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Stability of profits and earnings management in the transport sector of Visegrad countries

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Abstract

Research background: Business profit and its stable development are key performance indicators. Many enterprises performed earnings manipulation, either upward or downward, according to the current business and macroeconomic situation, as well as time. These activities may interrupt the stationarity of time series. This article focuses on the transport enterprises, and the assessment of bonds in their earnings.

Purpose of the article: The target of the article was to identify the occurrence of non-stationary and its unit root in the EBITDA of transport enterprises for each country in V4 during the period of 2010–2019.
Methods: The stationarity and unit roots in time series were tested by the Kwiatkowski, Phillips, Schmidt, and Shin tests and the Augmented Dickey-Fuller based on the samples of 470 Slovak, 405 Czech, 774 Polish, and 1,056 Hungarian. The behavior of earnings manipulation (the first cause of non-stationarity) was indicated by the Modified Jones model. Additional causes for non-stationarity were confirmed by the regression analysis, including factors such as the GDP, unemployment rate, average monthly gross wage, and the Ease of doing business index.
Findings & value added: The non-stationarity in the time series of EBITDA was disclosed for each country in the V4 region. Earnings management was discovered to be the cause of this erratic development. Thus, the value-added for the authorities and auditors is to show the association between non-stationary and creative accounting. In addition, purposeful downward manipulation in the transport sector occurs, not upward, which is typical in general. The methodology used in the study may be applied cross-sectorally in emerging countries. The labelling of specific macroeconomic variables depending on the country offers enterprises the opportunity to focus on factors with a crucial influence on their existence and activities.

Introduction

In recent years, many innovative management concepts have been developed and have been implemented into practice in businesses (Lazaroiu & Harrison, 2021, pp. 23–36). Some of them have been successful, but some of them have not (Mitan *et al.* 2021, pp. 87–98). However, from the viewpoint of management, investors, regulators, and even countries represented by governments, authorities, and auditors, the most essential issue is still the economic explanation of the performance of the enterprise (Krulicky & Horak, 2021, pp. 38–51; Valaskova *et al.*, 2021c, pp. 639–659). Business profit or earnings are the most important measure of performance for each party included in the environment of the enterprise (Firmansyah *et al.*, 2021, pp. 9–17). Hundreds of investigations by both developed and developing countries examine this issue annually (Durana *et al.*, 2022a).

Earnings and their determinants (Wijayanti *et al.*, 2022, pp. 127–133), their maximization (Manikas *et al.*, 2019, pp. 1–8), their taxation (Devereux, 2019, pp. 591–619), or tax avoidance (Hamzah *et al.*, 2021, pp. 126–141) are the focus of recent incentives. The research also assesses the development of earnings according to the size of the enterprise (Pratiwi & Pralita, 2021, pp. 26–34; Siekelova *et al.*, 2021, pp. 41–56), ownership (Civelek *et al.*, 2021, pp. 137–149), decision-making (Zvarikova *et al.*, 2021, pp. 9–21; Griffin & Krastev, 2021, pp. 65–78; Duft & Durana, 2020, pp. 9–18), and innovation used (Hopkins & Siekelova, 2021, pp. 28–41; Durana *et al.*, 2020b). However, the studies in specific sectors are undersized.

The significance of the transport sector has rapidly increased for the European economy over the past 60 years (Ali *et al.*, 2018, pp. 361–397). The modern development of the economy of the country is impossible without the creation of a highly efficient transport sector. Sharapiyeva *et al.* (2019, pp. 331–338) add that this sector should be framed in terms of its ability to contribute to each of the country's economies. There is an increasing number of transport enterprises on the market. Therefore, the transport sector creates a very important economic link, and it is needed to know its economic condition, demonstrated by profit and the factors that cause it.

Saji (2021), Pagach and Warr (2020), Sami (2020, pp. 169–189), Fischer *et al.* (2020, pp. 1163–1179) note that the development of earnings may be effectively explained by the analysis of the time series. The solution may be run through an advanced method such as autoregressive integrated moving average (ARIMA) forecasting as provided by Hewamalage *et al.* (2020, pp. 388–427) or Akca and Canakoglu (2021, pp. 463–504) using ARCH (autoregressive conditionally heteroscedastic) and GARCH (generalized autoregressive conditional heteroscedasticity) models. For this research into the development of the earnings, it is possible to apply tests for stationary time series and unit roots. Andrijauskiene *et al.* (2021, pp. 471–502) justify that the stationarity means that the average earnings may change during the analyzed period, but the way the change occurs does not change itself over time. The statistical properties are still the same if there is no cause for this kind of change (Dias *et al.*, 2020, pp. 585–608). The confirmation of the change of statistical properties over time indicates the impact of microeconomic and macroeconomic unit roots on the development of earnings in the sector.

Accordingly, taking into account the facts mentioned above, the target of the article was to identify the occurrence of non-stationary and its unit root in the EBITDA of transport enterprises for each country in V4 during the period of 2010–2019.

The provided research uses methods of time series to disclose the non-stationarity in earnings, specifically the Kwiatkowski, Phillips, Schmidt, and Shin test, which innovates the earlier Dickey-Fuller test. Both tests are run to prove the presence of a unit root in earnings. The Modified Jones model indicates the behavior of earnings as a microeconomic cause of unit root in the 10-year analyzed period. This model is the preferred choice for the detection of earnings management in the V4 region based on evidence. In addition, regression analysis using the stepwise method with all assumptions fulfilled sets up the macroeconomic reason for non-stationarity.

The rest of the article is divided as follows. Firstly, the literature review of studies related to the recent incentives in the transport sector, in business

profit and earnings manipulation, is highlighted. Then, the financial dataset used, and the statistical procedures implemented in the provided study are demonstrated. The results that cover the time series analysis, earnings manipulation detection, and regression analysis of macroeconomic factors are involved in the third part. In the Discussion chapter, the obtained results are compared to similar studies. Conclusions sum up the results of the study and their practical implications, list the weaknesses of the study, and, based on them, suggest the future directions of the exploration.

Literature review

The literature review shows research incentives for the analyzed issue.

