Profitability and number of firms

CHAPTER 15

Profitability and Number of Firms: Their Dynamic Interaction in Dutch Retailing

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Abstract. High profitability attracts new firms, whereas a rise in the number of firms creates a pressure on profitability. The purpose of this study is to investigate this dynamic interaction between profitability and number of firms in the Dutch retail sector. A two-equation error-correction model is developed and tested using a panel data set of 36 Dutch shoptypes covering the 1978-1988 period.

I. Introduction

Dynamic market modeling has received broad attention in industrial economics (see Nelson and Winter, 1982; Eliasson, 1984 and 1991; Geroski and Masson, 1987; Carlsson, 1989; Schmalensee, 1989; Klepper and Graddy, 1990; and Mueller, 1990). This study is concerned with a central theme in this literature: the development of market structure and performance over time. In fact, we investigate the growth, or decline, of both profit levels and number of firms over time in the retail sector. We seek to provide answers to questions like: What is the effect of an increase in the number of firms on profitability? What is the effect of high or increasing profitability on the growth of the number of firms? What is the effect of demand growth on profitability and on the entry and exit flows in the industry? Does unemployment lead to an increase in the number of firms as unemployed are forced into entrepreneurship?

This study stands out from other studies in that it deals with the retail sector. There are several justifications for this choice.[2] First, retailing contributes strongly to the economy: for instance, in the Netherlands it accounts for about 23% of the total number of economically active enterprises and about 13% of the total labor force in the private sector in 1988 (Bode, 1990). There has however been scarce attention in industrial economics for non-manufacturing industries, let alone for the retail sector. Second, retailing is a comparatively simple entrepreneurial activity to which there are only limited entry and exit barriers. This implies that adjustment processes generated by entrepreneurs discovering and exploiting profit opportunities can be expected to have a direct

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[2]Clearly, the accessibility of some extensive panel data sets which have been merged for the purpose of the present analysis plays an important role in this choice.

effect in the sense that, for instance, the setting up or closing down of stores occurs within only a limited time period. Interesting evidence on the speed of the competitive and entrepreneurial process in the Dutch economy may be derived from such a low-barrier industry. Third, retailers can be expected to react in a more predictable and direct way to market incentives and disincentives than entrepreneurs in manufacturing industries. This is a consequence of the more clearly structured market environment in retailing, where elements of innovation, complex and time-consuming decision-making procedures and international competition generally play a limited role compared to manufacturing.

In an earlier study (Carree and Thurik, 1994), we used a similar dynamic market model to empirically investigate distinct competitive forces (like actual competition among incumbents, new firm competition and potential competition) and various inflationary processes (such as cost, demand and wage inflation) in the retailing sector. This study provides additional information on the speed and empirical relevance of the adjustment processes in retailing. Our model is discussed in Section II. Section III is used for a description of the data set of 36 shoptypes for the period 1978-1988. Section IV presents the empirical results. Section V is a conclusion.

II. The Dynamic Interaction between Profitability and Number of Firms

Entrepreneurial activity is a vital but elusive concept in theories of economic development and market dynamics (see Hébert and Link, 1989). The entrepreneur is the key figure both for Schumpeterians and for Neo-Austrians. There is however a fundamental difference between the Schumpeterian notion of entrepreneurship and the Neo-Austrian (that is, Kirznerian) ideas on entrepreneurship. Schumpeter takes the entrepreneur to be the innovator and thus the creator of disequilibria. For Kizner, however, the role of the entrepreneur is to discover and exploit profit opportunities leading to the kind of adjustment processes necessary to move markets toward the equilibrium state (see Kirzner, 1973 and 1979). In this study, we concentrate on entrepreneurial activity as a competitive force to adjust profits towards their long-run equilibrium levels. Hence, our model of the dynamic interaction between profitability and number of firms in retailing is based on the Kirznerian notion of entrepreneurship. This implies that we have to specify profit opportunities (market incentives) and the ways of their exploitation. For Kirzner the efficiency of the market system depends crucially upon the degree of success with which entrepreneurs discover and exploit these profit opportunities.

Two fundamental indicators for profit opportunities in an industry are the prevailing level of profitability and the market growth. Profitable and growing markets generally provide more opportunities for entrepreneurs to act successfully than declining markets with many firms experiencing losses. The exploitation of these profit opportunities can be achieved either by incumbents or by entrants into the market. Incumbents may try to enhance their competitive position by decreasing prices or increasing advertising efforts or level of service.

