European Accounting Review

ISSN: 0963-8180 (Print) 1468-4497 (Online) Journal homepage: http://www.tandfonline.com/loi/rear20

Evaluating the effects of financial ratio adjustment in European financial statements

José L. Gallizo , Fernando Jiménez & Manuel Salvador

To cite this article: José L. Gallizo , Fernando Jiménez & Manuel Salvador (2003) Evaluating the effects of financial ratio adjustment in European financial statements, European Accounting Review, 12:2, 357-377, DOI: 10.1080/0963818022000001163

To link to this article: http://dx.doi.org/10.1080/0963818022000001163

European Accounting Review 2003, **12:2**, 357–377

Evaluating the effects of financial ratio adjustment in European financial statements

José L. Gallizo, Fernando Jiménez and Manuel Salvador
University of Zaragoza

Manuscript first received: January 2001. Manuscript accepted: April 2002

ABSTRACT

This paper is devoted to an analysis of financial ratio adjustment in European financial statements. To that end, we use an hierarchical model based on the partial adjustment model. This model allows us to distinguish between adjustments that are due to external shocks and which affect all countries, on the one hand, and those resulting from internal shocks which affect the relative position of one country with respect to the rest, on the other. In addition to estimating the average adjustment coefficients of each ratio, we locate those countries that have a behaviour which is significantly different from the rest. We find that, in general, the evolution of the ratios analysed is mainly determined by their adjustments to external shocks, with the ratios related to the profit and loss account demonstrating a greater sensitivity to all types of shocks. By contrast, the debt ratios show the least sensitivity. When considered on a country-by-country basis, the most significant differences appear in the results ratios, with Spain being the country that is most sensitive to external shocks, and Denmark and Germany being least sensitive to all types of shocks.

1. INTRODUCTION

The literature confirms that over recent years ratio analysis has emerged as the main tool used by researchers to carry out financial statement analysis. This technique, employed to analyse the management of a firm in such a way that a study of its evolution over time allows for comparisons to be made with other firms, has come to be widely used given its advantages as compared to other types of indicators. From amongst all the arguments that can be advanced in its favour, Lev and Sunder (1979) and Whittington (1980) place emphasis on the way that the influence of the size of the firm is eliminated. This advantage supposes that the division of financial statement items by some control item allows for a comparison to be made between firms of different sizes.

Address for correspondence
Dr José L. Gallizo, Facultad de Ciencias Económicas, Gran Vía, 2, 50005 Zaragoza, Spain. E-mail: jgallizo@posta.unizar.es

ISSN 0963-8180 print/1468-4497 online DOI: 10.1080/0963818022000001163
Published by Routledge Journals, Taylor & Francis Ltd on behalf of the EAA

Once having determined the type of analysis, the analyst must fix the points of reference in order to establish the diagnosis of the firm according to its results. It is occasionally the case that the information on these points of reference comes from the firm itself, which can establish benchmarks on the basis of desirable ratios and correct its 'course' according to the importance of the changes produced in its indicators. Empirical and analytical studies have considered the way firms try to adjust their individual values with those of the industry in which they operate, with the aim being to identify areas of abnormal performance in their organization. These comparisons often take as a reference the average ratios of the industrial sector to which these firms belong, with the main determinant of the evolution of each ratio being the error correction with respect to these average values (see, for example, Lev, 1969, or Frecka and Lee, 1983). But why is it to be expected that industry averages would be financial accounting ratio targets? This is because investors compare the economic conditions of firms within the industry. For example, if the extent of earnings management differs considerably from the industry-wide average, investors and other stakeholders may regard it as a signal of the future success of the firm. In this sense, the amount of earnings management of a firm cannot be expected to deviate too much from the industry-wide average in the long run (Kallunki and Martikainen, 1999). When seeking to explain the movements of financial ratios, the model allows us to estimate the effects of two main forces: (1) the passive movement of financial ratios due to exogenous factors, and (2) the active adjustment of financial ratios by management towards the desired target (Wu and Ho, 1997).

The purpose of this paper is first to propose an alternative model to determine the value around which the ratios are adjusted. Using this model, we then carry out a dynamic analysis of financial ratios adjustment in European financial statement in order to estimate the variation in these ratios over time.

Previous studies have tried to offer explanations for the differences observed between countries by reference to considerations of a cultural or institutional type. By contrast, few papers have gone on to consider the possibility that these differences might also be due to strategic or management motivations.[1] Thus, a particular aim of this paper is to analyse the similarities and differences that exist in the adjustment of the financial ratios of each country. Here, we pay particular attention to the extent to which the observed behaviour of the adjustment ratios is due to factors related to firms' efficiency or to their capacity to react to external shocks which affect all countries.

The paper is organized as follows. In Section 2 we consider the most important studies on the problem of financial ratio adjustments, as well as their main limitations. Section 3 is devoted to a brief presentation of the database used in the paper. In Section 4 we describe the proposed model, which is then applied to a statistical analysis of the data in Section 5. Section 6 closes with a review of the most important conclusions.

2. BACKGROUND

A significant part of the studies devoted to analysing the evolution of financial ratios have been based on the partial adjustment model proposed in Lev (1969). This establishes that firms adjust their financial ratios in each period in function of their relative position with respect to the average values of the sector in which they operate. Subsequently, Lee and Wu (1988) incorporated the persistence of changes in the average of the sector into the original model. This model was then improved by Peles and Schneller (1989) and Davis and Peles (1993), under the assumption that when there is a deviation from management objectives, steps are thereafter taken within the firm that result in a return of the ratio to the objective or target value. Although the firms do not make their ratios objective, these authors presuppose that steps taken by management, together with the external forces of the market and the behaviour of the sectoral economy, would in any event establish the equilibrium values. In this latter work, the authors found that both the liquidity ratios, as well as those of performance, capital structure and gross margin, offered evidence of the existence of balancing forces which allowed the ratios to return to equilibrium values in the face of external shocks.

More recently, Wu and Ho (1997) have proposed an error correction model that explains the adjustment process of a ratio by reference to the joint action of two overlapping effects. First, there is an industry effect, of a passive and external character, which is proper to the sector in which the firm operates. Second, there is a management effect, of an active and internal character, which is attributable to direct action taken by the management of that firm. Their model also incorporates the transversal dependence of the series being analysed and models the short- and long-term dynamics in the movement of the financial ratios. Using pooling regression techniques, these authors estimate the average adjustment coefficients which reflect the sensitivity of the ratio of a firm to external shocks affecting all the industry, or to internal shocks affecting the firm in particular. They also find that the majority of the variation in the movement of the ratios is due to the active adjustments made by the management with the aim of achieving a relative position in the industry in accordance with their strategic objectives. Similarly, they report that small firms tend to have larger adjustment coefficients and are more sensitive to external shocks affecting the entire industry than their large-sized counterparts.

