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Countries' Structural Characteristics and the Magnitude of Fiscal Shock

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Abstract

The transmission channels of stabilizing fiscal policy remain partially unexplored, which presents a challenge for the effective management of economic policy. Using a broad dataset and vector autoregression methodology, this paper examines the relationship between selected structural characteristics of economies and the magnitude of fiscal multipliers. The results indicate that fiscal multipliers tend to be smaller in more developed economies, in business-friendly environments, and in EU and EMU member states. Additionally, findings on public and private debt, as well as savings levels, suggest that fiscal multipliers are higher in countries where a larger share of economic agents faces liquidity constraints. Consequently, increased public spending, driven by households' higher marginal propensity to consume, produces a stronger impact on output through the multiplier effect. Our results provide a foundation for fiscal policymakers to design appropriate measures tailored to the specific characteristics of individual economies, aiming to enhance the effectiveness of stabilization policies. Consequently, fiscal stimulus can achieve a greater impact while ensuring the efficient allocation of taxpayer resources.

Introduction

The cyclical nature of economic dynamics requires economic policy to be responsive and adaptable in real time. The objective of ensuring stable and sustainable long-term economic growth is contingent on preventing excessive short-term declines in economic activity. Stabilizing the business cycle while preserving the foundations for long-term growth represents a key challenge for policymakers today.

Amid cost-push and demand-pull price pressures, economies, particularly in Europe, are facing structural challenges that undermine their competitiveness. The energy transition and the green agenda have significantly disrupted international cost differentials, impacting key economic sectors that are now compelled to initiate new investment cycles in pursuit of restructuring. As industrial policy becomes increasingly central in the evolving landscape of international economic cooperation, public funding will play a critical role in shaping and directing economic transformation. Furthermore, with rising defense expenditures, it is becoming evident that fiscal policy, in a broader sense, will assume a pivotal role in maintaining economic growth and ensuring moderate inflation.

Given the diverse structural characteristics of economies, fiscal measures must be appropriately designed to account for these differences. In the short term, ensuring stable economic growth rates requires a thorough understanding of the multiplicative effects of specific fiscal operations. Assessing fiscal multipliers, the mechanism that quantifies the impact of fiscal expansion on output, is therefore crucial for designing fiscal programs that align with the specific needs of individual economies, to maximize the efficiency of public spending.

Empirical literature has already examined various cyclical and structural determinants influencing the magnitude of fiscal multipliers. Notably, business cycle phases (Auerbach & Gorodnichenko, 2010), exchange rate regimes, trade and financial openness, levels of economic development, and public debt (Ilzetzki et al., 2013; Koh, 2017) have been identified as key determinants. Despite the growing body of research in this field, findings remain heterogeneous, and ongoing studies are investigating additional structural factors that may help explain variations in fiscal multipliers. Enhancing the understanding of fiscal stimulus transmission mechanisms would be invaluable for policymakers, facilitating more effective allocation of public resources and improving the overall efficiency of fiscal policy.

This paper addresses the issue of fiscal multiplier variability as a function of structural economic characteristics. Specifically, using a quarterly and annual dataset covering 47 countries, we examine how the level of economic development, public debt, savings rates, and membership in political-economic integrations influence the magnitude of fiscal multipliers. The broadest possible sample of countries, for which

quarterly data are available for the three core variables in the baseline VAR model, was selected. To ensure the robustness of the results, we systematically applied two approaches to assess the role of these structural determinants: panel analysis and regression analysis, using previously estimated individual fiscal multipliers for each country. Our findings suggest that higher levels of economic development and savings, as well as lower levels of public and private debt, are associated with lower fiscal multipliers. Additionally, countries outside the European Union (EU) and Economic and Monetary Union (EMU) exhibit higher government spending multipliers.

The next section presents a review of relevant empirical literature, followed by a discussion of the methodological approach and dataset in Section 3. Section 4 outlines the results of the empirical analysis, and Section 5 concludes with key findings.

Empirical Literature Review

This section provides a summary of key findings from the empirical literature regarding the influence of country-specific characteristics on the magnitude of fiscal multipliers. Perotti (2004) and Blanchard & Perotti (2002) established the vector autoregression framework for analysing fiscal policy's impact on GDP and macroeconomic variables. Blanchard and Perotti (2002) showed that government spending shocks raise GDP, while tax shocks reduce it. Perotti (2004) found fiscal policy effects weakened after 1980. Expanding on this, Giordano et al. (2007) used the SVAR approach to examine fiscal policy in Italy, finding that higher government consumption boosts output. Burriel et al. (2009) similarly showed that expansionary fiscal policy raises GDP and private consumption, with Euro Area multipliers resembling those in the U.S. and increasing during budgetary distress. Research also highlights the importance of business cycle phases in fiscal multipliers. Auerbach and Gorodnichenko (2010; 2011; 2017) found larger multipliers during recessions in the U.S., OECD countries, and Japan, a conclusion supported by Batini et al. (2012). However, Ramey and Zubairy (2014) found no significant difference across business cycle phases in the U.S. Riera-Crichton et al. (2015) showed that multipliers peak during severe crises. Additionally, fiscal stimulus to government consumption raises multipliers across all phases of the business cycle.

Structural characteristics of countries have also been identified as relevant factors influencing fiscal multipliers. Ilzetzki et al. (2013) showed that fiscal

stimulus has a greater output effect in more developed countries, while multipliers tend to be smaller in open economies compared to closed ones. Furthermore, fiscal multipliers were found to be lower or even negative in countries with high public debt. Andrés et al. (2015) examine government spending multipliers in a general equilibrium model with search and matching frictions, incorporating varying household debt levels. Their findings suggest that impatient households and private debt contribute to multipliers exceeding one, but worsening financial conditions reduce their size. Hory (2016), analysing 48 emerging and advanced economies, found significantly lower spending multipliers in emerging markets. Additionally, spending multipliers exhibited a negative correlation with imports, public debt, and savings, while being positively correlated with unemployment levels and financial development. Koh (2017) corroborated these findings, suggesting that fiscal multipliers are larger during periods of low public debt, financial crises, and economic downturns, as well as in more developed economies. However, unlike Ilzetzki et al. (2013), Koh (2017) reported that fiscal multipliers are not necessarily smaller in highly open economies and argued that exchange-rate regimes do not necessarily determine the magnitude of fiscal multipliers.

Deskar-Škrbić et al. (2017) examined structural determinants, highlighting the negative correlation between tax burden and fiscal multipliers. Borsi (2018) estimated larger fiscal multipliers during credit crunch periods, while Miyamoto et al. (2018) emphasized that fiscal multipliers tend to increase when economies operate under a zero-lower bound, as the crowding-out effect of private expenditures diminishes significantly. Using a panel vector autoregression approach and data from 2001 to 2017, Ianc & Turcu (2020) examines fiscal multipliers across EU members and candidates, categorized by their integration stage. The results show that increased government spending boosts GDP in the EU and Eurozone candidates but slightly reduces it in Eurozone members. The effects of tax increases vary, with both positive and negative impacts on GDP across groups, indicating the presence of both Keynesian and non-Keynesian multipliers. Overall, spending multipliers are more influenced by a country's EU or Eurozone membership than tax multipliers.

Economic inequality can also act as a structural determinant of the size of fiscal multiplier. Brinca et al. (2016) provided insights into the link between wealth inequality and fiscal multipliers, showing a positive correlation between the wealth Gini coefficient and multiplier size. They attributed this to reduced liquidity constraints, lower precautionary savings among poorer households, and declining real interest rates. Later, Brinca et al. (2021) found that higher income inequality exacerbated the recessionary effects of fiscal consolidation in the Eurozone. In contrast, Auerbach et al. (2021) proposed a theoretical model suggesting that higher income inequality leads to smaller fiscal multipliers due to constrained demand among poorer households and low spending propensities among the wealthy, an effect potentially mitigated by access to credit. Guo et al. (2023) analyse 20 European economies to assess how household financial constraints affect fiscal and monetary policy effectiveness. They find that fiscal multipliers grow when more households face liquidity constraints. Government spending has a greater impact when poorer, liquidity-constrained households lack illiquid assets, while tax multipliers rise with wealthier, liquidity-constrained households who own some illiquid assets. Overall, more liquidity-constrained households enhance policy effectiveness, but when liquidity, savings, and credit constraints coexist, effectiveness may stagnate or decline.

The role of various debt types in shaping the fiscal multipliers size is still intriguing. Broner et al. (2022) examine the link between fiscal multipliers and foreign holdings of public debt. While fiscal expansion can boost economic activity, it may also crowd out domestic consumption and investment. However, when governments rely more on foreign savings to finance debt, these crowding-out effects weaken, leading to larger fiscal multipliers. Analysing the U.S. post-war period and 17 advanced economies since the 1980s, the findings confirm that higher foreign ownership of public debt is associated with larger multipliers, with values below one when foreign holdings are low and above one when they are high. Kim (2023) finds that government spending has a stronger impact during periods of private debt overhang, but its effectiveness varies by debt type. While the evidence on larger multipliers in household debt overhang is inconclusive, firm debt overhang consistently shows higher multipliers. In such cases, government spending significantly stimulates both private consumption and investment, with multipliers exceeding one. However, in household debt overhang, these positive effects, particularly on private consumption, are weaker. Zurita (2024) examines how household debt influences government spending multipliers using a smooth transition vector autoregression model. Analysing Australia, Sweden,

Norway, and the world's seven largest economies, the findings reveal that fiscal expansion is in the short term more effective when household debt is low.

Understanding the interplay between public debt and the dynamics of fiscal policy is also important for accurately projecting debt sustainability. Deleidi et al. (2024) examine the role of fiscal multipliers in shaping economic policies, particularly in the context of fiscal consolidation programs in the Eurozone. The analysis identifies a sustainability range for the debt-to-GDP ratio, showing how different public deficit levels depend on fiscal multipliers. The findings suggest that, under certain country-specific conditions, restricting public spending may hinder rather than support public debt sustainability. Analysing data from 14 OECD countries between 1981 and 2017 using the local projections approach, Ciaffi et al. (2024) finds that total government spending multipliers exceed one, with government investment having a stronger impact than consumption. While all fiscal policy measures help lower the public debt-to-GDP ratio, government investment proves to be the more effective in ensuring public debt sustainability. However, our paper focuses on examining the role of countries' structural characteristics in influencing the magnitude of the fiscal multiplier.

Methodology and Data

To evaluate the effects of government spending multipliers, we utilize the analytical framework introduced by Blanchard and Perotti (2002) and later refined by Perotti (2004) for analysing fiscal policy measures. The model consists of three key variables: the logarithms of real government expenditure (g_t), real GDP (y_t), and the price level (p_t). Let X_t represent the vector of endogenous variables and U_t the vector of reduced-form residuals. The resulting reduced-form VAR model is structured as follows:

$$X_t = A(L)X_{t-1} + U_t \qquad (1)$$

Here, $X_t = [g_t, y_t, p_t]'$ and $U_t = [u_t^g, u_t^y, u_t^p]'$, where L represents the lag operator, and $A(L)$ is the corresponding polynomial. The reduced-form residual of the variable g_t, denoted as u_t^g, can be interpreted as a shock to the system.

Drawing on the AB model (Lütkepohl, 2005), we express the system of equations in matrix form as shown in the following equation:

$$AU_t = BE_t \qquad (2)$$

Here, U_t represents the vector of VAR residuals, and $E_t = [e_t^g, e_t^y, e_t^p]'$ is the vector of innovations. We define the matrices A and B. Equation (2) can then be expressed as:

$$\begin{bmatrix} 1 & 0 & 0 \\ -\alpha_g^y & 1 & 0 \\ -\alpha_g^p & -\alpha_y^p & 1 \end{bmatrix} \begin{bmatrix} u_t^g \\ u_t^y \\ u_t^p \end{bmatrix} = \begin{bmatrix} \beta_g^g & 0 & 0 \\ 0 & \beta_y^y & 0 \\ 0 & 0 & \beta_p^p \end{bmatrix} \begin{bmatrix} e_t^g \\ e_t^y \\ e_t^p \end{bmatrix} \qquad (3)$$

To identify the system, we require a total of $\left(2k^2 - \frac{1}{2}k[k+1]\right)$ restrictions, where k represents the number of endogenous variables, which is 3 in our case.

The ordering of the variables defines their causal relationships. Specifically, changes in government spending trigger immediate responses in both real GDP and the price level. However, government spending does not show an immediate reaction to shifts in output and the price level within the same period. Additionally, the price level has no contemporaneous effect on output. This system achieves exact identification through a well-defined set of constraints (12 restrictions). Using the results from the VAR model, the impulse response function assesses the dynamic patterns and magnitudes of each variable's reaction to government spending shocks.

To explore the relationship between the size of government spending multipliers and specific country characteristics, the following specification was used:

$$\alpha_i = \beta_0 + \beta_1 x_i + e_i \qquad (4)$$

where α_i denotes the government spending multiplier for country i, β_0 is the constant term, β_1 is the slope coefficient, x_i represents a country-specific characteristic of country i, and e_i stands for the residuals.

To assess the government spending multiplier using a panel dataset, we followed the methodological approach previously established by Blanchard & Perotti (2002), while incorporating enhancements to the panel VAR model as outlined by Ilzetzki et al. (2013) and Koh (2017). Similar to the time series model, the baseline panel VAR model includes three macroeconomic variables: real government consumption ($g_{i,t}$), real GDP ($y_{i,t}$), and the price level ($p_{i,t}$). The vector of endogenous variables is denoted as $X_{i,t}$, and the vector of residuals as $U_{i,t}$. The reduced form of the panel vector autoregression is represented in Equation (5):

$$X_{i,t} = C(K)X_{i,t-1} + U_{i,t} \qquad (5)$$

where $X_{i,t} = [g_{i,t}, y_{i,t}, p_{i,t}]'$ and $U_t = [u_{i,t}^g, u_{i,t}^y, u_{i,t}^p]'$, K is the operator of lag structure, and $C(K)$ is the polynomial of corresponding degrees.

To identify shocks in government expenditures, we apply Cholesky decomposition, where the sequence of the variables plays a critical role. The results are derived from the following system of equations:

$$AX_{i,t} = \sum_{k=1}^{K} C_k X_{i,t-k} + BE_{i,t} \qquad (6)$$

In this context, $X_{i,t}$ represents the vector of endogenous variables for country i in year t. C_k is the matrix that captures both the direct and cross effects of the k-th lag of the variables, while matrix B is diagonal. As a result, $E_{i,t}$ represents the orthogonal shocks to government expenditure (Ilzetzki et al., 2013). Our model follows a specific variable ordering: real government consumption, real GDP, and the price level.

The arrangement of variables in the panel VAR model defines their causal relationships, following a similar structure to the time series VAR model previously discussed. Real GDP responds promptly to changes in government spending, while government spending does not immediately react to fluctuations in output within the same period. At the same time, the price level reacts concurrently to variations in both fiscal spending and output. However, within the same period, it has no impact on either of these variables. For the panel analysis, the Stata package by Abrigo & Love (2016) was utilized. This package uses the generalized method of moments (GMM) estimation technique.

Our study employs a VAR model incorporating real government spending, real GDP, and the GDP deflator, using quarterly data from 1995 to 2021 for 47 countries. Government consumption, GDP, and price level data are obtained from the International Financial Statistics database (IMF, 2024). Government spending multipliers are first estimated separately for each country before applying a panel VAR model to annual panel data. The annual dataset, covering the same period, is obtained from the World Bank (2024) and includes government spending, GDP, and price levels for the 47 countries.

To estimate fiscal multipliers for individual countries, it is essential to use quarterly data to ensure a sufficiently long time series. The selection of lags in the individual VAR model, based on time series data, was determined using the Akaike Information Criterion (AIC) and the Hannan-Quinn Information Criterion (HQIC). In the panel model, we were able to use annual data, as it provides a

sufficiently large sample size while also avoiding issues related to fiscal policy decision-making and expenditure patterns within a given year. This issue does not arise with annual data, as the budget must be constructed and executed every year. In the panel model, we followed the Modified Akaike Information Criterion (MAIC) and the Modified Hannan-Quinn Information Criterion (MQIC), with a one-year lag consistently proving to be the most appropriate choice.

To account for country-specific characteristics, we incorporate additional variables: real GDP per capita (in USD), the savings rate as a percentage of GDP, public and private debt levels as a percentage of GDP, and the composite Ease of Doing Business index (World Bank, 2024). Countries are also categorized based on their EU and Eurozone membership. Furthermore, they are grouped into two categories according to the median value of each indicator. The structural determinants or indicators used in this article were selected based on a review of the relevant empirical literature. In the regression analysis, the average values of the selected determinants are used as independent variables. In the panel model, the selected determinants are used to divide the sample based on the median of their values, following a similar approach applied, though to different determinants, in studies such as Ilzetzki et al. (2013) and Koh (2017).

Our data sample includes the following countries: Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, Costa Rica, Croatia, Cyprus, Czech Republic, Denmark, Ecuador, Estonia, Finland, France, Germany, Greece, Honduras, Hungary, Indonesia, Ireland, Israel, Italy, Japan, Republic of Korea, Latvia, Lithuania, Luxembourg, Malta, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Serbia, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Thailand, Turkey, and the United Kingdom.

Results

The results of the empirical assessment of the significance of various structural characteristics on the size of fiscal multipliers are presented in Table 1 and Table 2. Table 1 initially reports results based on a panel VAR model, comparing the output response to a positive government spending shock under different scenarios, depending on the levels of specific indicators. Countries in the panel sample are classified based on GDP per capita into relatively more and less developed economies, by their relative inclination towards entrepreneurial activity, by higher or lower levels of

savings, by higher or lower levels of public and private debt, and by whether they are members of the EU or EMU or not. Subsequently, Table 2 builds upon the estimated fiscal multiplier values for individual countries and examines the impact of selected structural determinants on the magnitude of fiscal multipliers through regression analysis. The results based on the panel VAR model are reported as statistically significant within the 90% confidence interval. The Y-axis measures the size of the fiscal multiplier in absolute terms, meaning that if government spending increases by 1 currency unit, GDP increases by the corresponding value on the Y-axis, also measured in currency units.

Relatively more developed countries exhibit a statistically significant and substantial immediate output response to a positive fiscal shock. However, shortly thereafter, the government spending multiplier begins to decline within the statistically significant interval and gradually approaches zero. Conversely, in relatively less developed countries, the initial output response is comparable but subsequently increases within the statistically significant part of the interval. While the immediate effect is similar, fiscal multiplier values tend to be higher over the forecast horizon in economically less developed countries. Regarding the indicator measuring a country's inclination toward entrepreneurial activity and business operations, higher fiscal multipliers are observed in countries with relatively fewer barriers to conducting business. Since the Ease of Doing Business indicator also indirectly reflects the level of economic development, our empirical findings, based on both GDP per capita and the Ease of Doing Business index, are substantively comparable in an indirect manner.

The classification of countries based on their level of savings yields results indicating that fiscal multipliers tend to be higher in countries with lower savings levels, at least in terms of the statistically significant portion of the output response. In countries with higher savings levels, the values increase in the statistically insignificant part of the output response. Regarding the role of debt levels, both public and private, the results do not offer a fully clear interpretation. In countries with a relatively higher share of public debt in GDP, the immediate output response is stronger compared to countries with a relatively lower share of public debt in GDP. However, in more highly indebted countries, fiscal multiplier values decline significantly more rapidly, indicating a lack of persistence. In the case of private debt, the absolute values of fiscal multipliers are comparable, but the dynamics are reversed. Nevertheless, in terms of the statistically relevant portion of the forecast horizon, fiscal multipliers tend to be somewhat higher when private debt levels are lower. Indicators of savings levels and both public and private indebtedness suggest that fiscal multipliers are higher in environments where economic agents are relatively more constrained in terms of both wealth and liquidity. As a result, these economic agents allocate a larger share of fiscal stimulus to consumption, thereby amplifying the effect of the fiscal multiplier.

Participation in international political and economic integrations necessitates a certain level of integration and comparability of national subsystems. Accordingly, membership in the EU and the EMU requires countries to meet a set of criteria before accession and to maintain compliance thereafter. As a result, there are more standardized rules governing fiscal operations and reporting. Panel analysis results indicate that fiscal multipliers tend to be lower in EU and EMU member states throughout most of the forecast horizon, with the sole exception being the immediate effect observed in Eurozone member states. Furthermore, it should be noted that countries joining the EU and EMU are, on average, relatively more economically developed. This aligns with the findings of our empirical analysis based on country rankings according to GDP per capita.

Table 1

Countries' characteristics and the magnitude of fiscal multiplier – panel analysis
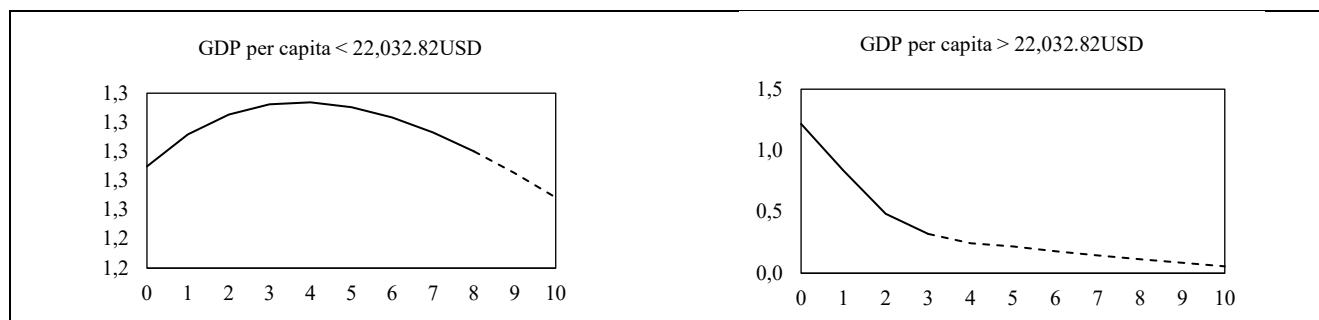
Continuation of Table 1

Countries' characteristics and the magnitude of fiscal multiplier – panel analysis
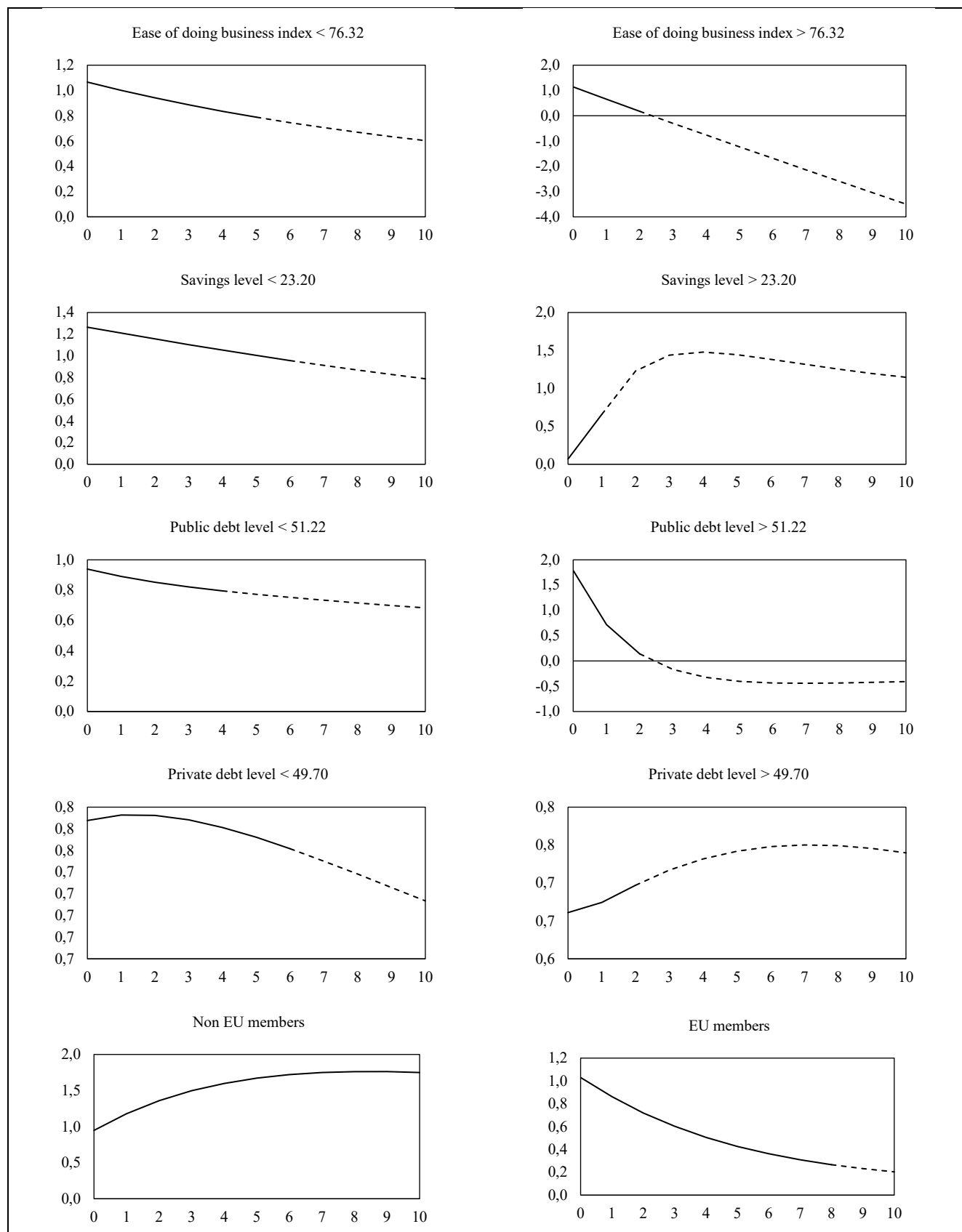
Continuation of Table 1
Countries' characteristics and the magnitude of fiscal multiplier – panel analysis
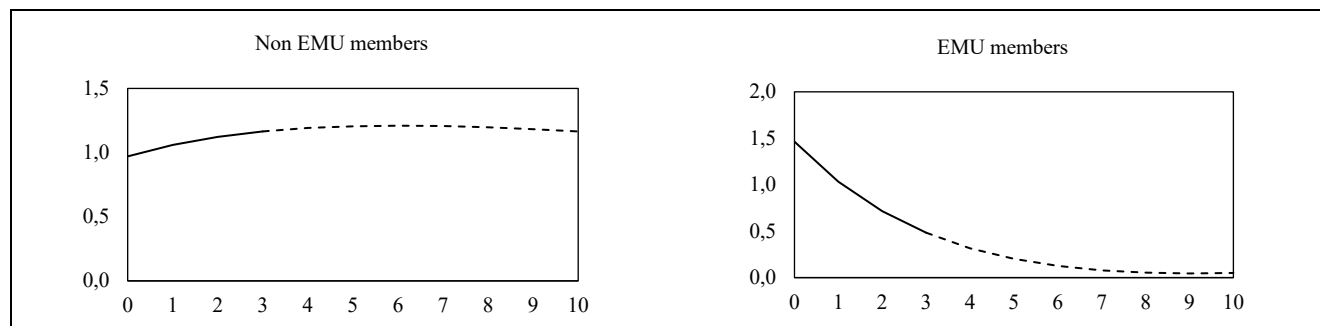
Notes: The graph depicts the response of GDP to a positive fiscal shock (equivalent to 1% of GDP). The statistically significant part is represented by a solid line.
Source: Author's estimation

The regression analysis results in Table 2 illustrate the dependence of fiscal multiplier size on selected structural characteristics of economies. For the regression analysis, the fiscal multiplier was first estimated for each country individually using the VAR methodology, based on a sample of 47 countries. The independent variables consisted of indicators representing the structural characteristics of each country, while the dependent variables were the impact multiplier values.

