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EDITORIAL

After conducting a double-blind peer review process, the Issue 1 Volume 27 Year 2025 of the scientific journal called *Economic Horizons* contains six original scientific papers.

The coauthors *Wenjie Zhang, Muhammad Daaniyall Abd Rahman* and *Chakrin Utit* investigate the effects of the trade creation according to the RCEP trade creation (RCEP - Regional Comprehensive Economic Partnership) and the redirecting of trade flows to Chine and its sectors, as well as the influence of imports and exports on its provinces. In the paper, the so-called WITS-SMART tool (i.e. The World Bank's World Integrated Trade Solution Software for Market Analysis and Restrictions on Trade), the OECD tables with the ICIO input and output components at the international level, and the tables with the input and output components at the level of a larger number of the regions in China (the Chinese Multi-Regional Input-Output) are applied. The results of the conducted study are indicative of a significant growth of trade with Japan and South Korea and, simultaneously, the relatively low trade effects with the nations and regions of ASEAN (Association of Southeast Asian Nations), such as Australia and New Zealand. The coauthors emphasize the disparities between different regions in China. They also point to the fact that the eastern coastal provinces obtain more trade benefits than in relation to the central and western areas. Besides, they highlight the significance of the implementation of the policies encouraging cooperation in the high-growth sectors, as well as the significance of the development of closely tailored strategies for regional advancement.

Starting from the fact that the relevant literature has not shed sufficient light on the role played by the Nigerian drivers of the more intensive export of the products other than oil derivatives, the coauthors *Mohammed Shuaibu* and *Usman Gana* investigate the determinants of the export activities that are in the function of the growth of the economy of this country. Apart from the focus on the above-mentioned products, the research explicitly considers the trade credit and digital payment systems. The autoregressive distributed lag model is applied and the monthly data for the period from 2010 to 2013 are used. The results obtained indicate that increased trade credits and a better electronic payment system significantly improve the efficiency of the sector for exporting the products other than oil derivatives. The coauthors conclude that an increase in trade credits and the improvement of the electronic payment system may serve as an alternative to stimulating the potential of the export sector of Nigeria when the products other than oil derivatives are in question. They also establish a fact that the promotion of trade credits and an increased use of electronic payment may help Nigeria to improve the efficiency of the export of the products other than oil derivatives, all being aimed to incentivize sustainable economic growth.

Pursuant to the attitude that the business cycle of an economy is a complex phenomenon which is all but easy to measure and interpret, the author *Emilija Janković* does research in the business cycles of the selected countries analyzing the data on the gross domestic product (GDP), the cyclical movement of the GDP component, the labor market variables and the nominal variables (namely inflation, interest rates and the foreign exchange rate). The study focuses on the European Union (EU) as a whole, Germany (as the most developed economy of the EU) and the economy of the Republic of Serbia. The author aspires to reveal the regularities in the movement of the above-mentioned variables in the period from the first quarter of 2009 to the third quarter of 2023. With the help of a detailed statistical analysis of the time series, the stylized facts have been studied and the volatility of these variables, their correlation with the GDP, as well as their persistence have been examined. The paper generally concludes that the business cycle of Serbia does not lag behind more developed countries.

Bearing in mind the importance of the Internet and communication with consumers in the online environment, primarily via social media, as well as the growing significance of sustainability in contemporary business operations, the coauthors *Jovana Filipović* and

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Srđan Šapić analyze the impact of marketing activities in social media on consumer behavior with respect to green products. Concretely, the coauthors investigate the marketing activities in social media undertaken by domestic and global companies in the Republic of Serbia that encompass the following five aspects, namely entertainment, interaction, trend pursuit, customization and electronic word of mouth (eWOM). Applying empirical research by means of the survey method and via SEM analysis, they conclude that the above-mentioned aspects of social media do differently influence the attitudes towards the green products of the domestic and global companies. A fact has been established of the existence of a positive moderation impact of the global identity on the links between the aforementioned variables in the models. This paper contributes to the analysis of the connection between social media marketing activities and consumer behavior towards green products, simultaneously accompanied by a comparative analysis of the domestic and global companies.