Entrants may find market niches or may profit from the lack of ability of incumbents to adjust to developments in market demand. Many of these entrants may use entrepreneurship as an escape out of unemployment (see Storey, 1991). High unemployment may, therefore, stimulate potential independents to enter and discourage incumbents to exit.

The model which is presented in equations (1) and (2) is of an error-correction mechanism type (see Salmon, 1982; and Gilbert, 1986).[3] Shoptypes which provide entrepreneurs high profitability are assumed to be *in error - i.e.*, in disequilibrium. As the entrepreneurs in this study are mainly small independents for whom profits generally equal their income (before taxes) we define excess profit (*i.e.*, the market *error)* as the difference between this profit and gross modal wage. So,

$$(1)\quad \Delta\Pi_{it}-\Delta MI_t = \alpha_0+\alpha_1(\Pi_{i,t-1}-MI_{t-1})+\alpha_2(\Delta\Pi_{i,t-1}-\Delta MI_{t-1})+\alpha_3\Delta NOF_{it}+\alpha_4\Delta NOF_{i,t-1}+\alpha_5\Delta CS_{it}+\alpha_6\Delta\Delta CS_{it}+\alpha_7(\Delta K_{it}-\Delta Q_{it})+\epsilon_{1it},$$

and

$$(2)\quad \Delta NOF_{it} = \beta_0+\beta_1(\Pi_{i,t-1}-MI_{t-1})+\beta_2(\Delta\Pi_{i,t-1}-\Delta MI_{t-1})+\beta_3\Delta CS_{i,t-1}+\beta_4\Delta CS_{i,t-2}+\beta_5 UN_{t-1}+\beta_6\Delta UN_{t-1}+\beta_7\Delta NOF_{i,t-1}+\epsilon_{2it}.$$

In these equations, ϵ_{1it} and ϵ_{2it} are possibly correlated random errors and the variables are *logarithms* of Π_{it} (average profit in shoptype i in year t in 1980 prices), MI_t (gross modal wage in year t in 1980 prices), NOF_{it} (number of firms in shoptype i in year t), CS_{it} (consumer spending for the product package sold in shoptype i in year t in 1980 prices), K_{it} (average value of total costs in shoptype i in year t in 1980 prices), Q_{it} (average value of sales in shoptype i in year t in 1980 prices) and UN_t (number of unemployed in 1,000 persons in year t).

Eight hypotheses concerning the signs of the parameters incorporated in this model are discussed.

HYPOTHESIS 1: $\alpha_1<0$ and $\alpha_2>0$.

An excess profit situation is one of instability, which attracts entrepreneurial activity not only from within the shoptype but also from diversifying firms in other shoptypes or vertically integrating wholesalers or manufacturers. This activity brings profits down: we expect α_1 to be negative.[4] We have no strong

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[3]In Carree and Thurik (1994), the dependent variable of the profitability equation is $\Delta\Pi_{it}-\Delta Q_{it}$. Influences of distinct competitive forces on retail pricing practice and the role of retailing in the inflationary process were the major topics in that study.

[4]Empirical studies in the literature on the persistence of profits (see Mueller, 1990) usually find this effect of excess profitability on the development of profitability to be negative. There are however different opinions about the extent of this effect. Geroski and Masson (1987) find a small effect and regard the competitive process to be extremely slow, while Levy (1987) reports a strong effect with adjustment to long-run equilibrium levels in only five years.

a priori reasons to expect the lagged endogenous variable to have any effect in equation (1). Nevertheless, we incorporate this variable to allow for sustained growth or decline of profits *vis-à-vis* modal wage. Such a structural shift may be a consequence of slowly evolving revaluation of the entrepreneurial activity of shopkeepers - for example, by growing or declining managerial responsibilities. This could be a reason for a positive α_2.

HYPOTHESIS 2: $\alpha_3<0$ and $\alpha_4>0$.

As the number of firms grows competitive forces are expected to increase. This implies that α_3 is expected to be negative. Earlier experience with increases in the number of firms would, however, make a shoptype less sensitive to such new firm competition. A positive α_4 would be consistent with this view. An extreme situation is the one in which $\alpha_3=-\alpha_4$: changes in the growth of the number of firms ($\Delta\Delta NOF_{it}$) have an effect on the development of profits *vis-à-vis* modal wage and not so much the growth of the number of firms (ΔNOF_{it}). However, we hypothesize that $\alpha_3<-\alpha_4$ because we expect less recent changes in the industry structure to have a more limited effect than recent ones.