Firstly, economic investigations into the transport sector are demonstrated. Shafique *et al.* (2021, pp. 61–71) highlight that the transport sector is crucial for economic development and accelerates economic activities. They detect a fundamental contribution this sector makes to economic growth; it is a unidirectional causality. Vukic *et al.* (2021) also analyze the economic influence of the transport sector on the economy. The article provides the conclusion that there are significant multiplicative effects of transport in the economy. Matuka and Asafo (2021, pp. 856–881) confirm that transport has a positive impact on economic growth, both in the short run and the long run. Ali *et al.* (2021) add that the bonds of the transport sector are not only for the whole economy, but that there are bonds which are backward and forward with other sectors of the economy. It is identified that the most connected sector is financial intermediation, then the food and beverages sector and, lastly, the petroleum, chemical, and non-metallic mineral sectors. Njoya and Nikitas (2020) also evaluated the backward and forward linkages to the local economy. They emphasize the importance of transport because of its effect on output, income, and employment. Frajtova Michalikova *et al.* (2022, pp. 70–82) refer to its significance during the COVID-19 pandemic based on the review of contributions published in ProQuest, Scopus, and Web of Science between 2020–2022. However, the inverse relationship between transportation enterprises and their earnings on macroeconomic variables is emphasized by Valaskova *et al.* (2020, pp. 101–119) and Cabinova *et al.* (2021, pp. 198-221) as well.

Secondly, the current drivers of earnings in transport are mentioned. Industry 4.0, sustainability, and smart cities are the newest incentives in the determinants of earnings in the transport sector. According to Nastisin *et al.* (2021, pp. 1–9), reputation management is the most important tool in the context of achieving sustainable performance in this business. Blake and

Frajtova Michalikova (2021, pp. 159–173) or Valaskova *et al.* (2021d, pp. 9–20) note the use of cloud technologies, industrial big data analytics, machine learning algorithms, and cognitive automation to be profitable. Nyulasziova and Palova (2020, pp. 75–106) and Campbell and Bilan (2021, pp. 68–80) point out the need for decision support systems and cyber-physical systems to support sustainable operations and increase earnings. Wallace and Lazaroiu (2021, pp. 79–92), Bennett (2021, pp. 20–29), Holmes and Cug (2021, pp. 135–148) deal with autonomous vehicles. Mulligan (2021, pp. 121–134), Cooper *et al.* (2021, pp. 20–30), Bennett *et al.* (2020, pp. 51–57) add smart cities and smart intelligent transport systems.

The last research on the topic of earnings predominantly focused on creative accounting, earnings management, and fraudulent accounting. Hlawiczka *et al.* (2021, pp. 27–37) use bibliographic analysis to show the differences in creative accounting, earnings management, and fraudulent accounting. They divide them based on related keywords and phrases.

Vagner *et al.* (2021, pp. 249–262) mark the year 1988, as the year of the first publication about earnings management on the Web of Science. Sosnowski (2021, pp. 661–677) explains that there are many reasons why enterprises make the decision to engage in earnings management. Earnings management is when managers intentionally (but legally) change the way they report their financial results to make them look better (Elnahass *et al.*, 2022; Thai *et al.*, 2021, 403–417). Blazek *et al.* (2020) define "creative accounting" as the process of transforming accounting numbers from their original form to a desired form that can be used to benefit the enterprise and its management. A lot of different things are included, like the entity giving creative accounting information, only using some alternative accounting principles, or not using all of them, or ignoring some of them. Zheng *et al.* (2021, pp. 1–10) sum up fraudulent accounting as a deliberate or reckless act, and the conclusion is a major misleading accounting report. It is the use of accounting fraud and other violations or illegal means to seek self-interest, thereby harming the interests of others.

Finally, the review outlines current publications on earnings management. Martinez-Martinez *et al.* (2021, pp. 399–428) find the dependence between earnings management and the sector life cycle stage. Durana *et al.* (2021b, pp. 425–461) assess the impact of the life cycle of the enterprise on earnings management, not the sector. The manipulation is compatible with the U-curve. Enterprises that are in the cycle of their introduction or declining manipulate earnings upwards. While mature or shake-out businesses manipulate downwards.

Xie *et al.* (2022) confirm the results and add to the life cycle the reference of family business. The preference of activities of earnings manage-

ment in the life cycle stages was different for family and non-family enterprises. Family enterprises use earnings manipulation more often than non-family ones. Khan and Kamal (2022) also evaluate the family's affiliated and non-affiliated enterprises. They argue that the magnitude of manipulative behavior is higher in non-affiliated ones.

Hickman *et al.* (2021) investigate the association between corporate social responsibility (CSR) and earnings manipulation. This study concludes that CSR does not have an influence on earnings management. Ehsan *et al.* (2022, pp. 478–495) or Palacios-Manzano *et al.* (2021, pp. 921–937) test the same association. They disclose a negative relationship between these variables.

The most recent investigations have targeted many nexuses, many sectors, but transport is not one of them. Especially the development of earnings or the occurrence of manipulative behavior by the enterprise. Earnings management and bonds related to it are still very hot topics. It has been proven that there is a relationship between earnings management and life cycle, family business, and CSR. But this research was conducted to prove bonds between methods. It was applying the methods of time series and the earnings management model to confirm the association between them. Then, the effect of macroeconomic factors on earnings in V4 is looked at.

Research method

The research focuses on the stationarity of earnings in the transport sector. The enterprises from the NACE H were included in this research only if they reached the level of total assets of 500,000 euros at least to gain reliability and robustness. Thus, the raw database provides 4,996 enterprises. Bureau van Dijk is the provider of origin data through their realized Amadeus database.

Svabova *et al.* (2020, pp. 80–90) or Gashi Ahmeti and Fetai (2021, pp. 331-344) show that many methods can be used to quantify earnings, e.g., EAT, EBT, EBIT, EBITDA. Durana *et al.* (2022b) emphasize that profit reduces the discrepancies in financial performance of the transport sector because it removes the impact of different tax policies and interest rates, especially the different depreciation and amortization standards. Thus, the investigation set EBITDA as the financial indicator of the earnings of the transport sector, because of the association between EBITDA reconciliation quality and opportunistic disclosure signaling manipulation. It was proven by Mey and Lamprecht (2021, pp. 87–110).

The V4 region was contrasted in the recent investigations, for example, by Valaskova *et al.* (2021a, 631–669), Simonidesova *et al.* (2021, pp. 35–46), Gabrielczak and Kuziemska-Pawlak (2021, pp. 93–113), and Chovancova and Tej (2020, pp. 235–251). However, Slovakia, Czechia, Poland, and Hungary were also chosen because of their nexus of transport sectors during the period 2010–2019. Durana *et al.* (2022b) confirm that these connections during the mentioned period were tight and intertwined. Recent data was not used due to the COVID-19 pandemic.

