performance is examined in Brooks (1973), Lustgarten (1975), Collins and Preston (1969) and Scherer (1980). Empirical evidence is provided in all studies except in that of Scherer, where attention is paid to countervailing power exercised by strong buyers, whose importance was already stressed in Galbraith (1952). The countervailing power of strong buyers is supposed to restrain the pricing power of sellers. Lustgarten used several measures of buyer structure. He found that the higher the degree of buyer concentration in an industry, the lower the PCMs. A similar result was found by Brooks, who concluded his study with: 'since the effects of buyer concentration on seller profitability are directly opposite to those of seller concentration, the exclusion of buyer concentration in any study relating variations in market structure to variations in seller profitability could obscure the real effects of variations in seller concentration' (Brooks (1973), p. 59). Collins and Preston showed that there is a stronger relation between seller concentration and PCMs in consumer goods industries as compared to producer goods industries. This result suggests that the relationship between seller concentration and price-cost margins is strongly affected by the balance of buyer-seller relationships.

The output of final goods of an industry can be divided into five categories: exports, household consumption, corporate investments, materials and government. Ornstein (1975, p. 112) applied the following classification to data from the United States without considering exports.[10] An industry is classified as a consumer goods industry if $P1 \geq P2$, where $P1$ is the percentage of final output that goes to household consumption, and $P2$ is the percentage of final output that goes to investments plus materials. If $P1 < P2$ it is classified as a producer goods industry. Data are taken from the 'Input-Output Table for the Dutch Economy,' National Accounts published by The Netherlands Central Bureau of Statistics. Of the 66 industries 56.1% are classified as consumer goods industries.

Table 2 shows that for both consumer and producer goods industries the

10 The Netherlands is a much more open economy than the U.S. so we have to adjust for exports. We have subtracted exports from final output under the assumption of equal primary output orientation towards domestic and foreign markets.

PCMs fall in 1975. The PCMs of both the consumer goods industries and the producer goods industries do not recover until 1984, in which year the PCMs start with a period of strong increase. Computation of the simple correlation coefficients between the price-cost margins of both types of industries and two business cycle measures,[11] aggregated capacity utilization and aggregated sales growth, suggests that the aggregated capacity utilization explains more of the variation in price-cost margins for producer goods industries than for consumer goods industries.

The pattern of the difference between the PCMs of the most and least concentrated groups differs considerably between producer goods industries and consumer goods industries. For the latter the difference declines from .062 in 1974 to .010 in 1986, but for the producer goods industries it disappears and decreases until it becomes negative in 1982 (.144–.174 = –.030). During the period 1982–1986 the most concentrated producer goods industries perform worse than the least concentrated ones. We may conclude that the decline of the gap for all industries can be attributed for the most part to the producer goods industries.

With regard to the relation between the concentration ratio level and the PCM level, we notice that in industries that primarily produce consumer goods as well as in industries that primarily manufacture producer goods the level of the PCMs does not increase monotonously with the $C4$-level.

Exports

The average share of output exported during the period 1974–1986 is 0.37[12] for our data set. Calculation of these shares for producer and consumer goods industries separately delivers export shares of .48 and .29, respectively. In other words, producer goods industries tend to export a larger part of their output than consumer goods industries.

The relationship between the share of output exported by an industry and its price-cost margins is unclear. In Table 3 the average price-cost margins by level of export share are presented. In 1974 there seems to be a positive relationship between export shares and price-cost margins, but the 1986 values rather point at a negative relationship.

Conclusions

From this section it became clear that

- price-cost margins vary over time;
- there is a moderate correlation between price-cost margins and business cycle measures on an aggregated level;

11 The correlations between the aggregated capacity utilization and the PCMs of producer and consumer goods industries are .77 and .45, respectively. The correlations between the aggregated sales growth and the PCMs of both types of industries are almost equal: .47 for producer goods industries and .45 for consumer goods industries.