HYPOTHESIS 3: $\alpha_5>0$ and $\alpha_6>0$.

Growing consumer spending on retail services is assumed to lift the pressure on increases of retailers' profits: a positive α_5 is expected. We also incorporate $\Delta\Delta CS_{it}$ as indicator for unexpected demand shocks: temporary deviations from demand growth over time for specific retail services may facilitate profit increases even more. This indicates a positive value for α_6.

HYPOTHESIS 4: $\alpha_7<0$.

Rises in the cost-output ratio are likely to endanger a favorable development of profit as cost shifts are likely to be passed on only partially to customers (in the same period).[5] So, we expect the parameter α_7 to be negative. In the long run, cost changes are entirely passed on in the case of a negative α_1 due to the elimination of disequilibrium by the error-correction mechanism.

HYPOTHESIS 5: $\beta_1>0$ and $\beta_2>0$.

High profits will encourage entry into a shoptype and discourage exit. The parameter β_1 is expected to be positive. Growing profits *vis-à-vis* modal wage ($\Delta\Pi_{i,t-1}-\Delta MI_{t-1}$) may also provide an incentive to enter a shoptype. This implies a positive β_2.

HYPOTHESIS 6: $\beta_3>0$ and $\beta_4>0$.

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[5]Nooteboom, Kleijweg and Thurik (1988) using 16 Dutch shoptypes for the period 1976-1983, find that deviations from *normal costs* are passed on to customers for about fifty percent only.

Growing consumer demand provides opportunities for new entrants. Viable submarket niches may emerge or incumbents may simply lack the ability to expand quickly enough. As speed of perception and exploitation of these opportunities for entry is unknown both $\Delta CS_{i,t-1}$ and $\Delta CS_{i,t-2}$ are incorporated. We expect both a positive β_3 and a positive β_4.

HYPOTHESIS 7: $\beta_5 > 0$ and $\beta_6 > 0$.

High and growing unemployment discourages shopkeepers to exit as both variables are indicators for poor job opportunities. It also implies that there are a large number of potential entrepreneurs: unemployed may try to become self-employed in retailing to improve upon their financial situation. Evans and Leighton (1989) present evidence that unemployed workers are more likely to enter self-employment than employees. Retailing may be an especially attractive sector for new business start-ups as financial and knowledge barriers are low. Thus, both β_5 and β_6 are expected to be positive. The change in unemployment may very well be a more adequate measure of the tension on the labor market than unemployment, because of the sustained high unemployment level in the Netherlands. Those who are already unemployed for several years may be expected not to have the same amount of entrepreneurial ability and perseverance to become self-employed as workers who have become unemployed only recently. Storey (1991) provides a survey of the studies on the effect of unemployment on new business start-ups.

HYPOTHESIS 8: $\beta_7 > 0$.

Gort and Konakayama (1982) argue that perceptions of profit opportunities are positively related to the successful experience of others in the market. This implies that entrepreneurial activity may tend to be autocorrelated: successful entry may demonstrate the attractiveness of a shoptype to entrepreneurs: a positive β_7 is expected. One might argue that some new entrants already disappear after a one-year period due to inadequate preparations and too optimistic expectations. This could disturbe interpretations on the parameter β_7 as representing the demonstration effect, because a lower value for this parameter could be the result of such a correction.

III. Data

In this study, a data set of 36 Dutch shoptypes for the period 1978-1988 is used. The source of the data is an ongoing panel of independent, mainly small Dutch retailers called *Bedrijfssignaleringssysteem* (interfirm comparison system), which is operated by the EIM Small Business Research and Consultancy in Zoetermeer. In Carree and Thurik (1994), we provide an overview of the shoptypes and the observation periods for which data for these shoptypes are

available.[6] We have a total of 341 data points, while on average a data point is computed using observations from about seventy individual retail stores. The consumer spending and modal wage data are from the Central Bureau of Statistics (CBS) in Voorburg, unemployment data were retrieved from the UN Monthly Bulletin of Statistics and data on number of firms were gathered by the Central Registration Office (CRK) in The Hague. Summary statistics for the variables used in the model can be found in Table 1.

