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THE EXISTENCE OF INTER-INDUSTRY CONVERGENCE IN FINANCIAL RATIOS: EVIDENCE FROM TURKEY

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Abstract

Adjusting financial ratios to industry targets is an important reserach field in the finance literature. Empirical evidences suggest that firms do adjust their financial ratios to industry targets. Using the partial adjustment model, we employ the pooled OLS to investigate the behaviour of financial ratios of 100 firms in Turkish manufacturing industry for the period 1996 through 2004. The results indicate that the financial ratios are periodically adjusted to their industry means. But the speed of adjustment of all the financial ratios for Turkish manufacturing firms is slower than that for firms of transition countries and Western firms reported in earlier studies. The turnover ratios have lower adjustment speed than short-term liquidity ratios. The adjustment coefficients are the largest for short-term liquidity ratios. Therefore, these ratios can be adjusted in the short run more easily than the turnover ratios.

Key words: Financial ratios, industry target, the partial adjustment model, Turkey.
JEL classification: G32.

1. Introduction

In the finance literature, there are two competing models: the static trade-off theory and the pecking order theory. These models try to explain the financing decisions in firms.

The static trade-off theory assumes that the optimal capital structure can be visualized as a trade-off between the benefit of debt financing (the interest tax shelter) and the costs of debt financing (financial distress and agency costs). Each firm should set its target capital structure such that its costs and benefits of leverage are balanced at the margin, because such a structure will maximize its value. It is generally expected to find that firms, within a given industry, have similar capital structures, because such firms will have roughly the same types of assets, business risk, and profitability (Brigham and Gapenski, 1996: 382, 396). According to this theory, firms with a debt ratio below the target ratio adjust their debt upward towards the target debt ratio, and firms with a debt ratio above the target ratio adjust their debt downward towards the target debt ratio (Swinnen, Voordeckers and Vandemaele, 2005: 3).

On the other hand, the pecking order theory assumes that firm prefers internal to external financing and debt to equity if it issues securities. Firm has no well-defined target debt-to-value ratio (Myers, 1984: 576). The pecking order theory focuses on the capacity of the firm to secure internal equity financing (first), external debt financing (second), and external equity financing (third) (Claggett, 1991: 36). If firms have a positive free cash flow, the debt ratio below the target debt ratio moves further away from the theoretical target, while the debt ratio above the target moves towards the target debt ratio. If firms have a negative free cash flow, the debt ratio above the target debt ratio moves further away from the theoretical target, while the debt ratio below the target moves towards the target debt ratio (Swinnen, Voordeckers and Vandemaele, 2005: 4-5).

Financial ratios of firms tend toward some target value. The duration of the adjustment process is a function of benefit and cost to the firm of making the adjustment, and the time needed for a response to the adjustment by market forces operating on the industry and the firm. In general, an adjustment is costly and not likely to be immediate. Financial ratios involving only current balance sheet items, such as current assets and current liabilities, are to a large extent under the firm's control and easier to manipulate. Therefore, such ratios are expected to have a short duration of adjustment. A speedy adjustment of financial ratios entailing durables and other long-term

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balance sheet items, such as long-term liabilities and equity, can be quite expensive. It is expected their adjustment to be performed slowly (Peles and Schneller, 1989: 527-528).

In most of empirical studies, target adjustment models have been used to provide evidence that firms adjust towards target financial ratios. The results and implications of these studies show that the typical financial structure of a firm within a given broad classification differs significantly from the financial structure of a firm belonging to another class and the financial ratios of firms in the same industry have a tendency to convergence to the average value of the industry. Some of these studies are: Schwartz and Aronson (1967), Lev (1969), Bowen, Daley, and Huber (1982), Jalilvand and Harris (1984), Peles and Schneller (1989), and Konings and Vandenbussche (2004).

The target adjustment models are also used to test the empirical validity of the trade-off theory and the pecking order theory. The results of these tests indicate that firm long term debt to total asset ratio tends to move toward industry mean within one year. In general, more firms with above industry average long term debt ratios adjust toward the mean than those with below average ratios. Firms normally behave in a manner consistent with the pecking order theory. In small firms, the static trade-off theory and the behavioural principle are less important than the pecking order theory. Some of these studies are: Claggett (1991), Shyam-Sunder and Myers (1999), Voordeckers and Vandemaele (2005).

