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Article

Earnings quality and corporate life cycle before the crisis: A study of transport companies across europe

Amfiteatru Economic Journal

Provided in Cooperation with:

The Bucharest University of Economic Studies

Suggested Citation: Michalkova, Lucia; Cepel, Martin; Valaskova, Katarina; Vincurova, Zuzana (2022) : Earnings quality and corporate life cycle before the crisis: A study of transport companies across europe, Amfiteatru Economic Journal, ISSN 2247-9104, The Bucharest University of Economic Studies, Bucharest, Vol. 24, Iss. 61, pp. 782-796, <https://doi.org/10.24818/EA/2022/61/782>

This Version is available at:

<https://hdl.handle.net/10419/281662>

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**EARNINGS QUALITY AND CORPORATE LIFE CYCLE BEFORE THE CRISIS.
A STUDY OF TRANSPORT COMPANIES ACROSS EUROPE**

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Please cite this article as:

Michalkova, L., Cepel, M., Valaskova, K., Vincurova, Z., 2022. Earnings Quality and Corporate Life Cycle Before the Crisis. A Study of Transport Companies Across Europe. *Amfiteatru Economic*, 24(61), pp. 782-796.

DOI: [10.24818/EA/2022/61/782](https://doi.org/10.24818/EA/2022/61/782)

Article History

Received: 18 March 2022

Revised: 15 April 2022

Accepted: 25 June 2022

Abstract

Deteriorating macroeconomic conditions and plans to move to a green economy such as the Green Deal are putting pressure on both internal and external stakeholders to create a liquidity cushion in the event of unexpected expenditures. However, when analyzing reported earnings, which may constitute a source of internal financing, it is necessary to take into account the corporate life cycle, which changes the quality of reported earnings. The aim of the study is to identify and examine the impact of the corporate life cycle on the level of earnings quality in European transport companies in the pre-crisis years. A hierarchical linear mixed model was used to reveal these relationships, the sample included more than 30,000 companies covering the years 2011-2019 from 30 European countries. Discretionary accruals were used as quality proxy earnings, and the company's life cycle was modeled by the Dickinson cash flow model. Transport companies in Europe in the pre-crisis period had low-quality reported earnings. These enterprises manipulated earnings in accordance with the U-shaped curve, where mature firms applied downward earnings management techniques on average. Very large companies that were listed in the pre-crisis period chose upward earnings management, while smaller and unlisted companies opportunistically reduced reported earnings. These results imply that, in the pre-crisis period, European transport companies opportunistically obtained short-term benefits according to management requirements by reporting accounting profits other than cash flow. However, during the crisis and post-crisis years, they reduced their internal financing resources and/or affected the chances of obtaining state aid and other subsidies approved according to the accounting outputs.

Keywords: earnings quality, transportation, corporate life cycle, cash flow pattern.

JEL Classification: G31, G32

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Introduction

The world economy has faced several challenges since 2020, such as the COVID-19 pandemic, the scarcity of raw materials, or the rupture of supply chains (Rydell and Kucera, 2021). Szmigiera (2022) states that there is no clear consensus among economies as to how much a pandemic has damaged the world economy. However, they agree that it had several negative consequences, such as a decline in world GDP of at least 3.4%, turbulence in financial markets, and a decline in consumption. Several industries have been marked by the latter, such as the automotive, hospitality, and transport industries. Rodrigues et al. (2021) notes that the transport and tourism sectors have been affected in two ways; directly through declining incomes and indirectly by changing tourist and mobility patterns. The 70% drop in international tourist demand affected mainly rail, passenger ships and cruises and air transport. Changing conditions, together with rising costs for safety protocols, staff, and fuel, herald a long recovery period, which is also affected by the European Union Green Deal (Ionescu, 2021).

These conditions in the transport sector point to the need for a security cushion or liquidity cushion that businesses have in the event of an unexpected cash demand. Retained earnings is an important form of this security cushion, but adverse economic conditions increase the risk of accounting manipulation, special earnings management. The low quality of financial statements is reflected in the large gap between reported earnings and cash flows. Dechow et al. (2010) assess the concept of earnings quality from various points of view and offer several proxies for earnings quality. Hlawiczka et al. (2021) discussed the meaning of terms such as creative accounting, earnings management, which is most often associated with accruals.