Other works have used the partial ratio adjustment model. Thus, Lehtinen (1996), based on the empirical results of Lev (1969), establishes the level differences in financial ratios across countries. Ho *et al.* (1997) attempt to remedy the problem of biased estimation for the speed of financial ratio adjustment by explicitly considering the interdependence among firms in that adjustment. Ozkan (2001) has investigated the determinants of the target capital structure of firms and the role of the adjustment process. Nwaeze (2001) analyses the intertemporal behaviour of accruals and estimates separate adjustment rates for total and managed accruals, before comparing them in order to assess the

influence of managers on accrual adjustment. Finally, Gallizo *et al.* (2002) propose a Bayesian hierarchical model based on the partial adjustment model to estimate the average adjustment coefficients associated with the error correction component and with the sensitivity of the firm to exogenous factors that have an industry-wide effect.

In this paper, we analyse the evolution of the financial ratios of a set of firms operating within the manufacturing sector of various EU Member States. For that purpose, we use a derivation of the earlier mentioned model proposed by Wu and Ho (1997). However, and by contrast to these authors, we use a random coefficients model which assumes that the adjustment coefficients of the series being analysed are not exactly equal, but rather fluctuate randomly around the average coefficients. This hypothesis provides more realism to the analysis being carried out, in that it reflects the fact that different countries have distinct institutional structures, which cause the speed of reaction not to be exactly the same from country to country.

Furthermore, given that the firms analysed operate in EU Member States, their adjustment coefficients will not be significantly different, with this being a consequence of the European Economic Space created in 1991 and the subsequent establishment of European Monetary Union. These steps have led to a tendency towards homogenization on the part of EU Member States and to a weakening of the role played by domestic institutions in the economic life of individual countries. In this context, we cannot forget the advances made in European financial reporting, after overcoming the obstacles represented by nationalistic inertia. Presently, a number of bodies are working for the harmonization of accounting rules and disclosure, notably the IASC (Nobes, 1998). More specifically, the drive towards accounting harmonization that has just taken place in Europe is a revolutionary change, made with the aim of perfecting the single market. The European Commission has announced its proposal that all European Union listed companies should be required to comply with International Accounting Standards from 2005 (Singleton, 2001). The first positive effect will be that multinational companies will be able to be listed on the stock markets of different countries without having to prepare additional accounts. There will also be an increase in the comparability of the financial statements produced by European companies and by those operating in other developed countries.

The characteristic that distinguishes this paper is the European ambit within which it is placed, given that earlier works have analysed the adjustment coefficients of financial ratios by reference to one single country. Under the approach adopted here, we can examine the changes in the ratios under the circumstances where, apart from reflecting the specific shocks of one sector, the model also takes into account the specific shocks of each country. Specifically, the proposed model allows us to test the homogeneity hypothesis of the adjustment coefficients of each country and to identify those countries which show a pattern of behaviour that is significantly different from the rest (see Section 5.2).

3. DATA

The data used in this paper have an annual character and are drawn from the Business Accounts Harmonized Data Bank (BACH) covering the period 1986–95. This BACH database is fed by data coming from the national bodies responsible for centralizing balance sheets for the European Commission, in such a way that aggregated information is obtained. With the aim of making comparative analysis possible, this database harmonizes the accounts in accordance with a plan that is consistent with the Fourth Directive. This gives rise to time series of accounting data, by sectors and by firm size, whose comparability has been improved as regards the structure of balance sheets and profit and loss accounts between countries.[2]

With the objective of having a minimum number that is adequate for analysing each one of the series being considered, we have taken the decision to include those countries that have at least eight data in each series. This criterion has led our analysis to be carried out with respect to seven countries, namely Austria, Denmark, France, Germany, Italy, the Netherlands and Spain.

Given that the weight of the data on manufacturing industry is very significant in the database as a whole, we have concentrated our study on comparisons within this sector, divided into sub-sectors (Table 1). As far as the selection of ratios is concerned we must not forget that a crucial question both in financial ratio analysis research and practice is to find a parsimonious set of financial ratios to cover the activities of the firm. The main approaches in this area are fairly clear-cut. They are pragmatic empiricism, a data-oriented classification approach, a deductive approach and, lately, the combination of the last two (Salmi and Martikainen, 1994). Pragmatic empiricism is exemplified by the textbooks of Lev (1974), Foster (1986) and Bernstein (1989) but in many cases it is the official bodies that also give recommendations. Generally the Security Exchange Commission stipulations influence the reporting of financial ratios in many countries. In Europe, where our study is based, it is the European Commission which has this function.

Table 1 Manufacturing industry (sub-sectors)

211.	Extraction of metalliferous ores
212.	Extraction of non-metalliferous ores
213.	Chemicals and man-made fibres
221.	Manufacture of metal articles, mechanical and instrument engineering
222.	Electrical and electronic equipment
223.	Manufacture of transport equipment
231.	Food, drink and tobacco
232.	Textiles, leather and clothing
233.	Timber and paper manufacture, printing
234.	Other manufacturing industries

The ratios correspond to the set used by the Directorate-General for Economic and Financial Affairs of the European Commission in its Annual Report on the 'Financial situation of European enterprises' (European Commission, 1997). Our aim has been to apply a new adjustment model to a selection of ratios established over the years for manufacturing industry. Our original idea has been to analyse the different speed of adjustment of financial variables between European countries and to obtain results on the convergence of their business structures as a consequence of the achievements of the single market. To that end, the use of a set of ratios tested in earlier works devoted to the financial analysis of European convergence would appear to be appropriate. Previous studies have shown that the ratios used are important indicators of the financial evolution of industrial firms (European Commission, 1995, 1997, 1998). Similarly, they have been used in multivariate studies of the EU economy by way of financial statements analysis (Serrano *et al.*, 2001, 2002), or to establish a comparison between the financial structures of SMEs and that of large enterprises within the EU (Rivaud *et al.*, 2001). Table 2 contains the definitions of the ten ratios employed.

This set of variables is divided into the following three classes: (1) profitability, (2) productivity and (3) indebtedness. The first three classes include familiar financial ratios, and cover the profitability of the firm from three alternative relevant perspectives. The gross profit margin (R1) enables the firm to create the necessary provisions to meet its financial charges and pay tax on its profits. The return on sales (R2), indicates the percentage of sales that is earned as net

