

# Do Small Firms Compete with Large Firms?

David B. Audretsch\*, Yvonne M. Prince\*\* and A. Roy Thurik\*\*\*

\*Tinbergen Institute of Rotterdam, Centre for Economic Policy Research (CEPR)  
and Georgia State University

\*\* EIM Small Business Research and Consultancy

\*\*\* Centre for Advanced Small Business Economics (CASBEC) and Tinbergen  
Institute at Erasmus University Rotterdam, and EIM Small Business Research and  
Consultancy

January 1998

JEL: L0,L6

**Abstract:** Despite the pervasive phenomenon of scale economies the majority of firms has always been small firms. The emergence of small firms as a means of economic development on both sides of the Atlantic has been one of the major new topics of economic policy since the 1980s. This has drawn renewed attention to the question of how small firms are able to exist. The theories of strategic niches and dynamic complementarity imply that small firms seek out markets where they are able to avoid competition with their larger counterparts. In this paper we test the validity of these theories by examining the extent to which small-firm profitability is set by large-firm profitability. We find considerable evidence that the price-cost margins of small firms do not tend to follow those of large firms. This is interpreted as supporting the theories that small firms pursue a strategy of producing in distinct product niches.

**Acknowledgement:** This paper was prepared while Audretsch was a visiting professor at the Tinbergen Institute Rotterdam in the summer of 1997. Financial support from the Netherlands Organization for Scientific Research (NWO) is gratefully acknowledged.

# 1 Introduction

One of the most consistent and striking empirical phenomena in economics is the persistence of an asymmetric size distribution of firms that is comprised of a relatively small number of large enterprises and that is heavily skewed towards a large number of small firms. This skewed firm-size distribution has been found to persist across industries, countries and over time with a remarkable tenacity. At the same time, a large body of literature suggests that some, if not most of these small enterprises are sufficiently small as to be operating at what has been termed as a *sub-optimal scale of output*, because they are below the minimum efficient scale (MES) level of output. Upon reviewing the literature examining the extent of suboptimal scale plants and firms in industrial markets, in 1991 Leonard Weiss concluded that, "In most industries the great majority of firms is sub-optimal. In a typical industry there are, let's say, one hundred firms. Typically only about five to ten of them will be operating at the MES (minimum efficient scale) level of output, or anything like it. So here is a subject that ought to be measured and critically analyzed and evaluated."<sup>1</sup>

The persistence of a large portion of the firm-size distribution to consist of small enterprises raises the question of not only *why* do small firms exist but also *how* are they able to exist. One answer, provided by a growing body of literature linking survival rates to firm size and age, is that they cannot – at least not for an indefinite period of time [Audretsch, 1995]. In this paper we suggest a different explanation. We rely upon a theory of duality which argues that small firms provide a different economic function than their larger counterparts and therefore do not directly compete with large firms. In particular, the theory of strategic niches, developed by Porter [1979] and Caves and

Porter [1977] implies that by strategically occupying a market niche, small firms can avoid directly competing with large companies. A more precise justification of this niche strategy of small firms is given by Nooteboom [1994] who uses the concept of dynamic complementarity to explain why small and large firms might not compete with each other.

The view that small firms are sub-optimal implies that firm profitability will be positively related to size. While a substantial theoretical literature has emerged predicting firm profitability to rise along with firm size, a persuasive body of empirical studies have identified a positive relationship between market share and profitability [Schmalensee, 1985]. However, more recently, Porter [1979] and Caves and Porter [1977] have questioned the link between firm size and profitability. They argue that the activities of large and small firms differ within the same industry and are anything but homogeneous. The existence of what they term as inter-industry barriers to mobility enables the formation of strategic groups, and in particular, small firms to seek out and defend strategic product niches. According to the theory of strategic niches, small firms will actually exhibit higher levels of profitability by occupying product niches in strategic groups that are inaccessible to their larger counterparts.

The purpose of this paper is to examine the extent to which small firms actually compete with large firms. We do this by comparing the determinants of large-firm profitability with those of small-firm profitability, and the extent to which the profitability of small firms is determined by large-firm profitability, based on disaggregated manufacturing data from the Netherlands over the period 1975-1986. We find considerable evidence that not only do price-cost margins tend to be higher for smaller

firms than for their larger counterparts, but that small firms tend to constitute a strategic group in an industry that is distinct from the larger enterprises. Thus, we conclude that, at least for the Netherlands, small firms do not tend to compete directly with large firms. There is no indication that our results are specific for the Netherlands and would be different in other OECD countries.