Correct estimation of discretionary accruals as a proxy of earnings quality is crucial in the current economic situation. This highlights the relevance of earnings as a source of liquidity in unforeseen situations such as the current pandemic (Tucker, 2021). Several studies (Chen et al., 2010; Hribar and Yehuda, 2015; Suberi et al., 2012) have shown the inhomogeneity of the normal accrual generating process using estimation samples within a single industry. Although the companies in these samples had similar financial characteristics in line with macroeconomic conditions, the companies in these samples did not take into account the corporate life cycle. Chen (2016) or Habib and Hasan (2017) show the impact of the life cycle on the value of discretionary accruals and thus the quality of reported earnings. Moreover, earnings management techniques gained importance in the context of COVID-19, as shown by Lassoued and Khanchel (2021) observed a significant increase in upward earnings management in the pandemic year 2020. Liu and Sun (2022) found similar results in a sample of US companies. Susak (2020) looked at the relationship between financial reporting delays and discretionary accruals, with companies adjusting their financial statements in line with pessimistic expectations of economic developments. Hsu and Yang (2022) examined that the quality of reported profits decreased during the pandemic and the larger board has a mitigating effect on the quality of earnings. Priem (2021) notes that investors have increased the use of equity positions in response to the crisis.

The studies mentioned above point to several aspects of earnings management in the current economic climate: the vulnerability of some sectors, the impact of the company's life cycle, and the need for a liquidity cushion in the company. In this context, the aim of the study is to reveal and examine the impact of the corporate life cycle on the earnings quality detected as discretionary accruals in transport companies across Europe in pre-crisis years. The data

covered more than 30,000 transport companies and more than 220,000 observations from 2011-2019 from 30 European countries. Life cycle stages were estimated according to the Dickinson (2011) model; two models were used as earnings quality proxies – a modified Jones model from Dechow et al. (1995) of total discretionary accruals and Teoh et al. (1998), which covers short-term discretionary accruals. The variables Leverage, Profitability, Liquidity, or Corporate Growth were used as control variables at the corporate level; unemployment rate on an annual basis controlled the country's effect on the value of discretionary accruals. Due to the complexity of the data in terms of time- and cross-section, a hierarchical linear mixed model was used, which allows to include links between the data in several stages (observation, enterprise, and country).

1. Review of the scientific literature

There are several perspectives on earnings management, and thus on the reasons for changes in the quality of reported profits. Healy (1995) perceived the need to portray a stable company with predictable financial results. In addition to the title earnings management, McKee (2005) uses terms such as accounting magic, accounting alchemy, window dressing, or lending from the future; emphasizes, however, the legality of earnings management techniques. Desai and Dharmapala (2009) point out that the conditions imposed by the tax authorities allow managers to manipulate profits, which makes the financial statements obscure for investors and for the tax authorities.

Palacios-Manzano et al. (2021) highlight the issue of corporate social responsibility in relation to quality earnings and ethical investment. Garcia-Sanchez et al. (2020) agrees with the importance of corporate social responsibility for earnings management and adds that the level of earnings quality is also related to the maturity of the industry and thus to the life cycle stage of the industry. Sosnowski and Wawryszuk-Misztal (2019) consider the composition of the board, such as age, to be an important factor. Safta et al. (2020) adds that the level of profit manipulation in Romanian companies is also influenced by the industry. They found that 100% of the enterprises analysed in the tourism, construction, trade, and transport sectors manipulated the statements. Lanouar et al. (2013) examined the determinants of discretionary accruals on a sample of Tunisian companies; leverage, company size, and performance, together with other indicators, have a significant impact on discretionary accruals. Meek et al. (2007) agree on the importance of the impact of company size on earnings quality; Earnings management practices are more common in large companies. Siekelova et al. (2021) examined the impact of company size on the level of earnings management in the mining and quarrying sector; downward earnings management has been found in large and very large companies, while medium-sized companies are more inclined to upward earnings management. However, in the environment of Brazilian companies, corporate size has little effect on the level of accounting manipulations (Souza et al., 2013). Valaskova et al. (2021) describes that the level of earnings quality is influenced by country affiliation. Durana et al. (2021a) investigated the differences in the earnings management in the Central European and Baltic countries. Systematic profit manipulations were recorded in both regions, with time differences in the level of earnings management techniques.