Table 2 Financial ratios used in the study and their definitions

No.	*Financial ratio*	*Definitions*
I. Profitability		
(R1)	Gross profit margin	Ratio of gross operating profit or loss to net sales
(R2)	Return on sales (ROS)	Ratio of profit or loss for the financial year to net sales
(R3)	Return on equity (ROE)	Ratio of profit or loss for the financial year to equity capital
II. Productivity		
(R4)	Relative share of purchases	Ratio of consumption of goods and services to net sales
(R5)	Value-added ratio	Ratio of value added (operating income minus costs of materials) to net sales
(R6)	Relative share of staff costs	Ratio of staff costs to net sales
(R7)	Staff costs to value added	Ratio of staff costs to value added (operating income minus costs of materials)
III. Indebtedness		
(R8)	Gearing	Ratio of long- plus short-term debt to total assets
(R9)	Borrowing ratio	Ratio of financial indebtedness balance sheet total
(R10)	Debt structure	Ratio of long-term debt to short-term debt plus long-term debt

income that may be retained in the company to support operations, while the return on equity (R3) measure evaluates operating performance in relation to the resources provided by the shareholders. These three ratios refer to a company's overall ability to generate earnings and, by extension, cash flows operations (Haskins *et al.*, 1996: 133). As regards the productivity of materials, ratio (R4) for intermediate consumption makes clear the differences between countries that arise for a number of reasons, particularly the degree of specialization per industry in sectors that are raw-material intensive to differing degrees, and the degree of sub-contracting. These are aspects linked to the value added to sales (R5), which indicates the degree of vertical integration of a group of companies, and can also be interpreted as an index of vulnerability to disruptive action affecting supplies of materials and services (Morley, 1979). Similarly, the productivity of personnel, measured over sales (R6) or over value added (R7) reflects social changes, wages and salaries, and its importance in each country depends on the extent to which external labour is taken into account, the existence of employee participation schemes and the inclusion of pension funds provisions (Evraert and Belkaoui, 1998). Finally, the analysis of debt allows for three approximations to the development of financial alternatives in each country: (R8) expresses the proportion of debt to assets, where all the debts are taken into consideration (Rees, 1995); for its part, (R9) exclusively takes bank borrowings (Cooke, 1998); whilst (R10) expresses the nature of the debt according to their maturity. International comparison in the area of debt is a delicate process, given the differences in the behaviour and habits of each country. Nevertheless, it is true that the phenomenon of cross-border investment and the liberalization of financial activities means that these differences are increasingly smaller (Todd and Sherman, 1991). Thus, remaining with this area of debt, recent studies have obtained empirical evidence on the similarities in the behaviour of firms operating in the EU. These have shown that gearing (R8) decreases with the size of the firm in all European countries and that the debt structure, according to (R10), is such that short-term debt predominates over long-term in European SMEs (Rivaud *et al.*, 2001).

4. THE MODEL

Following Wu and Ho, we propose an error correction model to explain the ratios adjustment process. This model allows us, first, to distinguish between movements in the ratios that are due to general shocks affecting the complete environment or specific shocks affecting each country and, second, to estimate the capacity of reaction of each one of these to such shocks. Furthermore, the model offers a number of advantages over those formulated in earlier studies, given that we assume that the adjustment coefficients are not exactly equal, but rather fluctuate randomly around the average adjustment coefficients.

Let R be a financial ratio. Let $\{R_{ijt};\ t=1,\ldots,T;\ i=1,\ldots,N;\ j=1,\ldots,S\}$ be the observed data of R where R_{ijt} is the value of ratio R in the period t corresponding to the j sector of the i country. Further, let $\{y_{ijt}=\log(R_{ijt});$

$t = 1, \ldots, T;\ i = 1, \ldots, N;\ j = 1, \ldots, S\}$ be the values of the logarithms of such ratios. Finally let

$$x_t = \frac{1}{NS} \sum_{i=1}^{N} \sum_{j=1}^{S} y_{ijt}$$

be the average value of the logarithms of such ratios,

$$\Delta y_{ijt} = \alpha_{ij} + \lambda_{ij} \Delta x_{t-1} - \gamma_{ij}(y_{ijt-1} - x_{t-1}) + u_{ijt}$$
$$t = 2, \ldots, T;\ i = 1, \ldots, N;\ j = 1, \ldots, S \qquad (1)$$

where Δ is the difference operator value in period t of the logarithm of the geometric average of the ratios of the firms of the countries and sectors being analysed, λ_{ij} measures the sensitivity of the series y_{ijt} to shocks that affect all countries and sectors, γ_{ij} is the adjustment coefficient to shocks that affect the relative position of the *i*th country and *j*th sector in the industry as a whole and u_{ijt} is an error term.

As we have indicated earlier, the firms analysed take the average value of the industry in which they operate as the reference value of the long-term ratio, fixing their position in function of that level but without that position having to be the same for each firm. This supposes that the coefficients $\{\lambda_{ij};\ i = 1, \ldots, N;\ j = 1, \ldots, S\}$ and $\{\gamma_{ij};\ i = 1, \ldots, N;\ j = 1, \ldots, S\}$ are random and that they oscillate around average values λ and γ so that:

$$\lambda_{ij} = \lambda + v_{ij};\ \gamma_{ij} = \gamma + w_{ij} \quad i = 1, \ldots, N;\ j = 1, \ldots, S \qquad (2)$$

where

$$\left\{ \begin{pmatrix} v_{ij} \\ w_{ij} \end{pmatrix};\ i = 1, \ldots, N;\ j = 1, \ldots, S \right\}$$

are independent random variables with averages vector 0 and variances and covariances matrix Θ. Finally, we assume that the errors $\{\mathbf{u}_t;\ t = 1, \ldots, T\}$ where $\mathbf{u}_t = (u_{11t}\ u_{12t}\ \ldots\ u_{NSt})'$ are an NS-variant white noise with variances and covariances matrix $\Sigma = (\sigma_{kl})$.

It is clear that we have opted for a random effects model rather than for a fixed effects one. In our case, that is to say, in an application to EU Member States, we believe that the institutional factors that operate in both the product and financial markets are not fixed, but rather are changing over time. Having said that, we assume that such changes do not take place sharply. The legislative reforms introduced by the regulatory bodies during the period under study have been due, amongst other factors, to the advances that have been made in the construction of the European Union: its expansion, the elimination of trade barriers, the criteria

imposed by the single currency, etc. All these lead us to think that the adjustment coefficients will be neither very different nor static over the years, but will rather demonstrate a certain random fluctuation around the average European adjustment coefficient.

Finally, it should be noted that in all cases we have analysed for the existence of possible autocorrelation in the residuals of the adjusted models using the Box–Ljung test for 1, 2, 3 and 4 lags, without finding significant results at either the 1% or 5% levels.

5. RESULTS

In this section we consider the results obtained by applying the methodology described in Section 4 to the data presented in Section 3. The results obtained for each ratio are commented on in Section 5.1 and the results for each country are considered in 5.2.

5.1. Results obtained for each ratio

Table 3 contains the results obtained in the manufacturing sector for the ten ratios analysed. We should first note that, with respect to all these ratios, the hypothesis of constancy of the adjustment coefficient is rejected in all the countries and subsectors considered. This is made clear by the *p*-values of the randomness test and the high variation coefficients of each one of the adjustment coefficients, which indicates that the observed behaviour of the series being analysed is not homogeneous.