12 This share has grown steadily from 0.36 in 1974 to 0.40 in 1986.

TABLE 2 - AVERAGE PRICE-COST MARGINS (UNWEIGHTED) BY FOUR-FIRM CONCENTRATION RATIO, 1974–1986 (PRODUCER AND CONSUMER GOODS INDUSTRIES)[a]

		Producer goods industries				
	all (29)	$0.00 < C4 \leq 0.20$ (6)	$0.20 < C4 \leq 0.40$ (8)	$0.40 < C4 \leq 0.60$ (7)	$0.60 < C4 \leq 0.80$ (5)	$0.80 < C4 \leq 1.00$ (3)
1974	0.202	0.182	0.157	0.167	0.295	0.290
1975	0.170	0.163	0.146	0.142	0.190	0.283
1976	0.177	0.171	0.157	0.156	0.204	0.250
1977	0.170	0.167	0.154	0.155	0.186	0.228
1978	0.169	0.171	0.141	0.150	0.202	0.230
1979	0.170	0.175	0.143	0.156	0.194	0.227
1980	0.170	0.177	0.145	0.162	0.170	0.241
1981	0.161	0.174	0.144	0.175	0.135	0.190
1982	0.157	0.174	0.151	0.170	0.134	0.144
1983	0.168	0.198	0.161	0.178	0.171	0.132
1984	0.187	0.198	0.172	0.197	0.199	0.158
1985	0.187	0.208	0.175	0.205	0.195	0.121
1986	0.195	0.205	0.176	0.211	0.241	0.109
1974–1986	0.176	0.182	0.156	0.171	0.194	0.200

TABLE 2 - CONTINUED

	Consumer goods industries				
	all (37)	$0.00 < C4 \leq 0.20$ (10)	$0.20 < C4 \leq 0.40$ (16)	$0.40 < C4 \leq 0.60$ (8)	$0.60 < C4 \leq 0.80$ (3)
1974	0.175	0.159	0.164	0.194	0.221
1975	0.165	0.155	0.153	0.181	0.190
1976	0.173	0.169	0.156	0.198	0.198
1977	0.169	0.176	0.146	0.197	0.202
1978	0.170	0.175	0.152	0.194	0.174
1979	0.169	0.169	0.155	0.187	0.184
1980	0.165	0.163	0.151	0.183	0.192
1981	0.160	0.153	0.141	0.190	0.191
1982	0.158	0.156	0.137	0.196	0.180
1983	0.164	0.164	0.144	0.200	0.176
1984	0.170	0.168	0.153	0.194	0.198
1985	0.172	0.173	0.156	0.195	0.197
1986	0.188	0.185	0.171	0.227	0.195
1974–1986	0.169	0.167	0.152	0.195	0.192

[a]The number of industries within each interval is in parentheses.

TABLE 3 - AVERAGE PRICE-COST MARGINS (UNWEIGHTED) BY EXPORT SHARE (EX)[a], 1974–1986

	all (66)	$0.00 < EX \leq 0.25$ (22)	$0.25 < EX \leq 0.50$ (27)	$0.50 < EX \leq 0.75$ (12)	$0.75 < EX \leq 1.00$ (5)
1974	0.202	0.175	0.170	0.206	0.276
1975	0.181	0.162	0.155	0.184	0.200
1976	0.190	0.181	0.162	0.168	0.225
1977	0.185	0.179	0.156	0.165	0.214
1978	0.185	0.185	0.153	0.160	0.208
1979	0.184	0.183	0.153	0.165	0.205
1980	0.181	0.180	0.152	0.167	0.191
1981	0.173	0.168	0.152	0.171	0.137
1982	0.171	0.168	0.153	0.159	0.132
1983	0.180	0.178	0.159	0.166	0.150
1984	0.191	0.180	0.174	0.185	0.162
1985	0.193	0.186	0.180	0.183	0.132
1986	0.206	0.225	0.188	0.184	0.185
1974–1986	0.186	0.181	0.162	0.174	0.186

[a]The number of industries within each interval is in parentheses.

- the gap between the price-cost margins of the most and the least concentrated industries disappears over time;
- there is a positive, but not always monotonic relation between the degree of seller concentration and price-cost margins;
- there are significant differences in the development of price-cost margins between producer and consumer goods industries;
- the relationship between exports and price-cost margins is unclear.

Furthermore, price-cost margins appear to vary considerably across our 66 industries. In 1986, the price-cost margins vary from .056 to .404. The corresponding standard deviation is .068.

4 EMPIRICAL RESULTS

In this section we consider a model to explain differences in price-cost margins of Dutch manufacturing industries. As can be concluded from the preliminary findings in Section 3 we have to include at least the following. Firstly, we have to correct for business cycle effects. Secondly, effects of international trade should be taken into account, because in a small open economy like The Netherlands both exports and competing imports are likely to influence the degree of market imperfection. Thirdly, differences between the buyer concentration of the industries seem to be of importance. In Section 4.1 we shall consider the variables and hypothesize their influence on price-cost margins. The estimation results are also presented in Section 4.1. Finally, the results from an estimation method discriminating between intertemporal and inter-industry effects are presented in Section 4.2.