After determining the properties of the sample, period, and region, the following methodological steps were applied:

1. The missing values and the computation of annual EBITDA

The raw dataset of financial data contained the missing values for EBITDA. These enterprises were excluded from the analysis (Table 1). From the study, 360 Slovak units, 370 Czech units, 1,167 Polish units, and 394 Hungarian units were removed. That is the way the final sample was created from 2,705 transport enterprises. The samples were not balanced, but they reflected the real situation in national economies based on the methodology of the study realized by Belas and Cepel (2020, pp. 678–693).

Average annual EBITDA was calculated as an average annual EBITDA, which was preferred over panel data. This approach was based on Durana *et al.* (2021a, pp. 39–55). Table 2 shows the identified values of average EBITDA in thousands of euros for the entire examined period and region.

2. The existence of a normal distribution and the absence of serial correlation

In order to estimate the properties of a time series, a normally distributed sample is needed (Bai & Ng, 2005, pp. 49–60). The Shapiro-Wilk test (Shapiro & Wilk, 1965, pp. 591–611) was designed for samples with fewer than 50 observations. If a lot of the values in the data set are the same, the test will not work as well as it should. However, Chen (1971, pp. 760–762) emphasizes that the Shapiro-Wilk W statistic has good sensitivity when assessing normality under different contaminated normal distributions, which is important.

After evaluating normality, the presence of no serial correlation indicates that the data are independently distributed, which is a desirable assumption for financial time series. The Box-Pierce test is commonly used to determine whether a time series needs to be independent. Box and Pierce

(1970, pp. 1509–1526) perform the test of the randomness at each distinct lag, but it has a very conservative nature. Thus, the test was improved to include overall randomness. Despite the mentioned fact, this investigation used the Box-Pierce Q statistic to test if the analyzed sample of financial data is uncorrelated without assuming statistical independence.

$$Q = n \sum_{k=1}^{h} r_k^2 \tag{1}$$

Q is the Box-Pierce test statistic, which is compared to the χ^2 distribution; *n* represents all number of observations; *h* s the maximum lag taken into account (Box & Pierce, 1970, pp. 1509–1526).

3. The disclosure of stationarity and unit root

If the statistical properties of a time series do not change over time, it is said to be stationary. The mean and variance of a stationary time series remain constant across time (Durana *et al.*, 2020a). Stationarity can be tested using one of two methods: unit root or stationarity test. The Kwiatkowski, Phillips, Schmidt, and Shin (KPSS) test is arguably the most well-known test for stationarity in econometrics. The KPSS test determines if a time series is stationary around a mean or linear trend or non-stationary as a result of a unit root (Kwiatkowski *et al.*, 1992, pp. 159–178). Time series is divided into the sum of the random walk r_t, deterministic trend ξt, and stationary errors ε_t:

$$y_t = r_t + \xi t + \varepsilon_t \tag{2}$$

where r_t is random walk:

$$r_t = r_{t-1} + u_t \tag{3}$$

where u_t are independent and identically distributed random variables $(0, \sigma_u^2)$.

It is used ω statistics for testing:

$$\omega = \frac{\sum_{t=1}^{T} S_t^2}{T^2 \hat{\sigma}_\varepsilon^2} \tag{4}$$

where

$$S_t = \sum_{i=1}^{t} e_i \tag{5}$$

and $\hat{\sigma}_\varepsilon^2$ is the estimate of long-term variance e_t:

$$\hat{\sigma}_\varepsilon^2 = \lim_{T \to \infty} \frac{E}{T} \left[\left(\sum\nolimits_{t=1}^{T} \varepsilon_t \right)^2 \right] \tag{6}$$

The analysis allows formulating hypotheses as follows:

H_0: *The time series for the EBITDA of Slovak (Czech, Polish, Hungarian) transport enterprises was stationary.*

H_1: *The time series for the EBITDA of Slovak (Czech, Polish, Hungarian) transport enterprises was not stationary.*

Too frequently, the correct hypothesis of stationarity is rejected, resulting in a preference for the hypothesis of non-stationarity (Hobijn *et al.*, 1998, pp. 483–502). It is a disadvantage of the KPSS test. Because of this, unit root tests are added. H_0 is that the time series possesses a unit root and thus it is not stationary ($\gamma = 0$). The origin of the Dickey-Fuller tests (the equations 7–9) is as follows:

$$\Delta y_t = \gamma y_{t-1} + \varepsilon_t \tag{7}$$

$$\Delta y_t = a_0 + \gamma y_{t-1} + \varepsilon_t \tag{8}$$

$$\Delta y_t = a_0 + \gamma y_{t-1} + a_2 t + \varepsilon_t \tag{9}$$

The improved version was applied to the Augmented Dickey-Fuller (ADF) test that was run.

$$\Delta y_t = a_0 + \gamma y_{t-1} + a_2 t + \sum_{i=2}^{p} \beta_i \Delta y_{t-i+1} + \varepsilon_t \tag{10}$$

where:

Δy_t	first-order linear differential of equation,
γ	unit root,
a_0	intercept,
$a_2 t$	linear time trend,
p	lag order of the autoregressive process,
ε_t	white noise.

The analysis allows formulating hypotheses as follows:

H_0: *There was a unit root for the EBITDA of Slovak (Czech, Polish, Hungarian) transport enterprises. Time series was not stationary.*

H_1: *There was no unit root for time series for the EBITDA of Slovak (Czech, Polish, Hungarian) transport enterprises is stationary. Time series was stationary.*

4. The calculation of manipulative behavior

Then, the unit roots of non-stationarity were found. Earnings management as a microeconomic cause is determined by Valaskova *et al.* (2021b, pp. 167–184). The existence of manipulative behavior is possible to indicate by earnings management models. There are two fundamental techniques for shaping an enterprise's financial outcome: accrual-based earnings management and real earnings management. Real earnings management is often used in business practice. However, as it is hardly quantifiable, the detection of real earnings management practice in a huge sample of enterprises from different countries over a 10-year period is very difficult. Thus, the model based on discretionary accrual was preferred. The choice of an adequate model must be made according to empirical evidence. Kliestik *et al.* (2020, pp. 1452–1470) find that the Modified Jones model is appropriate for the V4 region. This model was created by Dechow *et al.* (1995, pp. 193–225).

$$\frac{NDA_{it}}{TA_{\mathrm{t}-1}} = \alpha_0 \frac{1}{A_{\mathrm{it}-1}} + \alpha_1 \frac{\Delta REV_{it} - \Delta REC_{it}}{A_{it-1}} + \alpha_2 \frac{PPE_{it}}{A_{it-1}} + \varepsilon_{it}; \tag{11}$$

$$(TA_{\mathrm{t}-1} = NDA_{it} + DA_{it}), \tag{12}$$

where:

NDA_{it}	non-discretionary accrual in a year t;
DA_{it}	discretionary accrual in a year t;
$TA_{\mathrm{t}-1}$	total accrual in a year t;
A_{it-1}	total assets in a year t-1;
ΔREV_{it}	annual change in revenues in a year t;
ΔREC_{it}	annual change in receivables in a year t;
PPE_{it}	long-term tangible assets in a year t;
$\alpha_0, \alpha_1, \alpha_2$	coefficients;
ε_{it}	prediction error.

