

Financial Performance and Cultural Differences in E-Commerce: A Comparative Analysis of Czech and Slovak Firms

Research Paper

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Abstract: **Research purpose.** The study compares the financial performance of Czech and Slovak e-commerce firms and examines cross-country differences in profitability, liquidity, efficiency and value-creation proxies (gross margin, added value and labour productivity). The purpose is to identify statistically detectable differences in key indicators and to discuss them through the lens of cultural economics and institutional context as an interpretative framework, while acknowledging that financial-statement data do not allow direct measurement of firm-level culture or ownership nationality.

Design / Methodology / Approach. The analysis is based on firm-level financial data extracted from the ORBIS database for companies classified under NACE 4791. The normality of the data is verified using the Shapiro–Wilk test. Since most indicators did not show a normal distribution, non-parametric procedures were chosen for comparisons between countries, in particular the Mann–Whitney U test and Spearman rank-order correlations to examine internal financial relationships. Multiple-testing corrections were performed using the Holm–Bonferroni and Benjamini–Hochberg methods to ensure robustness. A total of 483 firms were included in the analysis.

Findings. The results reveal marked cross-country differences. Slovak firms tend to demonstrate a more performance-oriented profile, with profitability more closely associated with labour productivity, margin optimisation and value-creation proxies (gross margin and added value). In contrast, Czech firms tend to exhibit a more stability-oriented profile, where profitability is more strongly linked to liquidity, solvency and working-capital management. Slovakia shows higher levels of profitability and value-creation proxies, while the Czech Republic shows significantly higher levels of liquidity and financial stability. These patterns may be interpreted as broadly consistent with cross-country differences in uncertainty avoidance, risk perception and business adaptability discussed in the economic-culture literature; however, cultural factors are not directly observed at the firm level in the dataset.

Originality / Value / Practical implications. The study provides original evidence on how financial strategies in the e-commerce sector differ between two closely related Central European economies and discusses these differences using cultural and institutional context as an interpretative framework. By integrating financial analysis with cultural-economic theory, the results can be interpreted as suggesting that national context may be associated with profitability- and stability-oriented profiles in digital industries. The findings offer practical implications for managers and policymakers: Slovak firms may strengthen liquidity planning to reduce vulnerability to shocks, while Czech firms could enhance competitiveness by improving productivity and operational margins. The results also contribute to the theoretical debate on the role of culture in financial behaviour in the digital age, while acknowledging that culture is not directly measured in firm-level financial statements.

Keywords: E-commerce • Financial performance • Economic culture • Cross-country comparison

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Introduction

In recent years, e-commerce has been developing rapidly and is significantly changing the way companies in Europe organise sales and logistics. This trend is also evident in the Czech Republic and Slovakia. In Central Europe, the Czech Republic and Slovakia represent two closely related economies that share a common historical foundation yet differ in their institutional frameworks, managerial practices, and business cultures. Although both countries emerged from the same economic system, their post-transition development trajectories have diverged, leading to potential differences in how firms operate, finance their growth, and manage liquidity and profitability.

E-commerce plays a growing role in both economies. According to Eurostat (2024), the share of e-commerce in total retail sales continues to increase in the Czech Republic, where digital infrastructure and consumer trust in online transactions are relatively high. In Slovakia, e-commerce also exhibits strong growth, but firms tend to operate on a smaller scale and with more conservative financing strategies (OECD, 2024). These variations are often attributed not only to market size or regulatory environments but also to differences in economic culture; the set of values, attitudes, and decision-making norms that shape business behaviour (Hofstede, 2001; Kaasa, 2017).

The concept of economic culture reflects how cultural dimensions, such as uncertainty avoidance, risk tolerance, or long-term orientation, influence economic and managerial decisions. Previous studies have shown that cultural and institutional contexts affect financial decision-making, investment strategies, and corporate performance (Guiso et al., 2006; Licht et al., 2007).

The growing importance of e-commerce in Central Europe underscores the need to understand how firms in digitally driven industries differ in their financial behaviour across national and cultural contexts. This makes a comparative financial analysis of e-commerce firms relevant and timely.

The aim of this study is to compare the financial performance of Czech and Slovak e-commerce firms and to explore how profitability, liquidity, efficiency and value-creation proxies (gross margin, added value and labour productivity) differ between the two national markets. Based on theoretical frameworks linking culture, institutions and firm-level outcomes, three propositions are examined: (H1) financial performance indicators differ significantly between Czech and Slovak e-commerce firms; (H2) key financial relationships (such as those between profitability, liquidity, leverage and productivity) differ between the two countries; and (H3) the observed financial patterns are consistent with national-level cultural and institutional context and can be discussed using an economic-culture lens. Since firm-level cultural attributes and ownership nationality are not observed consistently in the data, H3 is treated as an interpretative proposition rather than a directly tested causal hypothesis.