When considering the percentage of systematic variation due to the external effects, that is to say, due to shocks that affect the industry as a whole V_λ, we can further observe that, in almost all cases, the influence of these is stronger than that of the internal effects, i.e. of each country, with the sole exception of the debt structure (R10) ratio. This is explained not so much by the influence of specific political or economic decisions that affect it, but rather by the composition of the ratio itself, where it is the financial strategy of the firms which determines the degree of maturity of their liabilities.

The estimations of both adjustment coefficients verify the restrictions of the model. The estimations of the coefficients λ oscillate between 43.46% in ratio R8 and 94.14% in ratio R3, whilst those of the coefficients γ are lower, ranging from 21.13% in ratio R4 to 46.54% in ratio R10. Thus, we can affirm that, in the countries and manufacturing sectors analysed, the evolution of the ratios being considered tends to demonstrate a greater sensitivity to shocks which affect all the industry than to shocks which affect each country in particular. In this sense, it should be borne in mind that different industries could adopt certain accounting choices that are traditionally followed within each industry. Since the selection of accounting procedures will ultimately affect the figures in financial statements, the financial ratio behaviour may vary across industries (Wu and Ho, 1997).

Table 3 Results in the manufacturing sector

Ratio	$\hat{\lambda}$	$Std(\hat{\lambda})$	$\hat{\gamma}$	$Std(\hat{\gamma})$	$CV(\lambda)$	$CV(\gamma)$	V_λ	R^2
(R1) Gross profit margin	0.8010	0.1116	0.4177	0.0635	1.0330	0.8883	0.6195	0.4773
(R2) Return on sales	0.8982	0.1182	0.4570	0.0635	0.9991	0.7250	0.6659	0.4825
(R3) Return on equity	0.9414	0.1481	0.3847	0.0642	1.2100	0.9411	0.7146	0.4627
(R4) Relative share of purchases	0.4521	0.0972	0.2113	0.0765	1.2610	1.3570	0.6384	0.3700
(R5) Value-added ratio	0.6987	0.0949	0.4064	0.0727	0.7063	0.7833	0.5109	0.3811
(R6) Staff costs to sales	0.6864	0.0749	0.4318	0.0680	0.6099	0.7263	0.7081	0.5229
(R7) Staff costs to value added	0.7593	0.0912	0.3861	0.0636	0.7642	0.7766	0.7697	0.5337
(R8) Gearing	0.4346	0.0990	0.2142	0.0540	1.2600	1.2020	0.5279	0.2192
(R9) Borrowing ratio	0.5778	0.0955	0.2688	0.0541	0.9032	0.9758	0.5468	0.2855
(R10) Debt structure	0.7578	0.1391	0.4654	0.0624	1.1450	0.6637	0.3892	0.3379

Notes:
$CV(\lambda)$: variation coefficient of $\{\lambda_{ij}; i = 1, \ldots, N; j = 1, \ldots, S\}$. $CV(\gamma)$: variation coefficient of $\{\gamma_{ij}; i = 1, \ldots, N; j = 1, \ldots, S\}$. V_λ: percentage of systematic variation explained by the passive effects. R^2: squared multiple correlation coefficient.

We can further note that the ratios that relate profitability (R1 to R3) tend to be more sensitive to external shocks than is the case with the other ratios, as their high passive adjustment coefficients (between 80.10% and 94.14%) make clear. This could be due to the high degree of interconnection between the firms of the countries being analysed, by virtue of them all belonging to the European Union. Such a relationship means that cycles of economic growth and recession tend to affect all sectors and countries equally, without giving rise to significant individual repercussions that could reveal themselves in a higher value of the active adjustment coefficients.

Similarly, the productivity of labour and value-added ratios (R5 to R7) demonstrate a marked sensitivity to shocks caused by management activities, in the form of active adjustment coefficients (between 38.61% and 43.18%). Here, we are dealing with ratios whose values are particularly determined by staff costs which are, in turn, significantly influenced by management activities, such as contracting more or less overtime hours according to the volume of orders, assigning work to outside the firm or establishing production incentives. The firm will exert an influence over the adjustment coefficient of the ratio by way of any of these active policies. In this way, the results obtained show that, for these ratios, the percentage of movements attributable to strategic management is very high.

The purchases of goods and services ratio (R4) shows a low speed of convergence, with a value of the active adjustment coefficient of 21.13%. This ratio measures productivity in intermediate consumption and provides information on the degree of specialization of each industrial activity. In the period under analysis, European manufacturing firms experienced difficulties with respect to this ratio, with sales contracting or increasing more quickly than forecast, and with management not being able to reduce intermediate consumption to the same extent, which could explain the limited reaction of this adjustment coefficient.

The indebtedness ratios tend to demonstrate a lower sensitivity to all types of shocks. This is either because their adjustment coefficients tend to be the lowest (ratios R8 and R9), or because the percentages of variation explained by these shocks tend to be lower, giving rise to small values of the multiple correlation coefficients. This indicates a certain stability over time in the indebtedness of the firms of all the countries, with the general movements of the economy hardly affecting this indicator. In this regard, it is well known that in Europe the nominal rates of interest fell from the middle of the 1990s, but without this giving rise to an appreciable variation in the level of indebtedness of European firms. This contradicts the traditional assumption that investments did not increase because the cost of credit was too high. The explanation for this stability can possibly be found in the deregulation of the capital markets and the liberalization of financial activities, which led to an increase in investments through the development of financial instruments that are alternative to traditional bank financing.

5.2. Results by country

Table 4 contains the results obtained on a country-by-country basis for the ratios related to profitability. When analysing the values of the homogeneity test, we can note that the main differences as regards the adjustment coefficients correspond to Denmark, Germany and Spain.

Denmark and Germany have external and internal adjustment coefficients for the R2 and R3 ratios that are smaller than the average adjustment coefficients estimated in Table 4, demonstrating a lower sensitivity than the other countries to all types of shocks. By contrast, Spain demonstrates external adjustment coefficients that are significantly higher than the rest, showing a greater sensitivity to external shocks, very probably due to its strong dependence on the exterior.

In relative terms, we should particularly note that in the evolution of the ratios for Denmark, the effect of internal shocks has more importance than that of external shocks, with the contrary being the case for Germany. This is demonstrated by the fact that the percentage of variation (var_λ) in Denmark is lower than 0.5 for almost all the ratios whilst in Germany it is higher than 0.5. As regards the other countries, their behaviour is similar to that of Germany, save for the case of Austria, which demonstrates behaviour similar to that of Denmark.