Table 2
Countries' characteristics and the magnitude of fiscal multiplier – regression analysis

Direct multiplier: $\alpha_i = \beta_{0,i} + \beta_{1,i}X_i + e_i$				
X_i	β_0	β_1	t-stat (p-value)	R^2
GDP per capita	0.363	−0.008	−1.73 (0.089)	0.063
Ease of doing business	2.749	−0.033	−1.87 (0.068)	0.072
Level of savings	0.918	−0.027	−1.44 (0.157)	0.044
Public debt level	0.086	0.003	1.61 (0.107)	0.056
Private debt level	0.090	0.009	1.66 (0.097)	0.060
EU membership	0.401	−0.489	−2.32 (0.025)	0.107
EMU membership	0.274	−0.379	1.74 (0.088)	0.063

Notes: α_i represents the direct government consumption multiplier for country i, while x_i denotes the factor determining its magnitude. The regression analysis provides intercepts, slope coefficients, t-statistics and p-values, along with the R² value.
Source: Author's estimation

Overall, the regression analysis results yield conclusions that are largely consistent with those of the panel analysis. Specifically, the coefficients for GDP per capita, the Ease of Doing Business indicator, and the savings rate are negative, indicating that higher values of these indicators are associated with lower fiscal multipliers. Among these, the coefficients for the level of economic development and the Ease of Doing Business index are statistically significant, whereas the coefficient for the savings rate is not statistically significant. The shares of public and private debt in GDP exhibit a positive relationship with fiscal multiplier size. However, in the case of public debt, the coefficient is on the threshold of statistical significance, while for private debt, it is slightly above this threshold. The results suggest that EU and EMU membership are associated with lower fiscal multipliers, and in both cases, the slope coefficient is statistically significant. Among all variables, EU membership explains the largest share of the variability in fiscal multiplier size, accounting for approximately 10%.

In Table 3, we present a summary of our empirical exercise, including both panel and regression analysis results. Our findings indicate that GDP per capita, the composite Ease of Doing Business indicator, the savings rate, and membership in the EU and EMU exhibit a negative relationship with the size of the fiscal multiplier. On the other hand, the level of public and private indebtedness indicates a positive relationship. Households' income-wealth position and liquidity constraints appear to play a role in determining the size of fiscal multipliers. Higher debt levels and lower savings, indicating greater liquidity constraints, are associated with higher government spending multipliers. Similar conclusions, though based on slightly different methodologies, were reached by Andrés et al. (2015), Hory (2016), Guo et al. (2023), and Kim (2023). Additionally, Brinca et al. (2016) indirectly support this

relationship through indicators of wealth inequality. However, Zurita (2024) finds an inverse relationship, though the study focuses on nine of the most economically developed countries, limiting the heterogeneity of the dataset. Regarding public debt, empirical findings remain mixed. Our results align with Hory (2016) but contrast with Ilzetzki et al. (2013) and Koh (2017). Similar to our study, which identifies a negative relationship between EU and EMU membership and fiscal multipliers, Ianc & Turcu (2020) also show that candidate countries for these integrations exhibit higher multipliers than member states. Concerning the level of economic development, our findings contradict those of Ilzetzki et al. (2013) and Koh (2017). However, it should be noted that for GDP per capita, our results are at the margin of statistical significance.

Table 3

Countries' characteristics and the magnitude of fiscal multiplier – summary

Characteristics	Influence on the Magnitude of Fiscal Multiplier	
	Panel analysis	Regression analysis
GDP per capita	negative	negative
Ease of doing business	negative	negative
Level of savings	negative	negative*
Public debt level	positive	positive*
Private debt level	inconclusive	positive
Membership in EU	negative	negative
Membership in EMU	negative	negative

Notes: * represents statistically insignificant relationship.
Source: Author's estimation

Conclusion

Accounting for the specific characteristics of individual economies is essential for the successful and effective implementation of fiscal policy measures - not only in terms of business cycle stabilization but also as a response to structural economic challenges. In the context of geopolitical disruptions, tightening international trade conditions, energy restructuring and the green transition, demographic trends, and rising defense expenditures, the burden of driving future economic development will, in the short to medium term, largely fall on fiscal policy. The ability of countries to fully leverage their economic potential or risk falling into developmental stagnation will depend on the proper design and implementation of fiscal programs tailored to their underlying economic structures.

This paper examines the impact of selected structural economic determinants on the magnitude of fiscal multipliers using a dataset of 47 countries. By employing two methodological approaches, panel VAR analysis and regression analysis based on individual country-specific fiscal multiplier estimates, we assess how these structural factors influence fiscal policy effectiveness.

The key findings of this study are as follows. First, less developed countries, measured by GDP per capita, exhibit higher fiscal multipliers. Additionally, a negative relationship is identified between the Ease of Doing Business index and the size of the government spending multiplier. Second, the negative and statistically significant coefficients for EU and EMU membership, observed in both the panel and regression analyses, indicate that the short-term impact of fiscal stimulus is weaker in member states of these integrations. It is important to note that EU and EMU members are, on average, more economically developed countries. Third, economies characterized by higher levels of debt and relatively lower savings rates tend to have higher fiscal multipliers. This suggests that in countries with such characteristics, fiscal stimulus translates more directly into additional consumption due to the presence of liquidity constraints.

The findings of this study provide valuable insights for policymakers in both fiscal and monetary policy domains. The effectiveness of policy measures depends on evolving economic conditions, influencing both monetary and fiscal interventions. In cases where monetary policy lacks sufficient or well-targeted instruments to achieve its objectives, the role of sound fiscal policy becomes even more critical for sustaining economic prosperity. Given the ongoing trends of rising debt levels and increasing economic inequality, our results also carry indirect policy implications. Since fiscal expansion is more effective in relatively more indebted economies and countries with relatively lower savings rates, stimulus-driven economic growth could contribute to a relative reduction in debt burdens. Moreover, it may indirectly help mitigate economic inequality.

Future research should focus on identifying additional potential determinants of fiscal multiplier size and further exploring the transmission mechanisms through which fiscal stimulus impacts economic activity under various scenarios and economic conditions. Such efforts would contribute to a more comprehensive understanding of the stabilizing function of fiscal policy.

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Strukturne karakteristike držav in velikost multiplikatorja vladne potrošnje

Izvleček

Transmisijski kanali stabilizacijske fiskalne politike še ostajajo delno neraziskani, kar predstavlja izziv za učinkovito vodenje ekonomske politike. Ta študija z uporabo obsežne podatkovnega niza in metodologijo vektorske avtoregresije analizira razmerje med izbranimi strukturnimi značilnostmi gospodarstev in velikostjo fiskalnih multiplikatorjev. Rezultati kažejo, da so fiskalni multiplikatorji praviloma manjši v bolj razvitih gospodarstvih, v poslovno prijaznih okoljih ter v državah članicah EU in EMU. Ob tem ugotovitve o javnem in zasebnem dolgu ter ravneh varčevanja nakazujejo, da so fiskalni multiplikatorji višji v državah, kjer se večji delež ekonomskih subjektov sooča z likvidnostnimi omejitvami. Posledično dodatna javna poraba zaradi višje mejne nagnjenosti k potrošnji povzroči močnejši končni učinek na ekonomsko aktivnost. Naši rezultati tako dajejo podlago nosilcem fiskalne politike za oblikovanje ustreznih ukrepov, prilagojenih specifičnim značilnostim posameznih gospodarstev, z namenom po izboljšani učinkovitosti stabilizacijske fiskalne politike. Posledično lahko s sistemom fiskalnih spodbud dosežemo večji učinek ob hkratni učinkoviti rabi davkoplačevalskih sredstev.

Ključne besede: fiskalna politika, strukturne determinante, VAR

Development of Slovenian Macroeconomic Imbalances and their Synchronization with EU Countries

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Abstract

Slovenia and other EU member states are subject to the Macroeconomic Imbalances Procedure. This article aims to evaluate the macroeconomic imbalances of the Slovenian economy and its synchronisation with other EU countries from 2013 to 2022. Eleven Scoreboard indicators are used to monitor external and internal macroeconomic imbalances. The originality of the paper relates to the use of cluster analysis to determine Slovenia's position among other EU countries in terms of imbalance indicators by dividing EU countries into clusters based on their similarity. The process used the standardized squared Euclidean distance as the basic metric, the furthest neighbour method was used to cluster the objects, which are represented graphically by a dendrogram. Slovenia exhibited relative stability in both external and internal macroeconomic imbalances between 2013 and 2022. However, in the last three years, it showed threshold values for the nominal unit labour cost index, general government gross debt, and there was a risk associated with the development of the house price index. The cluster analysis revealed that Slovenia's external macroeconomic imbalances were significantly synchronized with core EU countries in 2014 and 2022. In 2017 and 2020, macroeconomic imbalances exhibited similarities with the Baltic and Central European countries. The internal macroeconomic balance remained stable in the monitored period, and it developed in sync with the core EU countries and Central European countries.

Introduction

The European Commission monitors macroeconomic imbalances in EU countries through the Macroeconomic Imbalances Procedure (MIP) as a systemic anti-crisis measure in line with the European Semester (EC, 2016). This article aims to evaluate the macroeconomic imbalances of the Slovenian economy and its synchronization with other EU countries from 2013 to 2022. The originality of the paper relates to the use of cluster analysis to provide a spatial view of the similarity or

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dissimilarity of macroeconomic imbalances and their development over time across EU countries. This information can be an important indicator for early warning of adverse economic developments, as the high degree of interconnectedness of EU countries allows and encourages spillover effects between countries. By effectively monitoring and timely addressing macroeconomic imbalances, policymakers can mitigate risks, increase economic resilience, and promote sustainable growth.

Internal and external macroeconomic equilibrium are crucial conditions for sustainable economic development. Theoretical models, such as the Swan-Salter diagram (Schmitt-Grohé & Uribe, 2021; Frankel, 2023) or the Mündell model of efficient market classification (Mandel, 2000; Krugman, 2021), define this balance. The emergence of macroeconomic imbalances can be attributed to various factors, including the economic maturity of the country, the state of the business cycle, the condition of financial markets, the behaviour of economic entities, and monetary and fiscal policy. Macroeconomic imbalance is defined in Regulation (EU) No. 1176/2011 on prevention and correction of macroeconomic imbalances (EUR-Lex 2011) as: "*any trend giving rise to macroeconomic developments which are adversely affecting, or have the potential to adversely affect, the proper functioning of the economy of a Member State or of the Economic and Monetary Union, or of the Union as a whole*". The EU has implemented the MIP to address and rectify destabilising economic imbalances within its member states. The procedure aims to prevent and correct such imbalances to maintain the overall economic health of the EU (Hodson, 2018). The MIP commences annually with the Alert Mechanism Report (EC, 2024), in which macroeconomic imbalances are monitored through five indicators of external position and competitiveness, six indicators of internal macroeconomic imbalances, and three indicators of unemployment. The indicators are defined in the Scoreboard (EC, 2012; 2017).

The interrelationships between macroeconomic imbalances and economic growth, economic cycle and their synchronization were identified in publications Gros, D. (2012), Sella, Vivaldo, Groth & Ghil (2016), Bandrés, Gadea-Rivas & Gómez-Loscos (2017). The ECB's occasional paper (2018) reviewed the process of accumulating imbalances in the euro area, concluding that these indicators would have predicted the crisis well in advance. Frieden and Walter (2017) highlight that the

Eurozone crisis shares many features of previous debt and balance-of-payments crises. Bednářová and Hovorková Valentová (2016) do not support the Endogeneity of the Optimum Currency Area Criteria Hypothesis. The authors recommend that countries joining a currency union should focus more on meeting the criteria ex ante rather than ex post. Bednářová & Hovorková Valentová (2021) also examined the UK's specific position in terms of external macroeconomic imbalances and identified that the UK showed a relatively high degree of synchronization with EU countries only in 2007, but not in the following years. According to the ECB (2019), credible and decisive structural reforms are crucial to address macroeconomic imbalances. Mongelli, Dorrucci, Ioannou & Terzi (2015) provided solutions to the Euro Area crisis through European institutional integration. Collignon (2013) examined macroeconomic imbalances and competitiveness in the euro area, while Camarero, D'Adamo & Tamarit (2018) focused on differences in wage determination in the Eurozone. Heinemann et al. (2018) or Coelho (2019) then examined the effects of fiscal rules and fiscal policies on macroeconomic imbalances. To analyse the development of macroeconomic imbalances in Slovenia, it is important to consider the various factors that affect the country's economic stability. Examining optimal macroeconomic policies during financial crises can provide insights into coping with the economic challenges that Slovenia also faces (Neck et al., 2011). Analyses of the impact of different types of firm growth on macroeconomic aggregates over economic cycles can provide valuable insights into the dynamics of Slovenia's economy (Bonča et al., 2018). The transmission of economic cycles, particularly in the context of EU enlargement and the adoption of the euro, can provide insight into how the Slovenian economy interacts with its European partners (Nguyen & Rondeau, 2019). Examining the relationship between macroeconomic stability and sustainable development in transportation companies across the Eastern European Union countries, including Slovenia, can emphasise the significance of economic equilibrium for sustained growth (Comporek et al., 2021).

Methodology and Data

MIP commences annually with the Alert Mechanism Report (EC, 2024), in which macroeconomic imbalances are monitored through five indicators of external imbalances and competitiveness, six indicators of internal macroeconomic imbalances, and three

indicators of unemployment – see Table 1. The definition of individual indicators on the Scoreboard (EC, 2012; 2016; 2017) includes their calculation and

thresholds (Eurostat, 2024). Macroeconomic imbalance is identified when the threshold for each indicator is exceeded.

Table 1

Indicators of external and internal macroeconomic imbalances

Indicator	Definition	Threshold
Current account balance, % of GDP, 3 year average (CA)	$\dfrac{\left(\frac{CA}{GDP}\right)_t + \left(\frac{CA}{GDP}\right)_{t-1} + \left(\frac{CA}{GDP}\right)_{t-2}}{3}.100$	< -4% >6%
Net international investment position, % of GDP (NIIP)	$\dfrac{NIIP_t}{GDP_t}.100$	< -35%
Real effective exchange rate - 42 trading partners, HICP deflator, 3 years % change (REER)	$\dfrac{(REER\_HISC\_42)_t - (REER\_HISC\_42)_{t-3}}{(REER\_HISC\_42)_{t-3}}.100$	± 5% (EA) ± 11% (non EA)
Export market share - % of world exports, 5 years % change (EXP)	$\dfrac{\left(\frac{EXP_c}{EXP_{world}}\right)_t - \left(\frac{EXP_c}{EXP_{world}}\right)_{t-5}}{\left(\frac{EXP_c}{EXP_{world}}\right)_{t-5}}.100$	< -6%
Nominal unit labour cost index (2010=100), 3 years % change (ULC)	$\dfrac{(ULC)_t - (ULC)_{t-3}}{(ULC)_{t-3}}.100$	+ 9% (EA) + 12% (non EA)
House price index (2015=100) - deflated, 1 year % change (HPI)	$\dfrac{\left(\frac{HPI_t}{DEFL_t}\right) - \left(\frac{HPI_{t-1}}{DEFL_{t-1}}\right)}{\left(\frac{HPI_{t-1}}{DEFL_{t-1}}\right)}.100$	> 6%
Private sector credit flow - consolidated, % of GDP (PSCF)	$\dfrac{PSCF_t}{GDP_t}.100$	> 14%
Unemployment rate - 3 year average (UR)	$\dfrac{(UR)_t + (UR)_{t-1} + (UR)_{t-2}}{3}$	> 10%
Private sector debt – consolidated, % of GDP (PSD)	$\dfrac{PSD_t}{GDP_t}.100$	> 133%
General government gross debt - % of GDP (GGD)	$\dfrac{GGD_t}{GDP_t}.100$	> 60%
Total financial sector liabilities - non-consolidated, 1 year % change (FSL)	$\dfrac{(FSL)_t - (FSL)_{t-1}}{(FSL)_{t-1}}.100$	> 16.5%

Source: Authors' processing based on data from EC (2017) and EC (2024)

Cluster analysis is used to determine Slovenian position among other EU countries in terms of external and internal imbalance indicators. The principle of cluster analysis is to divide objects, in this case, EU countries, into clusters based on their similarity in terms of the examined indicators. Objects belonging to the same cluster are very similar, while those belonging to different clusters show significant differences. The process employed the standardized squared Euclidean distance as the basic metric, as reported in Everitt et al. (2010):

$$D_N(i, i') = \sqrt{\sum_{j=1}^{p} d_j^2(i;\ i')/s^2(x_j)} \qquad (1)$$

where $d_j(i;\ i') = x_{ij} - x_{i'j}$, $j = 1, 2, \ldots, p$.

The metric is selected due to the need to express the

observed indicators in different units of measurement. However, it requires that the observed indicators are uncorrelated. To ensure this, a Pearson's correlation coefficient is calculated for each pair of observed indicators (Black, 2010) and a t-test is performed at the 5% significance level - test for zero population correlation (Newbold, Carlson & Thorne, 2013). This test can demonstrate the correlation between variables, as stated in the alternative hypothesis. To ensure objectivity, it is necessary to exclude indicators that are highly correlated with other indicators from the analysis. This will prevent any potential bias in the results. The furthest neighbour method, one of the hierarchical agglomerative methods, is used to cluster the objects. This method clusters variables based on the minimal distance between their outermost elements. The clusters are represented graphically by a dendrogram. The final number of clusters is determined heuristically. The

analysis results may be biased by the presence of outlying objects. An EU country may have values of the observed indicators that are so far removed from the other values that they form a separate cluster. However, a country that is not an outlier may also form a separate cluster. It is necessary to determine whether a country is an outlier by an appropriate test. Davies and Gather (1993) address testing and identification of outliers. Cluster analysis is a state-based method, so it is carried out in three selected years, 2014, 2017, 2020 and 2022

using data from the Alert Mechanism Report (EC, 2024) and Eurostat (2024).

Development of External Macroeconomic Imbalances for Slovenia

Over the period under review, Slovenian external macroeconomic imbalances and competitiveness indicators have exhibited long-term stability, as indicated in Table 2.

Table 2
External Macroeconomic Imbalance Indicators

	Threshold	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Current account balance	-4%/+6%	1.3	3.2	4.1	4.6	4.9	5.6	6.0	6.3	5.5	3.2
Net international investment position	-35%	-39.3	-38.4	-31.2	-28.8	-24.2	-19.0	-16.3	-15.7	-7.7	-1.5
Real effective exchange rate	±5% (EA) ±11% (non-EA)	-0.6	1.2	0.3	-0.6	-1.9	2.0	1.0	1.7	-0.4	-1.3
Export market share	-6%	-18.5	-13.2	-5.0	3.2	17.7	19.3	15.5	19.3	10.6	2.9
Nominal unit labour cost index	9% (EA) 12% (non-EA)	0.1	0.1	-0.1	1.3	3.6	5.7	7.9	14.3	12.7	14.3

Note: Figures highlighted are the ones at or beyond the threshold.
Source: Eurostat 2023; Alert mechanism report 2024

External sustainability concerns remain limited. The current account balance only slightly crossed the threshold in 2019 and 2020. The net investment position has been improving since 2014, as has the share of export markets. In 2022, the current account balance fell due to a decrease in the balance of non-energy goods, and a decrease in the energy balance to a lesser extent. The balance of trade in goods improved in the second quarter of 2023. The net international investment position came in close to balance in 2022 and is projected to improve slightly in 2023 and 2024 (EC, 2024). The HICP-based real effective exchange rate depreciated in 2022, but its appreciation is being observed in 2023. When measured based on core inflation, the real effective exchange rate was broadly stable in 2022 and is displaying some appreciation in 2023 amid higher core inflation than in the euro area in both years. Cost competitiveness concerns have increased recently. Increases in nominal unit labour costs were sizeable in 2022, and were accelerating further in 2023. Moreover, they are growing faster than in the rest of the euro area, driven by significantly higher wage increases amid limited productivity gains (EC 2024).

Cluster Analysis of External Macroeconomic Imbalance Indicators

Table 3 shows the uncorrelated external macroeconomic indicators used for the analysis and the identification of outliers. The results of the cluster analysis are shown in the dendrograms in Figure 1. The number of clusters makes it possible to obtain clear and easily interpretable results, since the small distance of the links (distance up to 8 on the y-axis) explains a high degree of mutual similarity in the occurrence of macroeconomic imbalances between countries within each cluster.

The cluster analysis showed that in 2014, twelve European countries (cluster 1), including Slovenia, had a significant synchronization (cluster distance approximately 6.5). Slovenia, Italy, France, Austria, Finland, Germany, Denmark, Belgium, the Netherlands, Malta, Sweden and Luxembourg collectively had a high net investment position compared to the rest of the world (15.2%). The indicator for the loss of export market shares gradually approached the threshold, and the countries demonstrated stable development of the change in

nominal unit labour costs. The indicators of external macroeconomic imbalances and their development confirm a relatively stable external position and competitiveness. In 2017, Slovenia demonstrated a different state of the external sector and competitiveness than the EU core countries. Slovenia, Spain, Portugal, Hungary, Slovakia, Poland and Croatia were grouped in the cluster. These countries exhibited a negative net investment position abroad (-66.2%), but conversely, increased their share of export markets (14.2%). In 2020, Slovenia was grouped with Bulgaria, Czech Republic, and Estonia, while Romania, Lithuania, and Poland were placed at a greater distance. These countries experienced above-average growth in unit labour costs (18.3%), a deterioration in their net investment position (-27.4%), but an increase in their share of export markets (22.4%). Six clusters were identified in 2022, with a higher number of clusters indicating a lower degree of synchronization across EU countries. Slovenia again showed a significantly high degree of similarity with Austria and was also included in the EU core group (cluster 1). The current account balance fell sharply, from a surplus of 3.3% in 2021 to a deficit of -1%. This change was mainly caused by a decrease in the balance of non-energy goods and, to a lesser extent, by a decrease in the energy balance. The net international investment position (NIIP) came in close to balance. Increases in nominal unit labour costs were more significant than in

the rest of the euro zone, driven by significantly higher wage increases with limited productivity growth. When measured based on core inflation, the real effective exchange rate was broadly stable.

Table 3

Cluster analysis of External Macroeconomic Imbalance Indicators

Year	Uncorrelated indicators	Identification of outliers
2014	NIIP, REER, EXP	UK (F = 2.958, p-value = 0.052) Czech Republic (F = 2.235, P-Value = 0.109) All the EU countries were analyzed.
2017	NIIP, REER, EXP, ULC	Greece (F = 1.857, p-value = 0.1509) Romania (F = 1.726, p-value = 0.1772) All the EU countries were analyzed.
2020	NIIP, EXP, ULC	Ireland (F = 4.592, p-value = 0.0112) Ireland was excluded from the analysis.
2022	CA, REER, EXP	All the EU countries were analyzed.