Respecting the fact that the eternal dilemma in investors is how to find the companies to invest in and to make a satisfactory return on such investment, the coauthors *Tadija Đukić, Bojana Novićević Čečević* and *Adrijana Jevtić Tomić* examine the possibility of applying a systematic approach to the selection of the companies to invest in. The research focus is placed on the two levels of the analysis - ratio analysis, directed towards liquidity and profitability, and the multi-criteria ranking utilizing the PROMETHEE method. The results obtained in the ratio analysis conducted show that, from the point of view of an individual comparison, the companies whose PE ratio (i.e. the profit-earning ratio) is greater achieve better business performances in relation to those whose PE ratio is lower. Given the fact, however, that the perceivable differences in the values of the analyzed ratios among the companies cannot provide clear and precise guidelines for making a general conclusion, a combination of the ration analysis and the PROMETHEE method was applied, enabling a more efficient assessment of the performances, simultaneously providing guidelines to investors how to select the best companies, i.e. those with the biggest potential.

The coauthors *Ines Milohnić* and *Ivana Licul* apply the theory of planned behavior so as to investigate the influence of personal attitudes in connection with entrepreneurship, social norms and control of perceived behavior on students' entrepreneurial intentions. The research was done on a sample of 184 students in Croatia with the aim to demonstrate the real context in which students develop their entrepreneurial intentions. The conducted multiple regression analysis reveals that all the components of the theory of planned behavior positively and significantly influence entrepreneurial intentions, the most influential factor being control of perceived behavior, only to be followed by personal attitude and social norms. Those findings increase the level of understanding the critical elements shaping students' entrepreneurial aspirations. Additionally, the research results have generated useful pieces of information for higher education institutions, helping them to understand their students' entrepreneurial behavior and directing the development of target programs and internal policies. The results of the research done are also significant to a broader academic community when speaking about designing the strategies that promote the student population's entrepreneurial ambitions.

On behalf of the Editorial Board of the Journal, and on my own behalf, I hereby express my gratitude to the authors of the contributions published in Issue 1 of the Journal. Simultaneously, my special gratitude goes to the reviewers whose constructive and critical comments and suggestions made to the authors of the submitted manuscripts have contributed to reaching a higher level of the quality of the published papers.

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Milena Jakšić
Editor-in-Chief

Milena Jakšić is a full professor teaching at the Faculty of Economics of the University of Kragujevac. She earned her PhD degree at the Faculty of Economics of the University of Kragujevac in the narrow scientific field of general economics and economic growth. The key areas of her scientific and research interests are the financial system, financial markets, financial instruments and financial institutions.

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NATIONAL AND REGIONAL EFFECTS OF RCEP ON TRADE: THE APPLICATION OF THE WITS-SMART TOOL WITH THE FOCUS ON CHINA

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This paper investigates the effects of RCEP trade creation and trade diversion on China and its sectors, as well as the impact of imports and exports on provinces. The World Bank's World Integrated Trade Solution Software for Market Analysis and Restrictions on Trade (WITS-SMART) tool with the 2020 data, alongside the OECD Inter-Country Input-Output (ICIO) tables and the Chinese Multi-Regional Input-Output (MRIO) tables based on the 2017 data under two scenarios. The results of the study indicate that trade growth with Japan and South Korea is significant, on the one hand, whereas the trade effects with the ASEAN nations and regions such as Australia and New Zealand are relatively low, on the other. The research emphasizes the disparities between various regions in China, demonstrating that the Eastern coastal provinces obtain more trade benefits than the Central and Western areas. The study highlights the importance of implementing the policies encouraging collaboration in high-growth sectors and developing tailored strategies for regional advancement.