The model is summarized as follows by Durana *et al.* (2022b, pp. 399–425): it is based on a linear regression model that assumes discretionary accrual is linearly dependent on the annual change in the value of revenues and receivables, as well as the value of long-term tangible assets (lagged by total assets), Equation (11). The total accrual (the dependent variable in the regression analyses) is computed as the sum of annual changes in receivables and inventories; annual changes in payable accounts and depreciation are then subtracted from this sum. The results of the regression analysis enable the computation of non-discretionary accrual using the coefficients of the modified Jones model's derived regression equation, and then discretionary accrual is determined for particular years as shown in Equation (12).

5. The impact of macroeconomic variables

In addition, the second reason for the non-stationarity of earnings may be the macroeconomic situation. Explanatory factors that may explain the development of EBITDA were set based on the investigation of Valaskova *et al.* (2020, pp. 101–119). This study confirms the influence of five variables on the earnings of enterprises from V4 in general. To begin, the gross domestic product (GDP) in millions of euros. Second, the unemployment rate (UR) and inflation rate (IR) in percent. Third, the unemployment rate (UR) and inflation rate (IR) in percent. average monthly gross wage (AMGW) in euros. Finally, the Ease of doing business index (EoDB), whose value is close to 1, demonstrates that the national economy provides easier and more friendly regulations for enterprises. The lower the value,

the better the conditions. These variables were included in the creation of the regression models to detect the existence of their impact on earnings in the transport sector.

Descriptive statistics including minimum, maximum, first quartile, third quartile, median, mean, and standard deviation were calculated for the dependent variable EBITDA and all independent variables. Fundamental statistics were portrayed for Slovakia in Table 3, for Czechia in Table 4, for Poland in Table 5, and for Hungary in Table 6.

The existence of the outlying cases may disrupt the examination. Hudakova *et al.* (2021, pp. 60–77) recommend the Grubbs test to disclose the outlying values of financial data. As the computed p-value is greater than the significance level alpha (0.05), the null hypothesis cannot be rejected based on the results of Table 7. There is no outlying observation in the annual EBITDA of transport enterprises from V4. There is no value that could have an effect on the creation of the regression because it is either too high or too low.

Testing Gauss-Markov assumptions was necessary before the disclosure of significant macroeconomic factors. The first one is the linear dependence between EBITDA and independent variables and the multicollinearity between independent variables. The linear (direct or indirect) dependency was proved by the correlation matrix of the Pearson correlation coefficient. Its intensity was decided based on the limits of Valaskova *et al.* (2018). Subsequently, the test of the significance of the Pearson correlation coefficient was realized. The existence of an insignificant linear dependency excluded the variables from model creation. The variance inflation factor (VIF) was used to test the multicollinearity. Valaskova *et al.* (2018) highlight that the symptoms of multicollinearity are often present if the value of VIF exceeds the number 10.

The rest of the Gauss-Markov assumptions (normality, autocorrelation, and homoscedasticity) were also verified. Kim (2021, pp. 3197–3205) recommends the Durbin-Watson test to identify the autocorrelation for data that is like this investigation. Dalic and Terzic (2021, pp. 1–18) prefer the Breusch-Pagan test for determining homoscedasticity. The Shapiro-Wilk test was used again for normality. Its suitability for analyzing cases confirms the study of Kristofik and Slampiakova (2021, pp. 322–339).

The output of the regression function specifies the coefficients of all significant macroeconomic factors. Multiple regression uses the stepwise method to the exclusion of insignificant explanatory variables from created models. The significance of not excluded intercepts and independent variables was verified by the t-statistics. The significance of the created models

was assessed by analysis of variance (ANOVA). The goodness of fit of the created models was also evaluated.

XLSTAT Premium was used to get all the computations.

Results

The study involved the earnings before interest, taxes, depreciation, and amortization of 470 Slovak (SK) enterprises, 405 Czech (CZ) enterprises, 774 Polish (PL) enterprises, and 1,056 enterprises from Hungary (HU). It covered the period from the year 2010 to the year 2019. Thus, this dataset consisted of 27,050 measurements of transport enterprises put together. Then, the average value of EBITDA for each country in the Visegrad Group was calculated for each year.

There must be proof that the time series is normally distributed and that there is no serial correlation before testing stationarity. Initially, for specified samples of earnings, the Shapiro-Wilk analysis was run. Based on Table 8, the null hypothesis H_0 cannot be rejected because the computed p-value is greater than the significance level alpha. The assumption that EBITDA of transport enterprises in Slovakia, the Czech Republic, Poland, and Hungary is normally distributed was proven to be true.

After confirming normality, one more statistical test must be performed before checking for stationarity in the EBITDA time series. Distribution independence must be established. This fact means that subsamples do not exhibit serial correlation. The Box-Pierce test verifies that the sampling procedure is conducted randomly. Based on Table 9, as the computed p-value is greater than the significance level alpha, one cannot reject the null hypothesisH_0. Because there are no correlations in the population from which the sample was chosen, any observed correlations in the earnings are due to the randomness of the sampling procedure. The assumption that EBITDA of transport enterprises in Slovakia, the Czech Republic, Poland, and Hungary is independently distributed was also proven to be true.

This step was focused on the aim of the article, which was to detect non-stationarity in earnings. The parametric KPSS test of stationarity was run for level.