Source: Authors' own data obtained using STATGRAPHICS Centurion XVIII

Figure 1

Resulting dendrogram for external macroeconomic imbalance indicators
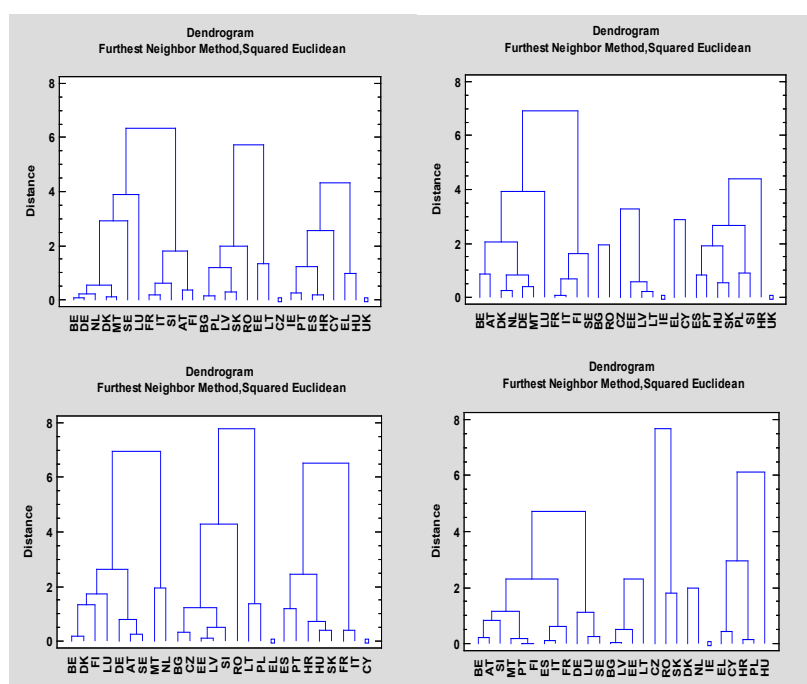
Notes: for 2014 in upper left panel, for 2017 in the upper right panel, for 2020 in lower left panel, and for 2022 in the lower right panel.

Source: Authors' own data obtained using STATGRAPHICS Centurion XVIII

Development of Internal Macroeconomic Imbalances for Slovenia

Table 4 records the values of indicators of internal macroeconomic imbalances, their development, and comparison with the established threshold value between 2013 and 2022.

The issue of internal macroeconomic imbalances arises due to the rise in residential real estate prices since 2017. In 2022, house prices were overvalued by almost 10%. The continued development of real estate prices is considered a risk factor for a more significant correction in the future, should economic conditions deteriorate. However, the debt-to-GDP ratio of households and non-

financial corporations has remained low for an extended period. Throughout the monitored period, the general government gross debt indicator exceeded the threshold value, but its size is significantly lower than the EU average.

In 2022, government debt decreased to 72.3% of GDP and is forecast to continue declining. Fiscal sustainability risks are medium-term and high in the long term (EC, 2024). The total financial sector liabilities indicator value is significantly below the threshold, indicating a healthy banking sector. Although capitalization is below the EU average, profitability in 2022 was among the highest in the EU (EC, 2024).

Table 4
Internal Macroeconomic Imbalances Indicators

	Threshold	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
House price index	+6%	-7.2	-6.2	1.4	3.6	6.6	6.6	5.3	5.2	7.9	4.3
Private sector credit flow	+14%	-3.7	-4.7	-5.0	-0.8	0.9	1.3	0.8	-0.9	3.5	5.2
Private sector debt	+133%	107.2	97.9	87.4	81.0	76.1	72.5	68.5	69.5	66.2	66.0
General government gross debt	+60%	70.0	80.3	82.6	78.5	74.2	70.3	65.4	79.6	74.4	72.3
Unemployment rate	+10%	9.1	9.6	9.6	8.9	7.9	6.6	5.4	4.8	4.7	4.6
Total financial sector liabilities	+16.5%	-10.1	-0.1	-3.8	3.4	5.3	4.1	9.9	14.0	14.1	-1.4

Note: Figures highlighted are the ones at or beyond the threshold.
Source: Eurostat 2023; Alert mechanism report 2024

Cluster Analysis of Internal Macroeconomic Imbalance Indicators

The uncorrelated internal macroeconomic indicators used for the analysis in individual years and the identification of outliers are written in Table 5.

Figure 2 shows dendrograms that display the results of the cluster analysis of internal macroeconomic imbalances.

In 2014, the first cluster was formed by merging twenty EU countries, which together accounted for over 70% of the total share. These countries demonstrated very good stability in the private sector with private sector credit flow (1.6%) and private sector debt (127.3%). The public debt indicator value (62.1%) was slightly above the threshold level, indicating stable public finances and

debt. The indicators of internal macroeconomic imbalances were significantly similar in Slovenia and core EU countries, such as Finland, Austria, and Germany. The cluster also included four other EU countries due to their moderate public sector indebtedness. In 2017, the cluster analysis revealed a significant reduction in the synchronization of the values of internal macroeconomic imbalances indicators in EU countries. Seven clusters were detected at a clustering distance of 10. Slovenia remained in a cluster of eight countries, including Germany, Austria, Malta, Poland, Romania, Hungary, Estonia and now Latvia.

These countries showed stability and good scores on indicators of internal macroeconomic imbalances. In 2020, EU countries were grouped into only three clusters with a clustering distance of approximately 8, indicating a high degree of mutual similarity. Slovenia and the other

12 countries in the cluster reported most indicator values below the thresholds or with only minor deviations. A lower degree of synchronization across EU countries identified a higher number of six clusters in 2022. Very similar characteristics were achieved for Slovenia and eight other EU countries (cluster 4), where house prices were overvalued and still increasing. In these countries, the evolution of house prices can be seen as a risk factor for a future sharper correction if economic conditions were to deteriorate (EC, 2024). At the end of 2022, the general government gross debt was above 60% in Slovenia, Austria, Croatia, Cyprus, Finland, Germany and Hungary, and decreased in all those countries.

Table 5

Cluster analysis of Internal Macroeconomic Imbalance Indicators

Year	Uncorrelated indicators	Identification of outliers
2014	PSCF, PSD, GGD	UK (F = 2.958, P-Value = 0.052) Czech Republic (F = 2.235, P-Value = 0.109) All the EU countries were analyzed.
2017	HPI, PSCF, UR, PSD, FSL	Greece (F = 1.857, P-value = 0.1509) Romania (F = 1.726, P-value = 0.1772) All the EU countries were analyzed.
2020	PSCF, PSD, GGD	Ireland (F = 4.592, P-Value = 0.0112) Ireland was excluded from the analysis.
2022	HPI, PSCF, UR, FSL	Luxembourg was excluded from the analysis.

Source: Authors' own data obtained using STATGRAPHICS Centurion XVIII

Figure 2

Resulting dendrogram for internal macroeconomic imbalance indicators
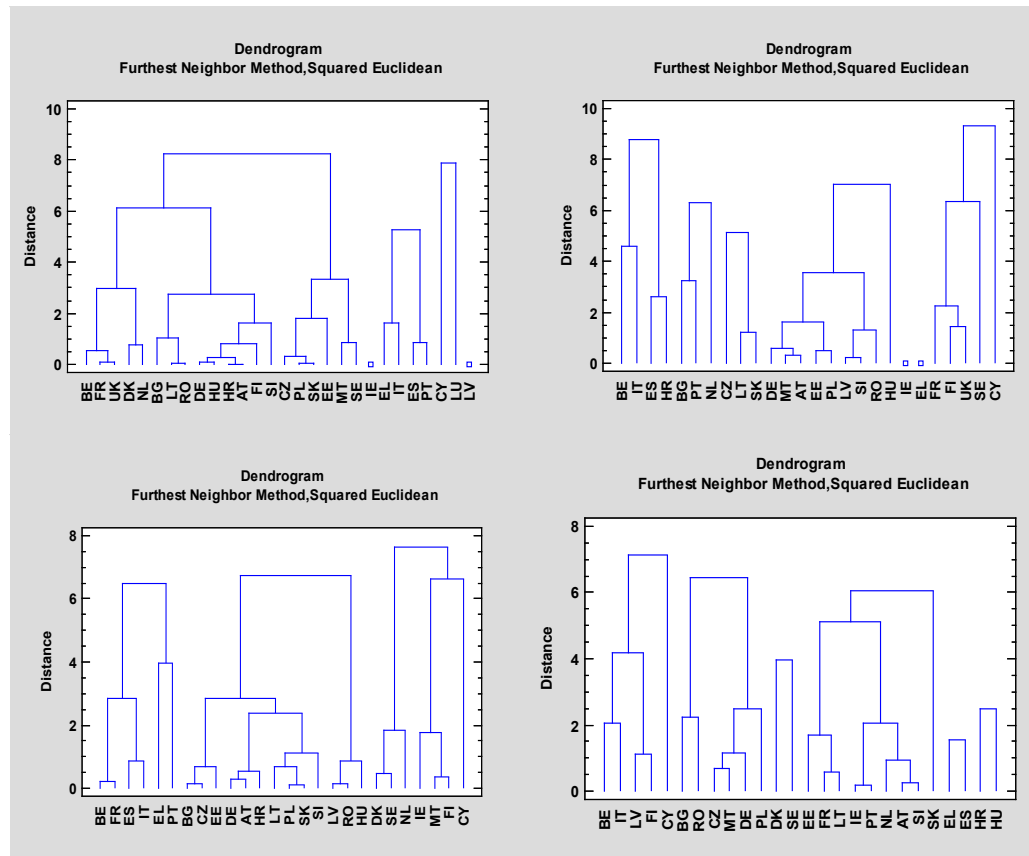
Notes: for 2014 in upper left panel, for 2017 in the upper right panel, for 2020 in lower left panel, and for 2022 in the lower right panel.

Source: Authors' own data obtained using STATGRAPHICS Centurion XVIII

Conclusions

Slovenia, along with other EU member states, is subject to the Macroeconomic Imbalances Procedure. This paper aimed to evaluate the macroeconomic imbalances of the Slovenian economy and its synchronization with other EU countries from 2013 to 2022. Eleven Scoreboard indicators were used to monitor external and internal macroeconomic imbalances. The originality of the paper relates to the use of cluster analysis to provide a spatial view of the similarity or dissimilarity of macroeconomic imbalances and their development over time across EU countries. Cluster analysis was used to determine Slovenia's position among other EU countries in terms of imbalance indicators by dividing EU countries into clusters based on their similarity. The process used the standardized squared Euclidean distance as the basic metric, the furthest neighbour method was used to cluster the objects, which are represented graphically by a dendrogram.

Over the period under review, external macroeconomic imbalances indicators exhibited long-term stability in Slovenia. The cluster analysis showed that in 2014, twelve European countries, including Slovenia, had a significant synchronization and they collectively had a high net investment position compared to the rest of the world. The indicator for the loss of export market shares gradually approached the threshold, and the countries demonstrated stable development of the change in nominal unit labour costs. In 2017, Slovenia demonstrated a different external sector and competitiveness position than the core EU countries, showing a negative net investment position abroad but increasing its share of export markets. In 2020, Slovenia was grouped with countries experienced above-average growth in unit labour costs, a deterioration in their net investment position, but an increase in their share of export markets. Slovenia and eight other EU countries displayed some risks of cost competitiveness losses in 2022. All of them showed strong unit labour costs dynamics. Core inflation in all these countries exceeded that in the euro area by visible margins, more significantly in Slovenia and Austria. The general government gross debt indicator identified internal macroeconomic imbalances in Slovenia in all years of the monitored period and the house price index in three years. In 2014, twenty EU countries demonstrated very good stability in the private sector and also stable public finances and debt. In 2017, the cluster analysis revealed a significant reduction in the synchronization of the values of internal macroeconomic imbalances indicators in EU countries. Slovenia remained in the cluster of eight countries that showed stability and good scores in indicators of internal macroeconomic imbalances. Slovenia, like the other twelve EU countries, reported most indicator values below the thresholds or with only minor deviations in 2020 as well. A lower degree of synchronization across EU countries identified a higher number of six clusters in 2022. Very similar characteristics were achieved for Slovenia and eight other EU countries with overvalued house prices and the general government gross debt above 60%. Fiscal sustainability risks remained medium-term.

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Razvoj slovenskih makroekonomskih neravnovesij in njihova sinhronizacija z državami EU

Izvleček

Slovenija je skupaj z drugimi državami članicami EU vključena v postopek v zvezi z makroekonomskimi neravnotežji. Namen članka je oceniti makroekonomska neravnovesja slovenskega gospodarstva in njegovo sinhronizacijo z drugimi državami EU v obdobju 2013-2022. Za spremljanje zunanjih in notranjih makroekonomskih neravnovesij se uporablja enajst kazalnikov. Izvirnost članka se nanaša na uporabo klastrske analize za določitev položaja Slovenije med drugimi državami EU glede na kazalnike neravnovesij z razdelitvijo držav EU v skupine na podlagi njihove podobnosti. V postopku je bila kot osnovna metoda uporabljena standardizirana evklidska razdalja v kvadratu, za razvrščanje v skupine držav, ki so grafično prikazane z dendrogramom, pa je bila uporabljena metoda najbolj oddaljenega soseda. Slovenija je med letoma 2013 in 2022 izkazovala relativno stabilnost zunanjih in notranjih makroekonomskih neravnovesij. V zadnjih treh letih pa je pokazala mejne vrednosti za indeks nominalnih stroškov dela na enoto, bruto javni dolg in obstajalo je tveganje, povezano z gibanjem indeksa cen stanovanj. Klastrska analiza je pokazala, da so bila zunanja makroekonomska neravnovesja Slovenije v letih 2014 in 2022 pomembno sinhronizirana z državami jedra EU. V letih 2017 in 2020 so makroekonomska neravnotežja kazala podobnosti z baltskimi in srednjeevropskimi državami. Notranje makroekonomsko ravnotežje je v opazovanem obdobju ostalo stabilno in se je razvijalo sinhronizirano z državami jedra EU in srednjeevropskimi državami.

Ključne besede: postopek v primeru makroekonomskega neravnovesja, Slovenija, klastrska analiza, dendrogram

Analysis of the Use of Social Media Components on Serbian Hotels' Websites

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Abstract

The research presented in this paper aims to determine to what extent hotels in Serbia use social media components on their websites. A total of 378 hotel websites in the Republic of Serbia were analysed. For each analysed hotel, the following attributes were observed: region, category, type, and size of the establishment, while the presence of valid links to social networks, the presence of a blog, Google Map, or a link to it, and the number of versions of the site in a foreign language were analysed on their websites. Descriptive statistics and the chi-square test were applied in data processing. The research has shown that hotels in Serbia insufficiently use social media components on their websites. These findings can be useful for hotels as they may indicate ways to improve their websites.

Introduction

The Information Age is characterized by the massive use of the Internet. The number of Internet users in the world has reached 5.44 billion, which accounts for 67.1% of the global population (Statista, 2024b). Initially, in the Web 1.0 stage, the Web was "read-only," meaning companies created content that users could only read (Minazzi, 2015). In the next stage, known as Web 2.0, that static mode was shifted to active (op. cit.), and passive users were turned into active ones (Moro & Rita, 2018). Users can now share their experiences and read about the experiences of other people, while the emphasis is placed on their interactivity. Web 2.0 has also changed the way hotels create value for their customers, offering them online reservations and service purchases through social media (Chatzigeorgiou & Christou, 2020; Pateli et al., 2020).

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According to Statista (2024b), as of April 2024, 5.07 billion people were using social media. Social media are internet-based applications that are founded on Web 2.0 and enable users to create and share various content (Kotler et al., 2019). Social media are now an essential part of people's everyday routines (Durão et al., 2023; Garg & Kumar, 2021). Kotler et. al. (2019) highlight that there are three main social media platforms: online communities and forums, blogs, and social platforms (i.e. social networks). Social networks are online communities where people exchange information, share their opinions, and socialize (Kotler et al., 2020). On a social network, anyone can create a profile with their personal information, create content, and share it with friends and co-workers (Minazzi, 2015). Of course, companies and organizations, including hotels, can also create their own accounts/pages/channels and use them to promote products and services, as well as to develop closer customer relationships (Kotler et. al., 2020).

Companies today understand that social media influence consumer perception, enhance brand value, and affect purchase decisions (Varghese & Agrawal, 2021). In addition, social media are also one of the most widespread advertising tools (Alves et al., 2016; Bhatt & Dani, 2022). Interactive nature of social media platforms facilitates communication with consumers, contributing to their greater satisfaction (Arevin et al., 2024), but there are differences among various applications (Ceyhan, 2019). It should also be noted that in today's digital age, search engines and social media are the primary sources of information (Kotler et al., 2021), so it is extremely important for hotels to use social media.

Although there is an abundance of different explanations and attempts to define what a blog is, many agree that it can be viewed as a website or a web page that contains entries shown in reverse chronological order (Garden, 2012). Companies can use blogs, as well as social networks, to achieve greater consumer engagement, but to also shape their opinions (Kotler et al., 2024). In this paper, the authors have investigated the extent to which blogs and links to profiles on social networks are present on the websites of Serbian hotels.

The authors also considered that a large number of people use Google Maps for navigation, so it would be useful to have this link present on the hotels' websites. Google Maps is the most popular digital map in the world (Mukherjee & Zalani, 2024). According to Statista (2024a), almost 130 million of aggregated downloads were recorded on iOS and Google Play in 2023.

Finally, although it is not directly related to the use of social media, if a website exists exclusively in Serbian version, it cannot be of use to potential and current international guests. Therefore, the authors have also investigated whether there are versions of the sites in foreign languages.

Literature Review

Many authors have studied hotel websites in their papers. One group of studies focuses on examining the level of e-commerce development using the adapted eMICA model (extended Model of Internet Commerce Adoption), some of which will be explained later in the paper. The MICA model, originally proposed by Burgess & Cooper (1999), was later upgraded to the eMICA model (Doolin et al., 2002), which allows measuring of the level of internet commerce adoption by identifying three stages with several layers: stages of promotion, provision, and processing. Using an adapted eMICA model, Ting et al. (2013) analysed the websites of 100 independent hotels from four continents, but they also identified a large number of website features, which they grouped into several dimensions. They allocated certain features to more than one dimension, and analysed the following seven dimensions: Interactivity, Navigation, Functionality, Marketing, Service, Innovation, and Online Processing. Some of the features observed (within the Online Processing dimension) were also Web 2.0 tools and multilanguage support.

Assiri & Shamsudeen (2019) analysed the websites of 42 premium and luxury five-star hotels in Saudi Arabia, also relying on the eMICA model and tools proposed by Ting et. al. (2013). The authors further defined a website characterization framework, which includes nine dimensions: Website Management, Website Navigation, Website Functionality, Social Networks, Product Information, Surroundings Information, Customer Relationship Management, Reservation Functionality, and Payment Method. Padilla-Piernas et al. (2023) also analysed the characteristics and functionalities of hotel websites in the region of Murcia (Spain) based on an adapted eMICA model, to which they added additional variables in its different stages, as well as other *ad hoc* parameters proposed by experts. Cristobal-Fransi et al. (2023) used the eMICA methodology in their analysis of the websites of 106 spas in Spain, while Ağ and Koruyan (2023) used it for the evaluation of Turkish hotel websites.

Spremić & Strugar (2008) have designed their own

framework for the evaluation of hotel websites, in which they observed several attributes categorized into several dimensions: Contact Information, Facility Information, Reservation Information, Surroundings Information, and Website Management. They applied their framework to evaluate the websites of Croatian high-class hotels. Gençer & Ceylan (2022) observed as many as 70 variables grouped into ten categories: sales promotion tools, communication tools, offering different language options, public relations tools, direct selling and marketing tools, social media tools, online promotion tools, information about the services provided, additional service information, and mobile services. They used this framework to analyse accommodation firms in Kütahya province in Turkey. In their analysis of the websites of five-star hotel chains in Egypt, Salem and Čavlek (2016) utilized a conceptual framework that considered several dimensions: Facilities Information, Surrounding Area Information, Customer Contact and Communication, Reservation/Price Information, Company Information, and Management of the Website.

Gritta (2023) focused on the analysis of the use of Web 2.0 components by small Italian hotels. Several types of websites were analysed: simple showcase site, showcase site with booking through OTA, and showcase site with booking through an e-shop. Next, the types of contact options on the website were analysed: whether the site has only an email address or a telephone number, or if the site has a link to a social network, or if the site has a chat option for online communication.

A few additional studies have focused on examining the importance of the use of social media and Web 2.0 by hotels. Thus, Haro de Rosario et al. (2013) analyzed the visibility of the 50 largest hotel chains in two phases. First, they performed a descriptive study of how the selected hotel chains use Web 2.0 tools and social media, and then they examined what factors impact development of these technologies in the hotel sector and how. On the other hand, Kalinić and Vujačić (2018) focused on exploring the characteristics of Facebook pages of Serbian hotels by analysing various social media metrics.

Although all the studies, which have been considered in the literature review, analysed hotel websites from various aspects, many did not emphasize the use of social media components, which, given their importance, the authors wanted to address in this study. In addition, there is no comprehensive study that examines to what extent hotels in Serbia use social media components on their websites, particularly noting the differences between hotels of various sizes and within different regions of the Republic of Serbia.

Materials and Methods

The research presented in this paper was conducted in March and April 2024. First, a list of categorized accommodation establishments in the Republic of Serbia as of January 2024 was downloaded from the website of the Ministry of Tourism and Youth (2024). Next, from this list of 435 establishments, those that do not fall under the hotels category according to the categorization regulations were removed (Službeni glasnik RS, 2012; 2016). More precisely, only the establishments of the following types were observed: hotel, aparthotel, and Garni hotel – 422 establishments in total. For each analysed hotel, the following data were recorded: region, category, type of establishment, and size.

Subsequently, by using Google search, it was investigated whether all these hotels had a functional website. The websites that could not be loaded, or were under construction, were not considered. Only functional websites were taken into account, and 378 hotels had such a website. Next, a content analysis of these websites was conducted to study the adoption of social media components. Special attention was paid to links to social networks. The authors clicked on all links and, unfortunately, found that some of them could not be regarded as valid: some lead to a page on the hotel's website instead of a social network profile, some to pages/profiles that do not exist, some to the social network itself (but not to a page/channel/account), and some to pages/profiles that were not pages/profiles of the hotel or hotel chain. There were also cases where social media buttons were present on the site, but they were not clickable, i.e. hyperlinked. In such cases, the corresponding attribute was assigned a value of 0, meaning that a valid link to the social network did not exist. In the case of the YouTube social network, the authors considered not only the social media button, but also the embedded videos on hotels' websites. Thus, a value of 1 was assigned only if the links to the hotel or the hotel's chain pages/profiles/channels were present, and the following social networks were considered: Facebook, Instagram, LinkedIn, X (formerly Twitter), Tripadvisor, TikTok, Pinterest, and Foursquare. Finally, the total number of valid links to social networks was also calculated for each site. During the analysis, it was noted that some hotels' websites still had an icon for Google+, even though this social network has not been in use since April 2019.

The next observed attribute was the presence/absence of a blog on the website, so the attribute was assigned a value of 1 or 0, respectively. As in the case of social networks, if the link did not lead to the hotel's or hotel chain's blog, this attribute was assigned a value of 0. There were also cases where the hotel's website menu had a blog/news section or similar, but it did not contain a single blog entry, so in this case, the corresponding attribute value was also coded as 0.

Given that the majority of tourists use Google Maps for navigation, it was analysed whether there were hyperlinks to it. If the hotel's address (or the icon in front of it) was linked to Google Maps, or if the map was embedded in the website, the attribute was assigned a value of 1 (except in the cases where the hyperlink did not work, then the value assigned was 0). In other cases, even if the website had an image file displaying a map, or if another map service was used (such as OpenStreetMap, etc.), the attribute value was 0. In a few cases when Google Maps did not display on the site at all, but rather an error message occurred, the attribute was also assigned a value of 0. The attribute value was also coded as 0 in the cases where a blank frame or empty space was shown on the page instead of the map. In one case, there was a QR code on the website leading to Google Maps, so the attribute value was coded as 1.

Since foreign tourists generally do not speak Serbian, the authors found it interesting to explore whether there were multiple language versions of hotel websites. Therefore, a special attribute was introduced – the number of foreign languages in which a version of the site existed – to investigate whether versions of the site actually existed in all the offered foreign languages, and it turned out that some available options did not work (i.e., clicking on some of them did not change the language in which the site content was displayed). Only those language versions that actually existed were taken into account. In cases where there was a brochure in a foreign language, but not a version of the website in that language, it was not taken into account (only individual versions of the website in foreign languages were counted). In one case, the site offered a translation through Google Translate, but this was not counted either.

Finally, it is important to mention that mostly the Serbian versions of the websites were analysed. Only in cases where there was no Serbian version available, the English version of the website was analysed.

Results and Discussion

Nowadays, it is very important that the design and content of a hotel's website align with the demands and expectations of consumers. In addition to traditional means of communication, such as email and phone, it is necessary to enable interactivity by introducing additional available content and functions on websites. In the digitalization era, potential users of hospitality services have online sources available to inform themselves about the quality of the hotel product. In this respect, the use of social media is important, as it allows hotel service users to share their experiences.

The study analyzed hotels across various regions, categories, types, and sizes. The distribution of hotels based on the observed attributes is presented in Table 1.