Keywords: China, Input-output tables, RCEP, SMART-WITS tool, trade creation and trade diversion

JEL Classification: F14, F15, F17

INTRODUCTION

Signed in 2020, the Regional Comprehensive Economic Partnership (RCEP) is a landmark free trade agreement (FTA) aimed at eliminating tariffs and fostering regional integration. As listed, Chapter 2 of the RCEP Agreement outlines the 20-year phased reduction of tariffs on 90% of traded goods, forming the foundation of this study (Department of Foreign Affairs and Trade, 2020). Unlike the customs unions, RCEP operates as an FTA without a unified external tariff policy. Building on J. Viner's (1950) theory of trade creation and trade diversion, and P. Krugman's (1991) theory of New Economic Geography, the study examines how RCEP's tariff reductions influence trade creation and trade diversion on the example of China and its sectors, and regional import-export disparities.

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Regional trade agreements (RTAs) are transformative tools in reshaping global trade. With RCEP contributing over one-third of the global GDP, understanding its multidimensional impacts on China's trade capacity and regional dynamics is becoming imperative (Goswami, Khan, Labiba, Achol, Saha & Zulfikar, 2022; Rahman, Rahman, Manini & Sharma, 2024). Despite extensive research in RTAs, studies rarely offer insights into RCEP's multidimensional impacts, particularly for China. The existing literature predominantly addresses single sectors or aggregate national effects, regional disparities being often overlooked.

Building on these insights, this study further explores the dual national and regional implications of the RCEP for China. At the national level, RCEP is expected to broaden market access for Chinese products, particularly in the manufacturing sectors (Tran & Tran, 2023). Reduced tariffs and streamlined trade facilitation measures are likely to enhance the global competitiveness of Chinese goods (Mo & Nie, 2022). Regionally, the impact of the Agreement is anticipated to be uneven, favoring the coastal provinces with robust manufacturing bases, simultaneously posing distinct challenges for the inland regions with differing industrial profiles (Zuev, Ostrovskaya & Kuznetsov, 2023). A deeper assessment is essential to understand these disparities and develop targeted strategies.

To address the foregoing gaps, this study is guided by the three key hypotheses:

H1: Tariff reductions by the RCEP member economies significantly enhance China's trade creation effects, whereas trade diversion effects remain lower than trade creation.

H2: The impacts of RCEP on China's industries exhibit significant heterogeneity, with the high-tech and manufacturing sectors benefiting the most from trade creation, whereas the low-value-added industries face greater adverse effects from trade diversion.

H3: RCEP impacts on China's imports and exports vary significantly across the provinces, with the coastal regions benefiting substantially more than the inland provinces.

The paper is organized as follows: Section 2 provides a review of the literature on RTAs, with the focus on the studies examining RCEP economic effects; Section 3 outlines the research methodology, and in Section 4, the results of the study are presented and interpreted. Finally, Section 5 concludes with the key findings and offers policy recommendations.

LITERATURE REVIEW

RTAs have long been recognized as pivotal tools in reshaping international trade patterns by reducing tariff and nontariff barriers. For instance, the development of the cross-border economic zones (CBEZ) has demonstrated a significant potential in fostering connectivity and economic cooperation in border regions, as observed in Vietnam's northern regions (Nguyen, Vu, Nguyen, Nguyen & Nguyen, 2019). The foundational work of J. Viner (1950) distinguishes the dual impacts of RTAs: trade creation, on the one hand, which fosters efficiency by encouraging trade among member states, and trade diversion, on the other, which shifts trade from more efficient nonmembers to less efficient members, potentially reducing overall welfare. Recent empirical studies have extended these theoretical insights, highlighting the effects of RTAs in different economic contexts (Franco-Bedoya & Frohm, 2022). In Asia, agreements like the ASEAN Free Trade Area (AFTA) and the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) have provided critical case studies demonstrating the transformative role of RTAs (Gaurav & Bharti, 2019).