As mentioned in the Introduction, the corporate life cycle is a significant factor in the quality of earnings as each stage of the life cycle has different financial characteristics, i.e.,

discretionary accrual estimation samples are therefore more homogeneous and provide a more accurate estimate. The Dickinson (2011) model is one of the most commonly used models. This model uses cash flow patterns to determine the life cycle stage; eight combinations of operating, financial, and investment cash flow are assigned to one of the five stages of the life cycle (Introduction, Growth, Maturity, Shake-out, and Decline). Start-ups have low collateral assets, which causes high capital costs, high indebtedness, and low depreciation as well as internal financing. These companies have negative working capital. There is also a large difference between profit growth and income growth (Kramolis and Dobes, 2020). In the second stage – Growth, profit still lags behind revenue, operating profit is positive, and the company exceeds the break-even point. Growing companies are more profitable than in the first stage, so growing accounting earnings are the motive for upward earnings management (Hussain et al., 2020). Akbar et al. (2019) argue that it is at this stage that debt grows in both the short and long term, and businesses are more profitable, with less risk of bankruptcy. Dickinson (2011) also adds that depreciation has a high value, which has a positive effect on the value of total accruals. Mature companies have the lowest operating costs, which causes a positive value of operating cash flow. High liquidity results in a tendency to more significant internal financing. Low working capital and its accruals result in increased profitability (Akbar et al., 2019), and these companies are more focused on operating cash flow and their earnings are of higher quality.

The penultimate stage of Shake-out foreshadows Decline as all major financial indicators (earnings, cash flow, and revenue) have a declining trend. Dickinson (2011) states that there is not much evidence of cash flows at this stage. Therefore, many authors (Hussain et al., 2020; Habib and Hasan, 2017; Durana et al., 2021b) use this stage as a benchmark for interpreting other stages. In the final stage of the Decline, debt ratios fall as businesses pay off their debts. The cost of capital may increase, but it is lower than in the Introduction stage. Defond and Jiambalvo (1994) argued that non-discretionary accruals may grow due to an increased risk of default.

The diversity of financial performance in a company's life cycle is also reflected in evidence of the impact of the corporate life cycle on earnings quality. Suberi et al. (2012) investigated the impact of the life-cycle stage on quality earnings and business growth. Earnings quality increases during the maturity stage, but in the growth stage, earnings management techniques are applied more in line with maintaining a competitive advantage despite unstable financial outcomes. Hribar and Yehuda (2015) reviewed accruals in relation to stock prices; cash flow and accruals of growing companies are directly correlated, which indicates a higher rate of discretionary accruals. Faff et al. (2016) adds that debt has a growing trend in start-ups and growing companies, which also affects earnings quality. Zamrudah and Salman (2013) examined lifecycle management and found that growing firms tend to use accrual earnings management, while declining firms tend to apply real earnings management techniques.

From the perspective of the crisis and the level of earnings management, there is empirical evidence of their interaction. Defond and Jiambalvo (1994) argued that high-risk debt covenants report lower-quality earnings. Nevertheless, evidence of behavior a year before bankruptcy is mixed: Charitou et al. (2007) found downward earnings management. Campa (2019) points out the differences in the behavior of listed and unlisted companies in France, more intensive upward earnings management is applied by listed companies mainly due to high leverage

Earnings management in the environment of transport companies is not well documented. To the best of our knowledge, there are only a few studies dealing with earnings management in the transport sector. Andreou et al. (2014) examined the relationship between corporate governance and earnings management in the maritime industry, and found that factors such as board size, internal ownership, or CEO duality affect the level of earnings management. Rusmin et al. (2013) investigated how managers opportunistically smoothed out income to overcome previous earnings in Asian transport companies. The economic crisis and size have been confirmed as significant factors as upward earnings management. Sylvia (2022) examined the relationship between earnings management and leverage, financial distress, and litigation risk, and accounting conservatism in Indonesian transportation service companies.