## **2 The Theories of Strategic Niches and Dynamic Complementarity**

The theory of strategic niches suggests that small and large enterprises are not engaged in homogeneous activities. Rather, the activities of smaller firms can be distinguished from their larger counterparts as a result of *strategic choice*. One variant of the strategic choice theory is that while all of the firms in a market may produce a homogeneous product, systematic differences exist with respect to the deployment of factors of production [Newman, 1978 and Caves and Pugel, 1980]. An alternative is that small firms produce goods which are distinct from those manufactured by the larger firms. In particular, Porter [1979] hypothesized that such differences permit smaller firms to seek out and maintain distinct product niches which enable smaller firms to experience higher rates of profitability than their larger counterparts for prolonged periods of time.

In their 1990 study, Acs and Audretsch found that small firms tend to be more innovative in highly concentrated industries dominated by large enterprises. This suggests that in order to compensate for their size disadvantage, small firms deploy a strategy of creating an innovative niche. The pressure to create such an innovative niche is apparently greater in industries dominated by large enterprises.

A different approach is applied by Nootboom [1994], where the strengths and weaknesses of small firms vis-à-vis their larger counterparts are discussed in his survey of a large number of studies of both a qualitative (process descriptions) and quantitative (econometric cause and effect studies) nature. Building upon the core characteristics of small firms being small scale, personality and independence and reinterpreting the work of Rothwell and Zegveld [1985], Nootboom creates an image of derived characteristics and preferred core strategies which are different for small than large firms but which also differ along with the various stages of development cycle of the industry. The implication is one where small firms have a greater potential flexibility and closeness to the customer, but are lacking economies of scale, scope and learning. Nootboom refers to evidence of this so-called *dynamic complementarity* concerning the semiconductor technology, micro-computers and even self service retailing. The interpretation is that small firms have an edge towards customization (low volume niche markets) and innovation (low volume temporary monopolies). Again small firms seek out markets where their advantages count and they are not confronted with the direct competition from their larger counterparts.

### **3 Hypotheses and Measurement Issues**

To test the hypothesis that small firms seek out and maintain strategic niches we rely upon the Dutch Manufacturing (DUMA) data source. The data set consists of 66 Dutch manufacturing industries (equivalent to the three-digit standard industrial classification level in the United States) over the period 1975-1986. The data permit the construction of price-cost margins for two main groups of firms -- large firms, defined as those with more than 50 employees, and small firms, defined as firms with fewer than 50

employees.<sup>2</sup> Price-cost margins are defined as the value of production minus labour costs and cost of materials divided by value of production. The value of production equals that of sales plus the change in inventories. Figure 1 shows that the averaged price-cost margin of small firms exceeds that of large firms in every year, with the exception of the first year.

To explicitly test the hypothesis that the price-cost margins of the small firms follow those of the large firms, we estimate the following non-linear two-equations model:

$$p_s^{it} = ap_l^{it} + (1-a)gMS_s^{it} + h_s^{it} \quad (1)$$

$$p_l^{it} = bMS_l^{it} + h_l^{it} \quad (2)$$

where price-cost margins of the large firms,  $p_l$ , are explained by industry-specific variables,  $MS_l$ . The price-cost margins of the small firms,  $p_s$ , are explained by those of the large firms,  $p_l$ , and by industry-specific characteristics,  $MS_s$ . The extent to which the price-cost margins of the small firms follow those of large firms is measured by  $a$ . If  $a$  approaches one, then it can be inferred that there is leadership by the large firms and that the small firms tend to be price-cost margin followers. On the other hand, if  $a$  approaches zero it can be inferred that the price-cost margins of small firms tend to be set independently of their larger counterparts. The superscripts refer to the industry,  $i$ , and the year,  $t$ . The error terms are expressed by  $h_s$  and  $h_l$ .

The industry-specific characteristics which have traditionally been hypothesized to influence price-cost margins [Scherer and Ross, 1990] include the extent of seller concentration, measured as the four-firm concentration ratio, and the small business presence, measured as the number of firms in the industry with between 10 and 50 employees [Prince and Thurik, 1993]. While the four-firm concentration ratio is expected to have a positive impact on price-cost margins, small business presence should have a negative impact on price-cost margins. Capital-intensity is measured as the value of the capital stock divided by the value of production, where the value of the capital stock is approximated by adding up the amount of fixed capital formation in the preceding ten years. The price-cost margin is expected to be positively related to capital intensity. The degree of capacity utilization in explaining price-cost margins is dealt with in Domowitz, Hubbard and Peterson [1986]. A positive relationship is expected between the price-cost margin and the degree of capacity utilization. Market growth, which is measured as the relative change in sales over this period, is expected to have a positive impact on price-cost margins.