To test these hypotheses, the study will employ quantitative methods using firm-level financial data obtained from the ORBIS database. Normality of data will be assessed using the Shapiro-Wilk test, after which appropriate methods will be applied. Cross-country differences in financial indicators will be evaluated using the Mann-Whitney U-test, while internal financial relationships will be explored through Spearman's rank-order correlation. In addition, multiple-testing corrections such as the Holm-Bonferroni and Benjamini-Hochberg procedures will be employed to ensure the robustness of statistical inference.

By applying these methods, the study will provide an empirical basis for evaluating whether and how financial performance differs between Czech and Slovak e-commerce firms. Furthermore, it will offer insights into the potential cultural, institutional and strategic factors that may contribute to these differences, thereby enriching the understanding of financial behaviour in the digital economy.

Literature review

The development of digital technologies has fundamentally transformed the structure of retail and services. E-commerce has become a key driver of economic growth and innovation not only globally, but also within the Central European region. This sector introduces new business models, accelerates capital turnover, and intensifies competitive pressure, prompting firms to optimise their financial management and investment decisions (Bu & You, 2020; Siegfried et al., 2021). E-commerce is now one of the fastest-growing segments of the global economy. Numerous empirical studies confirm that the growth rate of electronic commerce significantly exceeds that of traditional retail sales, primarily due to lower operating costs, broader product availability, and faster access to goods (Liu et al., 2018).

Within the European Union, the Czech Republic has long been among the countries with the highest share of online shoppers and a well-developed logistics infrastructure (Eurostat, 2024). Slovakia demonstrates a similar pace of growth, although with a smaller number of active firms and a lower level of digitalisation (OECD, 2022). Differences between these two countries can be explained not only by market size or investment intensity but also by cultural and managerial factors that shape financial decision-making and strategic management (Hofstede, 2001; Kaasa, 2017).

For this reason, examining the relationship between economic culture and the financial performance of e-commerce firms has gained increasing importance. Many authors point out that cultural context can influence firms' approach to risk or capital structure (e.g. Guiso et al., 2006; Licht et al., 2007). These differences can also be reflected in the area of liquidity or profitability.

According to Taher (2021), shifts in consumer behaviour may gradually reduce the volume of sales in traditional retail channels, as customers increasingly prefer the convenience and accessibility of online shopping. Similarly, Hamada et al. (2018) and Ghonyan (2020) highlight that the key benefits of implementing e-commerce include lower operational costs, more efficient business processes, and the adoption of advanced technological innovations. Zhou et al. (2021) further emphasise that companies capable of responding rapidly to market changes and adapting to new conditions achieve higher adaptability, which positively influences their financial performance.

Cultural context and financial behaviour of firms

Culture has long been recognised as an important determinant of economic behaviour in socio-economic and managerial research. Hofstede (2001) identified key cultural dimensions such as individualism, uncertainty avoidance and power distance, which influence organisational decision-making. Subsequent studies demonstrate that national cultural patterns shape entrepreneurial strategies, financing structures and innovation behaviour (Wennekers et al., 2007; House et al., 2014). In economic terms, the concept of economic culture encompasses values and norms guiding attitudes toward economic activity (Kaasa, 2017). Higher risk aversion is typically associated with conservative financial management and lower leverage (Tadesse & Kwok, 2006), while cultures characterised by lower power distance tend to support more flexible decision-making and quicker market responses (Taras et al., 2010).

Empirical evidence confirms that cultural context directly affects profitability, capital structure and investment decisions. Li et al. (2013) showed that firms in more individualistic countries invest more in innovation and achieve higher ROA, whereas Novani and Rahmawati (2020) identified links between cultural distance and profitability in multinational firms. In Central Europe, economic culture reflects a blend of post-socialist legacies and emerging market-oriented practices (Kaasa, 2017; Dvoutěý & Orel, 2020). Despite institutional similarities, countries differ in entrepreneurial optimism, trust in institutions and risk tolerance (Holienka, Pilková & Jančovičová, 2017; Gaşior & Gawel, 2021).

Research also points out that cultural factors manifest in financial indicators such as capital structure, liquidity and returns. Chui et al. (2010) showed that national culture influences debt–equity ratios, while Graham et al. (2012) noted that managers in high uncertainty-avoidance cultures favour stable returns, resulting in lower ROA and higher liquidity. As e-commerce expands, scholars increasingly explore financial performance drivers across markets (Stofkova et al., 2022). Financial performance is multidimensional, comprising profitability, liquidity, efficiency and leverage (Brigham & Ehrhardt, 2022), and in e-commerce it is closely tied to cash-flow cycles, cost efficiency and adaptability to market fluctuations (Laudon & Traver, 2022). Key retail indicators commonly analysed include sales revenue, gross margin, inventory turnover and ROA (Levy et al., 2019).

In Central European SMEs, managerial culture and institutional conditions also strongly influence financial outcomes. Šebestová and Sroka (2020) argue that entrepreneurial culture in the Visegrad region remains relatively conservative, with lower risk tolerance and a stronger emphasis on stability, contributing to lower leverage and higher liquidity compared to Western Europe. Other studies emphasise that cultural dimensions such as trust, individualism and innovativeness significantly predict financial performance (Guiso et al., 2006; Kaasa, 2017), with culturally more open firms often achieving higher value-added-to-sales ratios and more efficient use of human capital (Taras et al., 2010).