Table 4 Country-by-country results for profitability-related ratios

Ratio	*Country*	p_{HOM}	λ	*Std*(λ)	γ	*Std*(γ)	Var_λ
(R1) Gross profit ratio	Austria	0.48	0.8517	0.2698	0.6093	0.1448	0.4002
	Denmark	0.064	0.3228	0.1635	0.2362	0.1298	0.4726
	France	0.21	0.5543	0.1277	0.5305	0.1784	0.6403
	Germany	0.45	0.6773	0.1978	0.7317	0.2696	0.5833
	Italy	0.68	0.6279	0.18	0.3383	0.178	0.7758
	Netherlands	0.76	0.6609	0.2015	0.4951	0.1484	0.6872
	Spain	0.011	2.3	0.3787	0.4513	0.1228	0.7684
(R2) Return on sales	Austria	0.45	0.7469	0.1649	0.6265	0.192	0.5588
	Denmark	0.008	0.2354	0.1553	0.3134	0.1575	0.3341
	France	0.31	0.7411	0.1283	0.5994	0.1859	0.7064
	Germany	0.0014	0.2724	0.09731	0.1554	0.1242	0.8456
	Italy	0.5	0.6905	0.1643	0.4911	0.1767	0.7484
	Netherlands	0.45	1.134	0.3862	0.7003	0.1872	0.7462
	Spain	0.02	2.374	0.3809	0.3215	0.1029	0.8566
(R3) Return on equity	Austria	0.099	0.5684	0.2128	0.5134	0.1555	0.4445
	Denmark	0.037	0.3773	0.1663	0.2757	0.1219	0.4456
	France	0.055	0.6048	0.1423	0.5328	0.1958	0.6967
	Germany	0.011	0.3351	0.1487	0.3494	0.258	0.6353
	Italy	0.23	0.5983	0.1973	0.4924	0.2189	0.7306
	Netherlands	0.78	1.353	0.5568	0.3636	0.1254	0.8214
	Spain	0.053	2.618	0.6042	0.2864	0.1172	0.8948

Note:

p_{HOM}: *p*-value of the homogeneity test (see Appendix, equations (A10) and (A11)).

In Table 5 we present the results obtained for the ratios related to productivity. So far as the adjustment coefficients are concerned, we find no significant differences by reference to countries, save in the relative share of staff costs and in the staff costs relative to value-added ratios, where Spain has an external adjustment coefficient that is significantly higher than the rest. This indicates the limited capacity to react on the part of Spanish industry in adapting staff costs to changes in the economic environment. Specifically, the rigidities in the Spanish labour market during the period under study represented an obstacle to its correct functioning.

In relative terms, we should note that in the evolution of the productivity ratios of Spain, Italy and France, the effects of external shocks have more importance. However, when considering the same ratios, we find that for Austria, Denmark and, to lesser extent, Germany, it is the internal shocks that are more important. This result should come as no surprise if we recall that it is precisely in these

Table 5 Country-by-country results for productivity-related ratios

Ratio	*Country*	p_{HOM}	λ	*Std*(λ)	γ	*Std*(γ)
(R4) Relative share of purchases	Austria	0.27	1.344	0.5539	0.3442	0.1503
	Denmark	0.73	0.6115	0.2652	0.3623	0.2119
	France	0.91	0.3896	0.1391	0.165	0.1488
	Germany	0.78	0.5592	0.3855	0.4382	0.3113
	Italy	0.45	0.2548	0.1412	0.118	0.1984
	Netherlands	0.42	0.2547	0.152	0.2616	0.3339
	Spain	0.77	0.3295	0.1639	0.191	0.1916
(R5) Value-added ratio	Austria	0.97	0.7583	0.3484	0.4243	0.1495
	Denmark	0.49	0.4173	0.2461	0.2726	0.1539
	France	0.93	0.774	0.1853	0.4202	0.1819
	Germany	0.8	0.5981	0.2835	0.5506	0.2516
	Italy	0.78	0.8212	0.2607	0.3251	0.2707
	Netherlands	0.81	0.7803	0.3542	0.5381	0.223
	Spain	0.75	0.8973	0.2458	0.4638	0.155
(R6) Staff costs to sales	Austria	0.83	0.7876	0.2249	0.5154	0.1619
	Denmark	0.73	0.5279	0.2067	0.3561	0.1678
	France	0.66	0.5648	0.1354	0.3654	0.1365
	Germany	0.8	0.5549	0.1787	0.4287	0.219
	Italy	0.41	0.8285	0.2204	0.2265	0.23
	Netherlands	0.63	0.8701	0.2112	0.5213	0.2094
	Spain	0.35	0.9994	0.1996	0.5587	0.1567
(R7) Staff costs to value added	Austria	0.39	0.6447	0.253	0.6572	0.1845
	Denmark	0.22	0.3767	0.1964	0.2396	0.1404
	France	0.46	0.5674	0.1495	0.5067	0.1754
	Germany	0.8	0.6249	0.2269	0.4558	0.2565
	Italy	0.55	0.92	0.1856	0.2778	0.187
	Netherlands	0.93	0.8423	0.2244	0.4112	0.1762
	Spain	0.015	1.768	0.2554	0.4468	0.1349

Note:
p_{HOM}: *p*-value of the homogeneity test (see Appendix, equations (A10) and (A11)).

Table 6 Country-by-country results for indebtedness ratios

Ratio	*Country*	p_{HOM}	λ	*Std*(λ)	γ	*Std*(γ)
(R8) Gearing	Austria	0.54	0.5946	0.283	0.374	0.1456
	Denmark	0.25	0.05509	0.1935	0.1896	0.1041
	France	0.94	0.4944	0.1707	0.2199	0.1263
	Germany	0.81	0.645	0.4493	0.3441	0.2851
	Italy	0.21	0.1888	0.2387	0.01494	0.09089
	Netherlands	0.23	1.02	0.2849	0.2776	0.1317
	Spain	0.23	0.9958	0.3389	0.3865	0.1381
(R9) Borrowing ratio	Austria	0.42	0.7436	0.305	0.4335	0.1363
	France	0.73	0.4728	0.2292	0.3801	0.1394
	Germany	0.58	0.4012	0.26	0.3863	0.1477
	Italy	0.098	0.183	0.1472	0.08085	0.1011
	Netherlands	0.48	0.9586	0.3059	0.3548	0.1152
	Spain	0.12	1.025	0.2159	0.5609	0.1648
(R10) Debt structure	Austria	0.87	0.8988	0.4331	0.5463	0.1671
	Denmark	0.78	0.7787	0.3116	0.5697	0.1343
	France	0.65	0.4801	0.2777	0.4407	0.1705
	Germany	0.72	0.4409	0.3587	0.4056	0.2186
	Italy	0.37	0.3925	0.471	0.2996	0.1355
	Netherlands	0.98	1.794	0.3512	0.434	0.1888
	Spain	0.22	1.6	0.4181	0.4198	0.1358

Note:
p_{HOM}: *p*-value of the homogeneity test (see Appendix, equations (A10) and (A11)).

latter three countries where the most important reductions in the staff costs item have been made during the period under analysis with respect to the European average. This has resulted in the substitution of labour for capital and the subsequent obtaining of a significant increase in labour productivity (see European Commission, 1997).

It is known that the purchase of goods and services represents the main source of costs for European firms, but the capacity of firms to decide on this item varies significantly from one country to another. Note that the movements of R4, relative share of purchases, due to the active coefficients are low in Italy, France and Spain, countries located in the south of Europe where there is a lower degree of specialization on the part of manufacturing industry and a relatively lower level of productive sub-contracting. It is perhaps for this reason that management decisions have less control over this financial ratio.

