Profit Persistence in the European Food Industry

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***Abstract* - The present study is the first that analyzes profit persistence in the European food industry. Belgium, France, Italy, Spain and the United Kingdom are analyzed in terms of food industry profit persistence during 1996 to 2008. The results suggest that profits tend to converge towards a competitive norm. However, this process seems to be far from completion since a significant number of firms are estimated to earn abnormal profits that persist in the long run. Overall the degree of persistence seems to be lower compared to other manufacturing sectors. Significant positive determinants of profit persistence are industry size and growth as well as firm size. Significant negative determinants are a firm's age, its risk and industry R&D intensity.**

INTRODUCTION

Under conditions of perfect competition firm profits that deviate from the average, can only be a transitory phenomenon. However, it is commonly observed that actual profit rates differ heavily across firms contradicting the proposition of perfect competition. In industrial economics Bain's (1968) 'Structure-Conduct-Performance' paradigm focuses on industry characteristics as the driver of such abnormal profits. The resource-based view on the other hand attributes abnormal profits to firm specific resources.

Starting with Mueller (1986) a series of contributions analyzing profit persistence has emerged. While most of these studies concentrate on entire manufacturing sectors, studies which only focus on the food industry have been sparse with the exception of Schumacher and Boland's (2005) study of profit persistence in the US food economy. The present study contributes to the literature by being the first study estimating profit persistence and its drivers for European Union (EU) food processors.

METHODOLOGY

The standard autoregressive AR(1) persistence of profits model is a simple regression of the level of firm profits at a given point in time on the immediate previous level:

$$\pi_{i,t} = \alpha_i + \lambda_i \pi_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

where $\varepsilon_{i,t}$ is a white noise error term with zero mean and constant variance. As in previous literature, profitability of firm i at time t $(\pi_{i,t})$ is measured as the deviation of the firms return on assets (ROA) from the competitive norm which is approximated by the mean across the sample of firms. By taking the sample mean as a proxy for normal profit, we can interpret firm profitability as deviations from the competitive norm or as 'abnormal' profitability, with attendant welfare implications.

The coefficient on lagged profit $(\hat{\lambda}_i)$ reflects the speed of adjustment to the long run level and can be interpreted as 'short-run persistence'. Its mean value therefore is a measure for the competition within a sample. The long run average of the autoregressive process, on the other hand, yields the so-called 'long run projected profit rate'. It is, defined as $\hat{\rho}_i = \hat{\alpha}_i / (1 - \hat{\lambda}_i)$ and is the steady-state equilibrium value to which, according to the model, the series is ultimately heading. $\hat{\rho}_i$ is a measure of 'permanent rents', which are not eroded by competitive forces and can therefore be interpreted as 'long run persistence'. Since $\hat{\rho}_i = 0$ implies a long run projected ROA equal to the competitive norm, the percentage of $\hat{\rho}_i$'s significantly different from zero in a given sample is an indicator of the degree of profit persistence within it.

The present study extends the classical methodology by estimating AR models up to order four and employing Schwarz Bayesian Information Criterion (SBC) in order to decide, which model describes the adjustment path best. After choosing the 'best lag model', the long-run projected profit rate becomes $\hat{\rho}_i = \hat{\alpha}_i / (1 - \sum \hat{\lambda}_{ij})$, where $j = \{1 \ldots . L\}$ is the number of lags of the AR process and $\hat{\lambda}_i = \sum \hat{\lambda}_{ij}$ is the speed of adjustment parameter. The 'best lag model' allows for more general dynamics than the simple AR(1) and at the same time enables comparison with most of the previous literature.

Stability, and convergence upon a finite steady state, requires that the estimate of λ_i lies between plus and minus one. Furthermore, the procedure is appropriate only for stationary AR processes, since the measure for long-run persistence, is not defined for unit root processes, with $\hat{\lambda}_i = 1$.

DATA AND EMPIRICAL RESULTS

Data

The firm data used for the present analysis stems from AMADEUS. Data is available for 1996 - 2008. Following previous literature firm profitability in year t (π_{it}) is measured as the firms ROA in t minus mean ROA in t. The sample consists of 4676 firms in Belgium, France, Italy, Spain and the UK for which ROA data was available for the entire 13 year period.

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Profit Persistence

The first part of the estimation examines the existence of profit persistence per se by presenting results on the two persistence parameters $\hat{\lambda}_i$ and $\hat{\rho}_i$ which were estimated for each firm in the sample.