From the perspective of cost efficiency, e-commerce offers substantial savings in storage, distribution and marketing (Turban et al., 2021). Digital marketing tools allow more precise targeting and require fewer financial resources than traditional channels, improving efficiency and reducing marketing-cost ratios (Kotler et al., 2020; Chaffey & Ellis-Chadwick, 2020). Additionally, e-commerce enhances asset efficiency by reducing the need for

physical infrastructure and inventory (Mostafa et al., 2019), leading to higher asset turnover and improved financial performance.

The Czech Republic and Slovakia share common historical and institutional roots, yet their economic cultures have diverged since 1993. The Czech economy has traditionally been more export-oriented with a stronger industrial base, whereas Slovakia has focused more on attracting foreign investment and supporting innovation (OECD, 2022). Although cultural factors are recognised as important determinants of corporate financial behaviour, their role in shaping financial outcomes within the Central European e-commerce sector remains insufficiently explored, as previous research has focused more on macroeconomic characteristics or general cultural attributes. This study addresses this gap by providing an empirical comparison of Czech and Slovak e-commerce firms and by interpreting financial differences through the lens of economic culture and managerial practices.

Recent firm-level evidence further documents how digitalisation and e-commerce adoption shaped performance and resilience in the post-pandemic period. For example, cross-country firm data indicate that e-commerce adoption is positively associated with sales growth and is supported by targeted policy instruments during crisis conditions (Chundakkadan & Sasidharan, 2023). Related work also shows that higher digital intensity is linked to stronger profitability and revenue growth during pandemic and disruption shocks (Gaspar, Wang, & Xu, 2024). In addition, recent research on digital business model transformation highlights performance-relevant heterogeneity across firms and environments, reinforcing the importance of analysing financial behaviour in digital contexts (Fan, 2025).

Despite a growing comparative literature on e-commerce and digitalisation, many studies focus primarily on differences in average performance levels or growth rates. The present study extends this stream by examining not only cross-country differences in indicator levels, but also differences in correlation structures among profitability, liquidity, leverage, productivity and value-creation proxies. This correlation-based perspective is used to approximate country-specific financial logics, i.e., how financial outcomes are internally connected within firms, and to discuss these patterns through the lens of economic culture as an interpretative framework.

Research methodology

The dataset used in this study was constructed from the financial statements of firms obtained from the international ORBIS database (Bureau van Dijk). The sample includes companies registered in the Czech Republic and Slovakia classified under NACE Rev. 2 code 4791 - Retail sale via mail order houses or via Internet, which covers businesses whose primary activity involves selling goods through online platforms, electronic marketplaces, or catalogues. This classification ensures that the sample accurately represents the core e-commerce sector in both countries.

The collected data contain firm-level financial indicators for the period 2014–2023, enabling the assessment of current financial performance as well as long-term trends. The data set was supplemented with calculated variables capturing, for example, indicators such as profitability, liquidity, debt, asset efficiency, or value added.

After verifying data completeness and consistency, a total of 483 firms were included in the final sample, of which 384 are Slovak and 99 are Czech. To ensure transparency in sample construction, a stepwise ORBIS search strategy was followed. First, it is restricted ORBIS to active companies registered in the Czech Republic and Slovakia. Second, firms are selected whose primary activity is NACE Rev. 2 core code 4791 - Retail sale via mail order houses or via Internet, which yields 24,439 records in ORBIS. Third, a filter is applied requiring operating revenue (turnover) of at least EUR 10 thousand, and then entities without recent financial data and public authorities/states/governments were excluded. After applying these criteria, the final dataset consists of 483 firms.

The final sample is unbalanced (384 Slovak firms vs. 99 Czech firms), reflecting the number of ORBIS-covered companies that met the sector, activity and data-availability criteria in each country. This asymmetry is acknowledged in the methodological design. The Mann-Whitney U test is appropriate because it is a rank-based non-parametric test that does not require normality or equal sample sizes; unequal group sizes primarily affect statistical power and precision rather than test validity. To mitigate this issue, the analysis combines distributional diagnostics, non-parametric testing and multiple-testing corrections (Holm-Bonferroni and Benjamini-Hochberg), and the results are interpreted cautiously.

In terms of legal form, the sample is dominated by limited liability companies (478 firms) with a small number of joint-stock companies (5 firms). Firm size was approximated using employee headcount in the last available year; employee data are available for 212 firms and indicate that most firms are micro (<10 employees; n=182), followed by small (10 - 49; n=23), medium (50 - 249; n=5) and large (250 or more; n=2) firms. To characterise the scale of

the sample, median turnover in the last available year equals 157.3 thousand EUR (IQR 41.7 - 841.4) and median total assets in 2023 equal 93.1 thousand EUR (IQR 31.1 - 357.8).