The purpose of this paper is to examine speed of adjustment to target financial ratio and adjustment behaviour of financial ratios in Turkish manufacturing industry. This paper is an important research to explain the financing decisions of Turkish firms. It contributes to financial adjustment behaviour of firms for finance literature and so, it might help the firms to make effective financial behaviour. This paper is organized as follows: Section 2 describes the model specification. Section 3 introduces the data. Section 4 discusses the empirical results. Section 5 concludes the paper.

2. The Model

In this study, a partial adjustment model based on Lev's study (1969) is used. This model may be used to test whether firms tend to adjust their financial ratios to the industry average. Furthermore, it is employed by economists in most of empirical analysis.

Information regarding the adjustment duration can be obtained if one of the following two conditions is satisfied: (a) the actual target level is known, or (b) the form of the adjustment is known. Target levels can be proxied by the respective industry average (Peles and Schneller, 1989: 528).

A brief description of the model is as follows (Lev, 1969):

$$y_t - y_{t\text{-}1} = \beta\,(y_t^* - y_{t\text{-}1}), \qquad 0 < \beta \leq 1 \tag{1}$$

y_t = the natural logarithm of a firm's financial ratio at time t,
$y_{t\text{-}1}$ = the natural logarithm of a firm's financial ratio at time t-1,
y_t^* = the natural logarithm of a firm's target financial ratio at time t,
Since y_t^* is not observable, target, y_t^* is determined by observable $x_{t\text{-}1}$.

$$y_t^* = x_{t\text{-}1} \tag{2}$$

$x_{t\text{-}1}$ is the industry mean of the ratio which determines the target according to (2).
The combination of (1) and (2) defines the partial adjustment model.

$$y_t - y_{t\text{-}1} = \beta\,(x_{t\text{-}1} - y_{t\text{-}1}). \tag{3}$$

The size of the coefficient β represents the speed of adjustment towards the industry mean. The estimated β falls between 0 and 1. It is an indication that the firm adjusts the year-to-year differences in the ratio according to the industry mean. The closer β is to 1, the faster the periodic adjustment.

3. Data and Measurements

Annual time series data for the period of 1996-2004 are used to form a balanced panel data with 900 observations. The data are taken from annual financial statements of 100 firms in the

manufacturing sector traded on the Istanbul Stock Exchange. The sectors and number of firms per sector are presented in Table 1.

Table 1

The industrial classification

Sector N°	Activity	N° firms per sector
1	Food, beverage and tobacco sector	13
2	Textile, wearing apparel and leather sector	14
3	Paper, printing and publishing sector	8
4	Chemical, petroleum, rubber and plastic product sector	18
5	Non-metallic mineral products sector	21
6	Basic metal sector	10
7	Fabricated metal products, machinery and equipment sector	16
	TOTAL	100

We employed well-known five financial ratios (see Table 2). Current and quick ratios are popular measures of liquidity of a firm. Current ratio indicates the firm's ability to meet or cover its current liabilities using its current assets. In the quick ratio, inventory is excluded. Long-term solvency ratio is financial leverage ratio. Short-term capital turnover ratio and long-term capital turnover ratio are activity ratios.

Table 2

Overview of variables and measures

Label	Variable	Measure/Proxy
y_1	Short-term liquidity ratios	Current assets less inventory to current liabilities (quick ratio)
y_2	Short-term liquidity ratios	Current assets to current liabilities (current ratio)
y_3	Long-term solvency ratios	Equity to total debt
y_4	Short-term capital turnover ratios	Sales to inventory
y_5	Long-term capital turnover ratios	Sales to total assets

Pooled OLS is used to estimate the coefficients of

$$y_{ki,t} - y_{ki,t\text{-}1} = \alpha + \beta\,(x_{ki,t\text{-}1} - y_{ki,t\text{-}1}) + u_{it} \quad (4)$$

where $y_{ki,t}$ is observation on the financial ratio k for the ith firm in the tth period, k = 1,..., 5, i=1,...100, and t = 1,...,9. $x_{ki,\,t\text{-}1}$ is the arithmetic mean of the ratio k for the industry that is concerning with i firm in the (t-1) th period, and u_{it} is an error term. When the null hypothesis for constant term (α=0) is accepted, the partial adjustment model holds.