4.1 *Variables, Hypotheses and Regression Results*

In the industrial organisation literature it is well-established that the market power to raise price above cost increases with increasing seller concentration. Seller concentration is measured by the four-firm concentration ratio, $C4$.

To take differences in capital intensity between the industries into account we include a capital intensity indicator, K, which depends on the investments of the preceding ten years. There are two reasons to include a capital intensity indicator. Firstly, capital used in an industry can be seen as a barrier to entry. The higher the capital intensity of an industry the more difficult it is to start a new firm. The ability to exercise market power will be higher in the absence of potential competition. Secondly, inclusion of K allows for a full-cost approach, *i.e.* the size of mark-ups over prices are not set over average labour and material costs but over average total costs including average capital costs. In this case, price-cost margins, interpreted as unit price minus unit material costs minus unit labour costs, are again expected to be higher if unit capital costs are higher.

Business cycle

To be able to investigate the influence of the business cycle we have to answer two questions. Which variable must be used and on what level of aggregation? In the DHP-studies the three measures used are capacity utilization (see DHP, 1987), the economy-wide unemployment rate (see DHP, 1985, 1986a and 1986b) and the growth in industry output (see DHP, 1986a). In The Netherlands, like in most EC countries, it is difficult to measure the stage of the business cycle by the national unemployment rate, because a considerable part of unemployment has become structural. This leaves us with two measures:

1. the capacity utilization: CU[13];
2. the relative change in sales[14] (deflated): $(\Delta S/S)_{it} := (S_{it} - S_{it-1})/S_{it-1}$

We can associate capacity utilization with the stage of the business cycle on the supply side (changes in production factors, methods, schedules, *etc.*) and the relative change in sales with demand fluctuations. Although capacity utilization is partially a derivative of the relative change in sales the simple correlation coefficient between the two measures is low.[15] Clearly, the degree of capacity utilization is also determined by business decisions on production factors, methods and schedules. So the inclusion of both business cycle measures will hardly blur our estimation results.

In addition, we distinguish between 'local' and 'aggregated' levels of the business cycle measures. The 'local' level is concerned with the stage of the business cycle of an industry, *i.e.* on third-digit level, whereas the 'aggregated' level deals with the entire group of 66 industries.[16]

International trade

International trade effects can be divided into effects of competing imports, CI, and exports, EX. The effects of competing imports are straightforward.

13 A Wharton index is computed by plotting average value of production minus cost of materials (*i.e.* average value added). The straight lines through the peaks are assumed to correspond to a capacity utilization of 100%. The ratio between the average value added and the corresponding value of the straight line is defined as the capacity utilization. See also Thurik and Van der Hoeven (1989).

14 We prefer using sales rather than output (defined as value of sales plus change in inventories) because sales do reflect the stage of the business cycle better. Output may be higher than sales in recession periods (growing inventories) and output may be lower than sales if products are sold from stock (recovery period).

15 For example in 1979 the correlation coefficient takes the value .11.

16 The correlations between the local and the aggregated capacity utilization measures vary from -0.57 to 0.87. The average correlation over the 66 industries is 0.45. The correlations between the local and the aggregated relative change in sales measures vary from -0.46 to 0.90. The average correlation over the 66 industries is 0.42.

The higher the level of competing imports in an industry the higher the degree of competition in that industry. The ability to exercise market power will be less in the presence of competition from foreign firms. So, we expect that competing imports have a negative influence on price-cost margins.

The relationship between price-cost margins and exports is not straightforward. There are explanations and empirical evidence for a negative as well as a positive relationship. Two explanations for a negative relationship are (see Neumann, Böbel and Haid (1983) and Pugel (1980)): (1) necessity of survival may force domestic firms to engage systematically in export activities. The actual margins may be lower than those envisaged initially; (2) foreign markets may be used to dump domestic products. This situation is likely if foreign demand is more elastic than domestic demand. In this case, the higher domestic margin is averaged with a lower foreign margin (due to the lower foreign price). Two explanations for a positive relationship are (see Khalilzadeh-Shirazi (1974) and Pagoulatos and Sorensen (1976)): (1) exporting is a risky undertaking which must be rewarded by a risk premium if the firm is to engage in it. Why else incur the uncertainties associated with operating in foreign markets?; (2) if foreign demand is less elastic than domestic demand, the price in foreign markets may be higher than in domestic markets which leads to higher price-cost margins. So, we have no *a priori* hypothesis on the influence of export share on price-cost margins.