Information on ownership nationality (e.g., ultimate owner country) is not consistently available for the full sample in the export; therefore, stratification by owner nationality is not feasible in this study and is addressed as a limitation and a priority for future research.

Based on the available literature (Duguleană et al., 2024; Hațegan et al., 2021; Qureshi & Yadav, 2021; Pramono et al., 2020; Eger & Suchánek, 2020), a total of 13 financial indicators were selected for the analysis. Although the study applies a classical ratio-based balance-sheet approach, this choice is deliberate: financial indicators provide a standardised and widely used way to benchmark firm performance across countries when harmonised accounting data are available. In this paper, ratio analysis is used as an exploratory, comparative tool to identify statistically detectable differences and structural patterns; it does not by itself imply causal differences in managerial objectives. Capitalisation (capital structure) is explicitly incorporated through the Debt ratio indicator, defined as total liabilities to total assets, which captures the extent of leverage and the strength of the equity buffer. Because the priority between profit distribution and reinvestment depends on financing structure, the interpretation links leverage patterns to profitability and liquidity outcomes. This responds directly to calls to consider capital structure when comparing financial behaviour across firms and countries. Selected indicators cover key areas of business performance assessment – profitability, liquidity, indebtedness, efficiency and labour productivity – and allow for a comprehensive comparison of the financial situation of e-commerce companies in the Czech Republic and Slovakia. These indicators are clearly summarised in the figure below.

1. Testing the Normality of Data Distribution

Before comparing the financial performance of Czech and Slovak e-commerce firms, it is necessary to verify whether the analysed indicators followed a normal distribution. Normality testing determines whether parametric or non-parametric procedures are appropriate and thus prevents biased statistical conclusions (Field, 2018). To assess normality, the Shapiro-Wilk test was applied (Shapiro & Wilk, 1965), as it is one of the most sensitive methods for detecting deviations from a normal distribution. If the p-value is below 0.05, the null hypothesis of normality is rejected, indicating non-normal data; if the p-value is ≥ 0.05 , normality cannot be rejected.

2. Testing for Differences between Groups

After assessing the normality of the data using the Shapiro-Wilk test, several financial indicators were found not to follow a normal distribution. Therefore, a non-parametric approach was applied to compare the financial performance of Czech and Slovak e-commerce firms.

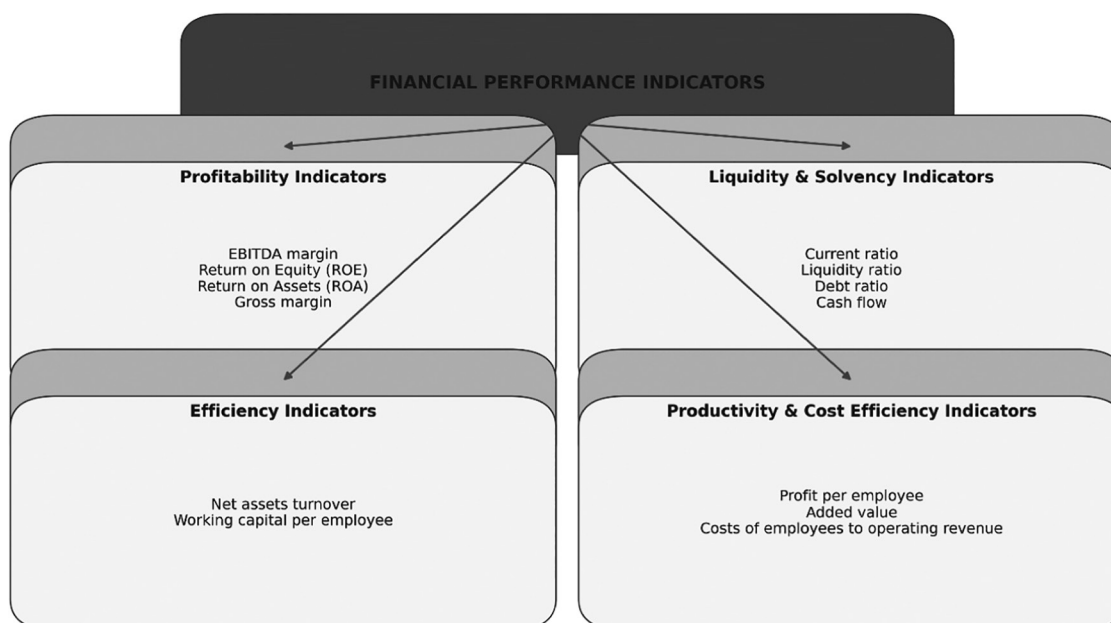


Figure 1. Structure of the Analysed Financial Indicators (Source: Created by the author).

Differences between the two independent samples were assessed using the Mann-Whitney U test, which evaluates group differences based on ranked values and does not assume normality (Field, 2018). Each indicator was tested separately, with p-values below 0.05 interpreted as evidence of significant cross-country differences. This method provides an appropriate basis for detecting variations in financial performance potentially linked to structural, institutional or cultural factors.