Table 1
Distribution of hotels by region, category, type of establishment, and size

	Number of hotels	%
Region		
Belgrade	109	28.84
Vojvodina	75	19.84
Southern and Eastern Serbia	69	18.25
Šumadija and Western Serbia	125	33.07
Hotel Category		
1-star	9	2.38
2-star	52	13.76
3-star	129	34.13
4-star	172	45.50
5-star	16	4.23
Hotel Type		
Hotel	252	66.67
Aparthotel	4	1.06
Garni hotel	122	32.28
Hotel Size		
Small	138	36.51
Average	187	49.47
Above average	50	13.23
Large	3	0.79

Source: Authors' calculations

It is evident that four regions consisting of multiple administrative districts were analysed. Table 1 presents these regions, as well as the number and percentage representation of hotels by region. Concerning the Belgrade Region, which consists of the city of Belgrade, 28.84% of hotels are located there. Within the Vojvodina

Region, hotels are located in the following administrative districts: 0.79% of hotels are located in the West Bačka, 1.85% in the South Banat, 8.20% in the South Bačka, 1.32% in the North Banat, 3.44% in the North Bačka, 0.79% in the Central Banat, and 3.44% in the Srem District. The Southern and Eastern Serbia Region consists of nine administrative districts, and hotels are located in the following administrative districts: 1.59% in the Bor District, 1.32% in the Braničevo District, 3.17% in the Zaječar District, 1.59% in the Jablanica District, 6.35% in the Nišava District, 1.59% in the Pirot District, 0.79% in the Podunavlje District, 0.53% in the Pčinja District, and 1.32% in the Toplica District. In the Šumadija and Western Serbia Region, 8.47% of hotels are located in the Raška District, 8.20% in the Zlatibor District, 4.50% in the Šumadija District, 3.17% in the Mačva District, 2.91% in the Moravica District, 2.38% in the Rasina District, 1.85% in the Kolubara District, and 1.59% in the Pomoravlje District.

In the research, hotels, aparthotels, and Garni hotels were analysed, and each of them had a specific categorization, from one to five stars. Table 1 shows the number and percentage of hotels by type of establishment and category.

Since there is no universal classification of hotels by size in the literature, the authors have decided to use Dukas' classification in this paper (Kosar, 2018). According to this classification, hotels are divided into four categories: small (with a capacity of up to 25 rooms), average (with a capacity of 26 to 99 rooms), above average (with a capacity of 100 to 299 rooms), and large (with a capacity of 300 or more rooms). Table 1 shows the distribution of the hotels analysed in this research by size.

As part of the research, the website of each hotel was analysed along with the presence of valid links to social networks: Facebook, Instagram, LinkedIn, YouTube, X (formerly Twitter), Tripadvisor, TikTok, Pinterest, Foursquare. Furthermore, the presence of a blog, Google Maps (or a link to it), and the number of foreign languages for which a version of the site existed were also analysed.

For each hotel, the total number of valid links to social networks was recorded. The number of hotels with a notable number of links to social networks is shown in Figure 1. It was observed that, out of the nine monitored social networks, the total number of links to social networks does not exceed six on any of the analysed websites.

Hotels with links to six out of the possible nine monitored social networks present on their websites make up only 1.32% of the sample, and all of them are four-star hotels. Interestingly, as many as 25.13% of the websites of the analysed hotels do not have a single link to social networks. It was observed that 13.76% of hotels have only one social network link on their website, 28.57% have two, 20.37% have three, 7.14% have four, and 3.70% have five links to social networks. On average, there are about two links to social networks present on the observed websites, which is a fairly modest result for modern times.

Figure 1
The number of hotels with a notable number of links to social networks
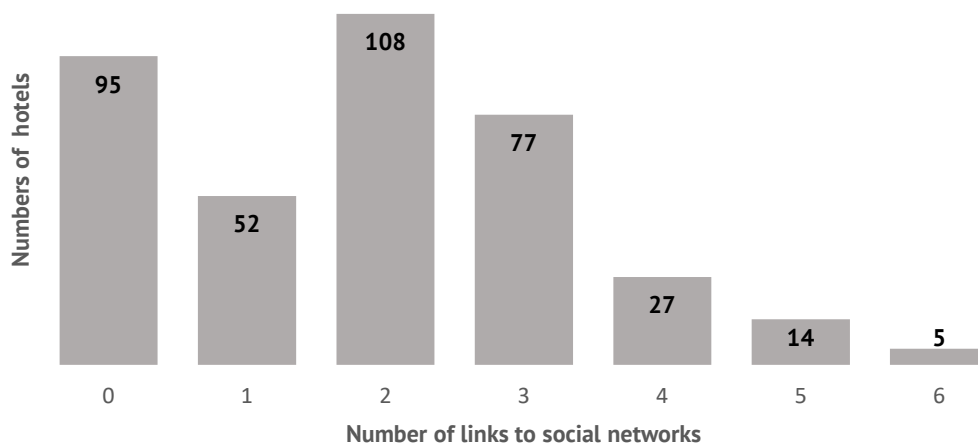
Source: Authors

The number of hotels with links to particular social media networks is presented in Figure 2. Facebook is the most frequently used social network, with a link to this network present on 65.61% of the observed hotels' websites. A link to Instagram is present on 58.73% of the websites, to LinkedIn on 9.26%, to YouTube on 21.43%, to X on 12.70%, to Tripadvisor on 16.14%, to TikTok on 0.53%, to Pinterest on 2.38%, and to Foursquare on 0.26%.

Figure 2

The number of hotels with links to particular social media networks
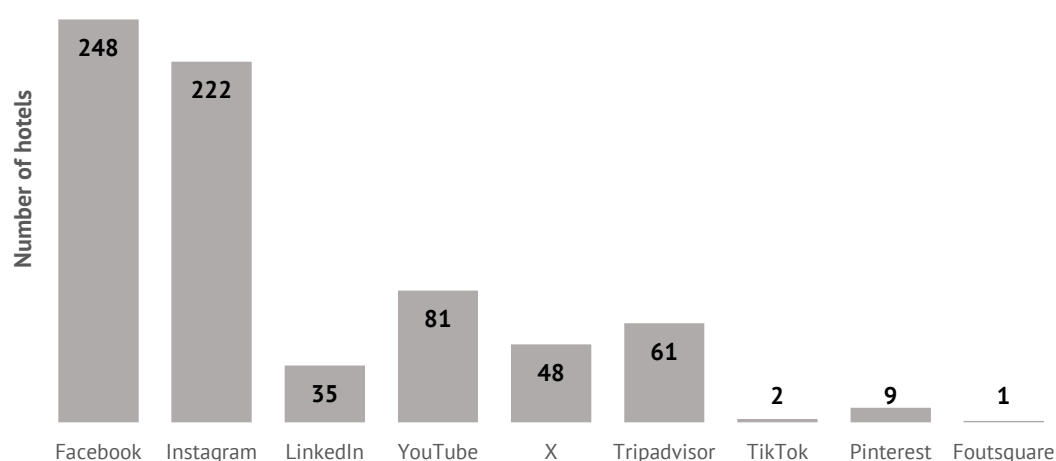
Source: Authors

The usage of various social media platforms varies across age groups. Generation Z tends to use platforms such as TikTok, Snapchat, and YouTube, while the millennial generation prefers platforms such as Facebook, X (formerly Twitter), and Instagram (Farid, 2024).

Generation X Social Media Statistics (Lindner, 2021) show that the social media platform they use the most is Facebook, since 74% of the demographic use this platform. They also use LinkedIn for professional networking. Facebook is also popular with Baby Boomers (Carrillo-Durán et al., 2022; Sheldon et al., 2021). Since the majority of analysed websites have a link to Facebook, it can be concluded that they are more tailored to middle-aged and older guests rather than younger generations. TikTok is quite popular and widely accepted among the youth, and nevertheless there are almost no links to this social network on the analysed hotel websites. Generation Z was estimated to control around $143 billion in global spending in 2023, which constituted roughly 40% of the total consumer base; and they're not just consumers, they are also influencers (Johnston, 2023). This is why the hospitality industry must evolve and adjust for the new generation of travellers.

By observing the total number of links to social networks on the hotel websites sorted by region, a significant statistical difference is noted. This result is indicated by the χ^2 test of independence, shown in Table 2.

Table 2

Chi-Square Test for the number of links to social networks by region

Chi-Square Tests				Symmetric Measure		
	Value	df	Asymp. Sig. (2-sided)		Value	Asymp.Sig. (2-sided)
Pearson Chi Square	32.92	18	0.02	Cramér's V	0.17	0.02
N of Valid Cases	378					

Note: 4 cells (18%) have expected count less than 5.

Source: Authors' calculations

The largest total number of links to social networks was observed on the hotel websites in the Belgrade Region and in the Šumadija and Western Serbia Region, while the smallest number was observed in the Southern and Eastern Serbia Region. This is visible in Figure 3.

Figure 3

The number of hotels with a notable number of links to social networks by region
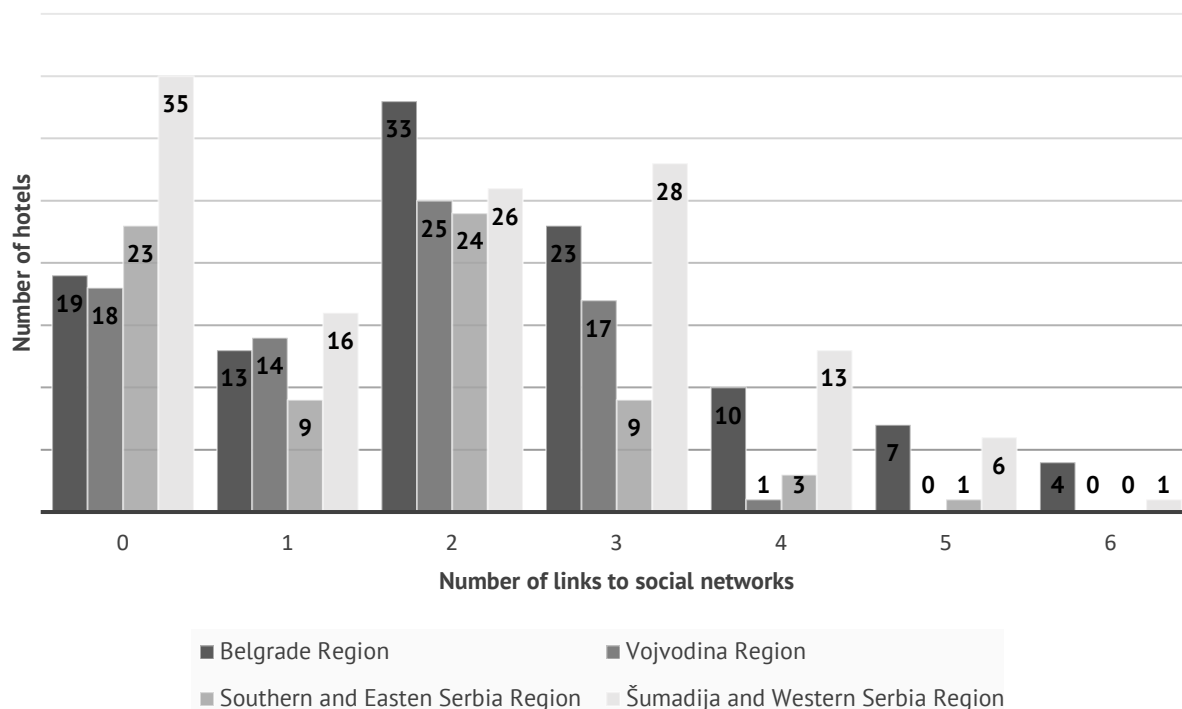
Source: Authors

By observing the hotels by category, it is noted that among five-star hotels, those with 3 or 5 links to different social networks present on their websites are the most represented, while four-star hotels most often have 2 or 3 such links, three-star hotels most often have 0 or 2 such links, two-star hotels most often have 0 or 2 such links, and finally, one-star hotels most often have 0 or 1 such link. The obtained results are completely in line with expectations, as shown in Table 3.

The analysis revealed that 42% of two-star hotels, 30% of three-star hotels, and 17% of five-star hotels have zero links to social networks on their websites.

Table 4 presents the number of hotels of each type with their corresponding count of social networks links. It is clear that the majority of hotels and Garni hotels have two links to social networks, and also that a significant portion of these establishments have no links to social networks.

Table 3

Distribution of hotels by category and number of links to social networks

Hotel Category	Number of links to social networks						
	0	1	2	3	4	5	6
1-star	4	2	2	1	0	0	0
2-star	21	10	13	7	1	0	0
3-star	39	22	41	20	5	2	0
4-star	30	17	49	43	20	8	5
5-star	1	1	3	6	1	4	0

Source: Authors' calculations

Table 4

Distribution of hotels by type and number of links to social networks

Hotel Type	Number of links to social networks						
	0	1	2	3	4	5	6
Hotel	53	34	67	56	23	14	5
Aparthotel	3	0	1	0	0	0	0
Garni hotel	39	18	40	21	4	0	0

Source: Authors' calculations

Table 5 shows the distribution of the number of links to social networks in the hotels classified into four groups by size. It is observed that in the group of small and average hotels, the highest number of hotels have links to two social networks, while in the group of above-average hotels, the highest number of hotels have links to four social networks. It is noticeable that a large number of small and average hotels have zero links to social networks, which, in this era of digitalization, is certainly not satisfactory. Considering the small share of large hotels in the sample, it is pointless to comment on them at this time. However, one hotel with over 300 rooms without a single link to social networks on its website was also found.

Table 5

Distribution of hotels by size and number of links to social networks

Size	Number of links to social networks						
	0	1	2	3	4	5	6
Small	42	20	49	23	3	1	0
Average	45	28	50	44	12	5	3
Above average	7	4	9	10	11	7	2
Large	1	0	0	0	1	1	0

Source: Authors' calculations

Table 6

Chi-Square Test for a blog by region

Chi-Square Tests				Symmetric Measure		
	Value	Df	Asymp. Sig. (2-sided)		Value	Asymp.Sig. (2-sided)
Pearson Chi Square	5.64	3	0.13	Cramér's V	0.12	0.13
N of Valid Cases	378					

Note: 0 cells (0%) have expected count less than 5.
Source: Authors' calculations

The presence of a blog on a website is important because it can also be used for attracting customers to engage on a more personal level (Kotler et al., 2024). Despite this, the research shows that only 18.52% of the hotels have a blog on their website. As shown in Table 6, Chi-square Test shows no significant difference between hotels with a blog present on their website in relation to the region.

On the other hand, there is a difference between hotels with a blog in relation to the category, type and size of the hotel, as shown in Table 7.

Therefore, a blog, as one of the possibilities provided by Web 2.0, although potentially very useful, is very rarely used in practice in the observed hotels.

The majority of hotels, specifically 82.80% of them, have a Google map, or a link to it, on their website. There is a significant statistical difference between hotels that have a Google map (or a link to it) on their website compared to the region (as shown in Table 8), with the Belgrade Region standing out in this regard compared to the observed regions.

Interestingly, there is no significant difference in the presence of Google maps or a link to it on the websites in relation either to the hotel category or to the hotel size or hotel type, illustrated in Table 9. The sample contains a small number of Garni and large hotels (as shown in Table 1), so the results obtained for these establishments cannot be considered significant.

Table 7

The share of hotels with a blog according to category, type, and size

	Blog	
	No (%)	Yes (%)
Hotel Category		
1-star	89	11
2-star	83	17
3-star	85	15
4-star	79	21
5-star	69	31
Hotel Type		
Hotel	77	23
Aparthotel	100	0
Garni hotel	89	11
Hotel Size		
Small	89	11
Average	81	19
Above average	60	40
Large	67	33

Source: Authors' calculations

Considering that both domestic and international guests visit websites, it is advisable to have versions of the website in foreign languages as well. For this reason, the number of versions of the site in foreign languages has been explored. It has been observed that the number of versions of the site in foreign languages ranges from 0 to 26. Table 10 shows the number and percentage share of hotels depending on the number of versions of the site in foreign languages.

It has been observed that only 5.56% of hotels have a website version in three foreign languages, mostly the ones in the Belgrade Region. A large percentage of hotels, specifically 55.82%, have a version of their website in only one foreign language. It is also worth noting that 21.96% of the hotels do not have a version of their website in any foreign language, with the Šumadija and Western Serbia Region leading in this regard with 34 hotels. When examining hotel categories, it has been observed, contrary to all expectations, that the majority of three-star hotels, specifically 37 of them, do not have any version of their website in a foreign language, while 109 of the four-star hotels have a version of their website in only one foreign language.

Table 8
Chi-Square Test for a Google Map by region

| Chi-Square Tests				Symmetric Measure		
	Value	Df	Asymp. Sig. (2-sided)		Value	Asymp.Sig. (2-sided)
Pearson Chi Square	11.75	3	0.01	Cramér's V	0.18	0.01
N of Valid Cases	378					

Note: 0 cells (0%) have expected count less than 5.
Source: Authors' calculations

Table 9
The share of hotels with a Google Map according to category, type, and size

	Blog	
	No (%)	Yes (%)
Hotel Category		
1-star	11	89
2-star	19	81
3-star	20	80
4-star	14	86
5-star	19	81
Hotel Type		
Hotel	19	81
Aparthotel	14	86
Garni hotel	25	75
Hotel Size		
Small	14	86
Average	20	80
Above average	12	88
Large	33	67

Source: Authors' calculations

Table 10
Distribution of hotels by the number of website versions in foreign languages

Number of site versions in foreign languages	Number of hotels	%
0	83	21.96
1	211	55.82
2	41	10.85
3	21	5.56
4	6	1.59
5	4	1.06
6	2	0.53
8	1	0.26
10	1	0.26
11	1	0.26
15	3	0.79
16	1	0.26
17	1	0.26
26	2	0.53

Source: Authors' calculations

Conclusions

The fact that social media components allow hotels greater presence and visibility on the internet is irrefutable. On the other hand, the number of Internet users is increasing every year, and consumers are becoming more and more informed. The presence of hotels on the Internet is not in itself a guarantee of success, as websites must be regularly updated and supplemented with new features, to achieve the greatest possible competitive advantage in business. The role of websites is not only to attract visitors or potential customers but also to form loyal and regular clients; therefore, special attention must be paid to social networks, blogs, as well as other content that allows for

feedback from clients, such as forums, surveys, etc. The research results show that the hotels in the Republic of Serbia do not use social media components to a large extent. The authors have found that 25.13% of the hotels do not have a link to any social network on their website, and only 18.52% of the observed hotels have a blog on their website. Additionally, 21.96% of the analysed websites do not have a version of the site in any foreign language, and 55.82% have a version in only one foreign language. All of these are undesirably high percentages for today's global world. The presence of Google Maps (or a link to it) on websites is quite satisfactory, standing at 82.80%.

Although the study presented in this paper showed some very interesting results, it must be noted that it has certain limitations. First, although it was useful to observe whether there are links to social media profiles on the hotel websites, no further research was conducted on how successfully they are managed. This could be the subject of a new study, since managing social media accounts is of exceptional importance for successful digital marketing.

Further, only the presence of a blog on the hotel websites was analysed, but unfortunately not the frequency of their updates. If the blog is not regularly updated, then it is better not to have it on the site at all. For example, it is inappropriate to have announcements about events that happened a long time ago, or information about Christmas discounts in the middle of summer. This will result in visitors noticing that the hotel does not pay enough attention to maintaining its website, leading to a negative rather than a positive impression. Finally, it should be noted that the versions of the website in different languages were not compared to determine whether they would have the same values for the observed attributes.

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Pravilnik o uslovima i načinu obavljanja ugostiteljske delatnosti, načinu pružanja ugostiteljskih usluga, razvrstavanju ugostiteljskih objekata i minimalno tehničkim uslovima za uređenje i opremanje ugostiteljskih objekata (Službeni glasnik RS, No. 48/2012; 58/2016).

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Analiza uporabe komponent družabnih omrežij na spletnih straneh srbskih hotelov

Izvleček

Namen raziskave je ugotoviti, v kolikšni meri hoteli v Srbiji na svojih spletnih straneh uporabljajo komponente družabnih omrežij. Analiziranih je bilo 378 spletnih strani hotelov v Republiki Srbiji. Pri vsakem analiziranem hotelu so bili opazovani naslednji atributi: regija, kategorija, vrsta in velikost ustanove, na njihovih spletnih straneh pa so bile analizirane prisotnost veljavnih povezav do družabnih omrežij, prisotnost bloga, Googlovega zemljevida ali povezave do njega ter število različic spletnega mesta v tujem jeziku. Pri obdelavi podatkov sta bila uporabljena opisna statistika in test hi-kvadrat. Raziskava je pokazala, da hoteli v Srbiji na svojih spletnih straneh premalo uporabljajo komponente družabnih omrežij. Te ugotovitve so lahko koristne za hotele, saj lahko nakazujejo načine za izboljšanje njihovih spletišč.

Ključne besede: spletna stran hotela, analiza spletne strani, družabna omrežja, hoteli, Srbija

Opportunities and Challenges of Supply Chain Sustainability Reporting: The Case of Slovenian Multinational Manufacturing Companies

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Abstract

This article explores reporting on supply chain sustainability from the perspective of opportunities and challenges for multinational manufacturing companies, considering the evolved European Union (EU) regulations and the scope and complexity of international supply chains. In the theoretical part, we examine corporate sustainability reporting, focusing on EU regulatory framework, sustainability in international supply chain management, and reporting on supply chain sustainability. The empirical analysis is based on the secondary and primary data gathered from a non-random sample of Slovenian multinational manufacturing companies from B2B industry. The analysis shows that the companies discussed included information on supply chain sustainability in their sustainability reports; however, they weren't very well-prepared for the requirements of the new EU sustainability reporting directives. We found they perceived opportunities and challenges in supply chain sustainability reporting similarly. Our research findings have several implications for corporate sustainability management and national institutional business support.

Introduction

Corporate sustainability reporting requirements are evolving and becoming more stringent. Over the past two decades, sustainability reporting has been largely voluntary. Adopting mandatory and regulated sustainability reporting in the last few years has significantly changed the landscape of non-financial corporate reporting (KPMG International, 2022, 3-6; OECD, 2024, 3). Transparency on sustainability implementation has become a part of the information companies must disclose to the public. Therefore, the knowledge and understanding of sustainability reporting is becoming increasingly important for companies (Deloitte, 2020, 2).

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Since supply chains represent a large part of companies' activities, their sustainable performance is essential for achieving corporate sustainability commitments (Alves, Mork, Rogge, Dutta, & Steinberg, 2022, 3). Pursuing sustainable supply chains, including a thorough review process as part of a corporate's management system, helps companies identify supply chain risks and better understand their supply chain performance (OECD, 2017, 3), which is becoming a significant part of sustainability reporting (Yadava & Sinha, 2016, summarised in Freire Lins, Erthal, & Marques, 2023, 2).

The European Union (EU) is tightening its regulatory framework on sustainability. Under Green Deal and the Sustainable Financial Framework, the EU is developing and amending sustainability reporting regulations as mechanisms for achieving sustainability goals. Two directives that mark the importance of value and supply chains in corporate sustainability reporting have been developed: The Corporate Sustainability Reporting Directive (CSRD) entered into force in January 2023 (European Commission, 2023), and the Corporate Sustainability Due Diligence Directive (CSDDD) was adopted in May 2024 (European Commission, 2024). In connection with CSRD, the European Sustainability Reporting Standards (ESRS) have been developed at the end of 2023 (European Commission, 2023). While CSRD expands the scope of reporting, ESRS standards provide a framework for consistency and comparability.

Our research assumes that the sustainability of supply chains has a crucial impact on achieving overall corporate sustainability performance and that the new EU sustainability regulation significantly impacts corporate sustainability performance and reporting. The evolution of corporate sustainability regulation and the commitment to sustainability reporting brings new challenges and opportunities for companies. Mandatory detailed reporting on the sustainability of international supply chains presents new dilemmas for multinational companies with complex supply chains regarding the number of business partners involved, their geographical origins, and the organization of downstream and upstream supply chain activities. There is a research gap in the existing literature on identifying the perceptions of multinational corporations on the new mandatory sustainability reporting of their large and complex international supply chains. Neither the perceptions of these companies about the content nor their perceptions about the implementation of this reporting are known. Such research can contribute to developing proactive supply chain sustainability management and national business institutional support for this reporting type.

This article aims to explore the sustainability reporting on supply chains in selected Slovenian multinational manufacturing companies operating in the B2B industry and determine their awareness, commitment, and perceptions about the new EU sustainability reporting regulations, focusing on supply chain sustainability reporting. We intend to identify opportunities and challenges the discussed companies perceive when reporting on the sustainability of their supply chains.

In the first section, we review the literature on corporate sustainability reporting, focusing on supply chain sustainability in the context of the evolved new EU regulatory framework on sustainability reporting. Then, we develop the hypotheses and describe the Methodology and Data. In the fourth section, we present and discuss the research results. The fifth section comprises a conclusion with research limitations, suggestions for further research, implications for corporate sustainability management, and national institutional business support.

Literature Review

Corporate Sustainability Reporting

Corporate Sustainability Reporting refers to companies publicly disclosing information about their non-financial performance and impacts (Deloitte, 2020, 2-6. A sustainability report includes disclosure of a company's ESG targets and informs about the company's progress and efforts to achieve these targets (GEP, 2023a). This reporting aims to provide stakeholders—such as investors, customers, employees, and the community—a transparent view of how a company manages its sustainability practices and contributes to sustainable development. Reporting on environmental performance and impacts comprises metrics like energy consumption, greenhouse gas emissions, waste management, water usage, and biodiversity impacts. In social responsibility, companies report on labor practices like employee welfare, diversity and inclusion, labor rights, and community engagement. Governance performance includes reporting on management practices, like the company's governance structure, ethical practices, compliance with regulations, sustainability risk management, and stakeholder engagement (CGC, 2024).

Corporate sustainability reporting has developed from environmental and corporate social responsibility reporting (UNEP, 2019, 13-26). It is an evolving field with different reporting systems. Various organizations have developed guidelines for approaching sustainability

reporting. Global Reporting Initiative (GRI) was the first organization to create voluntary standards for sustainability reporting, often used as the basis for mandatory reporting requirements. GRI standards are the most commonly used standards for sustainability reporting.