If international trade increases, traditional domestic measures tend to become less meaningful in describing market power. If there are competing imports, the competition on the domestic market may be higher than indicated by the four-firm concentration ratio. The ability to exercise market power will be less in the presence of competition by foreign firms. And the *domestic* four-firm concentration ratio tells little about the seller concentration on the *foreign* market. If the share of exports is high the actual seller concentration on the entire market including foreign countries may be lower than the four-firm concentration ratio indicates. Also, the influence of the configuration of the domestic market will decrease if the competitors on this market are involved in exporting their merchandise. To take these interactions between seller concentration and international trade into account, we include the cross-terms $C4EX$ and $C4CI$.

Buyer concentration

Instead of dividing the sample into consumer goods and producer goods industries, we introduce the variable PC for more accurate measurement of the buying market characteristics. PC is the share of household consumption, *i.e.* the ratio of consumption expenditures of households and final output minus exports. The variable PC is inversely related to the buyer concentration. A high share of household consumption (consumer goods industries) implies that there are many buyers in the market, all of whom purchase a relatively small part of final output. A low share of household consumption (producer goods

industries) points at a market with a few large buyers. Referring to the findings of Brooks (1973), Lustgarten (1975) and Collins and Preston (1969), we expect the effect of the explanatory variables seller concentration and export share to depend on the degree of buyer concentration. Countervailing power of buyers may diminish the market power of sellers. Concentration on the seller side is expected to be a meaningful indicator of market power only if there is a low concentration on the buyer side. One might expect that a low buyer concentration on the domestic market also holds for the foreign market. Consumer goods industries may suffer from a lack of direct knowledge of the foreign buyers, which results in a negative impact on price-cost margins. Alternatively, it may be that the Dutch domestic market is too small for most consumer products, so that exports are required to survive: exports are needed to sustain volume, but do not contribute proportionally to price-cost margins. Thus we expect that exports are more profitable for producer goods industries, *i.e.* industries in which buyers are highly concentrated. Therefore, we include the two cross-terms $C4PC$ and $EXPC$, which are expected to have a positive and a negative sign, respectively.

Testing the main hypothesis

To test whether price-cost margins are more procyclical in concentrated than in unconcentrated industries we consider the interaction between the seller concentration ratio and the business cycle. Our hypothesis will be supported if this interaction has a positive effect on price-cost margins. We add the cross-terms $C4CU_{it}$, $C4CU_t$, $C4(\Delta S/S)_{it}$ and $C4(\Delta S/S)_t$.

Regression results

The pooled regression results corrected for heteroscedasticity and autocorrelated errors read[17] (t-values are in parentheses):

17 Tests show that there is first-order autocorrelation and heteroscedasticity over the industries. To correct for this we transformed the original data. For all variables X_{it} (dependent and independent) the following transformation is applied:

$$X_{it}^T = \sqrt{(1-\hat{\varrho}^2)}\,X_{it}/\hat{\sigma}_i, \quad t=1$$
$$= (X_{it}-\hat{\varrho}X_{it-1})/\hat{\sigma}_i, \quad t>1$$

with $\hat{\varrho}$ and $\hat{\sigma}_i$, $i=1,\ldots,n$ obtained from the estimation of (a) and (b) respectively:
(a) $\hat{\varepsilon}_{it}=\varrho\hat{\varepsilon}_{it-1}+\varphi_{it}$, where $\hat{\varepsilon}_{it}$ are the estimated residuals of equation (1) before transformation;
(b) $\hat{\eta}_{it}^2=\sigma_i^2 D_{it}+\nu_{it}$, where $\hat{\eta}_{it}=\sqrt{(1-\hat{\varrho}^2)}\hat{\varepsilon}_{it}, \quad t=1$

$$= \hat{\varepsilon}_{it}-\hat{\varrho}\hat{\varepsilon}_{it-1}, \quad t>1$$

$D_{it}=1$ for industry i

$=0$ otherwise.