H_0: *The time series for the EBITDA of Slovak (Czech, Polish, Hungarian) transport enterprises was stationary.*

H_1: *The time series for the EBITDA of Slovak (Czech, Polish, Hungarian) transport enterprises was not stationary.*

Based on Table 10, as the computed p-value is lower than the significance level alpha, one should reject the null hypothesis H_0, and accept the alternative hypothesis H_1. The results were the same for each country in the V4 region. The statistical properties of EBITDA have significantly changed over time. The characteristics have not remained constant across the period 2010–2019. This conclusion was also supported by the results of the stationary and explosive ADF tests. Its hypotheses were formulated as follows:

H_0: *There was a unit root for the EBITDA of Slovak (Czech, Polish, Hungarian) transport enterprises. Time series was not stationary.*

H_1: *There was no unit root for time series for the EBITDA of Slovak (Czech, Polish, Hungarian) transport enterprises is stationary. Time series was stationary.*

Based on Table 11, as the p-value is greater than the significance level alpha, one cannot reject the null hypothesis H_0. These outputs confirmed the conclusions of the previous KPSS test of non-stationarity of time series. This fact determined that there was a unit root for the EBITDA of Slovak (Czech, Polish, Hungarian) transport enterprises.

The microeconomic reason for non-stationary may be caused by the occurrence of earnings management. The Modified Jones model was run. The difference between the total accrual and the calculated non-discretionary accrual was identified. It meant the value of the discretionary accrual for each transport enterprise. Discretionary accruals were calculated for the whole transport sector. The existence of earnings management (purposeful manipulation) was evidenced. The ratio of non-manipulative enterprises and the ratio of manipulative enterprises with positive and negative signs was indicated individually in every country in the V4 region for every year.

Table 12 shows manipulation in the Slovak transport sector. On average, 3.28% of enterprises did not manipulate their earnings over the 10-year analyzed period. 39.43% of the earnings of Slovak enterprises were manipulated upwards (+DA) and 57.30% downwards (–DA). Table 13 demonstrates manipulation in the Czech transport sector. On average, 4.32% of enterprises did not manipulate their earnings over the 10-year analyzed period. 44.20% of the earnings of Czech enterprises were manipulated upwards and 51.48% downwards. Table 14 explains manipulation in the Polish transport sector. On average, 5.94% of enterprises did

not manipulate their earnings over the 10-year analyzed period. 27.70% of the earnings of Polish enterprises were manipulated upwards and 66.36% downwards. Table 15 includes manipulation in the Hungarian transport sector. On average, 3.59% of enterprises did not manipulate their earnings over the 10-year analyzed period. 47.95% of the earnings of Hungarian enterprises were manipulated upwards and 48.46% downwards. Most transport enterprises realized earnings management based on calculated discretionary accruals. The majority of the time, it was a downward manipulation with negative values of discretionary accrual.

Macroeconomic unit roots were detected by regression analysis. All the assumptions needed to run this kind of analysis were checked. The first assumption of linear dependency of variables and the existence of multicollinearity were tested. The existence of a significant linear dependency between the dependent variable EBITDA of transport enterprises and independent variables GDP, unemployment rate, inflation rate, average monthly gross wage, and Ease of doing business index was assessed sequentially. The Pearson correlation coefficient reflected the strength and direction of the analyzed relationship. This coefficient is calculated in Table 16. Testing the significance of the Pearson correlation coefficient was run after the computation of the correlation matrix. As the computed p-value is greater than the significance level alpha (0.05), the null hypothesis cannot be rejected based on the results of Table 16. As a result, no significant liner dependency between EBITDA and inflation rate was found in all of the countries studied. No relation was also confirmed for EBITDA and the Ease of doing business index for Slovak, Czech, and Hungarian transport enterprises. These cases of independent variables were not included in the creation of the regression model. As the computed p-values are lower than the significance level alpha (0.05), the null hypothesis should be rejected and the alternative hypothesis accepted, based on Table 16. Thus, the significant and strong direct linear dependencies between EBITDA and GDP and the average monthly gross wage for the whole V4 region were detected. There was a significant and strong indirect linear dependency between EBITDA and the unemployment rate for the entire V4 region (despite Hungary, which had a medium strength). A significant medium strong indirect linear dependency was detected between EBITDA and the Ease of doing business index for Polish transport enterprises.

Multicollinearity levels were disclosed by VIF for those independent variables that were involved in the model. The values of the variance inflation factor are depicted in Table 17. The numbers were, in all cases,

lower than 10. It indicated no high correlation and there was no reason to investigate closely which variables had the highest impact on the multicollinearity. Furthermore, the regression model was constructed using a stepwise method, removing the independent variable(s) that caused the multicollinearity.

Then, the stepwise method was applied to make the regression models. The goodness of fit of the created models was evaluated by six statistics. These are in Table 18, and their values indicate the very good quality of the models. The rank of goodness of the created models was as follows: Poland, then Hungary, Czechia, and Slovakia.

The individual residuals of models were identified, and three assumptions related to the residuals of created models were explored. The assumption of normal distribution was tested by means of the Shapiro-Wilk test. Based on the results of Table 19, as the computed p-value is greater than the significance level alpha (0.05), the null hypothesis cannot be rejected. Each country in the Visegrad Four has residuals that follow a normal distribution.

The assumption of autocorrelation was tested by the Durbin-Watson test. Based on the results of Table 20, as the computed p-value is greater than the significance level alpha (0.05), the null hypothesis cannot be rejected, based on the results of Table 20. The residuals of the created model are not autocorrelated across all Visegrad countries.

The assumption of homoscedasticity was tested by the Breusch-Pagan test. Based on the results of Table 21, as the computed p-value is greater than the significance level alpha (0.05), the null hypothesis cannot be rejected. The residuals of the created model are homoscedastic for all countries in the Visegrad Group.

Based on the ANOVA from Table 22, the specific regression models explaining the EBITDA of transport enterprises were created for each country. The implemented statistics confirmed that there was a unit root explaining the EBITDA of Slovak, Czech, Polish, and Hungarian transport enterprises. Based on Table 23, individual equations of intercept and significant macroeconomic factors for countries in the V4 region were given as follows:

$$\mathrm{EBITDA}_{\mathrm{SK}} = 279.179 + 0.009 \cdot \mathrm{GDP} \tag{13}$$

$$\mathrm{EBITDA}_{\mathrm{CZ}} = 2{,}554.867 - 94.959 \cdot \mathrm{UR} \tag{14}$$

$$\mathrm{EBITDA_{PL}} = 1{,}249.348 + 0.021 \cdot \mathrm{GDP} - \\ - 8.361 \cdot \mathrm{AMGW} - 10.02 \cdot \mathrm{EoDB} \tag{15}$$

$$\mathrm{EBITDA_{HU}} = 1{,}783.850 - 59.851 \cdot \mathrm{UR} \tag{16}$$

Thus, the time series of EBITDA of Slovak enterprises was determined by GDP. The unemployment rate was a significant for both Czechia and Hungary. Transport in Poland was affected by the GDP, average monthly gross wage, and Ease of doing business index.