Sustainability reporting can vary depending on the type of company, its sector, size, location, and intended audiences. It can be voluntary or mandatory. Different groups of instruments can be used to enforce sustainability reporting, such as requirements or expectations of sustainability reporting laws, regulations, and policies issued by administrative bodies, self-regulatory reporting requirements, guidelines or recommendations for reporting on a specific topic or by a specific sector, and voluntary guidelines and standards for sustainability reporting (UNEP, 2019a, 56).

EU Regulatory Framework on Corporate Sustainability Reporting

The EU developed the Green Deal in 2019 to respond to the climate crisis and as a key to a climate neutrality and sustainability (European Parliament, 2023; European Council and Council of the European Union, 2023). It is a package of policy initiatives governing the areas of climate, environment, energy, transport, industry, agriculture, and sustainable finance, all of which are closely interlinked. Based on the Green Deal, the EU has made several commitments, notably to become the first climate-neutral continent by 2050 and to reduce GHG emissions by at least 55% below 1990 levels by 2030 (European Commission, 2021a). In 2018, the EU adopted its first Sustainable Growth Finance Action Plan. Building on this plan, the EU has set out the three building blocks of a sustainable finance framework (European Commission, 2021a, 2024): 1) a classification system or 'taxonomy' of sustainable activities that sets the conditions that economic activity must meet to be considered environmentally sustainable; 2) a disclosure framework for non-financial and financial companies, providing investors with the information they need to make informed decisions on sustainable investments; and 3) investment tools, including benchmarks, standards, and labels.

Under the second building block, the EU has also developed the Corporate Sustainability Reporting Directive (CSRD) and the Corporate Sustainability Due Diligence Directive (CSDDD), which complement each other. The CSRD, which entered into force in 2023, expands the previous Non-Financial Reporting Directive (NFRD) by broadening the scope of companies required to disclose sustainability information, strengthening reporting requirements, and integrating sustainability into corporate governance (EcoVadis, 2023, 3; Deloitte, 2023, 7). It ensures that companies report reliable and comparable sustainability information that investors and other stakeholders need. The CSRD emphasizes double materiality, which requires companies to report on the impacts of their activities on people and the natural environment, as well as how sustainability matters affect the company (Directive (EU) 2022/2464, 2022, 10). Double materiality expands the traditional notion of materiality in accounting and auditing, measured by financial factors, to environmental, social, and governance (ESG) considerations. It recognizes that a company's impact on society and the environment is significant for its financial performance and overall sustainability. By adopting double materiality, organizations acknowledge that their economic activities have broader implications beyond financial results, requiring a more holistic approach to reporting and accountability.

The CSRD is binding for an extended range of companies. Different groups of companies must report on different timetables (European Commission, 2023a; Wollmert & Hobbs, 2022). Companies previously subject to the NFRD (large listed companies, large banks, and large insurance companies) and large non-EU listed companies with more than 500 employees are committed to reporting from the financial year 2024, with the first sustainability report published in 2025. Other large companies with number of employees between 250 and 500, including other large non-EU listed companies, are committed to reporting from the financial year 2025, with a first sustainability report published in 2026, and listed small and medium-sized enterprises (SMEs), including non-EU-listed SMEs, are committed to reporting from the financial year 2026, with a first sustainability report published in 2027.

The CSRD requires companies to apply standards for sustainability reporting. Therefore, the European Commission adopted a new common European Sustainability Reporting Standards (ESRS) in 2023. By requiring common standards, the CSRD aims to ensure that companies across the EU report comparable and reliable sustainability information. The ESRS comprises 12 standards, which are thematically grouped and cover different elements of sustainability (EFRAG, 2024). They are based on the standards of the Global Reporting Initiative (GRI) and the standards of the International

Sustainability Standards Board (ISSB) (European Commission, 2023a).

The CSDDD, which entered into force in 2024, updates and strengthens the rules related to the social and environmental information companies must report and ensures a consistent flow of sustainability information (European Commission, 2021a). It emphasizes a better understanding of the double materiality perspective. Besides financial data, companies must publicly disclose relevant information about the sustainability risks and opportunities they face and the impacts of their activities on people and the natural environment (Wollmert & Hobbs, 2022; European Commission, 2021). The CSDDD focuses on due diligence of a company's operations, subsidiaries, and value chain in which direct and indirect business relationships are established (European Commission, 2022). Due diligence is a process by which companies can identify, prevent, mitigate, and explain how they address their actual and potential adverse impacts (OECD, 2017, 18). The due diligence process concerns a company's entire value chain, including its activities, products and services, business relationships, and supply chains. Impacts related to the company's activities include impacts directly caused by the company, impacts to which the company contributes, and impacts related to the company's value chain (Directive (EU) 2022/2464, 2022, 10-11). Supply chain due diligence is gathering information and reviewing records to assess the risks and opportunities associated with a company's supply chain. It is essential to any company's risk management strategy and helps companies make informed decisions about their suppliers and subcontractors (GEP, 2022). CSDDD seeks to ensure that companies address the negative impacts of their actions, including their value chains inside and outside Europe (European Commission, 2024a). The commitment for groups of companies is divided into three periods from CSDDD' entry into force (European Parliament and Council, 2024, 91-92): 1) from 2027 for companies with more than 5000 employees and a turnover of €1500 million; 2) from 2028 for companies with more than 3000 employees and a turnover of €900 million; and 3) from 2029 for companies with more than 1000 employees and a turnover of €450 million.

Supply Chain and Its Management

A supply chain is a network of interrelated companies that supply materials, products, and services. The upstream supply chain is the process of getting materials to the manufacturer, while the downstream supply chain is the process of getting products from the manufacturer to the end consumer (EFRAG, 2022, 26). Suppliers directly supplying goods or services are first-tier suppliers, while suppliers that supply the first-tier suppliers are referred to as second-tier suppliers. The international supply chain is similar to a complex network where numerous companies are part of multiple supply chains (Sanders, 2012, 5, 6). Supply chain management (SCM) is the systematic and strategic coordination of business functions within a given company and between companies within a supply chain to improve the long-term performance of individual companies and the supply chain as a whole (Mentzer et al., 2001, 18, summarised in Freire Lins, Erthal, & Marques, 2023, 3). SCM activities must be coordinated in domestic and international operations. International SCM involves the global focus of a company, including its diverse and internationally dispersed markets, production facilities, and suppliers. It requires a well-planned, designed, and managed supply chain network (Sanders, 2012, 346).

Sustainability in Supply Chain Management

Integrating sustainability into supply chains can bring several benefits to a company: it reduces the negative environmental impacts of the supply chain, increases the company's reputation, promotes the development of better techniques to reduce risks in the supply chain, improves cooperation within the company and with stakeholders, fosters a favorable work culture, and creates new business opportunities etc. (GEP, 2023).

The integration of sustainability into supply chain management (SCM) has given rise to the term sustainable supply chain management (SSCM), understood as "the strategic, transparent integration and achievement of an organization's social, environmental and economic objectives in the systematic alignment of key inter-organizational business processes to improve the long-term economic performance of an individual company and its supply chains" (Carter & Rogers, 2008, summarised in Freire Lins, Erthal, & Marques, 2023, 1). According to Seuring and Muller (2008, summarised in Okongwu, Morimoto, & Lauras, 2013, 4), SSCM is defined as "the management of material, information and capital flows and collaboration between companies along the supply chain, integrating objectives from all three dimensions of sustainable development, i.e., economic, environmental and social, derived from customer and stakeholder requirements". Environmental, social, and governance (ESG) management has also gained significant importance in corporate sustainability management. In this context, supply chain sustainability

is about shaping a company's investment, operational, and purchasing decisions to achieve positive ESG outcomes and reduce negative impacts (World Economic Forum, 2022, 4).

Reporting on the Sustainability of Supply Chains

Sodhi and Tang (2019, 2946-2948) distinguish between visibility and transparency of the supply chain. Supply chain visibility refers to a company's efforts to gather information about upstream and downstream activities in its supply chains. In contrast, supply chain transparency refers to a firm disclosing information to the public about upstream and downstream activities and the products it sells. Gaining visibility in the supply chain is a necessary step towards obtaining and disclosing information. Visibility caters to the needs of a company's internal stakeholders, transparency, however, is aimed at external stakeholders, including customers, investors, non-governmental organizations (NGOs), regulators, and oversight agencies.

Companies disclose information on the sustainability of their supply chains to different degrees: in detail for both types of suppliers, only for first-tier suppliers, and only to assure customers that their suppliers meet the standards (Sodhi & Tang, 2019, 2948). Supply chain disclosure is influenced by regulatory requirements, stakeholder pressures (investors, customers), corporate governance and risk management processes, reputation management, industry factors, position in the supply chain, past industry affairs, business opportunities, and competitive pressures (Bayne, Ng, & Wee, 2022, 3893-3894; Freire Lins, Erthal, & Marques, 2023, 1-2).

Marshall, Mcgrath, McCarthy, and Harrigan (2016, 3-4) list four types of supply chain information that are commonly publicly disclosed: 1) information about the supplier members that make up the supply chain, including at least the names and location of first-tier suppliers and the location of second-tier suppliers; 2) information on origin, comprising information on the materials used in the product, the source location of the material or ingredients and details of how the material or ingredients were sourced and produced; 3) environmental information, such as water use, land use, levels of emissions and energy consumption generated, air pollution and waste from own activities and downstream suppliers; 4) social information, such as working hours, wages and benefits, working conditions, and health and safety reports, human rights, including child labour, forced labour, freedom of association, and

non-discrimination, social impact, including anti-corruption policy, impact on local communities, local cooperation and development programs, and non-compliance with rules and regulations.

Opportunities and Challenges in Supply Chain Sustainability Reporting

Early commitment to transparency and supply chain accountability can provide opportunities to prepare for mandatory sustainability information disclosures (Sodhi & Tang, 2019, 2950-2951). Companies that lead in sustainability practices can differentiate themselves in the market, gaining an edge over competitors who may not prioritize these issues. Measuring and reporting sustainability can drive innovation, leading to new products and services that meet evolving customer demands for sustainable solutions. Analyzing sustainability data can reveal opportunities for reducing waste, improving resource efficiency, and cutting costs, leading to more sustainable operations. By disclosing information on their supply chains, companies can also use the gathered information to shape their strategies, manage risks, and achieve more robust and sustainable corporate performance in the long term (EY, 2021, 19). By integrating sustainability into their core strategies, companies can ensure long-term resilience and adaptability in a changing market landscape. Additionally, they maintain and enhance reputation and gain customers' and investors' trust, as well as employee satisfaction and retention.

On the other hand, by hiding supply chain information, companies traditionally protect their competitive advantage in product development, production costs, product quality, and speed of delivery. Reporting on the sustainability of supply chains presents several additional challenges for companies, including difficulty in gathering accurate and comprehensive data from multiple suppliers and other stakeholders in the supply chain, the complexity of supply chains, lack of standardization on sustainability reporting, resistance of suppliers to cooperate, companies resource constraints, changing regulations on sustainability reporting, the challenge to provide clear and consistent reporting due to subjectivity and interpretation of sustainability metrics, difficulty in balancing the varying expectations of different stakeholders regarding sustainability reporting, risk of greenwashing that undermines credibility, costly and time-consuming work and requisite demonstration of continuous improvement and future commitments, which requires ongoing effort and

resources (Sodhi & Tang, 2019, 2946; Jain & Tripathi, 2022). Therefore, some companies wait until sustainability reporting is mandatory for them.

While significant opportunities exist in reporting on supply chain sustainability, the reporting challenges require strategic planning and investment to overcome them.

Hypotheses Development

Companies can prepare their sustainability reports within the voluntary reporting framework based on various international frameworks, standards, or guidelines, such as GRI standards, the Sustainability Accounting Standards Board (SASB), the OECD Guidelines for Multinational Enterprises, the United Nations Global Compact, and ISO 26000 standards. The use of the aforementioned voluntary standards and frameworks for sustainability reporting was also proposed by the European Commission's Non-Financial Reporting Directive (NFDR), as the predecessor of the CSRD (Hahnkamper-Vandenbulcke, 2021, 3). Adhering to these international guidelines enables companies to be better prepared for the demands of mandatory sustainability reporting. On this basis, we developed the hypothesis 1:

H1: Selected Slovenian multinational companies report on their supply chain sustainability voluntarily and follow the selected standards/frameworks proposed by the Non-Financial Reporting Directive.

In CSRD and CSDDD, the focus is on considering companies' value chains and reporting on their broader impact. The CSDDD creates an obligation for companies to conduct due diligence regarding actual and potential negative impacts on human rights and the natural environment concerning their operations, the operations of their subsidiaries, and activities within the value chain in the context of established business relationships. The CSDDD encompasses the inclusion of due diligence in policies and management systems. With due diligence, companies identify, assess, prevent, mitigate, or eliminate actual and potential negative impacts on human rights and the natural environment throughout their value chains and report on these aspects (European Commission, 2022, 23-32). However, due to the size and complexity of international supply chains, many companies still lack insight into the details of their international supply chains, as required by the new mandatory directives on sustainability reporting. On this basis, we developed the hypothesis 2:

H2: As part of their voluntary sustainability reporting, selected Slovenian multinational companies don't conduct due diligence on all aspects of their supply chains.

A review of the supply chain helps company to improve its information, knowledge, and understanding of its supply chain. Companies better manage the social and environmental risks arising from supply chains by understanding and reporting information about sustainability (Aplanet, 2023). With transparency, a company gains and maintains the trust of its stakeholders and protects its reputation (Sodhi & Tang, 2019, 2950). Revealing information about the sustainability of supply chains enables companies to comply with voluntary and mandatory reporting requirements. However, conducting due diligence on the supply chain can be challenging for companies due to the complexity of supply chains, market pressures, and lack of clarity regarding due diligence obligations (European Commission, 2022, 2). Collecting and disclosing information about supply chains can be expensive and time-consuming. Companies are also exposed to potential risks of disclosing supply chains' information, which they prefer to keep confidential, and negative responses from stakeholders (Sodhi & Tang, 2019, 2946, 2952). The challenge also represents a misunderstanding of the requirements for voluntary and mandatory reporting on the supply chains' sustainability. Companies recognize the significance of conducting due diligence and disclosing information about the supply chains' sustainability. However, reporting on sustainable business practices brings companies opportunities and challenges. On this basis, we developed the hypothesis 3:

H3: Selected Slovenian multinational companies perceive more challenges than opportunities in reporting on the sustainability of their supply chains.

Methodology and Data

In the empirical analysis, we used a qualitative method of case study analysis. The non-randomized sample of three Slovenian multinational manufacturing companies from different B2B industries was drawn from the online database of Slovenian exporters SLOEXPORT, according to the following criteria: manufacturing industry, more than 500 employees, an export share in revenues of at least 51%, the headquarters in one of two selected Slovenian regions - the Podravska or Savinjska -, evident commitment to sustainable business practices and consent to participate in the research. Since they are large manufacturing companies, from the number of

employees and the extent of resources points of view, with a high proportion of their revenues from international business activities and extensive and complex supply chains, they could share similar experiences and perceptions about supply chain sustainability reporting, indicating broader applicability of our empirical results.

Due to the companies' request for anonymity, in the research, they are denoted with the letters A, B, and C. Company A operates in construction, mechanical engineering, transportation, pharmaceuticals, food industry, cosmetics, automotive industry, motorcycle manufacturing, and electrical engineering. It has subsidiaries in Serbia, Bosnia and Herzegovina, and Croatia. Company B supplies the automotive, packaging, plastics, chemical, interior design, coatings and paints, household appliances, textiles, agriculture, construction, and pharmaceutical industries. It has a subsidiary in Bosnia and Herzegovina and a representative office in Serbia. Company C supplies automotive, pharmaceutical, food, transportation, electrical, consumer goods, construction, and aerospace industries. It comprises several manufacturing and service companies in Serbia, Croatia, Hungary, Brazil, and the USA.

In the first part of the empirical research, we analyzed the companies' reporting on the sustainability of their supply chains by reviewing their sustainability e-reports for the year 2022. We reviewed the sustainability reports, which are separate or part of companies' annual reports. In the second part of the empirical research, which started in May 2024, we conducted the e-survey of non-anonymous representatives of selected companies by structured semi-open-ended e-questionnaire prepared in the 1KA application. Before the e-survey, we contacted the three companies and asked for the appropriate contact person according to the survey content. After receiving the completed e-questionnaires at the end of May 2024, we contacted the companies' representatives who answered the survey and asked them for additional explanations about their answers to open-ended questions in the e-survey. The questionnaire comprised sections on the company's supply chain, sustainability reporting, due diligence in supply chain review, and the opportunities and challenges of sustainability reporting in the company's supply chain (See Table 1 in the Appendix).

Results and Discussion

Analysis of Sustainability Reports

In analyzing the selected companies' reporting on their supply chains' sustainability we considered

environmental, social, and governance (ESG) aspects. We also analyzed the due diligence of the company's supply chains.

Two selected companies provided their sustainability report as part of the annual report, while one company prepared a stand-alone report. All companies prepared 2022 sustainability reports based on GRI standards for the first time. They also considered other international frameworks and standards from various fields. All companies stated standards such as ISO 9001 (quality management system), ISO 14001 (environmental management system), and ISO 45001 (safety and health at work). Some of them also used some standards from their industry. Company A cites standard ISO 22095 (chain of custody) for specific products. Company B has completed registration in the environmental management and assessment system EMAS for its unit at a separate location. Company C commits to compliance with the SA8000 standard (social accountability management system). The activities related to the UN Sustainable Development Goals are mentioned in the reports of companies A and B. Company C stated compliance with the ISO 26000 standard. In their sustainability reports, the selected companies stated goals related to sustainable development. Companies B and C elaborated and described the sustainability goals in detail. All companies described their risk management. Companies B and C mentioned risks associated with their supply chains in the context of additional statements regarding identified risks. Company B also revealed the risks of child labor in its supply chain and indicated the need for further verification.

All companies cited efforts towards a circular economy. In this context, for example, they included recycling, reusing materials, using secondary and recycled materials, and a closed-loop system. Companies described the supply of materials. Company A described responsible input sourcing and critical raw materials from conflict zones. Company B described the supply of several vital materials, specifically from which regions they are sourced, how often, and in what manner. Company C reported on conflict materials in its supply chain. Companies support responsible and sustainable behavior among their employees and business partners with varied documents. They have formulated documents such as the Sustainability Policy, Code of Ethical Conduct, Corporate Integrity Regulations, and Quality Policy. They described the expectations towards their suppliers and other business partners. The management of supply chain sustainability and the careful monitoring of supply chains are significantly influenced by establishing a supplier

code of conduct. Company B stated that the suppliers' code of sustainable conduct is being prepared. Company A outlined the conditions that influence the formation of the supplier network. Company B stated the procedure for evaluating suppliers and highlighted the results from the evaluation. Company C provided information on suppliers' annual evaluations based on set criteria groups.

All companies emphasized respect for human rights, which they also demand from their suppliers. In this regard, the two companies mentioned their consideration of international documents such as the UN Guiding Principles on Business and Human Rights, the Universal Declaration of Human Rights, and the ILO Declaration on Fundamental Principles and Rights at Work.

Selected companies are members of several national and international associations and organizations promoting sustainable and responsible supply chain management. All selected companies also mentioned the established procedures for accepting and addressing complaints and reports of inappropriate practices. This is also an essential part of the careful review (due diligence) of the supply chain and enhances and strengthens the understanding and transparency of the supply chain. All three selected companies also stated that their compliance with the European Union's REACH regulation on protecting human health and the environment against the harmful effects of chemical substances contributes to the due diligence of their supply chains.

Analysis of the Survey Results

Table 1 in the Appendix summarizes selected companies' responses in the survey and follow-up interviews.

Sustainability Reporting Awareness and Commitment

We asked companies about their current and previous commitment to sustainability reporting and their awareness of CSRD, ESRS, and CSDDD. All companies were committed to the NFDR, the predecessor of the CSRD. Companies have already had to prepare reports on sustainable business practices. They shaped these reports according to their judgment of appropriateness, as using standards or frameworks for sustainability reporting weren't mandatory for them. All three companies were preparing their first report under the CSRD, which was required in 2024, with the first report to be published in 2025. Two companies were well-informed about the CSRD, ESRS, and CSDDD, while one was poorly informed. We asked companies about the factors influencing

sustainability reporting in their supply chains. Similar and different factors in companies influenced their reporting on the sustainability of the supply chains. All companies cited the factor of "compliance with regulatory requirements." The factors "customer demands," "initiatives and guidelines in your industry," "concern for reputation," and "requirements of the company's owners or shareholders" have been mentioned twice. The factors "use of voluntary standards and guidelines" and "improving the understanding of the impacts of the company's supply chain on the environment and society" were mentioned once. The factors "creating competitive advantages," "past negative events in the industry," and "corporate governance procedures" were not selected as influential factors for supply chains' sustainability reporting.

Respondents also assessed the companies' preparedness for supply chains' sustainability reporting according to the requirements of the CSRD. Two companies reported good readiness, while one reported poor readiness. The company that reported poor preparedness claimed that the relevant EU directive must be read and studied in detail.

Opportunities and Challenges in Supply Chain Sustainability Reporting

We asked companies about the challenges and opportunities they perceive when disclosing information about the sustainability of supply chains. The overview of selected perceived opportunities and challenges shows similarities and differences among companies. B and C companies perceived six opportunities to disclose information, while company A stated three opportunities. Company B perceived six challenges, while companies A and C perceived four.

All companies face challenges such as "the prolonged duration of information gathering" and "suppliers' reluctance to provide information about their operations." Twice, the identified challenges included the selected responses "additional costs of collecting and interpreting information," "questionability of ensuring the quality of collected information," and "risk of disclosing confidential information about the supply chain." The challenges of "lack of knowledge about the supply chain" and "acquiring and selecting information for reporting" were selected twice. The challenges for the companies also represent "negative stakeholder feedback" and "lack of understanding of reporting requirements."

Concerning opportunities for supply chain's sustainability reporting, all selected companies chose the response "improving supply chain knowledge." The responses "building credibility and gaining trust among stakeholders (customers, local community, owners)," "readiness for future regulatory requirements regarding sustainability reporting," "acquiring new customers," and "using sustainability information to improve business operations" were selected twice, "compliance with industry expectations," "incentive to improve the sustainability of supply chains," "enhancement of reputation," and "improvement of understanding the impact of supply chain sustainability on the company's business", "access to capital through sustainable financial instruments, incentives, subsidies, participation in tenders" and "readiness to manage social and environmental risks and impacts of the supply chain" were selected once.

We identified similarities in the perception of opportunities and challenges among selected surveyed companies. A common opportunity they perceive is to disclose information to enhance their knowledge and, thus, understanding of the supply chain. The common challenges they perceive involve the difficulty in obtaining information due to the reluctance of suppliers and the lengthy process of gathering information.

Due Diligence Conduct in Supply Chains

A thorough supply chain review is critical for understanding supply chains and gaining insight into their performance. We surveyed companies about the factors that influence the conduct of due diligence in their supply chains. All selected companies have chosen the factors of "knowledge and understanding of the supply chain," "identification and management of operational supply chain risks," and "identification and management of socio-environmental supply chain risks." The factors "consideration of regulatory requirements," "gathering information about suppliers," and "evaluating new supply chain opportunities" were selected twice. The factors "ensuring supply chain efficiency," "identifying, mitigating, and preventing actual and potential harmful impacts of the supply chain," and "pressures from stakeholders (customers, local community, owners)" were selected once.

In the case of the selected three companies, the most significant influence on the performance of due diligence in the supply chain is driven by the intention to understand better and comprehend the supply chain and the identification and management of risks that arise

within it. We asked companies to what extent they conduct due diligence on their supply chains and gain insights regarding sustainability risks and impacts on the natural environment and society. In response to this question, company A stated that it conducts due diligence on the parent company's supply chain and examines subsidiaries/affiliates. Company B responded that it conducts due diligence on its supply chain within the parent company and assesses direct suppliers. Company C responded that it conducts due diligence on its supply chain to the extent of reviewing direct suppliers. To sum up, two surveyed companies reported conducting due diligence within the parent company, and one company also in its subsidiaries. Two companies include direct suppliers in this process, while none include the second-tier suppliers.

We asked companies which due diligence steps out of six possible are carried out by the company on their supply chains. The suggested possible steps for due diligence were related to the steps outlined in the OECD Guidelines for Multinational Enterprises on Responsible Business Conduct (OECD, 2023), which are also the basis for the due diligence process within the framework of the discussed EU directive. Company A responded that it has established the following due diligence steps: identifying current or potential adverse impacts; preventing and mitigating potential negative impacts, eliminating current negative impacts and minimizing their extent as much as possible; monitoring the effectiveness of the policy and due diligence. Company B outlined the following steps: identifying current or potential adverse impacts, monitoring the effectiveness of the policy and due diligence, and publicly communicating about the due diligence. Company C responded that they have established a process for incorporating due diligence into their business policies. Thus, two companies have implemented three, one company one, and none of the selected companies has implemented all six mentioned due diligence steps.