As the studies above show, the phenomenon of earnings management and earnings together, corporate life cycle and earnings management as well as management and crisis earnings are well documented, records in transport companies are insufficient and in the current economic environment they belong to a vulnerable sector.

2. Research methodology

In the context of the main objective of this study (revealing and examining the impact of the corporate life cycle on the quality of earnings in European transport companies), we used financial data obtained from the Amadeus database provided by the Bureau van Dijk (Moody’s Analytics). To sufficiently cover the pre-crisis (pre-pandemic) period, the data covered the period 2010-2019. In addition to this condition, three other criteria were used: a) the value of total assets is at least EUR 500,000 in the years 2016-2019, b) country belonging to one of the 40 European countries from which the Amadeus database collects data; c) affiliation of the company to NACE rev. 2 main sector H, divisions 49, 50, 51 and 52.

The gross sample contained 64,463 transport companies and 644,630 observations over the period from 36 European countries. Due to the volume of data, these were structured into several stages. The first stage was firm-year observation, all observations for the firm were nested firm for level 2. These firms were nested in NACE rev. H section classes that represent level 3. Level 4 expressed the corporate life cycle stage. The last level is the country affiliates (level 5). The sample was cleared of missing data and outliers were winsorized at 1% and 99% percentile.

Earnings quality is used as a dependent variable, with discretionary accruals being selected as suitable proxies for earnings quality. Two models of accounting earnings management were selected: the modified Jones model from Dechow et al. (1995) and Teoh et al. (1998), which focuses on short-term discretionary accruals. Formulas for estimating discretionary and total accruals are given in Eq. (1) – (3).

$$TA = \Delta CA - \Delta CL - \Delta Cash + \Delta STD - Dep \tag{1}$$

$$\frac{TA_{it}}{A_{it-1}} = \alpha_0 \frac{1}{A_{it-1}} + \alpha_1 \frac{\Delta REV_{it} - \Delta REC_{it}}{A_{it-1}} + \alpha_2 \frac{PPE_{it}}{A_{it-1}} + \varepsilon_{it} \tag{2}$$

$$\frac{TA_{it}}{A_{it-1}} = \alpha_0 \frac{1}{A_{it-1}} + \alpha_1 \frac{\Delta SALE_{it} - \Delta REC_{it}}{A_{it-1}} + \varepsilon_{it} \tag{3}$$

Where ΔCA – change in Current assets, ΔCL – change in Current liabilities, $\Delta Cash$ is change in Cash, ΔSTD – change in Short-term debt, Dep – Depreciation, TA_{it} – Total accruals in year t , A_{it-1} – Assets in year $t-1$, ΔREV_{it} – change in Revenues, ΔREC_{it} is change in Receivables; PPE_{it} – Property, Plant and Equipment in year t , $\Delta SALE_{it}$ – total sales in year t .

The corporate life cycle stage was estimated according to the Dickinson (2011) model applying cash flow patterns for life cycle stage assignment. The advantage of this model is its non-sequentiality, i.e., the company can be at any stage of the life cycle, regardless of its age. The characteristics of individual stages according to cash flow patterns are given in Table no. 1.

Table no. 1. Cash flow pattern according to Dickinson (2011) life cycle model

Cash flow	Introduction	Growth	Mature	Shake-out			Decline	
Operating	-	+	+	-	+	-	-	-
Investing	-	-	-	-	+	+	+	+
Financing	+	+	-	-	+	-	+	-

In addition to the main dependent and independent variables, other variables were used in the model, controlling company, industry, and country effects. Based on other studies (Hussain et al., 2020; Habib and Hasan, 2017; Durana et al., 2021b), we selected 6 quantitative indicators at firm level (leverage, profitability, tangibility, liquidity, corporate growth, and operational risk). In addition to these, we have selected a qualitative variable enterprise size, which is divided into four levels (Small, Medium-sized, Large, Very Large); the categorization is in accordance with the rules of the Amadeus database. At the country level, we used three macroeconomic indicators: real GDP growth, inflation, and the unemployment rate, which characterize the countries concerned in time and space. Macroeconomic data were obtained from EUROSTAT or national statistical databases. An overview of the variables used is given in Table no. 2.