In a small open economy such as The Netherlands, imports and exports have an impact on price-cost margins [Pugel, 1980 and Prince and Thurik, 1992]. While the export share is expected to exert a positive influence on price-cost margins, the import share is expected to have a negative impact on price-cost margins.<sup>3</sup> In addition, as Pugel [1980] argues, price-cost margins may be particularly sensitive to export performance in industries which are oriented towards consumer goods. Thus, we include a multiplicative variable of the share of consumption represented by household consumption (hhc) times the export share. An analogous multiplicative variable

multiplying the concentration ratio times the share of consumption represented by household consumption ( $hhc$ ) is similarly included.

From the large literature linking industry-specific characteristics to price-cost margins, we expect the following explanatory variables to have a positive impact on price-cost margins: the concentration ratio, capital intensity, capacity utilization, growth, and the export share. By contrast, we expect the small business presence and the relative importance of competing imports to exert a negative impact on the price-cost margin. Because capacity utilization, growth, and the export share can be measured separately for large and small firms, the matrices of industry-specific variables  $MS_s$  and  $MS_l$  differ from each other.

#### **4 Results**

We apply the *within-between* estimation method to partition the effects of the explanatory variables in time-serial (intertemporal) and cross-sectional (inter-industry) effects.<sup>4</sup> In Table 1 the pooled results are shown. The most striking result concerns the coefficient  $a$ , which measures the extent to which the price-cost margins of small firms follow the price-cost margins of the large firms. The pooled coefficient does not differ statistically from zero,<sup>5</sup> which suggests that the price-cost margins of small firms are completely independent of the price-cost margins of the large firms. There is no evidence of any type of leader-follower relationship between large and small firms.

However, when the model is partitioned into intertemporal and inter-industry effects, as is shown in Table 2, there does appear to be a positive relationship between price-cost margins of large and small firms, at least in the long run. Still, the coefficient



of 0.281, although statistically significant, is not particularly large. In the short run, the relationship is actually negative, suggesting that there is again no evidence of a leader-follower relationship between large and small firms.

The other determinants of price-cost margins suggest some similarities and some differences between large and small firms. In the pooled regression results shown in Table 1, the price-cost margins of both large and small firms are similarly influenced by the extent of seller concentration, the small business presence, capacity utilization, growth, the export share of the industry, and competing imports. However, the price-cost margins of large firms respond differently than do the price-cost margins of small firms to the degree of capital intensity in the industry, and the degree to which an industry is oriented towards consumer goods. These differences become somewhat more accentuated when the effects are decomposed into intertemporal (within) and inter-industry (between). We do not discuss the particular estimations of  $b$  and  $g$  here at length, because our focus is on the leader-follower effect represented by  $a$ <sup>6</sup>.

## **5 Conclusions**

The evidence presented in this paper suggests that small firms do not compete directly with large firms. The evidence is provided based on a dataset covering an extensive share of the manufacturing industry of a period (1975-1986) with considerable cyclical variation in a mid-size economy (the Netherlands). The inference is based on the finding that small-firm profits are independent of large-firm profits. Most importantly, this result suggests that large and small firms operate in distinct segments of the market, rather than competing directly. The evidence suggests that small firms do

not follow large firms but rather pursue their own independent policies. By pursuing a strategy of product niches, small firms may belong to a strategic group that is distinct from that of their larger counterparts. Such niche strategies apparently enable small firms to realize price-cost margins that are actually in excess of price-cost margins earned by their larger counterparts. The theory of dynamic complementarity implies that such strategies involve customization and innovation.