Empirical research in RTAs often underscores the predominance of trade creation over trade diversion, particularly when member economies exhibit complementary industrial structures. M. Ando, S. Urata and K. Yamanouchi (2022) showed that Japan's FTAs had significantly enhanced bilateral trade volumes, particularly in the high-value sectors such as the electronics and automotive industries. However, H. Lee (2016) cautioned that the impact of trade diversion could broadly vary depending on the agreement's specific rules, such as the preferential

rules of origin. K. P. Timsina and R. J. Culas (2021) provided a detailed analysis of Australia's FTAs, illustrating how trade creation in agricultural exports initially had outpaced trade diversion effects, which had become more pronounced over time. This supports the hypothesis that RCEP's tariff reductions will significantly enhance China's trade creation effects (H1).

The effects of RTAs are often unevenly distributed across sectors and regions. S. L. Baier and J. H. Bergstrand (2007) demonstrated that the export-oriented sectors with higher global competitiveness tended to benefit disproportionately from trade agreements. In the context of Japan and South Korea, recent studies have shown that FTAs bolster sectors such as electronics, chemicals, and machinery due to their strong integration in global value chains (Xiu & Yu, 2022). Regionally, RTAs often favor coastal regions with advanced industrial bases and infrastructure. B. Mo and H. Nie (2022) observed similar patterns in China, where coastal provinces had gained significantly more from previous trade agreements compared to the inland regions. This heterogeneity underscores the importance of tailoring policies in order to address regional disparities.

Building on these insights, RCEP emerges as a significant case study for understanding the transformative role of RTAs in fostering trade integration in the Asia-Pacific region. Studies on RCEP highlight its ability to integrate a diverse array of economies, ranging from highly developed countries like Japan to emerging markets such as Vietnam. N. Rahman *et al* (2024) applied gravity models to predict significant increases in China's trade volumes with Japan and South Korea, driven by sectoral complementarities. Q. F. Zhang, X. Chen, J. L. Zhang and L. Cai (2023) emphasized the reduction in both tariff and nontariff barriers under RCEP, which is expected to enhance China's export competitiveness in the key industries such as electronics, textiles, and machinery. D. Ling and K. Qian (2023) further explored the RCEP's potential to boost China's digital trade and e-commerce sectors, highlighting its transformative implications for modern trade structures. These findings collectively support the hypotheses H2 and H3, highlighting the sectoral heterogeneity and regional disparities in RCEP impacts.

In summary, the existing literature highlights the critical role of RTAs in reshaping trade patterns but often overlooks the multidimensional impacts of agreements like RCEP. By addressing these gaps, this study contributes to the understanding of RCEP trade effects at both the national and regional levels.

RESEARCH METHODOLOGY

Research design

This study employs a mixed methodological framework so as to analyze RCEP impacts on China's trade. Specifically, the World Bank's World Integrated Trade Solution Software for Market Analysis and Restrictions on Trade (WITS-SMART) is utilized in order to quantify trade creation and trade diversion effects, and supplement this with input-output analyses using the OECD Inter-Country Input-Output (ICIO) tables and the Chinese Multi-Regional Input-Output (MRIO) tables.

The WITS-SMART model

The WITS-SMART model quantifies the trade creation and trade diversion effects resulting from RCEP tariff reductions. Specifically:

trade creation is calculated as follows:

$$TC_{ijk} = M_{ijk} * \eta * \frac{\Delta_{ijk}}{(1+t_{ijk})*(1+{}^{\eta}/_{\beta})} \quad (1)$$

where

TC_{ijk}: trade creation,

M_{ijk}: imports,

t_{ijk}: the tariff,

η: the import elasticity of demand (system-defined),

β: the export elasticity of supply (99 by default),

i: commodity,

j: the exporting country,

k: the importing country;

trade diversion is calculated as follows:

$$TD_{ijk} = \frac{M_{RCEP} * M_{RoW}\left[\left(\frac{1+t_t}{1+t_0}\right)-1\right]*\lambda}{M_{RCEP}+M_{RoW}+M_{RoW}\left[\left(\frac{1+t_t}{1+t_0}\right)-1\right]*\lambda} \quad (2)$$

where

TD_{ijk}: trade diversion,

M_{RCEP}: the imported commodities from RCEP countries,

M_{RoW}: the imported commodities from the rest of the world,

t_t: the tariff (where t_0 and t_t represent the pre- and post-integration levels of the tariffs),

λ: the elasticity of substitution (1.5 by default).