Table no. 2 Dependent and independent variables of the models

Dependent variable(s)		
Acronym	Name	Formula
MJM EM	Earnings management	Discretionary accruals of modified Jones model (1995)
TM EM	Earnings management	Discretionary accruals of Teoh, et al. (1998) model
Independent variables		
Firm-level variables		
FINL	Financial leverage	$\text{Financial leverage} = \frac{\text{Long-term debt} + \text{Short-term debt}}{\text{Total assets}}$
TANG	Tangibility	$\text{Tangibility} = \frac{\text{Tangible fixed assets}}{\text{Total assets}}$
CULIQ	Current liquidity	$\text{Current liquidity} = \frac{\text{Current assets}}{\text{Current liabilities}}$
PROFI	Profitability	$\text{Profitability} = \frac{\text{EBITDA}}{\text{Total assets}}$
GROW	Growth	$\text{Growth} = \frac{\text{Total assets}_t - \text{Total assets}_{t-1}}{\text{Total assets}_{t-1}}$

OPRISK	Operational risk	$Operational\ risk = \frac{EBITDA_t - EBITDA_{t-1}}{EBITDA_{t-1}}$
CYCLE	Life cycle stage	Life cycle stages according to Dickinson (2011) model
SIZE	Company size	Company size categories according Amadeus database rules
Industry-level variables		
Industry	Industry dummy	Industry classification according to selected NACE rev. 2 section H divisions
Country-level variables		
COUNTRY	Country dummy	Country affiliation
GDP growth	Real GDP growth	Annual Real GDP growth rate (percentage of previous year)
INFLATION	Inflation rate	Annual inflation rate according to the Harmonised Index of Consumer Prices
UNEMPLOY	Unemployment rate	Annual unemployment rate according to EUROSTAT

Due to the data structure, a Hierarchical Linear Mixed Model was selected, which controls both cross-sectional and time-series dependencies. Firstly, the null model is tested with all levels as random factors (Snijders and Bosker, 2012). In this case, three levels were selected as significant random effects according to the *Wald Z-test* – repeated measures (firm-year observation, industry, and country level). Other factors were treated as fixed factors. An empirical model of the effect of the corporate life cycle on earnings quality is given in Eq. (4).

$$EM_{tijk} = \beta_0 + \sum_{k=1}^4 \vartheta_k \cdot LIFE\ CYCLE_k + \sum_{i=1}^3 \theta_i \cdot SIZE_i + \beta_1 \cdot FINL_{tijk} + \beta_2 \cdot CULIQ_{tijk} + \beta_3 \cdot TANG_{tijk} + \beta_4 \cdot PROF_{tijk} + \beta_5 \cdot GROW_{tijk} + \beta_6 \cdot OPRISK_{tijk} + \beta_8 \cdot GDP\ growth_{tl} + \beta_9 \cdot INFLATION_{tl} + \beta_{10} \cdot UNEMPL_{tl} + u_{0l} + u_{0j} + \varepsilon_{tijk} \quad (4)$$

$$u_{0j} \sim N(0, \sigma_{industry}^2) \quad u_{0l} \sim N(0, \sigma_{country}^2) \quad \varepsilon_{tijk} \sim N(0, \sigma^2)$$

Where EM_{tijk} – earnings management proxy (discretionary accruals), β_0 – grand mean of earnings management proxy; $\beta_1, \beta_2, \dots, \beta_{10}$ – regression coefficients of fixed effect covariates, ϑ_k – regression coefficients of life cycle stage dummy, θ_l – regression coefficient, u_{0j} – random effect of intercept between industries, u_{0l} – random effect of intercept between countries, ε_{tijk} – residual.