Hypotheses Testing

By examining the 2022 sustainability reports of selected companies, we found that they included information about their supply chains' sustainability. We recognized the importance of various international standards covering different business areas and the adherence to international human rights documents. Since selected companies are also members of several national and international associations and organizations, they have formulated various codes of conduct to transfer sustainability requirements to their suppliers and other

business partners. We found that all three companies prepared their sustainability reports according to voluntary sustainability reporting international GRI standards. As part of their commitment to voluntary non-financial reporting, selected companies report on the sustainability of their supply chains according to GRI standards. Based on this, we confirmed our first hypothesis that selected Slovenian multinational companies report on their supply chain sustainability voluntarily and follow the selected standards/frameworks proposed by the Non-Financial Reporting Directive. The finding that all of the selected multinational companies already report voluntarily on the sustainability of their operations is encouraging, as all of them seem to be working to achieve economic impacts through their operations through their positive impacts on the natural environment and society without binding regulations. Voluntary reporting on supply chain sustainability offers several benefits for companies, including operational efficiency, competitive advantage, stakeholder engagement, attracting investment, innovation opportunities, enhanced reputation, regulatory preparedness, risk management, long-term viability and employee satisfaction. By adopting voluntary reporting on supply chain sustainability, companies can contribute positively to society and the natural environment and reap significant business advantages.

From the answers to the survey, we gained important insights into the existent and prospective future corporate sustainability reporting of selected companies. We found that surveyed companies were not highly prepared to report on supply chains under the CSRD, although all of them already reported on sustainability voluntarily. The responses indicate a need for a better understanding of the new requirements in the field of sustainability reporting. All three companies face challenges in disclosing information about supply chains, including the lengthy process of gathering information and suppliers' reluctance to share details about their operations. They also see the opportunity to improve their understanding of the supply chain. All three companies believe that conducting due diligence promotes knowledge improvement, supply chain's understanding, and identifying and managing risks that may arise within the supply chain. We asked companies about the extent of conducting due diligence on their supply chains and obtained insights regarding sustainability risks and impacts on the environment and society. We found that none of the three companies conducts due diligence on supply chains at all specified stages. The companies also don't conduct due diligence on indirect suppliers. Based on this, we confirmed our second hypothesis that selected Slovenian multinational companies don't conduct due diligence on all aspects of their supply chains as part of their voluntary sustainability reporting. This finding is unsurprising, as such reporting can disclose information representing companies' competitive advantages.

On the other hand, recent voluntary sustainability reporting has left companies with few mechanisms to obtain the necessary information from their suppliers and other stakeholders. Mandatory reporting on the sustainability of supply chains presents an opportunity in terms of the required closer scrutiny of supply chains. This can lead to identifying gaps to make them more efficient and benefit the corporation's value chain.

Analyzing responses to questions about perceived opportunities and challenges in reporting on the supply chains' sustainability, we found that companies recognize both opportunities and challenges. They perceive challenges and opportunities similarly with no evident significant difference. Based on this, we rejected our third hypothesis that selected Slovenian multinational companies perceive more challenges than opportunities in reporting on the sustainability of their supply chains. We hypothesized that companies would perceive more challenges than opportunities before mandatory reporting on the sustainability of their supply chains and before due diligence and reporting would become routine for them. On the other hand, the rejection of this hypothesis is reasonable given that all companies were preparing sustainability reports voluntarily before mandatory reporting and saw many opportunities in such reporting.

Our research shows that the selected companies share some similarities in their awareness and commitment to supply chain sustainability reporting, perceived opportunities and challenges, and the extensiveness of the supply chain due diligence process. However, there are also some differences among them in this regard. Our research confirms that chain sustainability reporting practices can be influenced by various factors that interact in complex ways (Bayne, Ng, & Wee, 2022, 3893-3894; Freire Lins, Erthal, & Marques, 2023, 1-2). Supplier reluctance to share information can be related to the fear of scrutiny or lack of understanding of sustainability benefits. Also, it could be more common in industries where supply chains are more fragmented, with numerous suppliers and stakeholders participating.

Furthermore, supply chain sustainability reporting practices can be related to industry trends concerning consumer demand and transparency and types of market competition. For instance, in B2C industries with high competitive pressures, growing consumer awareness and demand for sustainable products can push companies to enhance their sustainability reporting, and the reverse could be true for B2B industries. Additionally, local regulations, companies' technological advancement in data management technologies, and internal corporate culture in leadership commitment and employee engagement may impair or improve supply chain sustainability reporting perceptions. By recognizing the types of these influences, companies can better strategize their reporting practices and address specific challenges more effectively.

Conclusion

The new EU regulations in sustainability reporting significantly shape corporate sustainability reporting and impact the increased inclusion of information about the company's supply chain into sustainability reports. Tracking and successfully meeting the requirements of these regulations can pose challenges and opportunities to companies. How companies cope with these requirements depends, to a large extent, on how they are prepared for this reporting. It is essential, in particular, if they have already voluntarily reported on sustainability implementation, what kind of sustainability reporting system they have in place, and the extent to which they have already carried out due diligence and integrated sustainability information across their supply chains into sustainability reports.

This research shows that reporting on the supply chains' sustainability is becoming an essential part of sustainability reporting, herewith increasing corporate accountability across supply chains. We believe this can significantly impact the improvement of the sustainability performance of more companies and the transparency of international supply chains.

The overall results of our empirical analysis show that not all selected companies were well prepared for the demands of the new sustainability reporting regulations. However, voluntary reporting according to established international standards enabled companies to be more prepared than if they didn't engage in it. We assume that surveyed companies are compelled to improve their due diligence in supply chain management primarily to increase the understanding of their complex international supply chains. With this, providing the appropriate information for successful reporting to the new sustainability reporting requirements will be possible.

In our empirical research, we limited the sample of Slovenian companies by the following characteristics: size (number of employees, extent of capital), type of industry (manufacturing and B2B), region of their headquarters, multinational presence, and commitment to sustainability through voluntary reporting. In the future, similar research could be done based on a larger sample of companies from different countries and of different supply chain scopes, further enhancing insights into the topics addressed. Differences between companies in the B2B and B2C sectors in reporting on the sustainability of supply chains could be explored. Conducting research on this topic over successive periods seems essential to follow the progress. Future research on supply chain sustainability reporting can expand understanding and improve practices in several other areas. Longitudinal research could be performed to assess the impact of sustainability reporting on company performance, reputation, innovation performance, and stakeholder engagement over time. Exploring reporting practices in specific industries to develop tailored guidelines and benchmarks would also be interesting. Additional impactful research topics could explore different stakeholders' (e.g., customers, investors) perceptions about sustainability reporting and its impacts on their decisions.

Overcoming the challenges of mandatory supply chain sustainability reporting while seizing its opportunities demands from companies to implement proactive approaches and changes in their business processes and management. By proactively addressing the challenges of mandatory supply chain sustainability reporting and leveraging the associated opportunities, companies can ensure compliance and enhance their overall business strategy and resilience in the marketplace.

To gather accurate and comprehensive data from all supply chain partners, companies should implement robust data management systems and establish clear data-sharing protocols with suppliers. They should stay informed about regulations through continuous education and consider hiring compliance experts or consultants to overcome the complexity of sustainability regulations. To seize the supply chain sustainability reporting as the competitive advantage, companies should use this reporting as a marketing tool to attract environmentally conscious consumers and investors. They should actively communicate sustainability efforts

through marketing and public relations channels to improve brand image and customer trust. Concerning the opportunity for higher operational efficiency through supply chain sustainability reporting, companies should assess supply chain processes for inefficiencies and implement sustainable practices that lower costs. They should also encourage cross-functional teams to brainstorm and develop innovative solutions contributing to sustainability goals. Since investors increasingly favor companies with strong sustainability performance, sustainability achievements in investor communications should be highlighted to attract funding.

National business support institutions can play a crucial role in helping companies navigate the challenges of supply chain sustainability reporting. They can raise awareness about the importance of sustainability reporting, influence public perception, and encourage sustainable consumption. To implement sustainability initiatives and innovation, these institutions can offer financial assistance through grants and funding and connect businesses with investors interested in funding sustainable practices. By offering access to sustainability consultants and industry-specific compliance assistance, they can provide relevant training and education through workshops, seminars, guides, toolkits, and consultation services. Additionally, they can recommend software solutions for sustainability data collection, management, and reporting. Concerning learning from practice, these institutions can offer networking opportunities through collaborative initiatives and peer learning in forums where companies can share experiences, challenges, and solutions related to sustainability reporting. Their important role can also be shown in advocating for government policies and local regulations that support sustainable practices and reduce compliance burden. Business support institutions can empower companies to overcome supply chain sustainability reporting challenges. This collaboration benefits individual companies and contributes to broader sustainability goals across industries and countries.

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Appendix

Table 1
Survey respondents' answers

Question	Company A	Company B	Company C
Knowledge on CSRD	High	High	Low
Knowledge on ESRS	Very high	Very high	Low
Knowledge on CSDDD	High	High	Low
Commitment to prepare the first report following CSRD	Commitment in 2024, with the report published in 2025	Commitment in 2024, with the report published in 2025	Commitment in 2024, with the report published in 2025
Commitment to NFDR	Yes	Yes	Yes
Factors influencing the reporting on the sustainability of the supply chain	• Meeting regulatory requirements • Use of voluntary standards and guideline • Requests from the company's owners or shareholders	• Meeting regulatory requirements • Customer demand • Requirements of company's owners or stakeholders • Industry initiatives and guidelines • Striving for company's reputation	• Meeting regulatory requirements • Customer demand • Industry initiative and guidelines • Striving for company's reputation • Improving understanding of the environmental and social impacts of a company's supply chain.

Continuation of Table 1

Survey respondents' answers

Question	Company A	Company B	Company C
Readiness to report on the sustainability of supply chains under the CSRD	High	High	Low
Perceived challenges in disclosing information on the sustainability of supply chains	• Additional costs of collecting and interpreting information; • Time-consuming collection of information; • Questionability of quality assurance of the information collected; • Suppliers are reluctant to provide information on their operations.	• Lack of knowledge of the supply chain; • Additional costs of collecting and interpreting information; • Time-consuming information collection; • Questionability of quality assurance of the information collected; • Risk of disclosure of unwanted supply chain information; • Reticence of suppliers to provide information on their business.	• Collecting and selecting information for reporting; • The length of time it takes to collect information; • Risk of disclosure of unwanted supply chain information; • Reticence of suppliers to provide information on their operations.
Perceived opportunities in disclosing information on the sustainability of supply chains	• Improving knowledge of the supply chain; • Building credibility and trust with stakeholders (customers, local community, owners); • Readiness for future regulatory requirements on sustainability reporting.	• Improving knowledge of the supply chain; • Building credibility and trust with stakeholders (customers, local community, owners); • Compliance with the expectations of the company's industry, • Acquiring new customers; • Using sustainability information to improve business performance; • Incentive to improve the sustainability of supply chains.	• Improving knowledge of the supply chain; • Improving reputation; • Readiness for future regulatory requirements on sustainability reporting; • Attract new customers; • Improve understanding of the impact of supply chain sustainability on business operations; • Using sustainability information to improve business performance
Factors influencing the implementation of supply chain due diligence	• Knowledge and understanding of the supply chain; • Identify and manage supply chain operational risks; • Identify and manage socio-environmental supply chain risks; • Compliance with regulatory requirements.	• Knowledge and understanding of the supply chain; • Identify and manage supply chain operational risks; • Identify and manage socio-environmental supply chain risks; • Obtaining information on suppliers; • Compliance with regulatory requirements; • Assessing new supply chain opportunities	• Knowledge and understanding of the supply chain; • Ensuring supply chain efficiency; • Identifying and managing supply chain operational risks; • Identify and manage socio-environmental supply chain risks; • Obtaining information on suppliers; • Identify, mitigate, and prevent actual and potential adverse supply chain impacts;

Continuation of Table 1

Survey respondents' answers

Question	Company A	Company B	Company C
			• Stakeholder pressures (customers, local community, owners); • Assessing new supply chain opportunities.
Scope of supply chain due diligence	• Screening within the parent company; • Screening of branches/subsidiaries.	• Screening within the parent company; • Screening of direct suppliers.	• Checking direct suppliers
Due diligence steps in place	• Identifying actual or potential adverse impacts; • Prevention and mitigation of potential adverse impacts; and Elimination of actual negative impacts and minimization of their extent; • Monitoring the effectiveness of the policy and due diligence.	• Identifying actual or potential adverse impacts; • Monitoring the effectiveness of the policy and due diligence; • Public communication on due diligence.	• Integrating due diligence into business policies

Source: Authors' compilation.

Priložnosti in izzivi poročanja o trajnosti dobavne verige: primer slovenskih večnacionalnih proizvodnih podjetij

Izvleček

Ta članek obravnava poročanje o trajnosti dobavne verige z vidika priložnosti in izzivov za multinacionalna podjetja ob upoštevanju spremenjenih predpisov Evropske unije (EU) ter obsega in zapletenosti mednarodnih dobavnih verig. V teoretičnem delu obravnavamo poročanje o trajnosti podjetij, pri čemer se osredotočamo na regulativni okvir EU, trajnost v upravljanju mednarodne dobavne verige in poročanje o trajnosti dobavne verige. Empirična analiza temelji na sekundarnih in primarnih podatkih, zbranih na nenaključnem vzorcu slovenskih proizvodnih večnacionalnih podjetij iz B2B industrije. Analiza kaže, da so obravnavana podjetja v svoja trajnostna poročila vključila informacije o trajnosti dobavne verige, vendar pa niso bila dobro pripravljena na zahteve novih direktiv EU o trajnostnem poročanju. Ugotovili smo, da obravnavana podjetja priložnosti in izzive na področju poročanja o trajnosti dobavne verige zaznavajo podobno. Ugotovitve naše raziskave prinašajo več implikacij za trajnostno upravljanje podjetij in nacionalno institucionalno podporo podjetjem.

Ključne besede: korporativna trajnost, večnacionalno proizvodno podjetje, mednarodna dobavna veriga, poročanje o trajnosti dobavne verige, Slovenija.

Assessing the Impact of Accounting Perceptions on Accounting Major Choice Based on Students' Personal Characteristics

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Abstract

In the paper, the impact of selected popular perceptions about accounting and the accounting major on the accounting major choice was assessed for the sample of undergraduate business school freshmen. Rather than observing differences between accounting majors' and non-accounting majors' perceptions themselves, a novel approach was used, focused on the observation of differences between accounting majors' and non-accounting majors' personal characteristics, deemed as relevant for their fit with selected popular accounting perceptions. Regression coefficients obtained from regressing these personal characteristics on the accounting major choice variable were used as evidence for the impact of observed accounting perceptions on accounting major choice. Results suggest an important impact of some of the popular accounting perceptions on students' decision whether to major in accounting or not.

Introduction

For some time now the accounting profession has been faced with a serious shortage of manpower, both in quantity and quality. One of the frequently discussed reasons for this is also lack of interest among students because of widespread unattractive perceptions of accounting and accountants (e.g. Albrecht & Sack, 2000; Hunt et al., 2004), perhaps nowhere more evident than in popular stereotypes such as beancounter, pencil-pusher, and number-cruncher. Although several studies can be found, confirming the pervasiveness of such perceptions both, in the general public and among business students (e.g. Caglio et al., 2019; Friedman & Lyne, 2001; Byrne & Willis, 2005), little empirical evidence exists about their actual impact on business students' decision to major in accounting or not. Few perceptual studies are identifying/testing differences in accounting perceptions between accounting and non-accounting business students, few studies

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regressing these perceptions on business students' decision whether or not to major in accounting, and that is about it. Results generally confirm some statistically significant differences in accounting perceptions between accounting and non-accounting students, as well as statistically significant correlations between these perceptions and students' decision to choose accounting as their college major, but it is our belief, that so obtained evidence is not a good indicator of the impact of popular accounting perceptions on students' decision whether or not to major in accounting.

First, students' perceptions about accounting in these studies are mostly measured independently of the same students' perceptions about their other college major choice alternatives. Because the choice is always among a finite set of alternatives, it is not perceptions about college majors on their own that guide students' choice, but perceptions about an observed college major relative (in comparison) to other available options. For example, perception about accounting involving a lot of math will not act as a deterrent against choosing accounting as a college major, if the student holds about the same perception also for all other alternatives he or she is choosing among.

Second, in cases when the average of observed perception among accounting and non-accounting majors is about the same, no statistically significant relationship between observed perception and accounting major choice may falsely be interpreted as no impact of observed perception on accounting major choice, where in fact there might be a strong impact. This is because such an approach does not take into account, that the same perception may have significantly different, even opposite effects on different individuals, depending on their personal characteristics (personality traits, competencies, workplace preferences, values, likes/dislikes, etc.). For example, the same perception about accounting as involving a lot of math can reasonably be expected to have an attraction effect on individuals with good math competencies and affinity to working with numbers, but at the same time a deterrence effect on individuals with weak math competencies and strong math apprehension. In both cases, the perception of accounting involving a lot of math has a strong impact on the decision-making process of observed individuals, but in the case of approximately the same average strength of the perception in both groups, directly regressing it on accounting major choice will show no statistically significant relationship. This is because the effect is not reflected by the relationship of accounting major choice with observed perception but by the

relationship of accounting major choice with the level of an individual's math competency. Consequently, the strength of the relationship between accounting major choice and personal characteristics describing individuals expected to be attracted or deterred by observed accounting perception is a better indicator of the impact of such a perception on accounting major choice than the strength of the relationship between accounting major choice and observed perception itself.

Those are the key reasons why the direct regression of accounting perceptions on students' decision to major in accounting or not is a flawed approach to measuring the impact of popular accounting perceptions on accounting major choice. Therefore, an alternative approach is proposed in this paper. One, based on identifying personal characteristics (personality traits, values, skills, competencies, likes/dislikes, work environment preferences, etc.) deemed as relevant for an individual's fit with selected popular accounting perceptions, and regressing them on the students' decision to major in accounting or not. Following the person-job-fit theory (e.g. Edwards, 1991; Kristof-Brown, 2005) it is reasonable to expect, that popular perceptions about accounting will act as an attractor to those, whose personal characteristics match/fit them closely, and as a repellant (deterrence) to those, whose do not. If this is true, then regression coefficients obtained from regressing these personal characteristics on students' decision whether or not to major in accounting might be used as a good indicator and evidence for the impact of observed perceptions on such a decision, without previously discussed insufficiencies of observing students' perceptions directly.

The main contribution of this paper to the existing research on accounting perceptions and accounting major choice is that it introduces a novel approach to the estimation of the impact of accounting perceptions on the student's decision whether to major in accounting or not. The remainder of the paper is structured as follows. First, the literature review is presented identifying the most pervasive general public's and business students' perceptions of accounting and accountants. Then, information about the participants of the study is presented, followed by the methodology section, results, discussion, and conclusion.

Literature Review on Perceptions of Accounting and Accountants

Empirical studies show that perceptions people hold about accounting and accountants cluster into a

relatively small number of distinct stereotypical representations (depictions/schemas/portrayals) that can also be found in popular and professional literature, movies, various media, etc. For example Carnegie & Napier (2010) found that from the scholarly literature on the popular perceptions of accountants and accounting, two major and broadly distinctive accounting stereotypes can be identified, first being labeled as »traditional accountant stereotype« (also reffered to as »beancounter accountant stereotype«), portraying accountants as trustworthy, narrow-minded, methodical, conservative, dull, boring, joyless, nerdy, pedantic, uncommercial and unimaginative number-crunchers and pencil-pushers (e.g. da Costa et al., 2020; Parker & Warren, 2017; Carnegie & Napier, 2010; Jeacle, 2008; Hunt et al., 2004; Friedman & Lyne, 2001; Parker, 2000; Bougen, 1994), and the second being labeled »business professional stereotype« (also referred to as »colourful accountant stereotype«), portraying accountants as professionals with characteristics of the executives, managers and entrepreneurs - a proactive, cool and much more creative than traditional accountants, but also of a dubious moral character, frequently associated with earnings manipulation, off-balance-sheet financing manoeuvres and corruption (e.g. Carnegie & Napier, 2010; Jeacle, 2008; Bougen, 1994).

Richardson et al. (2015) further analyzed the most salient stereotypes about accounting and accountants to develop a more refined framework of external perceptions, that distinguishes one stereotypical image from another. Their framework is constructed on two broad criteria that comprise accountants' personal characteristics and characteristics of accounting as a line of work. This way, authors identified four distinct stereotypical images of accountants – two positive (scorekeeper and guardian) and two negative (beancounter and entrepreneur) subcategories of the broader bookkeeper (i.e. traditional accountant) and business professional (i.e. contemporary accountant) stereotypes.[1]

According to Richardson et al. (2015), the key difference between scorekeeper and beancounter subtypes is in personal characteristics, attributed to them. While scorekeeper is characterized as vigilant, methodical, exact, conservative, honest, trusted, etc. (from the accounting profession and users' point of view desirable personal characteristics), beancounter is characterized as dull, boring, shallow, unimaginative, weak,

conformist, passive, lifeless, asocial, inept, awkward and obsessive (from accounting profession and users point of view undesirable personal characteristics).

Personal characteristics are also the key difference between the guardian and entrepreneur subtypes. While guardian is characterized by positive personality traits such as ethical, professional, versatile, capable, communicative, technically competent, with strong managerial skills, trusted, good leader, vigilant, exact, honest, sincere, caring, brave, etc., entrepreneur is characterized as sinister and manipulative, untrustworthy and possibly corruptible (Richardson et al., 2015).

Perceptual research generally confirms the widespread presence of traditional accountant stereotypes among students and the general public (e.g. Caglio et al., 2019). This is important because individuals may select careers according to the stereotypes they hold of persons in those careers (DeCoster, 1971). Students consider whether they would want to work with such people and how being accountants themselves would affect their self-image (Hunt et al., 2004). Nonetheless, other mental representations/schemas closer to Carnegie's and Napier's (2010) business professional type of accountant can also be found. In their study of perceptions about accountants among students and practicing accountants Caglio et al. (2019) for example found, that the most common image among participants was the one of an accountant as a modern professional (35.7 percent of all respondents), similar to business professional stereotype in Carnegie and Napier (2010), but without negative traits such as manipulativeness and lack of trustworthiness.[2]

The second most common image of accountants in the Caglio et al. (2019) study was the image of »*the plain vanilla professional*« (34.1 percent of all respondents). Authors described this plain vanilla professional as one that includes nuances that are neither particularly favorable nor unfavorable – »... *not boring, but not glamorous, moderately successful, with the capacity to bend the rules a little.*« (Caglio et al., 2019, p. 861).

The beancounter image was the least frequently reported (30.2 percent of all respondents), but further analysis showed that the frequency of identified mental representations/schemas differed among different groups of participants. The beancounter was much more

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[1] Scorekeeper and beancounter are subtypes of the bookkeeper stereotype, while guardian and entrepreneur are subtypes of the business professional stereotype.

[2] The modern accountant schema identified in their study had the highest score for honesty, the same as the guardian schema in Richardson et al. (2015).

common among students (37.4 percent of student respondents) than among practitioners (13.7 percent of practicing accountant respondents). Also, the beancounter stereotype was much stronger among students in accounting-unrelated disciplines, such as architecture, engineering, and the arts (43.3 percent), than among students of business and economics (32.6 percent). Such results led authors to conclude, that »*The traditional and extreme 'beancounter' stereotype is more deeply rooted in those who have distant relationships with accountants, while those who have closer, personal interactions with 'real' accountants recognize a plurality of nuances.*« (Caglio et al. 2019, p. 850).

Since beancounter, number-cruncher, and pencil-pusher are so-called work-related labels/stereotypes of accountants, it is not surprising that they have also been found to dominate the perceptions about accountants' work as well. There are several studies, reporting accounting line of work being frequently perceived as strongly numerically and rules-oriented, administrative/clerical by nature, repetitive with lots of routine, not particularly exciting and creative, solitary, etc., confirming bean-counting, number-crunching, and pencil-pushing stereotypes are strongly represented in perceptions of students and other important groups (for example teachers and career advisers), as well as the general public (e.g. Wells, 2015; Baxter & Kavanagh, 2012; Byrne & Willis, 2005; Saemann & Crooker, 1999). Many attribute this to an extremely narrow, reductionist view of accounting as a line of work, reduced only to book/record-keeping, preparation of financial reports, and auditing (e.g. Bougen, 1994), while other, more exciting aspects/dimensions of accounting as a profession are overlooked. Perhaps nowhere is that more evident than in Holland's (1966) categorization of accounting in the conventional occupations category, which Holland (1966) defined as "clerical work" with clerical skills as the core competency. In his self-directed search instrument (1979 version) all accounting jobs were categorized as primarily conventional - a classification that includes bookkeepers, budget reviewers, court stenographers, bank tellers, inventory controllers, financial analysts, cost estimators, payroll clerks, bank examiners, and tax experts (Chen et al., 2012), basically conflating accounting with bookkeeping.[3]

Based on the literature review, the perceptions about accounting as a line of work and as a college major in Table 1 were identified as the most pervasive in the general public as well as among business students.

Table 1

Popular perceptions about accounting as a line of work and a college major

	Perceptions	Evidence for the perceptions
1.	Mathematical-like, lots of working with numbers, calculations, methods, rules, and procedures.	- Perceptual studies (e.g. Meixner et al., 2009). - Number-cruncher stereotype.
2.	Clerical, secretarial-like (desk) job.	- Holland's model of occupational choice (e.g. Holland, 1966). - Pencil-pusher stereotype.
3.	Routine, monotonous, repetitive work.	- Perceptual studies (e.g. Baxter & Kavanagh, 2012). - Holland's model of occupational choice (e.g. Holland, 1966). - Beancounter and pencil-pusher stereotypes.
4.	Solitary work (environment), little interaction with others.	- Perceptual studies (e.g. Saemann & Crooker, 1999).
5.	Uncommercial, not likely to result in wealthiness.	- Beancounter stereotype.
6.	Challenging to learn, above average demanding (difficult) business college major.	- Perceptual studies (e.g. McGuigan & Weil, 2011; Enget et al., 2020).