$$
\begin{aligned}
PCM_{it} = {} & .084 + .093C4_{it} + .018K_{it} + .045CU_{it} + .046CU_t \\
& (2.3) \quad (.8) \qquad (2.3) \qquad (2.6) \qquad (1.1) \\
& + .049(\Delta S/S)_{it} + .042(\Delta S/S)_t + .070EX_{it} - .010CI_{it} \\
& \quad (3.4) \qquad\quad (1.4) \qquad\quad (2.3) \qquad (-1.9) \\
& + .047C4EX_{it} - .009C4CI_{it} + .103C4PC_{it} - .118EXPC_{it} \\
& \quad (.8) \qquad (-.6) \qquad (2.8) \qquad (-3.6) \\
& .132C4CU_{it} - .297C4CU_t - .022C4(\Delta S/S)_{it} \\
& (3.2) \qquad (-2.2) \qquad (-.7) \\
& - .061C4(\Delta S/S)_t \qquad (1) \\
& (-.6)
\end{aligned}
$$

$\bar{R}^2 = .652$

where

PCM	:	price-cost margin
$C4$	:	four-firm concentration ratio
K	:	capital intensity indicator
CU	:	capacity utilization
$\Delta S/S$	:	relative change in sales
EX	:	foreign sales divided by total sales
CI	:	competing imports divided by domestic sales
PC	:	the share of household consumption
i	:	index of industry
t	:	year of observation

With K defined as: $K_{it} = (1/Q_{it}) \sum_{j=t-10}^{t-1} I_{ij}$

where

I	:	fixed capital formation (deflated)
Q	:	value of sales + Δ inventories (deflated)

Below we shall discuss the influences on price-cost margins of all explanatory variables appearing in equation (1).

To investigate the influence of seller concentration, $C4$, we have two difficulties. Firstly, the coefficient of $C4$ itself is statistically not significant. Secondly, the variable $C4$ is involved in a series of cross-terms. To isolate the effect of seller concentration we compute $\partial PCM/\partial C4$ and ignore all influences

See for example Kennedy (1979, pp. 98–102) and Den Hertog, Kloek and Thurik (1991) for some insights in how to deal with problems like heteroscedasticity and autocorrelation in similar situations. The regression results presented are tested on stability of the parameters over time by means of a Chow-test and on normality of the residuals by means of a test proposed by Bowman and Shenton (1975): both stability and normality are not rejected.

which are not statistically significant. Then we find that $\partial PCM/\partial C4 = .103PC + .132CU_{it} - .297CU_t$, which implies that (1) the influence of seller concentration increases when buyer concentration (which is inversely related to PC) decreases. In other words, price-cost margins are subject to the interplay of market concentration on both the selling and the buying side; (2) the influence of seller concentration depends on the combination of local and aggregated capacity utilization. Whether this combined effect on price-cost margins is positive or negative depends on the relative degree of capacity utilization of an industry, CU_{it} *versus* CU_t. Turning now to the question of more procyclical price-cost margins in more concentrated industries we notice two things. Firstly, the coefficients of $C4(\Delta S/S)_{it}$ and $C4(\Delta S/S)_t$ are negative but statistically insignificant, which means that the hypothesis of more procyclical price-cost margins in more concentrated industries must be rejected. Secondly, the coefficients of the cross-terms $C4CU_{it}$ and $C4CU_t$ are statistically significant but have opposite signs. The positive coefficient of the cross-term between seller concentration and the industry-specific capacity utilization supports our hypothesis. The negative coefficient of the cross-term with aggregated capacity utilization does not support our hypothesis but rather points at more procyclical price-cost margins in less concentrated industries. Thus, whether the hypothesis is supported depends on the business cycle measure used. The overall conclusion is that the test of the hypothesis that price-cost margins are more procyclical in more concentrated industries is inconclusive. Also, no support is then found for the so-called administered price hypothesis.

The findings of DHP (1986a) that price-cost margins are more procyclical in concentrated industries are based on the following two business cycle measures: the economy-wide unemployment rate and the growth in industry output. However, when DHP include effects of competing imports the insignificance of the cross-term between $C4$ and the growth in industry output indicates that there are no procyclical price-cost margins. Again, the answer to the question whether there are procyclical price-cost margins in concentrated industries is dependent on the business cycle measure used.