3. Robustness Checks and Multiple Testing Correction

Because multiple hypotheses are tested simultaneously (13 financial indicators), the risk of inflated Type I error was managed using the Holm-Bonferroni correction (Holm, 1979), which sequentially adjusts p-values and provides stronger control of the family-wise error rate than the classical Bonferroni method. To complement this approach, the Benjamini-Hochberg procedure (Benjamini & Hochberg, 1995) was also applied to control the false discovery rate (FDR = 0.10), allowing the identification of effects that may be weaker but still systematically meaningful. Together, these correction methods ensure more reliable interpretation of significance levels across multiple comparisons.

4. Spearman Rank-Order Correlation

Since the financial indicators do not follow a normal distribution, the relationships between variables are analysed using the Spearman rank-order correlation coefficient. This method evaluates monotonic associations based on ranked values and is robust to non-normality, heteroscedasticity, and outliers. The correlation coefficient ρ ranges from -1 to $+1$, and its statistical significance is assessed using a two-tailed test (Spearman, 1904). The analysis is conducted separately for Czech and Slovak samples to identify country-specific financial patterns.

Research results

1. Testing for normality of data distribution (Shapiro-Wilk test)

The Shapiro-Wilk test was conducted separately for each financial indicator and for each group of firms (e-commerce and traditional retail). The Shapiro-Wilk test is known for its high sensitivity in detecting deviations from normality, particularly in small to moderate samples (Razali & Wah, 2011).

To assess the distributional properties of the data, the Shapiro-Wilk test was applied to all selected financial indicators. The test results showed that most variables deviated significantly from the normal distribution (p-values < 0.05), confirming the presence of non-normality in the dataset. As a result, the Mann-Whitney U test was selected for further analysis, as it does not assume normality and is suitable for comparing independent samples, in this case, Czech and Slovak e-commerce firms.

Table 1. Results of the Mann-Whitney U test for financial indicators (Source: Created by the author)

Financial Indicator	Rank Sum (CZ)	Rank Sum (SK)	U	Z	p-value
EBITDA margin	13539.00	40746.00	10053.00	-0.20752	0.835605
ROE	16904.00	60911.00	10508.00	1.89209	0.058479
ROA	22969.00	83984.00	16456.00	0.84150	0.400067
Gross margin	18493.00	98393.00	13543.00	-4.41301	0.000010
Current ratio	17557.50	80345.50	10220.50	2.57495	0.010026
Liquidity ratio	31578.00	85308.00	11388.00	6.15334	0.000000
Debt ratio	25618.00	90785.00	17249.00	1.38338	0.166549
Cash flow	22200.00	94686.00	17250.00	-1.41932	0.155807
Net assets turnover	19897.00	72338.00	15337.00	-0.49470	0.620811
Working capital per employee	29065.50	87820.50	13900.50	4.12430	0.000037
Profit per employee	4216.00	20537.00	2771.00	1.23168	0.218070
Added value	20891.00	95995.00	15941.00	-2.47644	0.013271
Costs of employees / Operating revenue	24475.00	92411.00	18491.00	0.41711	0.676595

2. Mann-Whitney U test

To examine whether statistically significant differences exist in the financial performance of e-commerce firms between the Czech Republic and Slovakia, the Mann-Whitney U test was applied to each of the selected financial indicators. The test results are summarised in Table 1, which presents the mean rank values for both countries, the corresponding U-statistic, and p-values indicating the level of statistical significance. A p-value lower than 0.05 denotes a statistically significant difference between Czech and Slovak e-commerce firms for a given financial indicator.

The results indicate several statistically significant differences in the financial performance of Czech and Slovak e-commerce firms, suggesting that the two markets may follow distinct financial and strategic patterns. These differences can be discussed in relation to national-level cultural and institutional context, but cultural factors are not directly observed at the firm level in the dataset and therefore remain an interpretative framework.

Profitability indicators

As it is seen in Table 1, the results reveal significant cross-country differences in profitability. Gross margin ($Z = -4.413$, $p < 0.001$) is substantially higher among Slovak e-commerce firms, indicating stronger operational profitability. This pattern may stem from market structure, where firms can specialise in niche segments and value-added services, allowing higher mark-ups. From an economic-culture perspective, the pattern may also be interpreted as consistent with managerial behaviours discussed in the literature (e.g., greater flexibility and adaptability under lower power distance and higher tolerance for uncertainty), but such cultural mechanisms are not directly measured in the financial data.

Conversely, ROE ($Z = 1.892$, $p = 0.058$) is marginally higher in Czech firms, suggesting more efficient use of shareholders' equity and potentially more mature financial management supported by financing conditions. The tendency toward stability and long-term reinvestment can be interpreted as broadly consistent with a more conservative financial orientation described in the literature, while recognising that alternative explanations (e.g., market structure and financing access) may also contribute.

In summary, Slovak firms excel in margin generation and operational value creation, while Czech firms demonstrate slightly higher capital efficiency. These patterns may be interpreted as broadly consistent with different managerial preferences discussed in the economic-culture literature (e.g., flexibility versus stability), but they should be read as indicative rather than deterministic.