As regards the indebtedness ratios, here we can note that the specific or country-based factors exert a greater influence over the forces that determine the adjustment of these ratios. The decline in economic growth during the early 1990s contributed towards the creation of a climate that was unfavourable to investment. A number of works have demonstrated that at the same time, in a number of countries, such as France, the economic life of plant and machinery was being extended, reflecting the wish to make better use of existing capital (European Commission, 1998). The

cause is not, therefore, a classic squeeze by the banks, but rather prudent behaviour by firms. We cannot find significant differences in the adjustment coefficients of the countries. In relative terms, the behaviour is similar to that of the productivity ratios, except in the case of the debt structure ratio (R10), where the effects of the internal shocks are more pronounced than those of the external shocks. For this debt ratio, the lowest value of γ is 0.01 for Italy, highlighting the difficulties in the possible stabilizing mechanisms through which industry corrects its debt levels in the face of specific events.

In summary, our findings suggest that the effects on debt ratios that incorporate long-term items require some time before they materialize and to depend on the configuration of several banking sector characteristics. Nevertheless, we should note that several recent works have found that financial integration and the gradual elimination of international cost differences in the provision of financial services, are allowing for the convergence of debt ratios in European industries (e.g. Haliassos and Christou, 2000).

6. CONCLUSIONS

In this paper we have presented an analysis of financial ratio adjustment in European financial statements. To that end, we have used data on the financial ratios of firms operating in the manufacturing sector of the EU Member States that participate in the BACH database. Using a partial adjustment model, we have distinguished the movements in the ratios caused by shocks affecting an entire manufacturing sector from those that are specific to the country being analysed.

The proposed model is different from the so-called simple partial adjustment, which considers the changes as global adjustments towards the desired objectives, as well as from the model recently proposed in Wu and Ho (1997). This is the case because our random coefficients model assumes that the adjustment coefficients of the series being analysed are not exactly equal, but rather fluctuate randomly around the average adjustment coefficients which, we argue, gives more realism to the analysis being carried out.

The results demonstrate that the sensitivity of the manufacturing firms is high in the ratios that measure productivity in the consumption of goods and services. This supposes that, at least in the sector being analysed, the firms possess a significant capacity to adapt their costs to the volume of sales. Thus, in a period of falling economic activity, firms experience operative difficulties resulting from the decline in sales, and reduce their purchases in a similar proportion. By contrast, in a period of economic expansion, the increase in sales is accompanied by the increase in intermediate costs.

Furthermore, the velocity of convergence is high in the labour productivity ratios, where the percentage of adjustment attributable to the management of the firm exceeds 40%. The lower speeds of adjustment tend to appear in the indebtedness ratios, reflecting the more limited capacity of manoeuvre of firms in this regard.

In general, our results demonstrate adjustment coefficients λ and γ that are higher than those obtained in the earlier works of Davis and Peles (1993) and Wu and Ho (1997). Furthermore, and by contrast with this latter work, the percentage of movement of the ratios attributed to the strategic management of the firms is lower than the external adjustment, with the sole exception of indebtedness.

These differences could be due to the fact that the series analysed in our work correspond to the average ratios of the firms in a given country. In such circumstances, the evolution of these series is, in general, smoother than those corresponding to individual firms, which is the type of series analysed by Wu and Ho (1997).

When considered on a country-by-country basis, the most significant differences appear in the results ratios, where we can note that Denmark and Germany are less sensitive to all types of shocks than the rest, and that Spain has the highest sensitivity to external shocks. For their part, the other ratios do not show significant differences with respect to the adjustment coefficients, given the limited sample size per series, which causes the standard errors of the estimators used to be bigger and the power of the tests to fall.

Future lines of research should be directed towards analysing the consequences of European economic integration. It is to be expected that with data up to the year 2000, and in the context of EMU, where firms will employ a common technology and where the economic cycles will be more similar, national economies will present smaller differences between one another. Only in the case of productive specialization, aimed at achieving a better exploitation of as yet untapped competitive advantages, will there be situations in which each country is subject to different levels of disturbances. As a result, they will then demonstrate different adjustment coefficients, depending on the specific shocks to the industry in which they have specialized. In future works it will be interesting to test these assumptions.

ACKNOWLEDGEMENTS

This work has benefited from the financial support provided by Research Project 2FD97-2091 of the European Regional Development Fund (ERDF) and SEC2001-1798. The authors would also like to express their thanks to three anonymous referees and to Professor Kari Lukka (Editor) for their helpful and constructive observations on an earlier version of this paper.

APPENDIX: STATISTICAL METHODOLOGY

A.1. Estimation of the parameters

The estimations of the parameters λ and γ have been obtained by generalized least squares and are based on the results obtained in Swamy (1970), but taking

into account that the errors $\mathbf{u}_t$ are contemporaneously correlated. These estimators are given by the expression:

$$\hat{\beta}_p = \begin{pmatrix} \hat{\lambda}_p \\ \hat{\gamma}_p \end{pmatrix} = \left(\mathbf{X}'\hat{\Omega}^{-1}\mathbf{X}\right)^{-1}\left(\mathbf{X}'\hat{\Omega}^{-1}\Delta\mathbf{y}\right) \tag{A1}$$

where:

$$\begin{aligned}
\Delta\mathbf{y} &= \left(\Delta\mathbf{y}'_{11}, \ldots, \Delta\mathbf{y}'_{NS}\right)' \quad \text{with} \\
\Delta\mathbf{y}_{ij} &= (\Delta y_{ij3}, \ldots, \Delta y_{ijT})' \quad i = 1, \ldots, N;\ j = 1, \ldots, S \\
\mathbf{X}' &= \left(\mathbf{X}'_{11}, \ldots, \mathbf{X}'_{NS}\right) \quad \text{with} \\
\mathbf{X}_{ij} &= \begin{pmatrix} \Delta x_2 & y_{ij2} - x_2 \\ \ldots & \ldots \\ \Delta x_{T-1} & y_{ijT-1} - x_{T-1} \end{pmatrix} \quad i = 1, \ldots, N;\ j = 1, \ldots, S \\
\hat{\Omega} &= \begin{pmatrix} \mathbf{X}_{11}\hat{\Theta}\mathbf{X}'_{11} + \hat{\sigma}_{11}\mathbf{I}_{T-2} & \ldots & \hat{\sigma}_{1M}\mathbf{I}_{T-2} \\ \ldots & \ldots & \ldots \\ \hat{\sigma}_{1M}\mathbf{I}_{T-2} & \ldots & \mathbf{X}_{NS}\hat{\Theta}\mathbf{X}'_{NS} + \hat{\sigma}_{MM}\mathbf{I}_{T-2} \end{pmatrix}
\end{aligned} \tag{A2}$$