Discussion

The results of this investigation are discussed and compared to the results of recent studies in the field of earnings.

Durana *et al.* (2022a) analyze the earnings in the transport sectors for the same 10-year period. EBITDA was also used as an appropriate measure of quantification of earnings and was calculated in an equivalent way. Time series analysis was created but without focus on stationarity and unit roots. But their study deals with the issue of finding a lever year that divides the development of earnings into two periods. During that period, the development in the time series is equal. Using Buishand's Q and R statistics, they disclose change points in earnings. The mentioned tests are adequate for variables following any distribution, whereas this study used the parametric KPSS test. Three different years were uncovered for the V4 region. 2013 for Slovakia and Hungary, 2014 for Czechia, and 2015 for Poland. The occurrence of significant years of change in all countries is compatible with the delivery of the conclusion of non-stationarity of earnings.

Non-stationary behavior may be created by trends, cycles, random walks, or combinations of all of them. Further, Durana *et al.* (2022b) assess the existence of a trend in time series of earnings. Using the Mann-Kendall trend test, the exploration confirms the presence of them in the transport sector. They also add annual magnitude and intercept to the proven trend by Sens's slope. Those results are again reconcilable to the delivered conclusion of non-stationarity and the necessity to determine the specific unit roots.

The activities linked to earnings management were outlined as a unit root. The detection is recommended by the modified Jones model in all sectors. However, each industry has its own set of manipulative characteristics. This research argues that most transportation entities prefer to have a downward manipulation with negative discretionary accrual values. It

contrasted with the study by Siekelova *et al.* (2020, pp. 70–83). Using the same model, they focus on the mining and quarrying sector and conclude that Czech and Slovak enterprises do activities to increase their earnings. On the contrary, the Polish, and Hungarian ones prefer techniques to reduce their earnings.

Michalkova *et al.* (2022) observe transport enterprises over the period 2011–2019 in 30 countries in Europe. The manipulation was explained as follows. Mature enterprises use downward earnings management techniques, as do smaller and unlisted ones. While enterprises with riskier cash flows prefer increasing earnings, such as listed and very large enterprises. Therefore, it is necessary to point out that the manipulation in transport may vary over the period according to life cycle and region and does not need to be confirmed only for downward manipulation in general as in this research.

Valaskova *et al.* (2020, pp. 101–119) also evaluate the development of EBITDA in V4, but this study uses a 9-year period (2010–2018) for the entire economy, not a specific sector. They confirm the heterogeneity in time series for each analyzed country and find the impact of adjustable areas (represented by business dynamism) and uncontrollable macroeconomic variables. On the one hand, using Pettitt's test, they note that business dynamism has no effect on earnings over the period.

On the other hand, Valaskova *et al.* (2020, pp. 101–119) show the compliance between the development of earnings in each country and all macroeconomic factors analyzed. Specifically, GDP, the unemployment rate, inflation rate, average monthly gross wage, and Ease of doing business index. It is in contrast with this study. It indicated that the earnings of Slovak transport enterprises were impacted only by GDP. The Czech and Hungarian transport sectors were affected only by the unemployment rate. The EBITDA of Polish enterprises was influenced by the GDP, average monthly gross wage, and Ease of doing business index. The impact of the inflation rate has not been confirmed in any country. The discrepancies may be caused by analyzing the whole economy for one study while the other study uses only the transport sector. The second reason is derived from the different methodologies used (time series analysis versus regression analysis).

Thus, the methodology of assessment of the development of earnings through time series is used for the entire economy as well as specific sectors. It is not exactly determined whether the approach and preference are to use average data or panel data. There is the consistency of the conclusions of compared non-stationarity tests, trend tests, and heterogeneity tests. The Modified Jones model is adequate to detect suspicious activities

of enterprises in individual sectors. The occurrence of earnings management is proven in transport over different periods (9-year and 10-year) in each country in the V4 region. The unit roots of macroeconomic variables are uncovered, but with irregular significance for the whole economy or specific sector.

Conclusions

The target of the article was to identify the occurrence of non-stationary and its unit root in the EBITDA of transport enterprises for each country in V4 during the period of 2010–2019. The non-stationaries were confirmed; the development in the time series was not constant. There were significant microeconomic and possible macroeconomic reasons found. The existence of earnings management was disclosed over all the analyzed years. Also, it was shown that specific macroeconomic variables have a significant impact on the earnings of transportation businesses.

Practical implications may be considered with the new methodology providing a solution to the issue of earnings assessment. This methodology uses time series analysis, earnings management analysis, and regression analysis. Academicians may apply it in other sectors of the national economy to and other crucial financial indicators. These findings can also be used by the auditors and authorities of emerging countries to disclose suspicious behavior of enterprises, because the presence of non-stationarity in earnings predicts the presence of manipulation. The practical implication of this research for enterprises lies in identifying macroeconomic factors that have a significant impact on their activities.

The first weakness of the provided investigation is the use of average earnings before interest, taxes, depreciation, and amortization. The next limitation of the research can be considered the fact that there are not equal numbers of enterprises in the samples of countries. Further, the focus on only one sector means a constraint as well. The run of the modified Jones model for a 10-year period and linear regression over time individually.

Thus, future research may focus on the creation of new models of the Visegrad Four using panel data for the EBITDA. The models may be detected using methods designed specifically for time series of financial data. The computed discretionary accruals may be added as a microeconomic input variable. It was mostly a downward manipulation during a 10-year period in the transport sector. It is a very surprising conclusion because the upward is preferred in general. The extension may be targeted at other sectors to provide a comprehensive overview and comparison. As for the rea-

son, it should be found in other sectors' earnings downward manipulation to create the homogenous clusters of them supported by the cluster of sectors that manipulate earnings upward.