This analysis directly supports the validation of the hypotheses H1 and H2, thus providing insights into the impacts on trade creation and trade diversion for China from both national and sectoral points of view.

IO tables

The IO framework including the ICIO tables and the Chinese MRIO tables complements the WITS-SMART analysis by capturing interregional trade linkages within China. The ICIO and MRIO tables offer a detailed view of an economy's structural dynamics by revealing the intricate web of interconnections between various sectors of the economy. This aspect makes them particularly valuable for research focused on understanding the impacts of economic policies and their broader implications (Xing, Dong & Guan, 2017; Jia, Cao & Jia, 2023).

Equation (4) is an IO equation, where the vector x is the column vector representing the total output of each industrial sector. The matrix Z has the elements z_{ij} that denote the intermediate inputs from the sector i to the sector j. The vector y is the column vector signifying the final demand of each industrial sector, and the vector μ is the column vector indicating the external imports of each industrial sector.

$$\begin{bmatrix} x^1 \\ x^2 \\ \vdots \\ x^G \end{bmatrix} = \begin{bmatrix} z^{11} & z^{12} & \dots & z^{1G} \\ z^{21} & z^{22} & \dots & z^{2G} \\ \vdots & \vdots & & \vdots \\ z^{G1} & z^{G2} & \dots & z^{GG} \end{bmatrix} \mu + \begin{bmatrix} y^1 \\ y^2 \\ \vdots \\ y^G \end{bmatrix} \quad (3)$$

The direct consumption coefficient is defined as $a^{rs}=z^{rs}\times diag(x^r)^{-1}$, where the element a_{ij}^{rs} represents the value of the product from the sectori of the country r directly consumed in the production of one unit of the product by the sector j of the country s, with $diag(x^r)$ denoting the diagonal matrix whose diagonal elements are the elements of the vector x^r. At this point, Equation (4) can be abbreviated so as to read $X = A \times diag(A)\mu + Y$, i.e. $X = AX + Y$. Equation (4) can be rewritten as follows:

$$\begin{bmatrix} x^1 \\ x^2 \\ \vdots \\ x^G \end{bmatrix} = \left(I - \begin{bmatrix} a^{11} & a^{12} & \dots & a^{1G} \\ a^{12} & a^{22} & \dots & a^{2G} \\ \vdots & \vdots & & \vdots \\ a^{G1} & a^{G2} & \dots & a^{GG} \end{bmatrix} \right)^{-1} \begin{bmatrix} y^1 \\ y^2 \\ \vdots \\ y^G \end{bmatrix} \quad (4)$$

where x^r represents the total output of the sector r. z^{rs} represents the intermediate consumption of the sector r by the sector s, and y^r represents the final output of the sector r. This equation takes into account the interdependencies between the production sectors and includes imports through the vector μ, while the matrix A is the technical coefficient matrix reflecting the proportion of each sector's output used to meet the demands of the other sectors.

The global trade effect can be calculated as follows:

$$\Delta X = (I - A)^{-1}\Delta Y \quad (5)$$

where ΔY equals the trade effect from Equation (3).

Equation (7) indicates the indirect trade effects:

$$\Delta O = \Delta X - \Delta Y \quad (6)$$

The total household consumption is as follows:

$$\Delta c_r = \left\{\left(\sum_i \Delta O_i * W_{r,i}\right) * (1 - tx_r)\right\}(1 - s_r) \quad (7)$$

where

Δc_r: total household consumption,

$w_{r,i}$: the average wage per worker by the sector i and the region r,

tx_r: the total household income tax rate by the region r,

s_r: the average household savings rate by the region r.