Table 1. An overview of the persistence parameters.

	Belgium	France	Italy	Spain	UK
Mean $\hat{\lambda}_i$	0.06	0.19	0.14	0.20	0.23
% of $\hat{\rho}_i$'s signif. ≠ 0[a]	38.0	39.0	38.3	42.0	40.4
% $R^2 > 0.1$	64.4	66.2	40.5	67.4	75.5

[a] at the 5% level or less

Row one of Table 1 shows the mean $\hat{\lambda}_i$ values for each country. The highest mean value can be found for the UK followed by Spain and France which indicates that the average speed of adjustment to the long run level is slower in these countries implying weaker competition. Italy and Belgium on the other hand exhibit lower average $\hat{\lambda}_i$ values indicating stronger competition. Overall mean $\hat{\lambda}_i$'s for the food industry turn out to be rather small compared to other studies based on entire manufacturing sectors which on average found values above 0.4. Competition among food producers therefore seems to be rather strong. These results are not too surprising since EU food markets are considered as being strongly saturated which in conjunction with a high level of price competition leads to strong competition and therefore to relatively low average $\hat{\lambda}_i$'s. Furthermore the retail sector as the main link between the food industry and the consumers is characterized by a high degree of concentration putting producers under pressure. In most EU countries the top 5 supermarket chains have a market share of around 70% (Wijnands et. al., 2007). The bargaining power of retailers is reinforced by the increasing importance of their private labels which in 2006 already achieved a market share of 27% (Datamonitor, 2006).

The percentage of $\hat{\rho}_i$'s significantly different from zero in row two reflects the fraction of firms within each country that do not converge to the average in the long run. It can therefore be seen as an indicator for the persistence within the food industries of each country. This percentage is around 40% for all countries indicating that a significant fraction of firms tend to earn abnormal profits that persist in the long run. Therefore the process of convergence seems to be far from completion. Row three of Table 1 shows that the percentage of equations where more than 10% of the variation in profitability is explained by the autoregressive process is larger as in previous studies which found on average values below 50%. This indicates that the best lag structure has higher explanatory power compared to the simple AR(1) used in most previous studies.

Explaining Profit Persistence

In order to explain profit persistence specific firm and industry characteristics that were deduced from AMADEUS and Eurostat were regressed on the two persistence parameters $\hat{\lambda}_i$ and $\hat{\rho}_i$. As regards firm characteristics Table 2 shows that especially young, large and fast growing firms are the ones earning high profits that persist. Regarding industry characteristics especially the size and the growth of the industry in which a firm operates seem to have a positive impact on its profit persistence. Firm risk and industry R&D expenditure have a negative impact on profit persistence in some countries.

Table 2. Regressors explaining $\hat{\lambda}_i$ and $\hat{\rho}_i$

	$\hat{\lambda}_i$ Dep. Var.					$\hat{\rho}_i$ Dep. Var.				
Indep. Var.	Be	Fr	It	Sp	UK[a]	Be	Fr	It	Sp	UK[a]
Market share		+					-	+	-	
Firm Age						-		-	-	
Firm size (Assets)	+	+		+	+				+	+
Firm growth (of assets)	+	+		+	-	+		-	+	
Risk (Gearing ratio)							+		+	
Ind. size (Sales)		+				+				
Ind. growth(No. of firms)		+				+		+	-	
Ind. R&D expenditure								-		-
Concentration (CR4)		+								

[a] + or - significant at 5% level or less

DISCUSSION AND CONCLUSION

The preceding analysis of profit persistence in the European food industry indicates that the process of convergence towards a competitive norm is far from completion since in each of the five countries analyzed a significant fraction of around 40% of the firms tends to earn profits above or below the competitive norm which persist even in the long run. Nonetheless the adjustment to the long run level seems to be quicker compared to other manufacturing sectors as indicated by the lower mean $\hat{\lambda}_i$ values. Comparing the results with other studies of entire manufacturing sectors it has to be noted that the degree of persistence is lower in the food industry mainly due to a high degree of market saturation and a highly concentrated retailing sector. Another striking difference is the importance of firm size. While many previous studies find evidence for the inefficiency of large firms, being of sufficient scale seems to be a very important matter in the food industry. Another crucial difference is the special characteristic of R&D and its negative influence on profit persistence. Contrary to other sectors innovation seems to be unsuccessful.

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