The significance of the models was tested according to Maximum Likelihood, fixed effects by *t-tests*, and random effects according to *Wald Z-tests* at 0.05 level. Interclass correlation (ICC) measured the proportion of variability captured by random effects, with a threshold that is significant is considered to be 5% (Snijders and Bosker, 2012); otherwise, there are low intergroup differences between groups. The model was created sequentially, by gradually adding independent variables from the empty model with intercepts, through firm-level fixed effects to the full model presented in Eq. (4) - (5). Models were compared based on the Likelihood test at the 0.05 level; *AIC*, *BIC*, and *-2 ML log-likelihood* according to the lower value rule. The multicollinearity of variables according to the correlation matrix was also tested in the modelling process; a correlation higher than 0.5 is considered problematic and a source of collinearity. Such variables were reviewed and, if necessary, removed from the model.

Taking into account the aim of the study, other significant factors of earnings quality, and expected changes in earnings quality due to the crisis, three hypotheses were developed:

H1: The corporate life cycle significantly affects earnings quality levels in European transport companies.

H2: Corporate size significantly affects earnings quality levels in European transport companies.

H3: Earnings quality varied year-on-year in the pre-crisis period in European transport companies.

3. Results and discussion

In the first step of estimating the model, we estimated discretionary accruals and other quantitative variables in accordance with Table no. 2. Some variables were year-on-year, so nine annual observations were estimated for each enterprise. Subsequently, the missing values were removed and outliers were detected. These were winsorized at 1% and 99% percentiles. The net sample was unbalanced and contained 223,055 observations from 32,319 companies. In terms of countries, 30 European countries are represented. The majority of enterprises were medium-sized (64.91%), small and large enterprises are represented in a similar proportion (16%), and very large enterprises are represented in only less than 3% of 32,319 enterprises. Growing companies are the second largest group of companies (30.41%). It is surprising that mature companies have less than 10% of the sample and the least observations were under the Introduction stage (less than 7%).

Table no. 3 summarizes the descriptive statistics of the variables examined. In the first place, the earnings quality given as the residuals of total accruals is high on average for all transport companies, because these companies use downward management on average only to a small extent. From a corporate life cycle perspective, the quality of earnings varies from stage to stage. Start-ups overstated reported cash flow due to the higher risk of bankruptcy; mature companies and shake-out companies, on the other hand, preferred downward earnings management and reduced profit due to their financial position. Similar results were found by Michalkova (2021) or Hussain et al. (2020). The gross profitability of inverted U-shaped had a similar trend as discretionary accruals. Surprisingly, however, mature companies do not achieve the highest accounting profitability, which can be explained by the high level of downward earnings management. The volatility of operating profit is given in the OPRISK indicator. Start-up companies have the most volatile profits, where the year-on-year change in operating profit is on average more than 50%, which is in line with the high level of earnings management in these companies. In terms of leverage, start-ups and declining businesses show the highest debt ratios, more than 70% on average. In line with the need to stabilize high indebtedness, these also have the highest liquidity, which affects working capital accruals.

Table no. 3. Descriptive statistics of variables

life cycle period	introduction		growth		mature	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
FINL t-1	0.732	0.254	0.609	0.238	0.662	0.254
FINL	0.713	0.239	0.615	0.231	0.679	0.256
CULIQ	2.014	2.473	1.850	2.121	1.613	2.099

life cycle period	introduction		growth		mature	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
TANG	0.278	0.247	0.436	0.244	0.366	0.265
PROFI	0.110	0.108	0.161	0.098	0.097	0.109
GROW	0.332	0.407	0.227	0.299	0.026	0.207
OPRISK	0.497	2.744	0.243	1.400	-0.113	1.727
EM_MJM	0.024	0.200	0.002	0.141	-0.017	0.165
EM_TM	0.025	0.201	0.002	0.141	-0.017	0.165
life cycle period	shake-out		decline		Total	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
FINL t-1	0.630	0.254	0.709	0.286	0.645	0.257
FINL	0.613	0.264	0.682	0.289	0.636	0.259
CULIQ	2.115	2.719	2.365	3.198	2.022	2.575
TANG	0.364	0.276	0.247	0.267	0.363	0.270
PROFI	0.129	0.113	0.089	0.114	0.129	0.111
GROW	-0.020	0.162	0.074	0.264	0.097	0.279
OPRISK	-0.050	1.432	0.126	2.543	0.097	1.778
EM_MJM	-0.012	0.142	0.015	0.188	-0.002	0.157
EM_TM	-0.012	0.143	0.015	0.189	-0.002	0.157

As part of the pre-test of discretionary accrual modelling, we checked the existence of multicollinearity using a correlation matrix. Within the independent variables, none of the pairwise correlations was greater than 0.5. A higher degree of correlation was recorded between *real GDP growth* and other macroeconomic indicators. This indicates that with *real GDP growth*, inflation and unemployment declined over the years under review. These indicators were gradually added to the model, and the models were compared according to their *AIC*, *BIC*, and *-2 ML log-likelihood*.