Source: Authors' compilation

Participants

Data for the study were obtained via paper survey from undergraduate students of the Bachelor's professional study program »Business Administration« at the Faculty of Economics and Business at the University of Maribor (FEB). Participants were students, attending the introductory accounting course. The introductory

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[3] Reardon (2001; as cited in Chen et al., 2012), summarised the description of the »conventional« (C) work category as follows: »*The Conventional (C) type generally likes to follow orderly routines and meet clear standards, avoiding work that does not have clear directions. The C type is described as conforming, conscientious, careful, efficient, inhibited, obedient, orderly, persistent, practical, thrifty, and unimaginative.*«

accounting course is a course that takes place in the spring semester (February to June) of the first year of the undergraduate program and is obligatory for all students at the Business Administration Bachelor's professional study program of the FEB. Of the 187 students participating in the survey, 133 were freshmen (which is around 47 % of all freshmen enrolled in that program at the time of the study), while the rest were either sophomores, who had not yet passed the introductory accounting course exam and were therefore attending lectures for the second time, or students repeating a first year of their study because they haven't met the conditions for advancement to the second year.

Only the responses of 133 freshmen were used for this study. Responses of sophomores and repeating students were excluded to exclude the impact of any systematic differences that might exist between those groups of students and freshmen.

Of the 133 freshmen, 29 have chosen accounting as their major, while the remaining 104 chose one of the remaining 7 majors of the program. 73 participants had already attended an accounting course in their high school, while for others, the introductory accounting course was the first time they met with accounting. 93 participants were women (of which 22 majoring in accounting), 39 were men (of which 7 majoring in accounting), and 1 identified as »other«. All participating students had the same lecturer.

The survey took place in May 2023, shortly before the official presentation of different college majors at the end of the month. At that time, the majority of the introductory accounting course lectures were already finished, while the first exam was scheduled for June.

Methodology

First, personal characteristics deemed as relevant for students' fit with selected accounting perceptions were identified. Each of them was then tested separately for its impact on accounting major choice. For this, binary logistic regression with the individual personal characteristics as independent and accounting major choice as dependent variable was performed for each of the identified personal characteristics separately. Obtained regression coefficients were then used as indicators for the impact of observed perceptions on students' decision whether to major in accounting or not. Finally, all personal characteristics with statistically significant individual impact were entered into the same model and tested for their combined effect on students' decision whether or not to major in accounting.

Identification of Relevant Personal Characteristics

Based on the perceptions from Table 1, personal characteristics in Table 2 were identified as relevant for the level of one's fit with accounting as a line of work and as a college major.

Table 2
Key personal characteristics of individuals, expected to be attracted/repelled by observed perceptions about accounting

	Perceptions	Relevant personal characteristics	Rationale
1.	• Mathematical-like, lots of working with numbers, calculations, methods, rules, and procedures. • Clerical, secretarial-like (desk) job. • Challenging to learn, above average demanding (difficult) business college major.	• Math competencies and affinity for working with numbers. • Affinity for desk jobs and office work environments. • Good, diligent student.	It is reasonable to expect that those with more of these personal characteristics will be attracted by observed perceptions of accounting while those with less of them or opposite personal characteristics will be repelled.
2.	• Routine, monotonous, repetitive work. • Uncommercial, not likely to result in wealthiness. • Solitary work (environment), little interaction with others.	• Seeking excitement. • Seeking opportunities for creativity and innovation. • Value orientation towards money and wealth. • Extraversion	It is reasonable to expect that those with more of these personal characteristics will be repelled by observed perceptions of accounting while those with less of them or opposite personal characteristics will be attracted.

Source: Authors' compilation

Measurement

Items from four instruments were utilized to measure personal characteristics (personality traits, competencies, job/work environment preferences, values, etc.), selected to be tested for their impact on students' choice of accounting as a college major.

The first instrument consisted of a list of items, developed by authors to measure the extent to which individuals identify themselves with selected personal characteristics. Each item described a different personal characteristic of an imaginary person and participants had to answer to what extent they found that person similar to themselves. The strength of the self-assessed similarity was used as an indicator of one's identification with and therefore possession of the observed characteristic.

The second instrument consisted of a list of items, developed by authors to measure students' job and work environment preferences. The instrument consisted of pairs of opposite job and work environment characteristics, and for each pair participants had to choose the preferred one.

The third and fourth instruments were the 60 items Hexaco Big Six Personality Inventory-Revised (Ashton & Lee, 2009) for the measurement of Big Six personality traits and Schwartz's 21 items ESS21 (PVQ21) instrument for the measurement of personal values (Schwartz, 2021). Table 3 contains detailed information about how each variable utilized in the study was measured.

Table 3
Variables and their measurement

Personal characteristic	Measurement
Accounting major choice. Variable label: AccountingMajorChoice	Binary variable with values 1 for accounting majors and 0 for non-accounting majors.
Math competencies and affinity to working with numbers. Variable label: Math CompetencyAffinity	First, the average of the self-reported final high-school math grade (Appendix item A2) and the self-reported midterm business math test grade (Appendix item A3) was calculated. Since the high-school grade range was from 2 to 5 and the midterm business math test grade range was from 0 to 15 points, both variables were standardized (normalized) before averaging. Math grade average was then combined with a self-assessed level of math competencies and affinity to working with numbers (Appendix item B3) and self-reported attitude towards math (Appendix item A4) into a single factor measuring one's level of math competencies and affinity to working with numbers. AVE = 74.266 Cronbach's alpha = 0.775. Composite reliability = 0.897.
Affinity for desk jobs and office work environments. Variable label: OfficeDeskJobAttitude	Self-assessed affinity for office work environments (Appendix item B11), self-reported preference for lots of vs. little office work (Appendix item C3), and reversed score for self-assessed aversion to desk work (Appendix item B6) were combined into a single factor measuring one's affinity for desk jobs and office work environments. AVE = 62.626. Cronbach's alpha = 0.657. Composite reliability = 0.830.
Extraversion Variable labels: 1. SocialSelfEsteem 2. SocialBoldness 3. Sociability	1. Social self-esteem. The sum of items 4, 28R*, and 52R from the 60-item version of Hexaco Big Six Personality Inventory. AVE = 63.346. Cronbach's alpha 0.704. Composite reliability = 0.838. 2. Social boldness. The sum of items 10R, 34, and 58 from the 60-item version of Hexaco Big Six Personality Inventory with the addition of the reversed score for self-assessed level of aversion to public speaking (Appendix item B7) to improve the reliability of the measure. AVE = 56.088. Cronbach's alpha 0.735. Composite reliability = 0.836. 3. Sociability vs. individualistic behavioral tendencies. The sociability facet of the original 60-item version of Hexaco Big Six Personality Inventory (sum of items 16 and 40) was combined with self-assessed communicativeness (Appendix item B2), preference for work environments with lots of vs. little teamwork and interactions with others (Appendix item C2), and the reversed score for self-assessed individualism (Appendix item B10), into a single factor, measuring one's level of sociability vs. individualistic

Continuation of Table 3

Variables and their measurement

Personal characteristic	Measurement
	behavioral tendencies. AVE = 61.012. Cronbach's alpha = 0.765. Composite reliability = 0.862.
Value orientation towards money and wealth. Variable label: MoneyWealthOrientation	Greed items of the 60-item version of Hexaco Big Six Personality Inventory (items 18R and 42) and value orientation towards money and wealth item of ESS21 Value Scale (item 2) were combined into a single factor measuring one's value orientation towards money and wealth. AVE = 73.287. Cronbach's alpha = 0.806. Composite reliability = 0.892.
Seeking thrill and excitement. Variable label: SeekingThrillExcitement	ESS21 Value Scale – Stimulation (sum of items 6 and 15). AVE = 76.989. Cronbach's alpha = 0.697. Composite reliability = 0.870.
Seeking opportunities for creativity and innovation. Variable label: SeekingCreativityOriginality	Self-assessed creativity and innovativeness (Appendix item B1), self-assessed preference for work environments with lots of vs. little need for creativity and original ideas (Appendix item C1), and orientation towards creativity and originality item of ESS21 Value Scale (item 1) were combined into a single factor measuring one's tendency for creativity and innovation. AVE = 66.985. Cronbach's alpha = 0.751. Composite reliability = 0.858.
Good/diligent student. Variable labels: 1. SelfAssessedDiligence 2. PassedExams	1. Average of self-assessed orderliness and meticulousness (Appendix item B4), diligence (Appendix item B9), and studiousness (Appendix item B8). AVE = 64.078. Cronbach's alpha = 0.705. Composite reliability = 0.842. 2. Reversed self-reported number of jet unfinished first semester exams (Appendix item A5).

Note: * The letter R next to the item's number denotes that the reversed score of the item was used.

Source: Authors' compilation

Results

In Table 4 results of binary logistic regression analyses of the impact of each observed personal characteristic on accounting major choice are reported. This way, personal characteristics with individually significant relationships (impact) on accounting major choice were identified for further analysis. Five observed personal characteristics were identified as having a statistically significant impact on accounting major choice as the dependent variable.

All predictor variables were standardized (normalized) before being entered into regression models.

The full working sample consisted of 133 participants' responses, but because of some missing answers, the number of observations is not the same for all observed predictor variables. For example, for the MathCompetenciesAffinity variable, there are only 117 observations, mainly because some students did not report their midterm business math test results.[4]

Table 4

Results of binary logistic regression analyses of the impact of selected individual personal characteristics on accounting major choice

	Predictor (independent) variable	N	B	S.E.	Wald	Sig.	Exp(B)	Nagelkerke R Square	Chi-square	-2Log likelihood
1	MathCompetencyAffinity	117	0.987	0.279	12.509	<0.001	2.683	0.189	15.569	110.839
2	SocialBoldness	133	0.006	0.211	0.001	0.979	1.006	0.000	0.001	139.496
3	SocialSelfEsteem	133	0.145	0.219	0.441	0.507	1.156	0.005	0.452	139.044
4	Sociability	133	-0.106	0.209	0.259	0.611	0.899	0.003	0.258	139.238
5	OfficeDeskJobAttitude	132	0.497	0.228	4.726	0.030	1.643	0.058	5.079	133.923
6	MoneyWealthOrientation	133	-0.805	0.237	11.533	<0.001	0.447	0.145	13.136	126.360
7	SelfAssessedDiligence	133	0.706	0.248	8.067	0.005	2.025	0.104	9.290	130.206
8	SeekingCreativityOriginality	132	-0.073	0.211	0.119	0.730	0.930	0.001	0.119	138.884
9	SeekingThrillExcitement	128	-0.036	0.216	0.029	0.866	0.964	0.000	0.029	134.454
10	PassedExams	133	1.274	0.366	12.086	<0.001	3.575	0.199	18.399	121.097

Source: Authors' estimation

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[4] Midterm business math test is not obligatory so not all students attend it.

In Tables 5, 6, and 7 results of the multiple binary logistic regression analysis of the impact of selected personal characteristics on accounting major choice are reported. Only personal characteristics, previously identified as individually statistically significantly related to accounting major choice, were included as predictors. Also, the variable of gender was added to control for its possible effects. No statistically significant relationship between participants' gender and accounting major choice was detected.

Table 5

Results of the multiple binary logistic regression analysis of the impact of selected personal characteristics on accounting major choice

	Predictor (independent) variable	N	B	S.E.	Wald	Sig.	Exp(B)
1	Gender	115	-0.193	0.682	0.080	0.777	0.824
2	MathCompetencyAffinity	115	0.389	0.333	1.366	0.243	1.476
3	OfficeDeskJobAttitude	115	0.432	0.305	2.010	0.156	1.540
4	MoneyWealthOrientation	115	-0.881	0.332	7.036	0.008	0.414
5	SelfAssessedDiligence	115	0.707	0.331	4.549	0.033	2.027
6	PassedExams	115	1.528	0.492	9.651	0.002	4.609

Source: Authors' estimation

Tabela 6

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
	Step	43.132	6	<0.001
Step 1	Block	43.132	6	<0.001
	Model	43.132	6	<0.001

Source: Authors' estimation

Tabela 7

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	82.216	0.313	0.471

Source: Authors' estimation

Table 8

Classification Table

			Predicted		
			Accounting major choice		
Observed			0	1	Percentage Correct
Step 1	Accounting Major Choice	0	82	6	93.2 (specificity)
		1	13	14	51.9 (sensitivity)
	Overall Percentage			70.0 (precision)	83.5 (accuracy)

Note: The cut value is 0.500.
Source: Authors' estimation

In Table 8, the classification table (confusion matrix) is presented reporting the number of correctly and incorrectly classified cases by the observed model. In addition to accuracy as the most commonly used overall performance measure for classification models, the F1 score was also calculated (Table 9). This is because, in imbalanced datasets such as ours, accuracy as an overall performance indicator is misleading, since it tends to favour the majority class at the expense of the minority class. F1 score does not have this problem, since it is calculated as the harmonic mean of the precision and recall (sensitivity) scores[5], and as such conveys a balance between the two. To evaluate the overall performance of the model, the F1 score for the model was compared to the F1 score of a dummy classifier, utilized as a baseline.

Table 9

F1 score

Dummy classifier	0.358[6]
Model	0.596
Difference	0.238

Source: Authors' estimation

Discussion and Conclusion

Results show that out of ten observed personal characteristics as independent variables, five have no statistically significant relationship with accounting major choice as dependent variable. Three of them (namely social self-esteem, social boldness, and sociability) are facets of the personality trait extraversion,

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[5] F1 score = 2 x (Precision x Recall) / (Precision + Recall).

[6] F1 score for a dummy classifier (i.e. baseline) = 2r / (r+1); where r = marginal probability $p(y = 1)$.

believed to differentiate between people seeking and people avoiding social interaction/contact. If this is true, then the finding of no statistically significant relationship with accounting major choice can be interpreted as an indicator (evidence), that perceptions of accounting as solitary work (environment) have no significant impact on observed students' decision whether or not to major in accounting. If they had, then following person-job-fit theory this should be reflected in the statistically significant relationship of extraversion with an accounting major choice since solitary work (environments) require less social interaction than collaborative work (environments) and, if an important factor in one's decision making, should attract more introverts than extraverts. Since no such relationship was found, following person-job fit theory, the most plausible explanation for such a finding is that the perception of accounting as a solitary work (environment) does not have an important bearing on observed students' decision whether or not to choose accounting for their college major.[7]

The remaining two personal characteristics with no statistically significant relationship to accounting major choice are value orientation towards thrill and excitement and value orientation towards creativity and originality, believed to differentiate between people valuing and seeking opportunities for the thrill, excitement, creative expression, and originality, and people valuing stability, predictability and avoiding surprises. If this is true, then the finding of no statistically significant relationship with accounting major choice can be interpreted as an indicator (evidence), that perceptions of accounting as involving lots of routine, monotonous, and repetitive tasks have no significant impact on observed students' decision whether or not to major in accounting. If they had, then following person-job-fit theory this should be reflected in the statistically significant relationship of students' value orientations towards thrill, excitement, creativity, and originality with accounting major choice, since jobs/work, involving lots

of routine, monotonous and repetitive tasks, does not offer a lot of opportunities for thrill, excitement, creativity and originality and, if important factor in one's decision making, this should act as a deterrence to those with more of these values compared to those with less of them. Since no such relationship was found, following person-job fit theory, the most plausible explanation for such a finding is that perception of accounting as involving lots of routine, monotonous, and repetitive tasks does not have an important bearing on observed students' decisions whether or not to choose accounting for their college major.

The remaining five observed personal characteristics all had statistically significant relationships with accounting major choice, but of various strengths and also different directions. The strongest positive relationship with accounting major choice was found for the number of successfully passed first-semester exams, which was used as a proxy indicator of one's diligence and capacity as a student. Such a result indicates that an accounting major attracts students, who are above average diligent, and study capable, and repels students, who are struggling or slacking. Following the person-job-fit theory, the most plausible explanation for such a result is an impact of the perception, that accounting is an above-average difficult, and demanding business major and as such requires above-average capacity and readiness to study, which deters students with less of such capacity and readiness from choosing it as their college major.

The same can be concluded for the relationship of accounting major choice with students' self-assessed diligence and affinity to study. Here too relationship is positive, indicating again that accounting attracts students who are above-average diligent and ready to study hard, and repels students who are struggling or slacking. This additionally supports the conclusion, that the perception of accounting as an above-average difficult business major is one of the most important

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[7] It is also possible, that extraversion as measured in this study is not the best nor only individual difference variable differentiating between individuals repelled from/attracted to solitary work (environments). If this is true, then the inclusion of alternative variables or different measures might yield different results and conclusions. Also, it is possible, that the impact of the perception of accounting as a solitary work (environment) on accounting major choice is suppressed by the effects of some other, more important factors. For example, those who lack math or some other competencies but perceive them as required to be successful in accounting are not likely to choose accounting for their college major even if they are attracted by the perception of accounting as a solitary

work (environment). Similarly, those strongly attracted by the perception of accounting as involving lots of math and working with numbers could choose accounting as their college major even if they are repelled by the perception of it as predominantly solitary work (environment).

The same might apply also for the other two individual difference variables in the study for which no statistically significant relationships with the accounting major choice were found (namely value orientation towards thrill and excitement and value orientation towards creativity and originality).

personal factors in a student's decision-making process whether to choose accounting as his/her college major or not.

Math competency and affinity to working with numbers are personal characteristics with the second strongest relationship to accounting major choice in our study. Here too, students with more math competency and affinity to working with numbers were more likely to choose accounting for their college major than students with less of such capacity and affinity. This is not surprising since good math competencies are often associated with one's overall capacity and diligence as a student. The existence of some overlap between the impact of these two variables on accounting major choice is evident also from the results of multiple regression analysis reported in Table 5 where math competency and affinity for working with numbers on accounting major choice lost the statistical significance it had when it was observed individually.

Again, following person-job-fit theory, the most plausible explanation for accounting majors possessing above-average math competencies and affinity for working with numbers compared to non-accounting business majors is an impact of the perception that accounting involves a lot of calculations and working with numbers and consequently requires above average math/numbers competencies/affinity, which in turn deters students with less of such capacity and affinity from choosing it as a college major.

Another personal characteristic observed as a factor of accounting major choice was students' attitude toward desk work and office work environments. As expected results show a positive relationship between a student's positive attitude towards desk work and office work environment and his/her decision to major in accounting, which once again can most plausibly be explained by the impact of the perception that accounting involves a lot of desk and office work generally.

The last personal characteristic observed as a factor of accounting major choice was the student's value orientation toward money and wealth. Here results show a negative relationship, indicating that those with a stronger value orientation towards money and wealth are less likely to choose accounting for their college major than those with less of such value orientation. Following person-job fit theory, the most plausible explanation for such a result is an impact of the perception of an accounting career offering (compared to other business majors) below-average opportunities for high earnings

and wealth, which acts as a deterrent for those with strong value orientation towards money and wealth.

In summary, based on observed relationships of selected personal characteristics with the accounting major choice variable, and following the person-job fit theory proposition that individuals choose their jobs/careers based on perceived fit with their interests, skills, competencies, likes and dislikes, etc., it can be concluded, that perceptions of accounting as involving lots of routine, monotonous and repetitive work/tasks, and perceptions of accounting as solitary work (environment), did not have an important role in the decision-making process of observed students when considering whether or not to choose accounting as their college major.

On the other hand, based on the same approach and reasoning, perceptions of accounting as: (1) involving lots of math, calculations, and working with numbers, (2) involving lots of desk and office work, (3) being uncommercial, not likely to result in financial success, and (4) being difficult college major, are all found to have an important impact on observed students' decision whether to choose accounting as their college major or not, confirming that traditional perceptions about accounting and accountants do indeed have a substantial impact on accounting major choice. According to Nagelkerke R Square statistics, (1) personal characteristics of math competency and affinity for working with numbers, (2) attitude towards desk work and office work in general, (3) self-assessed diligence, (4) the number of successfully passed first semester exams and (5) value orientation towards money and wealth, collectively account for 47,1 % of the change in the accounting major choice as criterion variable in this study, which is a substantial result, considering that no

other factors, frequently recognized as also important for student's choice of a college major, were included (e.g. influence of parents, friends, and relatives, influence of teachers, experiences with high school and college introductory accounting course, etc.).

Unfortunately, the findings of this study can not be generalized, since only one group of students from the same school having the same lecturer was participating. However, this was not the aim of the study in the first place. Rather, the aim was to demonstrate the possibility of an alternative approach to assessing the impact of perceptions about accounting and accountants on the decision of students whether or not to major in accounting. An approach, focused on observing the

relationships between accounting major choice variable and personal characteristics of students, and using these relationships in conjunction with person-job-fit theory as a basis for judgments about the impact of selected perceptions. For reasons explained in the introduction section of this paper, we believe that this is a better approach than the direct observation of differences in perceptions between accounting and non-accounting business students.

There are also some important limitations of the study that have to be noted. First, it is already mentioned that all participating students were from the same group, the same study program, and the same school, also having the same introductory accounting lecturer. Consequently, the findings of the study can not be generalized. The second limitation is the use of very brief measures for the majority of observed personal characteristics. Although all relevant reliability statistics were satisfactory, different and more precise measures might yield different results. Finally, in this study only a small number of selected perceptions and corresponding (matching) personal characteristics were observed. For a more complete assessment of the impact of popular accounting perceptions on accounting major choice, additional perceptions and corresponding (matching) personal characteristics should be tested, including interactions that might exist between some of them.

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Appendix: Questionnaire[8]

Part A:

A1	Indicate your gender: …………………
A2	Please indicate your final high school/gymnasium mathematics grade: ……….
A3	Please indicate your »Business mathematics« college course grade: ……….
A4	Between both extremes round a number, that best describes your attitude towards mathematics: Don't like mathematics. ← -3 -2 -1 0 1 2 3 → Like mathematics.
A5	Round the number of <u>yet unfinished</u> exams from the first study semester: 0 1 2 3 4 5 6

Part B:

The table below contains short descriptions of an imaginary person. Please read them carefully and for each indicate (round appropriate number), how much you find this person similar to you personally. Use the following scale:

1 = not like me at all   2 = a little like me   3 = somewhat like me   4 = quite like me   5 = very much like me

B1	This person is creative and innovative.	1 2 3 4 5
B2	This person is communicative. Easily makes contacts and likes to work with other people.	1 2 3 4 5
B3	This person is good at mathematics and likes to work with numbers.	1 2 3 4 5

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[8] Items from the 60-item version of Hexaco Big Six Personality Inventory, items from the ESS21 Value Scale, and items, not used in the study, are excluded.

Continuation of Part B:

1 = not like me at all   2 = a little like me   3 = somewhat like me   4 = quite like me   5 = very much like me

B4	This person is orderly and meticulous.	1 2 3 4 5
B6	This person has a hard time working behind a desk for long hours.	1 2 3 4 5
B7	This person does not like to speak in public.	1 2 3 4 5
B8	This person likes to study.	1 2 3 4 5
B9	This person is diligent.	1 2 3 4 5
B10	This person is more of an individualist. Does not like teamwork.	1 2 3 4 5
B11	This person likes office work.	1 2 3 4 5

Part C:

Below there are pairs of opposite characteristics of different jobs – a) and b). For each pair, please round the option that you prefer, once you start working. If you don't care, round option c).

C1	a) Creative work, need for original ideas.	b) Little need for creativity and ideas.	c) Don't care
C2	a) Lots of teamwork and meetings.	b) Little teamwork and meetings.	c) Don't care
C3	a) Lots of office work.	b) Little office work.	c) Don't care

Na osebnostnih značilnostih zasnovano ocenjevanje vpliva predstav o računovodstvu na odločitev študentov za študij računovodstva

Izvleček

V prispevku smo za vzorec dodiplomskih študentov prvega letnika visokošolskega strokovnega programa poslovnih ved ocenili vpliv izbranih uveljavljenih percepcij o računovodstvu na njihovo odločitev za izbiro računovodstva kot svoje študijske usmeritve. Namesto običajnega neposrednega opazovanja razlik v percepcijah med študenti računovodstva in študenti drugih študijskih usmeritev smo uporabili nov pristop, zasnovan na opazovanju razlik med osebnimi značilnostmi študentov računovodstva in študentov drugih študijskih usmeritev, prepoznanimi kot pomembne za posameznikovo osebno ujemanje z opazovanimi uveljavljenimi percepcijami o računovodstvu kot področju dela in študijski usmeritvi. Kot pokazatelj obstoja in jakosti vpliva opazovanih percepcij na odločanje študentov v zvezi z možnostjo nadaljevanja svojega študija na računovodski študijski usmeritvi smo uporabili regresijske koeficiente, pridobljene z regresijo opazovanih osebnih značilnosti na odločitev študentov za izbiro računovodstva kot svoje študijske usmeritve. Rezultati kažejo pomemben vpliv nekaterih izmed uveljavljenih percepcij o računovodstvu na odločanje študentov v zvezi z izbiro računovodstva kot svoje študijske usmeritve.

Ključne besede: računovodstvo, računovodska študijska usmeritev, predstave o računovodstvu, osebne značilnosti.

Neobanks' Footprint on the Transformative Path of the Austrian and the Slovenian Banking Market

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Abstract

The digital transformation in banking, which is supported by the European regulatory framework, has enabled new business models for banking. One example of these changes is the emergence of neobanks. We examine the presence of neobanks in two national markets, Austria and Slovenia. Despite the geographical proximity and rich history of banking integration between the two markets, our findings reveal significant differences in this perspective between the two markets. In the analytical part, we use available indirect and descriptive data. We have identified two historical periods. In the first, domestic neobanks appeared. Unlike in Austria, where there is a rich history of domestic neobanks, there were none in Slovenia. In the second identified period, the most propulsive European neobanks are similarly active in both markets, which increases competition in the banking markets. In the future, the neobanks could contribute to the increase in the mobility of deposits outside the national banking markets.