The five models are estimated by using Eviews 5.1 econometric software. The standart errors of dependent variables are quite high (see Tables 3, 4, 5, 6 and 7), which may point out there could be a potential outliner problem and heteroskedasticity. With heteroskedastic errors, the OLS estimator is not efficient and the estimators of the variances are biased. White (1980) has derived a heteroskedasticity consistent covariance matrix estimator which provides correct estimates of the coefficient covariances in the presence of heteroskedasticity of unknown form. Eviews has corrected heteroskedastic errors by using White's covariance estimator (Eviews, 2004: 456).

4. Empirical Results

The regression results of the partial adjustment model (4) are given for each of the financial ratios in Tables 3 to 7. In these tables, the robust regression results report for overall sample. In most specifications, the constant term (α coefficient) is statistically different from zero. It has significance at 1% level for quick, current, and sales to total assets ratios while the constant term has significance at 5% level for equity to total debt ratio. Thus, the firms are adjusting towards

different targets than the industry mean for these ratios. But, the constant term is statistically insignificant for sales to inventory ratio. Thus, the firms are adjusting towards the industry mean target for sales to inventory ratio. The constant term has a negative value for sales to total assets ratio which suggests that firms are adjusting this ratio towards a target that lies below the industry mean financial ratio. The positive constant term suggests that firms are adjusting their quick, current, equity to total debt ratios towards a target that lies above the industry mean financial ratio.

The coefficient of determination, R^2, is not large for overall ratios. This indicates the existence of additional explanatory variables which are not included in (4). But the purpose of this paper is to examine the periodic adjustment hypothesis and not to develop a prediction model for the financial ratios.

The β values found from Tables 3 to 7 are closer to 0 for overall ratios, compared to adjustment ratios in the literature for firms of transition countries and Western firms (Konings and Vandenbussche, 2004: 148). Adjustment to industry targets for the entire sample of Turkish manufacturing firms is slow. We found an adjustment coefficient of 0.16 for quick ratio, 0.17 for current ratio, 0.11 for equity to total debt ratio, 0.10 for sales to inventory ratio, and 0.10 for sales to total assets ratio. The turnover ratios have the lowest adjustment speed (0.10 for sales to inventory ratio, 0.10 for sales to total assets ratio). The adjustment coefficients are the largest for the short-term liquidity ratios (0.16 for the quick ratio, 0.17 for the current ratio).

The financial ratios adjust differently to their target ratio; this can be explained by the nature of the ratios. The speed of adjustment of a ratio will depend on the relative significance of the cost of adjustment and the cost of being out of equilibrium. Some ratios (e.g., the current ratio and quick ratio) involve short-term items and are under the direct control of management. Therefore, they can be adjusted in the short run more easily (with less cost) than other ratios (turnover ratios) (Lev, 1969: 296). The results regarding Turkish manufacturing firms are consistent with expected for liquidity and turnover ratios.

Table 3

The robust regression results ($y_{1i,\,t} - y_{1i,\,t-1} = \alpha + \beta\,(x_{1i,\,t-1} - y_{1i,\,t-1}) + u_t$)

Quick Ratio	Coefficient	Std. Error	t-Statistic	Prob.
α (constant term)	0.037464	0.014135	2.650396	0.0082
β	0.155556	0.024452	6.361733	0.0000
R-squared	0.061822	Mean dependent var.		0.002484
Adjusted R-squared	0.060777	S.D. dependent var.		0.382411
S.E. of regression	0.370608	Sum squared resid.		123.3405
F-statistic	59.17456	Durbin-Watson stat.		2.056827
Prob (F-statistic)	0.000000			

Table 4

The robust regression results ($y_{2i,\,t} - y_{2i,\,t-1} = \alpha + \beta\,(x_{2i,\,t-1} - y_{2i,\,t-1}) + u_t$)