Table 1. Summary statistics of the variables used

Variable	MIN	MAX	MEAN	STD
$\Delta\Pi_{it}-\Delta MI_t$	-1.13	0.99	0.037	0.262
$\Pi_{i,t-1}-MI_{t-1}$	-1.29	1.09	0.117	0.415
$\Delta\Pi_{i,t-1}-\Delta MI_{t-1}$	-1.13	0.99	0.039	0.276
ΔNOF_{it}	-0.11	0.10	-0.001	0.026
$\Delta NOF_{i,t-1}$	-0.11	0.08	-0.004	0.025
ΔCS_{it}	-0.22	0.21	0.002	0.058
$\Delta\Delta CS_{it}$	-0.29	0.19	0.006	0.062
$\Delta K_{it}-\Delta Q_{it}$	-0.19	0.17	-0.005	0.054
$\Delta CS_{i,t-1}$	-0.22	0.24	-0.004	0.064
$\Delta CS_{i,t-2}$	-0.22	0.24	-0.007	0.062
UN_{t-1}	5.32	6.71	6.262	0.496
ΔUN_{t-1}	-0.08	0.44	0.127	0.202

Note: MIN, MAX, MEAN and STD stand for minimum, maximum, mean and standard deviation.

IV. Empirical Results

Equations (1) and (2) are estimated using Three Stages Least Squares (SAS-module SYSLIN). We provide estimation results both for *no fixed effects* (α_0 and β_0 are equal for all shoptypes) and *fixed effects* (α_0 and β_0 are allowed to differ across shoptypes). By using fixed effects we allow the long-term equilibrium relation between profits and modal wage to differ across shoptypes. It is likely that profits in shoptypes characterized by high capital requirements, high risks and high managerial responsibilities will tend to have higher long-term equilibrium values than those in shoptypes in which these are low (see Carree and Thurik, 1994). Estimation results are presented in Table 2.

We find confirmation for profit adjustment to excess profits ($\alpha_1 < 0$). The adjustment rate (the extent of the effect of $\Pi_{i,t-1}-MI_{t-1}$ on $\Delta\Pi_{it}-\Delta MI_t$) is rather slow, about 10% in a one-year period, in the case shoptype-specific effects are excluded. This would imply an almost complete profit adjustment in about 30 years. However, the adjustment rate increases substantially to about 50% in a one-year period at their inclusion. This implies an almost complete profit

[6]Data are available for 14 shoptypes during the 1978-88 period, for 19 shoptypes during the 1982-88 period, for two shoptypes (electrical appliances, more than 25% repairs and electrical appliances, mixed assortment) during the 1982-87 period and for one shoptype (supermarkets without butcher's shop) during the 1978-83 period.

Table 2. Estimation results

Parameter	Variable	No FE	FE
α_0	constant	0.053	
		(3.2)	
α_1	$\Pi_{i,t-1}$-MI_{t-1}	-0.107	-0.492
		(2.4)	(4.3)
α_2	$\Delta\Pi_{i,t-1}$-ΔMI_{t-1}	-0.020	0.081
		(0.3)	(1.2)
α_3	ΔNOF_{it}	-8.208	-4.055
		(1.7)	(0.8)
α_4	$\Delta NOF_{i,t-1}$	5.527	2.150
		(1.6)	(1.0)
α_5	ΔCS_{it}	1.049	1.468
		(1.9)	(3.1)
α_6	$\Delta\Delta CS_{it}$	-0.661	-0.671
		(1.1)	(1.2)
α_7	ΔK_{it}-ΔQ_{it}	-1.993	-1.530
		(7.7)	(5.9)
β_0	constant	-0.015	
		(1.1)	
β_1	$\Pi_{i,t-1}$-MI_{t-1}	0.0053	0.0198
		(1.9)	(3.5)
β_2	$\Delta\Pi_{i,t-1}$-ΔMI_{t-1}	0.0023	-0.0076
		(0.5)	(1.6)
β_3	$\Delta CS_{i,t-1}$	0.129	0.120
		(6.0)	(5.4)
β_4	$\Delta CS_{i,t-2}$	0.002	0.008
		(0.1)	(0.4)
β_5	UN_{t-1}	0.0022	-0.0017
		(1.0)	(0.7)
β_6	ΔUN_{t-1}	0.0174	0.0178
		(2.6)	(2.6)
β_7	$\Delta NOF_{i,t-1}$	0.674	0.387
		(14.7)	(6.3)
System-R^2		0.439	0.545

Note: Estimations results are for no fixed effects (no FE) and for fixed effects (FE). Numbers in parentheses are t-statistics.

adjustment in about 5 years, which is consistent with the empirical evidence found by Levy (1987) for US manufacturing industries. It is most interesting to find the speed of adjustment to be roughly the same for different sectors, retailing *versus* manufacturing, in different countries, the Netherlands *versus* the United States. The parameter estimate of α_2 is not significant at a 5% level. There is no indication of change in profits *vis-à-vis* modal wage to have any effect on this change in the next period.