When drawing conclusions from the cross-terms between seller concentration and capacity utilization we should remember that the degree of capacity utilization not only depends on the stage of the business cycle but can also be determined by management goals. For example, reduction of the number of employees or working hours may increase the capacity utilization, independent of the stage of the business cycle. Cubbin (1988, p. 21) points out that a low degree of capacity utilization can be the result of the deliberate creation of entry barriers by incumbents by holding excess capacity.

As expected more capital-intensive industries have higher price-cost margins. This can be concluded from the coefficient of K which is in excess of zero.

We notice that the aggregated business cycle variables, CU_t and $(\Delta S/S)_t$, have no explanatory power but both local variables CU_{it} and $(\Delta S/S)_{it}$, which reflect the industry-specific business cycle developments, have a positive effect

on price-cost margins.[18] A higher degree of the industry-specific capacity utilization leads to a higher PCM. Sales growth of an industry also leads to higher price-cost margins. For example, an increase of 10 percentage points in the local supply-side business cycle measure as well as a 10 percentage points increase in the local demand-side business cycle measure leads to a price-cost margin growth of about 0.5 percentage points. In DHP (1986a), aggregate demand effects are found to be more important than local demand effects. In their study the aggregate demand effects were measured by the economy-wide unemployment rate and the local demand effects by the percentage change in industry output. As yet, we have no explanation for this disparity between our empirical results.[19]

The influence of exports, EX, on price-cost margins depends on the level of seller as well as buyer concentration: $\partial PCM/\partial EX = .070 + .047C4 - .118PC$. For an industry with average buyer and seller concentration among the 66 industries ($C4 = .392$ and $PC = .546$) exporting leads to slightly higher price-cost margins ($\partial PCM/\partial EX = .024$). For industries in which the buyers are perfectly concentrated ($PC = 0$), the effect of exports on price-cost margins is higher ($\partial PCM/\partial EX \geq .070$). However, for industries in which there is no concentration on the buyer side ($PC = 1$), the effect of exports on price-cost margins is always negative. The lack of direct knowledge of foreign buyers seems to have a negative impact on price-cost margins. Thus whether exporting is profitable or not strongly depends upon the extent of concentration among the buyers.

The level of competing imports, CI, has the expected negative influence on price-cost margins, indicating that foreign competition on the domestic market reduces the price-cost margins, but this effect does not appear to be statistically significant.

As expected the coefficient of the interaction term of $C4$ and competing imports, $C4CI$, is negative, diminishing the effect of domestic concentration on price-cost margins, but the multiplicative term $C4EX$ has an unexpected positive sign which means that exports strengthen the effect of domestic seller concentration on price-cost margins. However, the coefficients of both international trade cross-terms with $C4$ are not statistically significant.

Altogether, price-cost margins of Dutch manufacturing industries appear to depend on the interplay of seller and buyer concentration, capital intensity, the degree of industry's capacity utilization, the growth of industry's sales and the level of exports.

4.2 *Discrimination between Time-serial and Cross-sectional Effects*

In this section the 'within-between' estimation method is applied to divide the

18 In section 3 we already showed that the correlation between the PCMs and both aggregated business cycle measures is not very high.

19 Obvious but imprecise arguments are that the aggregation level and period considered do not coincide.

slope coefficients of a pooled cross-sectional and time-series model into intertemporal (time-serial) and inter-industry (cross-sectional) coefficients. We now consider the following condensed specification, which includes all explanatory variables of equation (1) with the exception of the aggregated business cycle measures and the interactive terms of $C4$ on the one hand and international trade and the business cycle on the other.

$$\begin{aligned} PCM_{it} = {} & \beta_0 + \alpha_1 C4_t^* + \beta_1 C4_{i.} + \alpha_2 K_t^* + \beta_2 K_{i.} + \alpha_3 CU_t^* + \beta_3 CU_{i.} \\ & + \alpha_4 (\Delta S/S)_t^* + \beta_4 (\Delta S/S)_{i.} + \alpha_5 EX_t^* + \beta_5 EX_{i.} + \alpha_6 CI_t^* \\ & + \beta_6 CI_{i.} + \alpha_7 C4PC_t^* + \beta_7 C4PC_{i.} + \alpha_8 EXPC_t^* + \beta_8 EXPC_{i.} + \varepsilon_{it} \end{aligned} \tag{2}$$

where

$$X_{i.} = \frac{1}{12} \sum_{t=1975}^{1986} X_{it} \text{ and } X_t^* = X_{it} - X_{i.} \text{ for all } t = 1975, \ldots, 1986$$