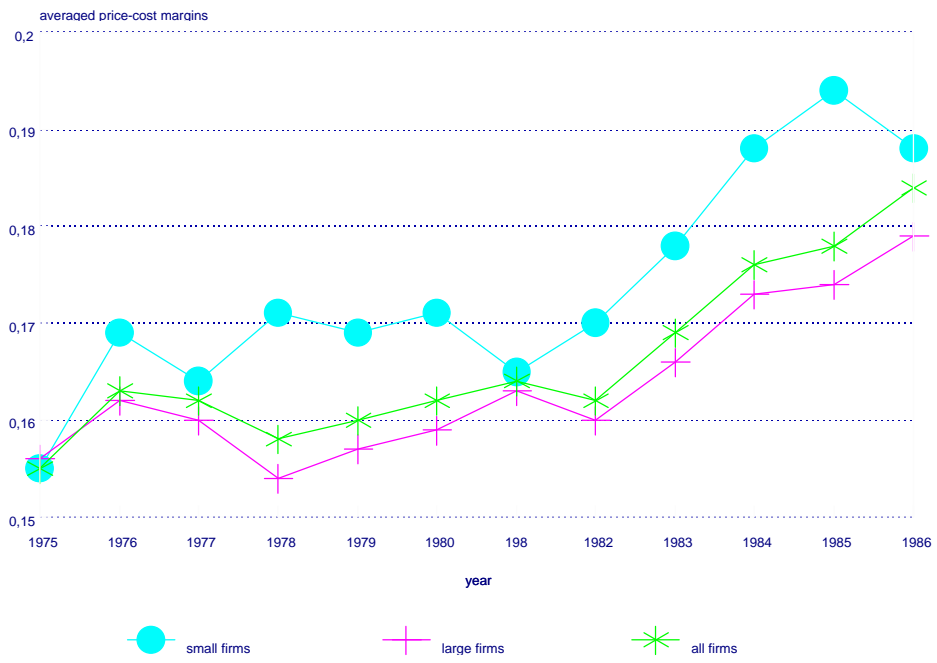
What are the economic welfare and policy implications? In 1991 Leonard Weiss argued that the existence of small firms which are sub-optimal within the organization of an industry represented a loss in economic efficiency. Weiss advocated any public policy which "...creates social gains in the form of less sub-optimal capacity." Such policy conclusions are based on the belief that small firms are merely smaller-scale clones of their larger counterparts. To the degree they experience higher costs small firms impose a loss in allocative efficiency. However, the evidence from this paper suggests a different view of small firms. Rather than imposing a deadweight loss on society, the process of creating and occupying a strategic niche enables the small firm to serve as an agent of change through innovative activity.

## References

- Acs, Z.J. ; Audretsch, D.B. **Innovation and Small Firms**, Cambridge: MIT Press, 1990.
- Audretsch, D.B. **Innovation and Industry Evolution**, Cambridge: MIT Press, 1995.
- Audretsch, D.B. ; Yamawaki, H., eds., **Structure, Conduct and Performance: The Work of Leonard Weiss**, New York: New York University Press, 1992.
- Caves, R.E. ; Porter, M.E. "From Entry Barriers to Mobility Barriers," **Quarterly Journal of Economics**, 91, 1977, pp. 241-261.

- Caves, R.E. ; Pugel, T. **Intraindustry Differences in Conduct and Performance: Viable Strategies in U.S. Manufacturing Industries**, New York: Salomon Brothers Center for Study of Financial Institutions, New York University, Monograph Series in Financial Economics, No. 1980-2. 1980.
- Domowitz, I. ; Hubbard, R.G. ; Petersen, B.C. "Business Cycles and the Relationship between Concentration and Price-Cost Margins," **Rand Journal of Economics**, 17, 1986, pp. 1-17.
- Gallant, A.R ; Jorgenson, D.W. "Statistical Inference for a System of Simultaneous, Nonlinear, Implicit Equations in the Context of Instrumental Variables Estimation," **Journal of Econometrics**, 11, 1979, pp. 275-302.
- Hsiao, C. **Analysis of Panel Data**, Cambridge: Cambridge University Press, 1986.
- Newman, H. "Strategic Groups and the Structure-Performance Relationship," **Review of Economics and Statistics**, 60, 1978, pp. 417-427.
- Nooteboom, B. "Innovation and Diffusion in Small Firms: Theory and Evidence," **Small Business Economics**, 6, 1994, pp. 327-347.
- Porter, M.E. "The Structure within Industries and Companies' Performance," **Review of Economics and Statistics**, 61, 1979, pp. 214-227.
- Prince, Y.M. ; Thurik, A.R. "Price-Cost Margins in Dutch Manufacturing: Effects of Concentration, Business Cycle and International Trade," **De Economist**, 140, 1992, pp. 310-335.
- Prince, Y.M. ; Thurik, A.R. "Firm-Size Distribution and Price-Cost Margins in Dutch Manufacturing," **Small Business Economics**, 5, 1993, pp. 173-186.
- Prince, Y.M. ; Thurik, A.R. "The Intertemporal Stability of the Concentration-Margins Relationship in Dutch and U.S. Manufacturing," **Review of Industrial Organization**, 9, 1994, pp. 193-209.
- Pugel, T.A. "Foreign Trade and U.S. Market Performance," **Journal of Industrial Economics**, 29, 1980, pp. 119-129.
- Rothwell, R. ; Zegveld, W. **Innovation and the Small and Medium Sized Firm**, London: Francis Pinter, 1985.
- Scherer, F.M. ; Ross, D. **Industrial Market Structure and Economic Performance**, third edition Boston: Houghton Mifflin, 1990
- Schmalensee, R. "Do Markets Differ Much?," **American Economic Review**, 75, 1985, 341-351.