$$\hat{\Theta} = \frac{1}{M}\sum_{i=1}^{N}\sum_{j=1}^{S}(\hat{\beta}_{ij} - \bar{\beta})(\hat{\beta}_{ij} - \bar{\beta})' \tag{A3}$$

with

$$\hat{\beta}_{ij} = \begin{pmatrix} \hat{\lambda}_{ij} \\ \hat{\gamma}_{ij} \end{pmatrix} \quad i = 1, \ldots, N;\ j = 1, \ldots, S$$

being the least squares estimators of

$$\beta_{ij} = \begin{pmatrix} \lambda_{ij} \\ \gamma_{ij} \end{pmatrix}$$

obtained for each series,

$$\bar{\beta} = \frac{1}{M}\sum_{i=1}^{N}\sum_{j=1}^{S}\hat{\beta}_{ij} \quad \hat{\Sigma} = (\hat{\sigma}_{kl})$$

is the sample variance and covariances matrix of the least squares residuals of the regressions carried out separately for each series, and $M = NS$ is the total number

of observed series. It can further be proved that the covariances matrix of this estimator is given by $\text{cov}(\hat{\beta}_p) = (\mathbf{X}'\hat{\boldsymbol{\Omega}}^{-1}\mathbf{X})^{-1}$.

A.2. Testing the hypothesis

Having estimated the parameters of the model, it is interesting to test two types of hypothesis on the adjustment coefficients β, namely the random hypothesis and that of homogeneity.

A.2.1. Test of the random hypothesis

This test analyses whether there is randomness in the estimated adjustment coefficients or whether, by contrast, it can be assumed that they are all equal. The null hypothesis of this test is H_0: $\beta_{11} = \beta_{12} = \ldots = \beta_{NS} = \beta$ and the test statistic is given by the expression:

$$RND = [(\hat{\beta} - (\tilde{\beta} \otimes \mathbf{1}_M))'\tilde{\boldsymbol{\Omega}}^{-1}(\hat{\beta} - (\tilde{\beta} \otimes \mathbf{1}_M)]/(2(M-1)) \tag{A4}$$

where $\hat{\beta} = \text{vec}(\hat{\beta}_{11}, \ldots, \hat{\beta}_{NS})$, $\mathbf{1}_M$ is the vector of M ones and:

$$\tilde{\beta} = ((\mathbf{1}'_M \otimes \mathbf{I}_2)\tilde{\boldsymbol{\Omega}}^{-1}(\mathbf{1}_M \otimes \mathbf{I}_2))^{-1}((\mathbf{1}'_M \otimes \mathbf{I}_2)\tilde{\boldsymbol{\Omega}}^{-1}\hat{\beta}) \tag{A5}$$

is the MLE estimator of β if H_0 is true, where:

$$\tilde{\boldsymbol{\Omega}} = \begin{pmatrix} \hat{\sigma}_{11}(\mathbf{X}'_{11}\mathbf{X}_{11})^{-1} & \ldots & \hat{\sigma}_{1M}(\mathbf{X}'_{11}\mathbf{X}_{11})^{-1}(\mathbf{X}'_{11}\mathbf{X}_{NS}) \\ & & \times(\mathbf{X}'_{NS}\mathbf{X}_{NS})^{-1} \\ \ldots & \ldots & \ldots \\ \hat{\sigma}_{1M}(\mathbf{X}'_{NS}\mathbf{X}_{NS})^{-1}(\mathbf{X}'_{NS}\mathbf{X}_{11}) & & \\ \times(\mathbf{X}'_{11}\mathbf{X}_{11})^{-1} & \ldots & \hat{\sigma}_{MM}(\mathbf{X}'_{NS}\mathbf{X}_{NS})^{-1} \end{pmatrix} \tag{A6}$$

It can be demonstrated that, under the null hypothesis, the *RND* statistic is distributed approximately as an $F_{2(M-1),M(T-2)}$. The p-value of the test is given by:

$$P_{RND} = P[F_{2(M-1),M(T-2)} \geqslant RND_{\text{obs}}] \tag{A7}$$

where RND_{obs} is the observed value of the *RND* statistic.

In our case, we have used this test to analyse whether the adjustment coefficients of the series being analysed can, for practical effects, be considered as if they were equal, given that, in this case, a more efficient estimator of the

common adjustment coefficient β would be estimated by equation (A5) whose covariances matrix is given by:

$$\text{cov}(\tilde{\beta}) = ((\mathbf{1}'_M \otimes \mathbf{I}_2)\tilde{\Omega}^{-1}(\mathbf{1}_M \otimes \mathbf{I}_2))^{-1} \tag{A8}$$

A.2.2. Test of the homogeneity hypothesis

The homogeneity test is used to analyse whether the average value of the adjustment coefficients of a set of series being analysed is equal to a previously determined value, β_0. Specifically, this test allows us to analyse whether the average adjustment coefficients of the countries being analysed are significantly different from the average adjustment coefficients of the ratios. Thus, if the country being considered is the *i*th, the null hypothesis to be tested will be H_0: $\beta_i = \beta_0$ where it is assumed that:

$$\beta_{ij} = \begin{pmatrix} \lambda_{ij} \\ \gamma_{ij} \end{pmatrix} = \beta_i + \begin{pmatrix} v_{ij} \\ w_{ij} \end{pmatrix} = \begin{pmatrix} \lambda_i \\ \gamma_i \end{pmatrix} + \begin{pmatrix} v_{ij} \\ w_{ij} \end{pmatrix} \tag{A9}$$

and where

$$\left\{ \begin{pmatrix} v_{ij} \\ w_{ij} \end{pmatrix};\ j = 1, \ldots, S \right\}$$

are independent random variables with averages vector 0 and variances and covariances matrix Θ_i. The test statistic is given by the expression:

$$F = \frac{(S-2)}{2(S-1)}(\hat{\beta}_{ip} - \beta_0)'(\mathbf{X}'_i\hat{\Omega}_i^{-1}\mathbf{X}_i)(\hat{\beta}_{ip} - \beta_0) \tag{A10}$$

where $\hat{\beta}_{ip}$, $\mathbf{X}_i$ and $\hat{\Omega}_i$ are given by expressions similar to (A1) and (A2). In all the cases, we have taken $\beta_0 = \hat{\beta}_p$ given by (A1).

It can be demonstrated that if the null hypothesis is true, then this statistic is distributed approximately as an $F_{2,S-2}$. The *p*-value of the test will be given by the expression:

$$P_{\text{HOM}} = P[F_{2,S-2} \geqslant F_{\text{obs}}] \tag{A11}$$

where F_{obs} is the observed value of F given by (A10).

NOTES

1 In the earlier literature, when making international comparisons, the objective of the various works has been to explain the differences of a cultural or institutional character between countries. Thus, Choi *et al.* (1983) analysed the extent to which the differences

observed between the ratios could be explained by the different business environment of the geographical areas under study: the USA, Japan and Korea. In this sense, it has been easier to find studies that justify such differences on the basis of considerations of an institutional, cultural, political and fiscal character, than those which offer explanations based on efficiency differences between countries (Foster, 1986: 190–1).