Estimation of equation (2) yields the intertemporal ('within-group') coefficients, $\hat{\alpha}_j$, $j = 1, \ldots, 8$, and the inter-industry ('between-group') coefficients, $\hat{\beta}_j$, $j = 0, \ldots, 8$. The results of this estimation method are given in Table 4. The corresponding adjusted R-squared is .669. The pooled coefficients of equation (2), $\hat{\eta}_j$, $j = 0, \ldots, 8$, are included to facilitate comparison (adjusted R-squared: .640). These pooled coefficients are obtained by estimation with the restrictions $\alpha_j = \beta_j$, $j = 1, \ldots, 8$. The F-test of testing the pooled model (null-hypothesis) against the within-between model rejects the pooled model.[20]

From the last two columns in Table 4, where $\hat{\alpha}$ and $\hat{\beta}$ are displayed, we see that:

- seller concentration, $C4$, appears to have only an intertemporal effect on price-cost margins. The negative sign of the coefficient α_1 indicates that disturbance in the balance of market power resulting in concentration growth leads to lower price-cost margins. This may reflect the short-term effects of the struggle for market power. Deconcentration appears to lead to short-term price-cost margin increases. This may be due to the new balance in the interrelationships between sellers and buyers;
- the intertemporal effect of the capital intensity indicator, K, is negative, whereas the cross-sectional effect is positive. This finding is not as disturbing as it may seem at first sight. The inter-industry coefficient, β_2, suggests that a capital-intensive industry has higher price-cost margins than one with a low capital intensity. In addition to this cross-sectional effect there is yet another effect: an increase in the capital used in an industry, as a result of more in-

20 The F-statistic equals 10.7 and the corresponding critical value is 2.5.

TABLE 4 - ESTIMATED COEFFICIENTS OF EQUATION (2)[a]

	pooled $\hat{\eta}$	intertemporal $\hat{\alpha}$	inter-industry $\hat{\beta}$
intercept	0.069 (6.1)	–	−0.325 (−4.9)
C4	−0.047 (−2.0)	−0.163 (−3.9)	−0.035 (−1.0)
K	0.020 (2.6)	−0.038 (−4.4)	0.082 (9.0)
CU	0.112 (12.6)	0.069 (9.1)	0.495 (7.1)
$\Delta S/S$	0.049 (6.7)	0.031 (4.6)	0.361 (3.5)
EX	0.090 (4.1)	0.059 (1.9)	0.114 (3.5)
CI	−0.015 (−5.8)	0.005 (1.6)	−0.016 (−4.7)
C4PC	0.115 (3.3)	0.090 (2.1)	0.194 (3.7)
EXPC	−0.136 (−4.1)	−0.081 (−2.0)	−0.225 (−4.8)

[a] Tests show that there is first-order autocorrelation and heteroscedasticity over the industries. To correct for this we transformed the original data. The results are tested on stability of the parameters over time by means of a Chow-test and on normality of the residuals by means of a test proposed by Bowman and Shenton (1975): both null-hypotheses are not rejected.

vestments, will lead to a short-term decrease of price-cost margins. One can expect that in the short run the productivity of investments will be low because of start-up problems. These investment costs will not be passed on to customers directly;
- both business cycle measures, *CU* and $\Delta S/S$, have an intertemporal as well as a cross-sectional influence on price-cost margins;
- exports, *EX*, and competing imports, *CI*, appear to have an inter-industry effect only. The extent to which an industry exports its output and faces foreign competition explains differences in price-cost margins across industries. If an industry raises its export share price-cost margins will not change;
- both cross-terms with the share of household consumption, *C4PC* and *EXPC*, influence price-cost margins in an intertemporal as well as in a cross-sectional sense.