Introduction

European citizens mostly keep their deposits in domestic banks. However, a small part is being held in bank accounts abroad, especially in other EU member states. There are two factors which importantly foster the ability to move deposits more easily: digital transformation of the banking industry and the European legislation supporting cross-border banking. Increased mobility of savers and credit seekers will be a relevant topic for the competitiveness of domestic banking markets in the next years. It is also relevant for banking supervision, especially in small European banking markets, when safeguarding financial stability is considered.

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Although the proportion of deposits kept in bank accounts abroad is still small, it can be expected to grow strongly and hence it can be a potential source of volatility in financing sources for banks, affecting the stability of deposits. One of the rare empirical pieces of evidence on this topic shows that for Dutch households this proportion has recently doubled to 2.4% of Dutch savings in bank deposits. Traditionally, Dutch households deposited the largest volumes in German banks, but as a result of the increase in interest rates, the volume of deposits in Estonia and Italy has increased significantly (De Nederlandsche Bank, 2024). Slovenian tax residents had almost 2.8 billion EUR deposited in foreign bank accounts globally by the end of 2022, mainly, 36.4 %, in Austrian banks (Finančna uprava Republike Slovenije, 2024b). However, some non-deposit bank exposures might be included in that data. In the Slovenian banking sector households held about 26.5 billion EUR deposits by the end of 2023, which is half of the balance sheet total of Slovenian banks and therefore their most important source of financing (Banka Slovenije, 2024b). According to these data, it appears that Slovenian households might be holding a much larger share in accounts abroad as compared to Dutch households.

The public accessibility of the internet in the 1990s was a major force enabling the emergence of neobanks and finally increased their importance. Previously, only a few banks operated in the sense of »banks without physical branches« and communicated with their customers via postal services and telephone (Guettler & Hackethal, 2005).

Today, neobanks are digital-only banks with a banking licence that operate exclusively online without physical branch locations. These financial institutions typically provide banking services and products through digital channels, like mobile apps and websites, and include a wide range of services like savings accounts, payment processing, loans and investment opportunities. They usually offer innovative features, fast account opening processes and are known for their customer-centricity, the integration of advanced technology and their adaptability to changing customer needs. They obtain data and feedback from their customers that can enable them to improve services by tailoring them to consumers' needs (BBVA Research, 2016; Citterio et al., 2024;

El-Gohary et al., 2021; Jagrič et al., 2021; Temelkov, 2020b; Ziouache & Bouteraa, 2023).

In today's markets there are two types of digital-only banks. Those of the first type that have taken comprehensive measures by fully exploiting the opportunities offered by digitalisation, reaching out to customers exclusively digitally and so entirely bypassing the concept of branches, thereby saving ongoing costs. These technology-enabled entrants are typically newly established, mostly fall under the category of less significant institutions or are long-existing but have recently radically changed to a digitally-focused business model. The second group consists of traditional banks responding to the challenges posed by the first type, the new digital entrants, by establishing new digital-only subsidiaries with different names and branding, in addition to their previous digital channels (European Central Bank, 2020).

While typically traditional small banks (less-significant institutions, LSIs) operate nationally, digital-only LSIs operate internationally, at least in European markets, due to passporting[1]. The range of business areas is different to traditional banks, as digital-only competitors tend to specialise in certain business lines, like payment systems, trading and asset management (European Central Bank, 2020).

We examine how traditional banks in two national markets are challenged by the new neobank market entrants. The paper explores a global and a more narrow research question. Results bring novel arguments regarding the area of financial innovations, thus strengthening the ability for managerial and supervisory decision-making in times when traditional banking has arrived at crossroads.

The paper is structured as follows. In section 2 we formulate two research questions and provide an overview of the current market structure in Slovenia and Austria. In section 3, we analyse the role of neobanks in the banking market based on their business model characteristics. In section 4 we compare the evolution of neobanks in the two selected markets, Austria and Slovenia. Finally, we present our conclusions in section 5.

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[1] Passporting allows banks and financial institutions in the European Economic Area (EEA) to operate across member states with a single regulatory license obtained in their home country. With passporting rights, a bank licensed in one EEA country can offer its services in others without needing additional authorization, significantly simplifying cross-border operations (see e.g. https://www.eba.europa.eu/regulation-and-policy/passporting-and-supervision-branches, accessed 30 October 2024).

Methodological Approach and Data on the Market Structure in Slovenia and Austria

Our primary research question refers to the investigation of *"whether neobanks act as an accelerator of the digital transformation of the banking industry as a whole"*. We address the impact of the fintech industry in this regard and explore the role of neobanks in the banking market. We use qualitative research methods, description and compilation methods, and subsequently analysis and synthesis.

After exploring the first research question in global terms, we proceed to our second and narrower, nationally oriented research question. Technology-enabled innovations in banking, new business models and new financial services could have a different impact on the market development in small markets as compared to large and mature banking markets. We explore the question "*how common are characteristics of the banking markets in the neighbouring euro area countries, Austria and Slovenia, in respect to the neobanks' presence and role played on the market*". We comparatively explore the market segment for digital-only or close-to-digital-only new market entrants. We look for common characteristics and important differences between the two national markets. Important facts to consider are that some market players are active in both markets (e.g. N26, Revolut, TradeRepublic) and that both countries are within the banking union and the banking supervision under the Single Supervisory Mechanism (SSM) and are subordinate to the European regulatory framework (but with national options making a difference). Therefore, the comparison will be twofold, with a market-entity aspect, that takes into account the market characteristics that enable profitable business operations, and, secondly, a financial stability aspect, where we explore the interplay of determinants supporting banking market integration in the CEE region as part of the euro area.

The Slovenian banking market is rather small and has experienced a trend of market consolidation. By the end of 2006, there were 20 banks and three savings banks with their headquarters in Slovenia and two branches of EU member state banks (Banka Slovenije, 2007). The number of credit institutions had been declining, decreasing to ten banks, three savings banks and two branches of member state banks by the end of 2023, when the sector's total assets amounted to EUR 53.1 billion, 81.1% of the Slovenian GDP (Banka Slovenije, 2024a). There is a large number of credit institutions and payment institutions of member states who may operate directly from outside Slovenia. Alone in 2023 there were

66 notifications of direct provisions of services by banks, notifications of cross-border services, provisions of consumer credit intermediation services for real estate, provisions of payment services, and provisions of electronic money issuance and payment services (Banka Slovenije, 2024a). Another important feature of the Slovenian banking market is a large share of non-bank deposits, amounting to EUR 41.1 billion or 77.4% of the banking system's total assets. Household deposits are currently a stable source of funding for the banking system. (Banka Slovenije, 2024b).

Fintechs have a very prominent presence in the area of payment services, and also in asset management, crypto-assets, insurance, savings products (accepting deposits), and lending services. In the area of payment services as well as in other areas, the Bank of Slovenia is active in the role of a controller, supervisor and catalyst through various instruments (Banka Slovenije, 2021). Under the Bank of Slovenia, the National Payments Council operates, where the stakeholders in payment services coordinate interests, define priorities and give ideas on measures to improve the situation, to support a balanced and sustainable development of the payment services market in Slovenia, ensuring an adaptation to changes in an international environment (Banka Slovenije, 2021).

Further, according to the governor of the Bank of Slovenia, technological changes facilitate the entry of new providers into the financial market. They introduce new approaches to business and transform traditional ways of doing business, especially when existing entities are not fast enough in implementing changes (Vasle, 2024). However, although Slovenian traditional banks have not established any digital-only banks as subsidiaries, they are on a path of digital transformation and interact with fintechs. NLB d.d. and its venture team eNLaB look for new and better ways of solving customers' financial needs by building business cooperations with ambitious fintechs (NLB d.d., 2024). Slovenian (traditional) banks are characterised by a volume of business activities that remains relatively small and their business models and the development of the services remain insufficiently addressed (Vasle, 2024).

In the 1990s, several direct banks were established in Austria that specialised in securities trading and custody. In the context of the market euphoria during the dotcom bubble in the late nineties, equity market investments became popular among broad sections of the population. For the business model of Austrian direct banks in the 1990s, a special procedure, an Austrian variant of a

single remote identity verification system, was very important. It made it possible to open an account by post. It enabled to offer securities custody accounts in Germany and Austria.

In this study, we use data from reports and statistical databases of the European Central Bank, De Nederlandsche Bank, Banka Slovenije, Finančna uprava Republike Slovenije, annual reports and web pages of individual banks and fintechs. However, national (publicly available) banking statistics do not reveal the volume of activities that foreign banks have in other national markets, operating cross-border. Also, a differentiation according to the business model is not publicly available. Therefore, to estimate the market presence of digital-only banks, we had to employ indirect data.

Novel and Technology-Dominated Banking Business Models

As access to technology has become widespread, technology has transformed almost every sector and changed everyday life. As a result, people and technology are increasingly, even inextricably intertwined. Disruptive technologies such as artificial intelligence also play an increasing role in banks' operations. Consequently, banks are more dependent on data, IT platforms and third-party services, like apps or cloud-based services (McCaul, 2024b) and are thus more vulnerable.

The main differences between traditional banking models and neobanks lie in various aspects such as their operational structure, customer interaction, and use of technology (Temelkov, 2020a, 2020b). While traditional banks have physical branch locations, neobanks operate online without physical restrictions. Customers can access neobanks from anywhere while traditional banks have fixed working hours for customer service. In this way, neobanks offer immediate customer service, while the speed of service of traditional banks depends on the knowledge and skills of the employees. However, when traditional banks integrate mobile apps with 24/7 support, the office opening times of branches do no longer make a difference.

Clerc et al. (2020) define four generations of neobanks:

- *Online offerings*: initially focusing on niche market segments (e.g. Fortuneo in 2000, Boursorama in 2002, ING Direct in 2000), they later offered low prices for basic banking

services and allowed customers to access a range of financial services that were not typical for traditional banks. They are characterised by two types of strategies: (i) distribution channel of a classic bank services (e.g. Hello Bank!, a brand of BNP Paribas), or (ii) an independent bank.
- *Distributor banks* ("phygital"): To improve the group's profitability by diversifying revenues, they are expanding the group's activities to the banking services of otherwise non-banking groups (e.g. C'Zam for Carrefour before 2020, AXA Bank), They use non-banks' core business networks to acquire customers by, e.g., financing purchases of the non-banks' products.
- *"Mobile pure play" neobanks*: are characterized by a "freemium" business model (free basic services), while further services have to be paid. The use of state-of-the-art IT technology also allows them to build and exploit extensive databases (e.g. N26 and Revolut).
- *"Ready to use" or "modular" banks:* they were initially operating as "Payment as a service" (PaaS) and later developed the "Bank as a service (BaaS)" model. They do not necessarily hold a banking licence, but they may offer services related to payments by interacting with another entity that does have a licence. The business model can be considered a B2B2C (business to business to client) model.

Today, technology-dominated business models are the most prominent. The elusiveness of the definition of neobanks stems from the blurred boundaries between banks and non-banks, which changes risks and poses a challenge also to regulation and supervision of different entities. Technology-oriented business models may underestimate sound bank risk management practices due to their focus on convenience, efficiency and growth (McCaul, 2024a).

The selected neobanks that operate in Austria and Slovenia have business activities in various business areas: Payments, Loan origination, Savings products and Securities trading.

There is a dominance of securities trading, Payment services and savings products are each offered often, which shows that while these are still core services, they are not equally prioritised by all neobanks. This suggests that many neobanks are cautious about entering the deposit business, as it entails higher regulatory and capital requirements.

Neobanks such as Revolut, ING-DiBa, and easybank stand out because they offer a comprehensive range of services. This divergence shows how neobanks are positioning themselves to meet specific customer needs – whether in retail banking or investment services.

National Banking Landscape and Cross-Border Banking in Austria and Slovenia

Technology-Oriented Financial Environment in Austria and Slovenia

There are no Slovenian neobanks or digital-only banks, neither as an independent bank headquartered in Slovenia nor as a subsidiary of a Slovenian bank. However, neobanks from other EU member states offer their banking services in the Slovenian market. The data on achieved volumes of activities is not disclosed by banks themselves and we could only indirectly estimate their market presence, combining several data sources.
However, there are Slovenian fintechs without a banking licence who offer specialised financial services, e.g. LeanPay, Bitstamp, mBills, Paywiser, Toshl Finance, and VALÚ. Some were established in Slovenia or by Slovenian citizens. They followed different paths of development, and some are no longer headquartered in Slovenia. To enable their operations or to gain clients, some are partners of licensed Slovenian (and other) banks. They operate in e.g. payment services, consumer credit services or crypto assets trading.

- Leanpay is not a bank but a fintech founded in 2019 in the field of digital Point-of-sale Finance ("dPOSF") and Buy Now Pay Later ("BNPL"). It is a market leader and offers payments in instalments. The service is digital, available anytime and anywhere with no required credit card or other financial product onboarding (Leanpay d.o.o., 2024).
- Paywiser, established in 2017, is a Bank of Slovenia-licensed e-Money institution and passported throughout the EEA that offers multi-functional full-service payment solutions. It issues payment cards, electronic wallets and accepts payments. It has a global presence with 360 offices forming a financial network (Paywiser d.o.o., 2024).
- mBills is a non-bank fintech, a mobile wallet that came to life as an idea in 2013 in the Halcom

incubator. 2017 mBills went into a strategic partnership with Petrol. It provides users with various payment methods: transfers between users, online payments, payments of cashier bills, and since 2018 a partnership with Mastercard has existed (Petrol Pay d.o.o., 2024). It also enables consumer credit up to 5,000 EUR from Addiko bank (Addiko bank, 2024).

Several fintechs and neobank were established in Austria and are therefore domestic financial institutions (banks or non-banks). A prominent example is Bitpanda GmbH, founded in Vienna in 2014. It was subsequently the first Austrian start-up company with a valuation of more than one billion USD (Danzer, 2021). Originally, the focus of the offering was on trading cryptocurrencies, and it has expanded over the years to include trading in other securities and commodities. Bitpanda currently has more than 3 million customers, but the number of customers in Austria is not communicated.

Austrian and Slovenian Neobanks

The ECB reports that, as of mid-2019, four digital-only LSIs were authorized in Slovenia to operate cross-border through branches or passporting, while Austria saw the authorization of ten such institutions, including domestic digital-only LSIs. (European Central Bank, 2020). In response to our inquiry about the names of these banks, the ECB, on behalf of the authors of the ECB's Risk Report on LSIs, stated, "We are not authorized by the National Competent Authorities (NCAs), who owned the data, to disclose the names of the banks included in this analysis". While passporting grants banks the right to operate cross-border, it does not confirm that they actually do so or to what extent, which remains unverified for this research.

The history of established neobanks in Austria is rich and is presented in Table 1. The three neobanks Direktanlage Bank, Volksbank Direkt and Direktbank.at were founded in the 1990s and all pursued a similar business model with a focus on securities trading. These banks have in the meantime left the market or they operate as a brand of an established traditional bank. Easybank was founded in 1997 and developed into the most successful Austrian neobank before being integrated into BAWAG PSK in 2020. From today's perspective, Dadat Bank, launched in 2017 by the GRAWE Banking Group, represents the youngest establishment of a neobank in Austria.

Table 1
Domestic direct and digital-only banks in Austria

Name	Founded/ M&A
Direktanlage Bank	− 1995 by the Salzburger Kredit- und Wechselbank − 2001 acquired Volksbanks Direct − 2002 acquired by German DAB Bank − 2014 acquired by BNP Paribas to be part of their subsidiary Hello Bank! − 2021 sold to BAWAG
Direktbank.at	− active since 1990 as an online platform of PRIVAT BANK AG − 2007 established as an independent bank and 100% subsidiary of PRIVAT BANK AG (itself a subsidiary of RLB OÖ[2] at the time) − 2015, the entire PRIVAT BANK Group was integrated into RLB OÖ
Volksbank Direkt	− 1998 founded by Volksbank Vorarlberg, addressing customers in Germany − 2001 entire customer portfolio was sold to Direktanlage Bank
easybank	− began as a supplementary online service for existing customers of BAWAG PSK − in 1996 establishment as an independent bank and 100% subsidiary of BAWAG PSK − -2017 acquired credit card business PayLife Bank GmbH, − 2018 expanded to Germany under the brand Qlick; − 2020, integrated into its parent company BAWAG PSK – today functions as a brand of the BAWAG Group.
Dadat Bank	− founded in 2017 by Schelhammer Capital Bank AG as a direct bank; − today it is a subsidiary of the GRAWE Banking Group

Source: Atzler, 2019; BAWAG, 2021; Braumann, 2018; Dadat Bank, 2024; Knauseder, 2019; Pressetext, 2020

Foreign Neobanks Operating in Austria and Slovenia

Today, several large European neobanks such as N26, Trade Republic and Revolut are active in Austria. N26, founded in 2013, has been offering services such as free current accounts, savings products, credit cards and securities trading in Austria since 2015. Trade Republic, founded in 2015, focuses on cost-effective trading in securities and cryptocurrencies, while Revolut, founded in London in 2015, offers current accounts and trading in securities and commodities in addition to foreign currency transactions.

However, these digital entrants were not the first ones without physical branches entering the market in Austria. BSV Bank, founded in Germany in 1965 as a bank without physical branches, initially communicated with its customers via postal services, later by telephone and finally introduced online banking.

In 1998, Dutch ING group acquired 49% and operated as DiBa and later as ING-DiBa (DiBa stands for 'Direktbank') as a direct banking subsidiary of ING Direct in the ING group. The bank experienced remarkable growth and offered its services (savings, loans, investment products and current accounts) via the internet, fax and telephone (Guettler & Hackethal, 2005).

In 2003, the ING group took over ING-DiBa in its entirety, and ING-DiBa in turn took over its largest direct bank competitor in Germany, Entrium Direct Bankers, which had been active in Austria already (Löding, 2003). In 2004, ING-DiBa Austria began its activities in Austria as a branch of the German ING-DiBa. At first, it only offered savings products. Loans and investment products were introduced in 2013 and current accounts in 2017 (Haas, 2021). Also in 2017, the bank was renamed ING Austria.

In 2021, the private customer business with around 100.000 customers was sold to bank99, a newly founded bank and 80% subsidiary of Austrian Post with a large number of branches (Handelsblatt, 2021; Österreichische Post, 2021). The remaining customer base of ING Austria consists only of wholesale customers. Accordingly, total assets fell from EUR 1,840 million in 2020 to EUR 261 million in 2022 and the number of employees declined from 332 to 17 (ING Group, 2023).

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[2] Raiffeisenlandesbank Oberösterreich AG (RLB OÖ)

Table 3
Foreign neobanks and digital-only banks operating in Austria and Slovenia

Name of the bank	Country of registration/IBAN/Deposit scheme/Supervisory Authority / Performance specifics or regulatory issues	Indication of volume of business activity	
		Austria	Slovenia
bunq	- Netherlands - since 2018 banking licence for all European markets (EAA) - for Slovenian and Austrian customers NL IBAN (local IBANs are possible for German, French, Irish, or Spanish customers) - Dutch Deposit Guarantee Scheme (DGS), protected up to EUR 100.000, - under supervision of De Nederlandsche Bank - in 2022 became the first profitable EU neobank	N/A (no exact data available)	- N/A (no exact data available) - probably small but stable activity - all MFIs in the Netherlands (ESCB excluded) exposure on the deposit liabilities vis-a-vis households in Slovenia in 2024 Q2 only 8 mio EUR
N26	- Germany, - full German banking license since 2016, expand to Europe in 2019 - German DE IBAN - funds protected up to EUR 100,000 by the German Deposit Protection Scheme - under supervision of BaFin - end of 2023, over 4.2 million income-related customers, primarily in Germany (50%) and France (25%) - in June 2024, a restriction since 2021 by BaFin, on the maximum number of new customers per month was lifted	N/A (the exact number of customers in Austria is not communicated)	- about 27,000 end-of-2022 bank accounts reported to the tax authority by Slovenian tax residents - assuming a similar reporting rate as with Revolut accounts, the number of bank accounts could be over 75,000
Revolut	- Lithuania - since 2018 licensed by the European Central Bank - Lithuanian LT IBAN - funds protected up to EUR 100,000 by the Lithuanian Public Institution "Deposit and Investment Insurance" - under supervision of the Bank of Lithuania	Revolut had 300,000 customers in Austria in February 2019, which corresponded to a market penetration of 3.7%	- data from international tax data exchange shows end-of-2022 about 137,000 bank accounts - a smaller number was reported by tax residents themselves to the tax authority 2023 (as of 30.9.) Revolut reports 116,000 customers,with 6 million card payments with an annual growth rate of 67%

Continuation of Table 3
Foreign neobanks and digital-only banks operating in Austria and Slovenia

Name of the bank	Country of registration/IBAN/Deposit scheme/Supervisory Authority / Performance specifics or regulatory issues	Indication of volume of business activity	
		Austria	Slovenia
			– the deposit liabilities vis-a-vis households in Slovenia of all microfinance institutions (MFIs) grew from 9 mio EUR in Q2 2021 to 64 million EUR in Q2 2024. Although here all banks are included, the popularity of Revolut in Slovenia might have importantly contributed to that figure
Trade Republic Bank	– Germany – full German banking license for EAA since December 2023 – German DE IBAN – funds protected up to EUR 100,000 by the German Deposit Protection Scheme – Under supervision of BaFin and Bundesbank	– N/A – Although capital gains tax (KESt) is not paid directly for Austrian customers, assistance is provided free of charge for the preparation of the tax return	– Despite no data gathered, we can assume the popularity has grown since December 2023 according to numerous questions by Slovenian households – The tax authority issued a public explanation on interest earned after 6.12.2023 is taxed with personal income tax as interest earned at bank accounts (133. ZDoh-2)
Klarna	– Sweden – Swedish banking licence since 2017	– used for online purchases in 7,000 stores – no disclosure on the number of customers in Austria	No data that would suggest business activity

Sources: bunq B.V., 2024; European Central Bank, 2024; Finančna uprava Republike Slovenije, 2024b, 2024a; Hunter, 2023; N26 Bank AG, 2024; Revolut Bank UAB, 2024a, 2024b; TradingView, 2024

Conclusions and Discussion

The rapid development of technology and innovation has fundamentally changed the financial sector in recent years. In particular, the emergence of banks with a digital business model, referred to as neobanks, has challenged the traditional banking system and led to a paradigm shift. The literature uses broad terms for this group of financial institutions, and numerous variations of financial institutions can be included in this group. This heterogeneity also reflects the rapidly changing business models that these banks apply when trying to achieve competitive and efficient operations to ensure profitability and stability in their financial performance. Thus, in the frame of our first research question we found

that neobanks have used technology more radically than traditional banks and have thus forced traditional banks to strengthen their digital channels to stay competitive. Further, neobanks typically offer non-bank financial services more actively than traditional banks. However, digital business models are not just about digitalisation of distribution channels but are deviating from traditional banking, which may weaken their operational resilience or liquidity due to excessive risk taking. Neobanks may force the banking and financial industry to change, and they also introduce a new vulnerability that has to be managed.

The second research question revealed surprising insights. Despite increased mobility enabled through

digitalisation and passporting, there are notable differences in different markets such as Austria and Slovenia. Very different characteristics appear from the fact that in the Austrian market, there was a much larger number of neobanks present in the market and that there is a history of Austrian banks' subsidiaries acting as neobanks, while in Slovenia, none of the banks has established a bank, with a digital business model. Probably, the size of the market and the inability to scale up business volumes in Slovenia contribute to these differences. Even with passporting abilities, a lower number of foreign neobanks is active in the Slovenian market. A common feature to both national markets is the presence of the most prominent European neobanks, like Revolut, Trade Republic Bank and N26.

An important limitation of this research is the unavailability of precise data on the activity of individual banks in individual markets. Additional and precise data on market activity was provided upon our direct request to the analysed banks not disclosed, also wasn't disclosed by the contacted national banking authorities and is not available from publicly available sources. In this research indices give first insights into this field. The stakeholders in the banking business, market participants and the regulatory and supervisory bodies might be able to use in the future different kinds of disclosed data on business activity in digital-only business models and cross-border. All banks, not just the digital-only, will be able to use this potential for growth of their business activities with expanding in digital-only business forms.

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Odtis neobank na poti transformacije avstrijskega in slovenskega bančnega trga

Izvleček

Digitalna preobrazba v bančništvu, ki jo podpira evropski regulativni okvir, je omogočila nove poslovne modele za bančništvo. Primer takih sprememb je pojav neobank. Preučujemo prisotnost neobank na dveh nacionalnih trgih, v Avstriji in Sloveniji. Kljub geografski bližini in bogati zgodovini bančne integracije med obema trgoma naše ugotovitve razkrivajo pomembne razlike med obema trgoma v tej perspektivi. V analitičnem delu uporabljamo razpoložljive posredne ter opisne podatke. Identificirali smo dve zgodovinski obdobji. V prvem so se pojavile domače neobanke. Drugače kot v Avstriji, kjer obstaja bogata zgodovina domačih neobank, jih v Sloveniji ni bilo. V drugem prepoznanem obdobju so na obeh trgih podobno aktivne najbolj propulzivne evropske neobanke, kar povečuje konkurenco na bančnih trgih. V prihodnosti bi lahko neobanke prispevale k povečanju mobilnosti vlog v čezmejni prostor, zunaj nacionalnih bančnih trgov.

Ključne besede: neobanke, digitalne banke, čezmejno bančništvo, digitalna transformacija

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