Table no. 4. Results of fixed and random effects estimate of mixed models

Dependent variable	EM_MJM		EM_TM	
Panel A: Fixed effects estimate				
Parameter	Estimate	Sig.	Estimate	Sig.
Intercept	0.02074	0	0.02019	0
Decline	0.02294	0	0.02316	0
Growth	0.00568	0	0.00650	0
Introduction	0.02308	0	0.02450	0
Mature	-0.00640	0	-0.00636	0
Large	-0.00500	0.021	-0.00499	0.021
Medium sized	-0.01210	0	-0.01297	0
Small	-0.00436	0.052	-0.00692	0.002
FINL	-0.03331	0	-0.03214	0
CULIQ	0.00163	0	0.00165	0
TANG	0.02682	0	0.02653	0
PROFI	-0.04049	0	-0.04045	0
GROW	0.03866	0	0.03583	0
OPRISK	0.00047	0.012	0.00028	0.138
UNEMPLOY	-0.09989	0	-0.09349	0
Panel B: Random effects estimate				
Parameter	Estimate	Sig.	Estimate	Sig.
Repeated measure (AR1 diagonal)	0.02389	0	0.02394	0
Repeated measure (AR1 rho)	-0.01512	0	-0.01429	0

Dependent variable	EM_MJM		EM_TM	
Random intercept Industry	0.00035	0	0.00035	0
Random intercept country	0.00016	0.018	0.00014	0.024

Panel A Table no. 4 reports regression coefficients of fixed effects of independent variables. Discretionary accruals in general and short-term form have a linear trend. Both accrual models give similar results, indicating that European transport companies are manipulating profits mainly in terms of working capital; the manipulation of long-term accruals in terms of depreciation is not significant. Hypothesis *H1* can be confirmed with respect to the *p-values* of the dummy life-cycle variable. In addition, there is a *U-shaped* relationship between earnings management and the company's life cycle. These results are consistent with the research of Hussain et al. (2020), Bender and Ward (2002) or Durana et al. (2021b) or Michalkova (2021). The intercept expresses the average discretionary accrual (total or short-term) of a very large company in the shake-out stage.

Company size significantly affected the quality of the reported earnings in all sizes of companies, i.e., hypothesis *H2* is confirmed. This finding is consistent with the findings of Ngo and Le (2021), but in contrast to Susanto et al. (2019), which examined Indonesian companies. The direction of accounting manipulations varied in this case. Small, medium, and large companies have applied downward earnings management to a greater extent. However, very large companies increased their accounting profit, which is in opposition to the findings of Siekelova et al. (2021). The main difference between very large companies and other size categories is their listing on the market. According to the rules of the Amadeus database, very large companies are listed. This finding is in line with the conclusions of Campa (2019), which attributes upward earnings management to high leverage; or Lizinska and Czapiewski (2018), who examined Polish companies during the IPO. The country effect is given through macroeconomic indicators. As mentioned above, the surveyed indicators were collinear, the variable UNEMPLOY (unemployment rate) reported the best explanatory power of the three examined. The rise in the unemployment rate, i.e., the deterioration of macroeconomic conditions in the country, is associated with a decline in earnings management. This finding contrasts with that of Ng et al. (2015). Dou et al. (2016), on the other hand, agrees with our results; decline in earnings management is also associated with an increase in unemployment insurance.