5 CONCLUSIONS

In this empirical study we focus on the cyclical behaviour of price-cost margins and its relationship to industrial concentration in 66 Dutch manufacturing industries from 1974 through 1986. With this study we want to contribute to the debate whether the stage of the business cycle affects the influence of seller concentration on price-cost margins. An important contribution has been made by Domowitz, Hubbard and Petersen (DHP) in a series of recent publications on U.S. manufacturing. Their major finding is that price-cost margins are more procyclical in more concentrated industries. Our major findings are:

- like DHP (1986a and 1986b) we see that the gap between price-cost margins

of concentrated and unconcentrated industries narrows in the period observed;
- in explaining movements in price-cost margins industry-specific business cycle fluctuations are more important than aggregated business cycle fluctuations. Both industry-specific capacity utilization and sales change contribute in explaining these movements;
- the relationship between seller concentration and price-cost margins is strongly affected by the balance of buyer-seller relationships. Collusive behaviour on the part of the buyers is supposed to diminish the influence of seller concentration on price-cost margins;
- whether the effect of exports on price-cost margins is positive or negative depends upon the extent of buyer concentration. Competing imports influence price-cost margins negatively. Next to these direct effects of international trade there are indirect ones correcting the influence of domestic market power. Foreign competition seems to weaken and exports do strengthen the market power on the domestic market. However, these indirect effects were found to be of no statistical significance;
- whether support is found for more procyclical price-cost margins in more concentrated industries as stated in DHP (1986a and 1986b) depends on the business cycle measure used. The test is inconclusive. Based on both aggregated and industry-specific sales growth, our empirical results show that there is no significant difference in reaction to business cycle changes between concentrated and unconcentrated industries. Based on both aggregated and industry-specific capacity utilization this difference in reaction appears to be significant. However, the signs are opposite;
- the separate intertemporal and inter-industry estimates show that an increase in the seller concentration ratio results in a decrease of price-cost margins, which is probably due to a temporary struggle for market power.

We are aware that our results may depend upon the absence of a product differentiation measure (*e.g.*, advertising to sales ratio) or other entry barrier measures (*e.g.*, R&D expenses). Moreover, the measurement of capital used in an industry can be improved upon.

Future research will be concerned with the influence of market volatility measures which are used as an indicator for the height of entry barriers (see Carree and Thurik (1990)). In future work we shall also investigate the influences of small business presence and large firm dominance, next to those of traditional market structure measures, on price-cost margins.

APPENDIX

DESCRIPTIONS OF SECOND-DIGIT DUTCH SBI AND AMERICAN SIC MANUFACTURING CODES

SBI (Standaard Bedrijfs Indeling 1974)	*SIC* (Standard Industrial Classification)
20 manufacture of food	20 food and kindred products (incl. beverages)
21 beverages and tobacco products	21 tobacco manufacturers
22 manufacture of textiles	22 textile mill products
23 manufacture of wearing apparel (except footwear)	23 apparel and other finished products made from fabrics and other similar materials
24 manufacture of leather, footwear and other leather products (except clothing)	24 lumber and wood products, except furniture
25 manufacture of wood products, including furniture	25 furniture and fixtures
26 manufacture of paper and paper products	26 paper and allied products
27 printing, publishing and allied industries	27 printing, publishing and allied industries
28 petroleum industry	28 chemicals and allied products
29 chemical industries	29 petroleum refining and related industries
30 manufacture of artificial and synthetic filaments and staple fibres (except glass)	30 rubber and miscellaneous products
31 manufacture of rubber and plastic products	31 leather and leather products
32 manufacture of building materials, earthenware, glass and glass products	32 stone, clay, glass, and concrete products
33 basic metal industry	33 primary metal industries
34 manufacture of fabricated metal products, except machinery and transport equipment	34 fabricated metal products, except machinery and transportation equipment
35 mechanical engineering	35 machinery, except electrical
36 electrical engineering	36 electrical and electronic machinery, equipment and supplies
37 manufacture of transport equipment	37 transportation equipment
38 instrument engineering	38 measuring, analyzing and controlling instruments; photographic, medical, and optical goods; watches and clocks
39 other manufacturing industries (except social workshops)	39 miscellaneous manufacturing industries

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Summary

PRICE-COST MARGINS IN DUTCH MANUFACTURING

The relation between price-cost margins and seller concentration and its development over the business cycle is investigated for Dutch manufacturing (1974–1986). We test the finding of Domowitz, Hubbard and Petersen (1986a and 1986b), that U.S. manufacturing (1958–1981) price-cost margins are more procyclical in more concentrated industries using a new data set. Considering business cycle measures at both industry and aggregated level, export share, level of competing imports and buyer concentration we find that (1) a business cycle upswing (downturn) leads to high (low) price-cost margins and (2) the test of more procyclical price-cost margins in more concentrated industries is inconclusive. Whether the finding of Domowitz, Hubbard and Petersen is supported depends on the business cycle measure used. Separate intertemporal and inter-industry estimates for most influences on price-cost margins are provided.