**Figure 1 Average Price-Cost Margins, 1975-1986; Aggregated Figures for the 36 Dutch Manufacturing Industries**



**Table 1 Pooled Estimation Results of Equations (1) and (2).**

	small firms ( $\alpha, \gamma$ )	large firms ( $\beta$ )
price-cost margin <sub>large firms</sub>	.048 (0.8)	
intercept	.112 (4.3)	.111 (4.1)
seller concentration	-.104 (-2.4)	-.122 (-2.9)
small business presence	-.080 (-3.1)	-.048 (-1.9)
capital intensity	.134 (5.6)	.007 (0.3)
capacity utilization	.097 (7.0)	.109 (9.5)
relative change in sales	.013 (2.0)	.019 (2.3)
export share	.115 (2.0)	.067 (2.4)
competing imports	.002 (0.3)	.003 (0.5)
share hhc x seller concentration	.090 (1.2)	-.134 (-2.1)
share hhc x export share	-.194 (-1.8)	-.107 (-2.2)
adjusted R-squared	.723	.391

Number of observations = 432.

A test on heteroskedasticity showed that there is heteroskedasticity over the industries. Also, there appeared to be first-order autocorrelation. The model is estimated by means of non-linear 3SLS and corrected for first-order autocorrelation and heteroskedasticity.

hhc = household consumption.

**Table 2 Within-Between Results of Equations (1) and (2).**

	small firms ( $\alpha, \gamma$ )	large firms ( $\beta$ )
<b><i>intertemporal effects (within)</i></b>		
price-cost margin <sub>large firms</sub>	-.106 (-2.1)	
seller concentration	.041 (0.6)	-.151 (-2.2)
small business presence	-.024 (-0.6)	-.017 (-0.6)
capital intensity	-.070 (-2.8)	-.054 (-2.1)
capacity utilization	.048 (4.3)	.056 (6.1)
relative change in sales	.008 (1.3)	.024 (2.6)
export share	-.003 (-0.1)	.085 (2.1)
competing imports	.020 (2.8)	.005 (0.6)
share hhc x seller concentration	.032 (0.5)	.069 (0.9)
share hhc x export share	.031 (0.6)	-.155 (-2.2)
<b><i>inter-industry effects (between)</i></b>		
price-cost margin <sub>large firms</sub>	.281 (3.1)	
intercept	-.278 (-2.7)	-.391 (-2.5)
seller concentration	-.125 (-2.2)	-.067 (-0.8)
small business presence	-.168 (-4.7)	-.034 (-0.6)
capital intensity	.292 (6.9)	.034 (0.9)
capacity utilization	.575 (4.7)	.593 (3.8)
relative change in sales	-.350 (-2.6)	-.018 (-0.1)
export share	.217 (3.2)	.035 (0.6)
competing imports	-.001 (-0.1)	.019 (1.8)
share hhc x seller concentration	.099 (1.2)	.132 (1.3)
share hhc x export share	-.321 (-2.5)	-.056 (-0.7)
adjusted R-squared	.850	.437

Number of observations = 432.

A test on heteroskedasticity showed that there is heteroskedasticity over the industries. Also, there appeared to be first-order autocorrelation. The model is estimated by means of non-linear 3SLS and corrected for first-order autocorrelation and heteroskedasticity.

hhc = household consumption.

## Footnotes

---

<sup>1</sup> Quotation from p. xiv of the Editor's Introduction in Audretsch and Yamawaki (1992).

<sup>2</sup> No information is available for the smallest firms employing fewer than ten employees.

<sup>3</sup> See Prince and Thurik (1994) for more evidence of the (dis)similarities between the U.S. and the Netherlands when explaining price-cost margins.

<sup>4</sup> See also Prince and Thurik (1992).

<sup>5</sup> The test-statistic  $T^0$  described in Gallant and Jorgenson (1979, p. 279) equals 32.7, while the corresponding critical value is 16.9.

<sup>6</sup> See Prince and Thurik (1993).