Current Ratio	Coefficient	Std. Error	t-Statistic	Prob.
α (constant term)	0.037706	0.013246	2.846584	0.0045
β	0.174920	0.030351	5.763318	0.0000
R-squared	0.063484	Mean dependent var.		-0.001833
Adjusted R-squared	0.062441	S.D. dependent var.		0.329792
S.E. of regression	0.319330	Sum squared resid.		91.57038
F-statistic	60.87326	Durbin-Watson stat.		2.012767
Prob (F-statistic)	0.000000			

Table 5

The robust regression results ($y_{3i,\,t} - y_{3i,\,t-1} = \alpha + \beta\,(x_{3i,\,t-1} - y_{3i,\,t-1}) + u_t$)

Equity to Total Debt Ratio	Coefficient	Std. Error	t-Statistic	Prob.
α (constant term)	0.061223	0.026614	2.300416	0.0217
β	0.113496	0.031845	3.564009	0.0004
R-squared	0.038220	Mean dependent var.		0.019691
Adjusted R-squared	0.037149	S.D. dependent var.		0.606833
S.E. of regression	0.595455	Sum squared resid.		318.4008
F-statistic	35.68544	Durbin-Watson stat.		2.135962
Prob (F-statistic)	0.000000			

Table 6

The robust regression results ($y_{4i,\,t} - y_{4i,\,t-1} = \alpha + \beta\,(x_{4i,\,t-1} - y_{4i,\,t-1}) + u_t$)

Sales to Inventory Ratio	Coefficient	Std. Error	t-Statistic	Prob.
α (constant term)	0.015129	0.013673	1.106475	0.2688
β	0.098378	0.017992	5.467980	0.0000
R-squared	0.036591	Mean dependent var.		-0.004273
Adjusted R-squared	0.035519	S.D. dependent var.		0.393854
S.E. of regression	0.386796	Sum squared resid.		134.3510
F-statistic	34.10717	Durbin-Watson stat.		2.206975
Prob (F-statistic)	0.000000			

Table 7

The robust regression results ($y_{5i,\,t} - y_{5i,\,t-1} = \alpha + \beta\,(x_{5i,\,t-1} - y_{5i,\,t-1}) + u_t$)

Sales to Total Assets Ratio	Coefficient	Std. Error	t-Statistic	Prob.
α (constant term)	-0.044532	0.009963	-4.469879	0.0000
β	0.095364	0.022045	4.325957	0.0000
R-squared	0.027792	Mean dependent var.		-0.048642
Adjusted R-squared	0.026710	S.D. dependent var.		0.304203
S.E. of regression	0.300113	Sum squared resid.		80.88110
F-statistic	25.67100	Durbin-Watson stat.		1.989180
Prob F-statistic)	0.000000			

5. Conclusion

This paper investigates the adjustment behaviour of financial ratios in Turkish manufacturing industry. The partial adjustment model is used to test and examine variables which are short-term liquidity, long-term solvency, short-term-capital turnover, and long-term turnover ratios. Data are taken from annual financial statements of 100 firms in the manufacturing sector traded on the Istanbul Stock Exchange for the 1996-2004 period.

The results of the test indicate that financial ratios are periodically adjusted to their industry means. But the speed of adjustment of all the financial ratios for Turkish manufacturing firms is slower than that for firms of transition countries and Western firms reported in earlier studies. Adjustment to industry targets for the entire sample of Turkish manufacturing firms is slow. The turnover ratios of these firms have lower adjustment speed than short-term liquidity ratios. The adjustment coefficients are the largest for short-term liquidity ratios. Because the short-term liquidity ratios (the current ratio, and the quick ratio) involve short-term items and under the direct control of management these ratios can be adjusted in the short run more easily than the turnover ratios. This may be explained by the nature of the ratios.

In most specifications, the firms are adjusting towards different targets than the industry mean for quick, current, sales to total assets, and equity to total debt ratios. But, the firms are adjusting towards the industry mean target for sales to inventory ratio. Furthermore, the firms are adjusting sales to total assets ratio towards a target that lies below the industry mean financial ratio. Also, the firms are adjusting their quick, current, equity to total debt ratios towards a target that lies above the industry mean financial ratio.

As a conclusion, the partial adjustment model may not be the most appropriate one for Turkish firms. Further research needs to improve a better model for Turkish economy.

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