Considering the dynamic interaction between profitability and number of firms results are that $\hat{\alpha}_3<0$, $\hat{\alpha}_4>0$ and $\hat{\alpha}_3<-\hat{\alpha}_4$, as expected. However, none of these results is statistically significant. Entry and exit may have only a limited direct effect on industry profitability because they are most widespread in the group of relatively small firms who make up the competitive fringe (MacDonald, 1986). Increases of retailers' profits appear to be facilitated by demand growth

($\alpha_5 > 0$) but not by changes in this variable. A favorable development of their profits is however endangered by rises in the cost-output ratio ($\alpha_7 < 0$). Presumably, this results from firms' market positions preventing cost shifts to be entirely passed on to customers within a one-year period or from limited awareness of cost changes during such a period.

Excess profits and growing consumer demand appear to be key incentives to new firm formation in retailing, since both the parameter estimates of β_1 and β_3 are positive and significant. This is consistent with empirical evidence in most studies on entry in manufacturing industries (Acs and Audretsch, 1989). The effect of excess profit ($\Pi_{i,t-1}$-MI_{t-1}) rises strongly at the inclusion of fixed effects. This is not surprising because entrepreneurs will confront expected profits with capital requirements, risks and managerial responsibilities when considering entry and exit. Entrepreneurial reaction, in setting up or closing down stores, to changes in consumer demand seems to be quick: $\Delta CS_{i,t-2}$ has no significant effect on ΔNOF_{it}. The parameter estimate of β_2 is also not statistically significant, indicating that entrepreneurs are not too impressed by short-term profit changes.

The level of unemployment (UN_{t-1}) appears to have no effect on changes in the number of stores. However, an increase in the number of unemployed does seem to be followed by an increase in the number of retail firms: the parameter estimate of β_6 is positive and significant. One is tempted to conclude that people who have become unemployed only recently have a higher propensity of using self-employment, in the retail sector, as an alternative to being unemployed than people who have had no working experience for a longer period. The parameter estimate of β_7 is positive and strongly significant. The demonstration effect appears to have empirical relevance in the retail sector.[7]

V. Conclusion

Measuring entrepreneurial activity is a daring venture as many different theories on the nature of entrepreneurship exist (see Hébert and Link, 1989). In this study, we concentrate on the Kirznerian notion of entrepreneurial activity as a competitive force to adjust profits to their long-term equilibrium levels. An error-correction model of the dynamic interaction between profitability and number of firms in retailing is developed and tested on a panel data set of 36 Dutch shoptypes for the period 1978-1988. One would expect entrepreneurial activity to be high in the retail sector because financial entry and exit barriers are low and starting and running a store is a comparatively simple entrepreneurial activity. Some evidence for this is found in the effects of excess profits and demand growth. The fact that excess profits vanish within a five-year period

[7]Robertson and Symons (1992) argue that biases arise when parameters vary across panels, shoptypes, while this is not allowed for in estimation. In the case of few time periods and many panels they find that dynamic properties tend to be over-estimated - *i.e.*, the coefficient of a lagged dependent variable is overstated. The decline of our parameter estimate of β_7 from 0.674 to 0.387 when fixed effects are included is consistent with the Monte Carlo results presented in Figure 4 of their paper.

demonstrates that excess profits arouse fierce competitive action. Excess profits also stimulate entry of new stores (entrepreneurs). Demand growth is followed by an increase in the number of stores already within a one-year period. Recently unemployed workers appear to exploit opportunities of becoming self-employed in the retail sector as increases in unemployment have a positive effect on the change in the number of stores. Profitability and number of firms are two important market phenomena which deserve detailed attention. There are however more elements of market structure and performance, like growth and survival rates of firms, evolving horizontal and vertical (dis)integration, adoption of organizational or technical innovations. We are just beginning to understand the causes and effects of market processes.

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