Panel B Table no. 4 report random model effects. First of all, firm-year observations are treated as random effects. The AR1 rho describes the autocorrelation between two consecutive years. A negative correlation indicates that a higher-than-average accrual in one year is associated with a lower-than-average discretionary accrual in the following year. This confirms hypothesis *H3*, i.e., discretionary accruals varied within the studied pre-pandemic period. Pachariyanon (2014) confirms that earnings quality changes over the years and upward earnings management in one year coupled with downward earnings management in the following year. Similarly, Durana et al. (2021a) or Kliestik et al. (2020), who similarly found a growing trend in earnings manipulations in Central European and Baltic countries over a similar period of time. Industry and country effect were treated as random effect. In both cases, the random effects are significant at the 0.05 level. Intergroup correlation (*ICC*) expressing proportionality variability was used; in both models examined, the *ICC* was less than 2% for the industry and less than 1% for the country, indicating that there are small differences in earnings quality between the different classes of the Transport sector according

to *NACE rev. 2*. Similarly, there are significant but very low differences between the earnings quality of companies from different countries.

All in all, European transport companies manipulated profits in the pre-crisis period, i.e., reported accounting earnings of low quality. The direction of accounting manipulations was associated with the life cycle stage (value of cash flows), and mature companies increased their accounting profits. Second, reporting high accounting earnings can result in a paradoxical situation. A financially sound company in bankruptcy can go bankrupt due to insufficient state aid provided to sectors affected by the economic crisis caused by *COVID-19*. Martin-Domingo and Martin (2022) state that European airlines with low financial performance in the pandemic have more often applied for state aid. Gourinchas et al. (2020) point out that state aid does not have to be distributed proportionally, as the vast majority of the companies surveyed did not need state aid at all because they were financially sound in terms of cash flow or would have gone bankrupt after receiving a state subsidy. The low quality of earnings in transport companies implies another issue: investments to meet the obligations arising from the *Green Deal*.

Conclusions

The current economic environment is marked by several factors: on the one hand, it is the *COVID-19* pandemic, which has broken many supply and demand relationships, changed customers' behavior and mode of transport, and thus the prospects of the sectors affected. On the other hand, there are long-term plans for the transition to a green economy known as the *Green Deal* and associated with post-*COVID* recovery plans. Transport companies are facing both of these challenges, which is reflected in the pressure for higher reliability of reported earnings. Nonetheless, the corporate life cycle needs to be considered as businesses are not uniform and their actual cash flow varies from reported earnings.

The aim of this study was to identify and examine the impact of the corporate life cycle on the quality of earnings in European transport companies in the pre-crisis years 2011-2019. It was structured into five levels: from company-year observation to country level. Earnings quality was modelled as total and short-term discretionary accruals; the company's life cycle was estimated according to the Dickinson (2011) cash flow model.

The study results in several findings. First, transport companies in Europe in the pre-crisis period had low quality reported earnings as averaged overall and current discretionary accruals gained non-zero values during the period under review. Second, the surveyed firms manipulated earnings in accordance with the *U-shape* curve, where mature firms applied downward earnings management techniques on average; firms with riskier cash flows were more inclined to report higher earnings than their actual cash flows. Very large companies that were listed in the pre-crisis period chose upward earnings management, while smaller and unlisted companies sought to reap the tax benefits of reporting low accounting profits. However, the specific macroeconomic conditions of the country did not have a significant effect on the variability of earnings quality. However, earnings quality over time has achieved significant variability; where there is a clear linear trend of change in earnings quality, but the direction of earnings manipulations is not clear as macroeconomic conditions alternate within Europe.

Finally, several limitations and future directions of development within this issue need to be considered. Earnings quality has been estimated as discretionary accruals, which is not the only proxy for earnings quality; other proxies such as real earnings management may be considered in further research. Second, only pre-crisis years were examined due to insufficient data for crisis or post-crisis years; future research could focus on comparing these two time periods using additional information on future *Green Deal* investments and the *European Recovery Plan*.

Acknowledgement

This paper is an output of science projects *the Slovak Research and Development Agency – Grant NO. APVV-17-0546 Variant Comprehensive Model of Earnings Management in Conditions of the Slovak Republic as an Essential Instrument of Market Uncertainty Reduction* and *VEGA 1/0210/19: Research of innovative attributes of quantitative and qualitative fundamentals of the opportunistic earnings modelling*.

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