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Annex

Table 1. Sample size description

Samples	Slovakia	Czechia	Poland	Hungary
Origin	830	775	1,941	1,450
Not available data	360	370	1,167	394
Final sample size	**470**	**405**	**774**	**1,056**

Table 2. Average EBITDA [thousand €]

Year	Slovakia	Czechia	Poland	Hungary
2010	880.28	1,930.037	1,053.727	1,024.888
2011	962.824	1,871.235	1,206.594	1,034.259
2012	1,011.158	2012.79	1,378.458	1,240.061
2013	913.666	1,785.946	1,353.325	1,265.860
2014	987.561	1,868.772	1,467.755	1,256.401
2015	1,117.208	2,187.054	1,779.606	1,384.819
2016	1,048.643	2,057.043	1,731.559	1,560.959
2017	1,026.084	2,365.319	1,879.227	1,533.392
2018	1,133.802	2,365.945	1,799.524	1,574.542
2019	1,133.565	2,328.085	2,068.761	1,516.403

Table 3. Slovakia: descriptive statistics of analyzed macroeconomic indicators

Statistics	EBITDA (th. €)	GDP (th. €)	Unemployment rate (%)	Inflation rate (%)	Average monthly gross wage (th. €)	Ease of doing business index (score)
Minimum	880.280	68,188.700	5.800	–0.500	769.000	29.000
Maximum	1,133.802	93,865.200	14.400	4.100	1,092.000	49.000
1st Quartile	969.008	73,794.050	8.500	0.100	809.750	34.500
Median	1,018.621	78,018.700	12.350	1.450	870.500	42.500
3rd Quartile	1,100.067	83,662.025	13.900	2.725	943.500	44.500
Mean	1,021.479	79,250.960	11.100	1.580	889.600	40.100
Standard deviation	89.045	8,163.654	3.332	1.656	104.681	7.172

Table 4. Czechia: descriptive statistics of analyzed macroeconomic indicators

Statistics	EBITDA (th. €)	GDP (th. €)	Unemployment rate (%)	Inflation rate (%)	Average monthly gross wage (th. €)	Ease of doing business index (score)
Minimum	1,785.946	157,821.300	2.000	0.300	936.000	26.000
Maximum	2,365.945	223,950.300	7.300	3.500	1,297.000	75.000
1st Quartile	1,885.935	160,243.000	3.175	0.750	966.750	30.750
Median	2,034.917	167,380.200	5.600	1.700	996.000	38.000
3rd Quartile	2,292.827	189,959.300	6.925	2.350	1,101.250	67.000
Mean	2,077.223	177,900.100	5.030	1.660	1,050.400	46.900
Standard deviation	220.681	23,764.537	2.099	1.057	128.083	19.858

Table 5. Poland: descriptive statistics of analyzed macroeconomic indicators

Statistics	EBITDA (th. €)	GDP (th. €)	Unemployment rate (%)	Inflation rate (%)	Average monthly gross wage (th. €)	Ease of doing business index (score)
Minimum	1,053.727	362,190.900	3.300	–0.700	860.000	24.000
Maximum	2,068.761	532,329.200	10.300	3.900	1,191.000	62.000
1st Quartile	1,359.608	389,037.925	5.225	0.275	902.250	27.250
Median	1,599.657	418,029.800	8.250	1.400	970.000	36.500
3rd Quartile	1,794.545	458,186.400	9.700	2.475	1,045.250	47.250
Mean	1,571.854	428,643.210	7.460	1.510	987.900	39.100
Standard deviation	326.558	54,983.072	2.699	1.579	110.526	14.019

Table 6. Hungary: descriptive statistics of analyzed macroeconomic indicators

Statistics	EBITDA (th. €)	GDP (th. €)	Unemployment rate (%)	Inflation rate (%)	Average monthly gross wage (th. €)	Ease of doing business index (score)
Minimum	1,024.888	99,576.300	3.400	0.000	735.000	40.000
Maximum	1,574.542	146,061.800	11.200	5.700	1,154.000	54.000
1st Quartile	1,244.146	102,024.025	4.425	0.725	770.250	42.250
Median	1,325.340	109,381.150	7.250	2.650	788.500	49.500

Table 6. Continued

Statistics	EBITDA (th. €)	GDP (th. €)	Unemployment rate (%)	Inflation rate (%)	Average monthly gross wage (th. €)	Ease of doing business index (score)
3rd Quartile	1,529.145	124,200.700	10.800	3.775	932.000	52.000
Mean	1,339.158	114,739.110	7.430	2.520	861.100	47.700
Standard deviation	208.060	16,431.895	3.229	1.974	141.035	5.599

Table 7. Grubbs test

Grubbs test	Slovakia	Czechia	Poland	Hungary
G (Observed value)	1.586	1.925	1.587	1.510
G (Critical value)	2.290	2.290	2.290	2.290
p–value	**0.943**	**0.317**	**0.941**	**0.998**
alpha	0.05	0.05	0.05	0.05

Table 8. Shapiro-Wilk test

Shapiro-Wilk test	Slovakia	Czechia	Poland	Hungary
W	0.940	0.898	0.958	0.888
p–value	**0.552**	**0.208**	**0.768**	**0.161**
alpha	0.05	0.05	0.05	0.05

Table 9. Box-Pierce test

Box-Pierce test	Slovakia	Czechia	Poland	Hungary
Q	5.321	7.744	7.978	9.536
p–value	**0.503**	**0.257**	**0.240**	**0.146**
alpha	0.05	0.05	0.05	0.05

Table 10. KPSS test

KPSS test	Slovakia	Czechia	Poland	Hungary
Eta (Observed value)	0.715	0.766	0.948	0.936
Eta (Critical value)	0.457	0.457	0.457	0.457
p–value	**0.004**	**0.002**	**< 0,0001**	**< 0,0001**
alpha	0.05	0.05	0.05	0.05

Table 11. ADF test

ADF test stationary	Slovakia	Czechia	Poland	Hungary
Eta (Observed value)	-1.435	-2.240	-1.654	-1.408
Eta (Critical value)	-5.930	-5.930	-5.930	-5.930
p–value	**0.565**	**0.328**	**0.493**	**0.574**
alpha	0.05	0.05	0.05	0.05
ADF test explosive	**Slovakia**	**Czechia**	**Poland**	**Hungary**
Eta (Observed value)	-1.545	-1.975	-1.346	-1.219
Eta (Critical value)	-5.930	-5.930	-5.930	-5.930
p–value	**0.471**	**0.604**	**0.405**	**0.364**
alpha	0.05	0.05	0.05	0.05

Table 12. Slovakia: earnings manipulation

Year	Slovakia						
	No manipulation		+DA		-DA		Total
2010	20	4.26%	249	52.98%	201	42.77%	470
2011	22	4.68%	222	47.23%	226	48.09%	470
2012	12	2.55%	76	16.17%	382	81.28%	470
2013	15	3.19%	150	31.91%	305	64.89%	470
2014	17	3.62%	198	42.13%	255	54.26%	470
2015	16	3.40%	112	23.83%	342	72.77%	470
2016	15	3.19%	261	55.53%	194	41.28%	470
2017	13	2.77%	189	40.21%	268	57.02%	470
2018	13	2.77%	218	46.38%	239	50.85%	470
2019	11	2.34%	178	37.87%	281	59.79%	470