2 With the close co-operation of experts from the various Central Balance-Sheet Data Offices, the first phase of the project consisted of a detailed comparative study of the different accounting systems. This initial stage led to the completion of tables for the transition from national accounting systems to a single accounting system based directly on that set out in the Fourth Council Directive (European Commission, 1999). Stuart McLeay (1998: 436) confirms that analysts are in favour of using various information sources and, in this regard, he cites the Central Balance-Sheet Offices of the Bank of France as a public entity. At the same time, he has certain reservations on the use of the commercial information services, which often obtain their data on the basis of small samples.

REFERENCES

Bernstein, L. (1989) *Financial Statement Analysis: Theory, Application and Interpretation*, 4th edn. Homewood, IL: Irwin.

Berry, R. and Nix, S. (1991) 'Regression analysis v. ratios in the cross-section analysis of financial statements', *Accounting and Business Research*, 21(82): 107–17.

Choi, F., Hino, H., Min, S., Nam, S., Ujiie, J. and Stonehill, A. (1983) 'Analyzing foreign financial statements: the use and misuse of international ratio analysis', *Journal of International Business Studies*, Spring/Summer: 113–31.

Cooke, T. E. (1998) 'Regression analysis in accounting disclosure studies', *Accounting and Business Research*, Summer: 209–24.

Davis, H. and Peles, Y. (1993) 'Measuring equilibrating forces of financial ratios', *Accounting Review*, 68: 725–47.

European Commission (1995) 'Situation financière des enterprises industrielles', *European Economy*, Supplement A: 2.

European Commission (1997) 'Financial situation of European enterprises', *European Economy*, Supplement A: 7.

European Commission (1998) 'Financial situation of Europen enterprises', *European Economy*, Supplement A: 11–12.

European Commission (1999) 'Guide for BACH data users', *European Commission ECFIN*, October.

Evraert, S. and Belkaoui, A. (1998) 'Usefulness of value added reporting: a review and synthesis of the literature', *Managerial Finance*, 24(11): 1–15.

Foster, G. (1986) *Financial Statement Analysis*, 2nd edn. Englewood Cliffs, NJ: Prentice-Hall.

Frecka, T. and Lee, C. F. (1983) 'Generalized financial ratio adjustment processes and their implications', *Journal of Accounting Research*, Spring: 308–16.

Gallizo, J. L., Jimenez, F. and Salvador, M. (2002) 'Adjusting financial ratios: a Bayesian analysis of the Spanish manufacturing sector', *Omega*, 30(3): 137–248.

Haliassos, M. and Christou, C. (2000) 'Consumption smoothing and financial integration in the European Union', *The Manchester School*, 68(6): 637–58.

Haskins, M., Ferris, K. and Selling, T. (1996) *International Financial Reporting and Analysis. A Contextual Emphasis.* Homewood, IL: Irwin.

Ho, S., Lee, C. F. and Wu, C. (1997) 'Inter-company dynamics in the financial ratio adjustment', *Advances in Quantitative Analysis of Finance and Accounting*, 5: 17–31.

Kallunki, J.-P. and Martikainen, M. (1999) 'Do firms use industry-wide targets when managing earnings? Finnish evidence', *International Journal of Accounting*, 34(2): 249–59.

Lee, C.-F. and Wu, C. (1988) 'Expectation formation and financial ratio adjustment process', *Accounting Review*, 63: 292–306.

Lefebvre, C. and Flower, J. (1994) *European Financial Reporting. Belgium*. London: Routledge.

Lehtinen, J. (1996) *Financial Ratios in an International Comparison: Validity and Reliability.* Acta Wasaensia, 49. Universitas Wasaensis, Vaasa.

Lev, B. (1969) 'Industry averages as targets for financial ratios', *Journal of Accounting Research*, 7: 290–9.

Lev, B. (1974) *Financial Statement Analysis: A New Approach.* Englewood Cliffs, NJ: Prentice-Hall.

Lev, B. and Sunder, S. (1979) 'Methodological issues in the use of financial ratios', *Journal of Accounting and Economics*, December: 187–210.

McLeay, S. (1998) 'International financial analysis', in Nobes, C. and Parker, R. (eds) *Comparative International Accounting.* New York: Prentice-Hall, pp. 419–39.

Morley, M. F. (1979) 'The value added statement in Britain', *Accounting Review*, 54(3) July: 618–29.

Nobes, C. (1998) 'Harmonization of financial reporting', in Nobes, C. and Parker, R. (eds) *Comparative International Accounting.* New York: Prentice-Hall, pp. 66–91.

Nwaeze, E. (2001) 'The adjustment process of accruals: empirical evidence and implication for accrual research', *Review of Quantitative Finance and Accounting*, 17: 187–211.

Ozkan, A. (2001) 'Determinants of capital structure and adjustment to long run target: evidence from UK company panel data', *Journal of Business Finance and Accounting*, 28(1–2) January/March: 175–98.

Peles, Y. and Schneller, M. (1989) 'The duration of the adjustment process of financial ratios', *Review of Economics and Statistics*, 62: 527–32.

Rees, B. (1995) *Financial Analysis.* Hemel Hempstead: Prentice-Hall.

Rivaud, D., Dubocage, E. and Salais, R. (2001) 'Comparison between the financial structure of SMES and that of large enterprisese (LES) using the BACH database', Economic Paper No. 155, ECFIN, July.

Salmi, T. and Martikainen, T. (1994) 'A Review of the theoretical and empirical basis of financial ratio analysis', *Finnish Journal of Business Economics*, 4(94): 426–48.

Serrano, C., Mar-Molinero, C. and Gallizo, J. (2001) 'Country and size effects in financial ratios: a European perspective', Papers in Accounting and Finance, No. AF01-3, University of Southampton, October.

Serrano, C., Mar-Molinero, C. and Gallizo, J. (2002) 'A multivariate study of the EU economy via financial statements analysis', *Journal of the Royal Statistical Society Series D*, 51(3).

Singleton, B. (2001) '2005 – one year closer', *Accountancy*, July: 31.

Swamy, P. (1970) 'Efficient inference in a random coefficient regression model', *Econometrica*, 38(2) March.

Tippett, M. (1990) 'An induced theory of financial ratios', *Accounting and Business Research*, 21(81): 77–85.

Todd, R. and Sherman, R. (1991) 'International financial statement analysis', in Choi, F. (ed.) *Handbook of International Accounting.* New York: John Wiley.

Whittington, G. (1980) 'Some basic properties of accounting ratios', *Journal of Business Finance and Accounting*, Summer: 219–32.

Wu, C. and Ho, S.-J. K. (1997) 'Financial ratio adjustment: industry-wide effects or strategic management', *Review of Quantitative Finance and Accounting*, 9: 71–8.