Liquidity and solvency indicators

Liquidity measures show some of the strongest contrasts between the two countries. Czech e-commerce firms achieve significantly higher Liquidity ratio ($Z = 6.153$, $p < 0.001$) and Current ratio ($Z = 2.575$, $p = 0.010$), supported also by higher working capital per employee. These results suggest that Czech firms maintain larger liquidity reserves and follow a more conservative financial strategy. From an economic-culture perspective, this may be interpreted as consistent with more risk-averse and long-term oriented managerial behaviour reported in the literature; however, the dataset does not allow direct observation of such cultural traits at the firm level.

In contrast, Slovak firms exhibit lower liquidity levels, which may reflect more growth-oriented financial strategies and greater dependence on operational cash flow or trade credit. Such an approach can enhance efficiency but increases exposure to short-term financial risk.

Overall, Czech firms appear more financially prudent and stability-focused, while Slovak firms show a higher tolerance for financial risk and prioritise operational agility.

Efficiency indicators

Efficiency results show a significant difference in Working capital per employee ($Z = 4.124$, $p < 0.001$), which is considerably higher in Czech e-commerce firms. This suggests that Czech companies operate with larger working-capital reserves per staff member, reflecting a more capital-intensive structure and supporting their overall liquidity-oriented strategy. From an economic-culture perspective, this tendency may be interpreted as consistent with a more cautious financial mindset and a preference for stability discussed in prior research, while acknowledging that credit conditions and other structural factors may also contribute.

By contrast, Slovak firms may rely on leaner resource structures and place greater emphasis on growth, innovation and operational agility. This pattern could be consistent with a more flexible managerial orientation

discussed in the literature and may also relate to structural factors such as investment dynamics; however, these mechanisms cannot be directly tested with the available financial-statement data.

Productivity and cost efficiency indicators

The Added value indicator ($Z = -2.476$, $p = 0.013$) was significantly higher among Slovak e-commerce firms, highlighting stronger labour productivity and value creation. This complements the high Gross margin observed in Slovakia and may be linked to foreign partnerships, cross-border integration and a more flexible managerial approach that supports experimentation and operational adaptability.

These findings, together with earlier results, show that Czech firms excel in liquidity, capital stability and working-capital management, while Slovak firms outperform in margin generation and value-added efficiency. These differences can be interpreted as broadly consistent with cultural patterns discussed in the literature (e.g., more cautious, stability-oriented strategies versus more entrepreneurial, innovation-oriented approaches). To avoid overly deterministic interpretation, the cultural explanation is framed as an interpretative lens alongside alternative explanations such as financing conditions, ownership composition and market structure.

3. Robustness checks and multiple testing correction

Because the analysis involved multiple hypothesis tests (13 in total), the probability of obtaining false-positive results (Type I errors) increases with the number of comparisons. To account for this issue, multiple-testing corrections were applied to ensure that the reported significant results remain statistically valid and robust. Two approaches were used: the Holm-Bonferroni correction to control the family-wise error rate (FWER) and the Benjamini-Hochberg (BH) procedure to control the false discovery rate (FDR).

The Holm-Bonferroni method was applied sequentially to the ordered p-values. At the 5% significance level ($\alpha = 0.05$), three indicators remained statistically significant after correction: Liquidity ratio, Gross margin, and Working capital per employee. These variables therefore represent the most robust differences between Czech and Slovak e-commerce firms.

When the threshold was relaxed to $\alpha = 0.10$, the same three variables remained significant, while Current ratio and Added value, which were initially significant at the unadjusted level, no longer met the stricter Holm criteria. However, under the less conservative Benjamini-Hochberg FDR approach ($q = 0.10$), both Current ratio and Added value are again identified as significant, confirming that the differences in these variables are unlikely to be random even under moderate correction for multiple testing.

The comparison of both procedures indicates that the strongest cross-country differences are concentrated in liquidity and value-creation metrics, highlighting Czech firms' stronger short-term solvency and Slovak firms' superior margin and added-value generation.

4. Spearman Correlation analysis

To better understand the internal relationships between the financial indicators of e-commerce firms, a Spearman rank-order correlation analysis was performed separately for Czech and Slovak samples. The results reveal several consistent and meaningful patterns reflecting the financial logic of firms. Cultural and institutional context is used only as an interpretative framework for discussing the differences between the two correlation structures.

Czech republic

The results for Czech firms show a strong internal coherence among profitability indicators. The EBITDA margin is highly correlated with ROA ($\rho = 0.74$, $p < 0.05$), ROE ($\rho = 0.56$, $p < 0.05$), and Gross margin ($\rho = 0.67$, $p < 0.05$), suggesting that operational and net profitability move closely together in Czech e-commerce. This reflects consistent financial management where operational efficiency translates directly into bottom-line performance.

In addition, Profit per employee is strongly related to both EBITDA margin ($\rho = 0.63$) and Cash flow ($\rho = 0.76$), reflecting that more productive firms also generate stronger liquidity and operational cash generation. This supports the idea that Czech e-commerce companies are focusing on stable internal financial performance, aligning profitability with workforce efficiency.