Table 13. Czechia: earnings manipulation

Year	Czechia						
	No manipulation		+DA		-DA		Total
2010	21	5.19%	209	51.60%	175	43.21%	405
2011	24	5.93%	182	44.94%	199	49.14%	405
2012	19	4.69%	166	40.99%	220	54.32%	405
2013	15	3.70%	187	46.17%	203	50.12%	405
2014	16	3.95%	201	49.63%	188	46.42%	405
2015	12	2.96%	203	50.12%	190	46.91%	405
2016	13	3.21%	171	42.22%	221	54.57%	405
2017	17	4.20%	147	36.30%	241	59.51%	405
2018	21	5.19%	166	40.99%	218	53.83%	405
2019	17	4.20%	158	39.01%	230	56.79%	405

Table 14. Poland: earnings manipulation

Year	Poland						
	No manipulation		+DA		-DA		Total
2010	53	6.85%	290	37.47%	431	55.68%	774
2011	48	6.20%	286	36.95%	440	56.85%	774
2012	49	6.33%	227	29.33%	498	64.34%	774
2013	51	6.59%	219	28.29%	504	65.12%	774
2014	55	7.11%	239	30.88%	480	62.02%	774
2015	44	5.68%	146	18.86%	584	75.45%	774
2016	42	5.43%	141	18.22%	591	76.36%	774
2017	35	4.52%	180	23.26%	559	72.22%	774
2018	41	5.30%	186	24.03%	547	70.67%	774
2019	42	5.43%	230	29.72%	502	64.86%	774

Table 15. Hungary: earnings manipulation

Year	Hungary						
	No manipulation		+DA		-DA		Total
2010	39	3.69%	520	49.24%	497	47.06%	1,056
2011	32	3.03%	450	42.61%	574	54.36%	1,056
2012	35	3.31%	579	54.83%	442	41.86%	1,056
2013	33	3.13%	602	57.01%	421	39.87%	1,056
2014	38	3.60%	482	45.64%	536	50.76%	1,056

Table 15. Continued

Year	Hungary						
	No manipulation		+DA		-DA		Total
2015	30	2.84%	493	46.69%	533	50.47%	1,056
2016	40	3.79%	813	76.99%	203	19.22%	1,056
2017	39	3.69%	489	46.31%	528	50.00%	1,056
2018	45	4.26%	324	30.68%	687	65.06%	1,056
2019	48	4.55%	312	29.55%	696	65.91%	1,056

Table 16. Correlation matrix with calculated p-values

Variables/ p-values	Slovakia EBITDA	Czechia EBITDA	Poland EBITDA	Hungary EBITDA
GDP	**0.859**	**0.868**	**0.925**	**0.808**
	0.001	0.001	0.000	0.005
Unemployment rate	**–0.813**	**–0.903**	**–0.899**	**–0.929**
	0.004	0.000	0.000	0.000
Inflation rate	0.017	0.284	–0.440	–0.409
	0.962	0.427	0.203	0.241
Average monthly gross wage	**0.822**	**0.829**	**0.918**	**0.750**
	0.004	0.003	0.000	0.012
Ease of doing business index	–0.328	–0.470	**–0.741**	–0.047
	0.354	0.170	0.014	0.898

Note: Values in bold are different from 0 with a significance level alpha 0.05 based on Table 9.

Table 17. Multicollinearity statistics

VIF	GDP	Unemployment rate	Inflation rate	Average monthly gross wage	Ease of doing business index
Slovakia	4.827	6.411	–	9.072	–
Czechia	6.855	3.069	–	4.716	9.060
Poland	6.303	9.713	–	9.437	1.614
Hungary	9.262	8.097	–	8.920	–

Table 18. Goodness of fit statistics of the models

Statistic	Slovakia	Czechia	Poland	Hungary
R^2	0.737	0.816	0.981	0.863
Adjusted R^2	0.705	0.792	0.972	0.846
Mallows' Cp	3.101	0.779	3.209	4.206

Table 18. Continued

Statistic	Slovakia	Czechia	Poland	Hungary
Akaike's AIC	79.358	93.978	83.029	89.826
Schwarz's SBC	79.963	94.583	84.239	90.431
Amemiya's PC	0.394	0.277	0.044	0.206

Table 19. Test on the normality of the residuals

Shapiro–Wilk test	Slovakia	Czechia	Poland	Hungary
W	0.961	0.893	0.936	0.900
p–value	**0.801**	**0.185**	**0.506**	**0.220**
alpha	0.05	0.05	0.05	0.05

Table 20. Test on the autocorrelation of the residuals

Durbin–Watson test	Slovakia	Czechia	Poland	Hungary
W	2.259	3.064	3.225	1.720
rho	–0.183	–0.569	–0.643	0.028
p–value	**0.977**	**0.127**	**0.159**	**0.368**
alpha	0.05	0.05	0.05	0.05

Table 21. Test on the homoscedasticity of the residuals

Breusch–Pagan test	Slovakia	Czechia	Poland	Hungary
LM (Observed value)	0.117	1.676	4.556	1.691
LM (Critical value)	3.841	3.841	7.815	3.841
p–value	**0.732**	**0.195**	**0.207**	**0.151**
alpha	0.05	0.05	0.05	0.05

Table 22. Analysis of variance of the models

ANOVA	F	*p*–value
Slovakia	22.464	**0.001**
Czechia	35.369	**0.000**
Poland	103.861	**<0.0001**
Hungary	50.392	**0.000**

Table 23. Model parameters

Slovakia	**Value**	**Standard error**	***t***	***p*–value**
Intercept	**279.179**	157.362	4.774	**0.001**
GDP	**0.009**	0.002	4.740	**0.001**
Czechia	**Value**	**Standard error**	***t***	***p*–value**
Intercept	**2,554.867**	86.377	29.578	**<0.0001**
Unemployment rate	**–94.959**	15.967	–5.947	**0.000**
Poland	**Value**	**Standard error**	***t***	***p*–value**
Intercept	**1,249.348**	**435.645**	**2.868**	**0.029**
GDP	**0.021**	0.005	4.052	**0.007**
Average monthly gross wage	**–8.361**	2.604	–3.211	**0.018**
Ease of doing business index	**–10.020**	1.617	–6.197	**0.001**
Hungary	**Value**	**Standard error**	***t***	***p*–value**
Intercept	**1,783.850**	67.761	26.326	**<0.0001**
Unemployment rate	**–59.851**	8.431	–7.099	**0.000**