A strong positive correlation between Current ratio and Liquidity ratio ($\rho = 0.83$, $p < 0.05$) confirms internal consistency of short-term solvency measures, whereas negative correlations between Debt ratio and both liquidity indicators ($\rho = -0.54$ and $\rho = -0.37$) show that higher leverage reduces firms' ability to meet short-term obligations. These patterns correspond with a financially conservative approach, typical for Czech firms, characterised by cautious risk management and maintenance of liquidity buffers.

Interestingly, Net assets turnover correlates negatively with most profitability measures ($\rho \approx -0.40$), which suggests that firms emphasising liquidity and stability may trade off some efficiency in asset utilisation. This pattern may be interpreted as consistent with the Czech national context described in the literature, where higher uncertainty avoidance (Hofstede, 2001) is associated with prioritising solvency and long-term security over rapid turnover, while recognising that operational and market factors may also drive this relationship.

Slovakia

The results for Slovak firms reveal a distinct internal structure of financial relationships, which differs substantially from that of Czech e-commerce companies. The most prominent feature is the exceptionally strong coherence among profitability indicators, particularly those associated with labour productivity and operational performance. Profit per employee demonstrates very strong correlations with ROA ($\rho = 0.898$, $p < 0.05$) and ROE ($\rho = 0.834$, $p < 0.05$), indicating that Slovak e-commerce firms rely heavily on workforce productivity as a fundamental driver of overall financial performance. Similarly, ROA and ROE themselves are tightly interconnected ($\rho = 0.885$, $p < 0.05$), indicating that operational efficiency directly translates into net profitability within the Slovak context.

Another notable pattern is the alignment between margin indicators and profitability. Gross margin shows positive relationships with ROA ($\rho = 0.416$) and EBITDA margin ($\rho = 0.433$), highlighting that Slovak firms tend to achieve higher returns through enhanced cost control and value-added activities. This margin-driven strategic orientation differs from the Czech sample, where liquidity measures played a more dominant role in shaping profitability.

Liquidity indicators in the Slovak sample show a markedly different pattern. While the Current ratio and Liquidity ratio remain strongly correlated with each other ($\rho = 0.861$, $p < 0.05$), their relationships with profitability are weak or insignificant. For example, the correlations between liquidity and ROE ($\rho = 0.013$) or liquidity and ROA ($\rho = 0.112$) are minimal. This reflects that Slovak firms do not rely on strong liquidity positions to achieve higher profitability. Instead, they appear to channel available resources into operational reinvestment and growth, which reduces short-term reserves in favour of productivity and value creation.

The strong negative correlations between Debt ratio and both Current ratio ($\rho = -0.819$) and Liquidity ratio ($\rho = -0.728$) represent one of the most striking findings for Slovakia. These patterns suggest a clear structural trade-off between indebtedness and liquid assets. Firms appear polarised - they either operate with high liquidity and low leverage or with high leverage and reduced liquidity.

Efficiency indicators show only weak links to profitability. Net assets turnover exhibits weak or inconsistent correlations with ROE and ROA, suggesting that asset efficiency does not play a central role in profitability generation. Instead, Slovak firms seem to rely on margin optimisation and productivity, rather than operational throughput, to achieve strong performance.

Overall, the correlation structure of Slovak e-commerce firms indicates a growth-oriented, margin-driven and productivity-focused financial model, in which return generation is based on operational efficiency and workforce performance rather than on liquidity management or risk-reducing strategies. This organisational profile may be interpreted as broadly consistent with cultural characteristics discussed in prior research (e.g., greater openness to risk and faster adaptation), while acknowledging that unobserved firm and market characteristics may also differentiate Slovak firms from their Czech counterparts despite shared historical and institutional foundations.

Table 2. Key Differences in Spearman Correlations between Czech (CZ) and Slovak (SK) E-commerce Firms (Source: Created by the author)

Pair of Indicators	ρ (CZ)	ρ (SK)	Stronger in
Profit per employee → ROA	high positive	very high positive	SK
Profit per employee → ROE	high positive	very high positive	SK
Gross margin → ROA	moderate positive	stronger positive	SK
Debt ratio → Current ratio	moderate negative	very strong negative	SK
Debt ratio → Liquidity ratio	moderate negative	very strong negative	SK
Gross margin → Liquidity ratio	strong negative	weak negative	CZ
Working capital per employee → Liquidity ratio	strong positive	weak/moderate	CZ
Added value → Cash flow	high positive	very high positive	slightly SK

As shown in Table 2, the correlation structures of financial indicators differ markedly between Czech and Slovak e-commerce firms.

Discussion

The findings of this study reveal distinct differences in the financial performance of e-commerce firms in the Czech Republic and Slovakia, despite the countries' shared institutional background and similar level of digital development. The results suggest that the two sectors may operate according to different financial logics that can be discussed in relation to cultural, institutional and market-specific conditions.

A key pattern emerging from the analysis is the performance-oriented profile of Slovak firms, reflected in strong correlations between profitability (ROA, ROE, EBITDA margin), productivity (profit per employee) and margin-based indicators (gross margin).

The findings imply that Slovak e-commerce businesses achieve financial success largely through value creation and operational efficiency. This aligns with prior research linking lower uncertainty avoidance, higher entrepreneurial orientation and greater adaptability with more dynamic financial strategies (Hofstede, 2001; Kaasa, 2017). Similar tendencies have been observed in other fast-growing digital markets in Central Europe, where e-commerce firms exhibit strong productivity-driven performance (Falk & Hagsten, 2015).

In contrast, Czech firms show a more stability-oriented financial strategy. Profitability in the Czech sample is closely associated with liquidity and working capital efficiency, indicating a preference for financial resilience and controlled risk-taking. This is consistent with cultural characteristics of higher uncertainty avoidance and a more conservative managerial approach documented in the Czech business environment (House et al., 2004; OECD, 2024). These findings also correspond with broader regional studies showing that firms in more risk-averse cultures maintain higher liquidity reserves and lower leverage (Chui et al., 2010).

Capital structure and financing conditions may also contribute to the observed contrast. In the Slovak sample, leverage is more strongly intertwined with liquidity measures, suggesting a sharper trade-off between external financing and short-term solvency. One plausible interpretation is that thinner equity buffers or more limited access to longer-term funding can increase reliance on internal financing (retained earnings) and short-term performance targets, whereas firms with easier access to credit facilities can maintain higher liquidity reserves. In addition, differences in the structure and maturity of financial services and bank - firm relationships may shape working-capital practices and liquidity buffers across the two markets. However, financing constraints and banking conditions are not observed directly in the dataset, so these mechanisms are discussed as plausible explanations rather than demonstrated causes.

Taken together, the patterns are consistent with different emphases in financial strategy. Value-creation and productivity channels appear more salient in the Slovak sample, while liquidity management and resilience channels appear more salient in the Czech sample. Such differences may reflect a mix of cultural preferences, sector structure, ownership composition, firm maturity and financing conditions; they should therefore be interpreted as indicative.

Overall, the findings suggest that national context can be associated with distinct financial profiles in the digital economy, even between neighbouring markets with shared historical roots. At the same time, the interpretation is necessarily cautious; multiple external and internal factors may contribute to the observed differences, and the cultural lens is presented as an interpretative framework rather than a causal claim.

Conclusions

This study compared the financial performance of e-commerce firms in the Czech Republic and Slovakia and identified statistically detectable cross-country differences in several financial indicators as well as in the internal relationships among those indicators. Although both countries share a common historical background, the results suggest that their e-commerce sectors exhibit different financial profiles that may reflect a combination of institutional conditions, financing patterns, market structure, and broader national context. Czech firms appear to follow a more stability-oriented profile, in which profitability is more closely associated with liquidity and working-

capital management. Slovak firms, by contrast, display a more performance-oriented profile, with profitability more strongly linked to labour productivity, margin generation, and value-creation proxies.

The contribution of the study lies in providing firm-level evidence from two closely related Central European markets and in extending comparative e-commerce research beyond simple differences in average indicator levels. By combining the Mann-Whitney U test, robustness checks for multiple testing, and Spearman correlation analysis, the paper shows not only where Czech and Slovak firms differ, but also how their internal financial logics are structured. In this respect, the findings enrich the literature on financial performance in digital industries by showing that neighbouring economies may still differ substantially in the balance between resilience-oriented and performance-oriented strategies. At the same time, the study treats the economic-culture perspective as an interpretative framework rather than as a direct causal explanation, which makes the conclusions more cautious and analytically balanced.

The results also carry several practical and policy implications. For managers in Slovak e-commerce firms, the findings suggest the importance of reinforcing liquidity planning, short-term solvency monitoring, and risk-buffer mechanisms so that strong productivity and margin performance are not accompanied by greater financial vulnerability. For Czech firms, the results indicate potential benefits from improving productivity, operational margins, and value-added generation to strengthen competitiveness without abandoning their relatively prudent financial stance. For policymakers and support institutions, the study implies that business-support measures in digital sectors should not be designed uniformly across countries, because firms may face different strategic trade-offs between growth, profitability, and financial stability even within a broadly similar regional setting.

These conclusions should, however, be interpreted considering several limitations. First, the analysis is restricted to firms classified under NACE 4791, which narrows the generalisability of the findings to other retail or digital segments. Second, the dataset is based on ORBIS reporting availability and the final sample is unbalanced, which means that smaller firms and firms with more limited disclosure may be under-represented and that cross-country comparisons should be read with appropriate caution. Third, ownership nationality was not consistently available for the full sample, so the paper cannot distinguish between national institutional effects and firm-level ownership structures, while cultural mechanisms are not directly observed in financial statements. Future research should therefore combine financial-statement data with ownership variables, survey-based managerial evidence, and multivariate modelling to test more directly the mechanisms behind financial strategies and performance differences in the digital economy.

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