In the above, r ∈ {1,2,...,n} and i ∈ {1,2,...,n}

$$\Delta f^i = Q * \Delta c_r \quad (8)$$

The vector of the consumption shocks inducing effects $\Delta f^i_{(gn\times1)}$ can be calculated as the product of the private consumption structure matrix $Q_{(gn\times g)}$ and the consumption vector for each region $\Delta c_{(g\times1)}$.

Matrix Q equals as follows:

$$Q_{r,i} = \frac{c_{r,i}}{\sum_i c_{r,i}} \quad (9)$$

Exports from each region can be calculated as follows:

$$\Delta Exports = \widehat{ex}(I - A)^{-1}\Delta f \quad (10)$$

where

$\widehat{ex}$ is export intensity, equaling exports over the total output. The data are estimated based on China's MRIO table.

Imports from each region can be calculated as follows:

$$\Delta Imports = \widehat{im}(I - A)^{-1}\Delta f \quad (11)$$

where

$\widehat{im}$ is import intensity, equaling imports over the total output. The data are estimated based on China's MRIO table.

Data sources and scenario design

Data sources

The dataset for this research included 2020 transactional data from the WITS-SMART system chosen as the pre-pandemic baseline for assessing the impact of RCEP on China's trade creation and trade diversion. Standardized 2-digit Harmonized System (HS) codes were used to ensure precise sectoral analysis. China was set as the beneficiary, the other RCEP member economies being categorized according to their roles, utilizing the World Bank's classification system to organize over 90 sectors into 16 categories for the streamlined analysis.

For the ICIO analysis, the study used the 2017 OECD ICIO tables valued for their standardized, up-to-date data from the OECD and non-OECD countries. These tables facilitated reliable trade dynamics analysis and global value chain comparisons (Melnyk, Kubatko, Piven, Klymenko & Rybina, 2021). Additionally, the 2017 MRIO tables from the China Emissions Accounts and Datasets (CEADs) were employed, focusing on its 31 mainland provinces and 42 industries. This dataset highlights the interconnections between sectors and regions, offering a broader view of China's economic dynamics.

Scenario setting

The scenario design employed is based on the commitments outlined in Chapter 2, Article 2.4 of the RCEP Agreement, which states that each party shall progressively eliminate or reduce customs duties on originating the goods of the other Parties in accordance with its Schedule in Annex I (Schedules of Tariff Commitments). According to Annex I, the member countries commit to eliminating tariffs on at least 90% of traded goods progressively over a maximum period of 20 years. Therefore, Scenario 1 reflects the initial phase of trade liberalization, while Scenario 2 represents the full implementation phase, targeting comprehensive trade integration.

Scenario 1: During the initial phase, tariffs are reduced to zero for 25% of imports from Japan, 38.6% from Korea, 67.9% from ASEAN, 65.8% from Australia, and 66.1% from New Zealand. This reflects early-stage trade liberalization.

Scenario 2: In the full implementation phase, tariffs reach zero for 86% of imports from Japan and Korea, 90.5% from ASEAN, and 90% from Australia and New Zealand, demonstrating RCEP's goal of enhanced regional trade integration.

Model computation

The research hypotheses are addressed through the following steps:

Step 1: Using the WITS-SMART model, trade creation

and trade diversion are quantified under the two scenarios. The results are integrated with the OECD ICIO tables, forming a matrix of 7 regions, 37 sectors, and 2 stages.

Step 2: The Step 1 export shocks are applied to the ICIO tables so as to evaluate how trade changes indirectly affect various sectors through the supply chain linkages.

Step 3: The China MRIO table assesses RCEP's impact on regional imports and exports, highlighting provincial-level trade discrepancies.

This combined WITS-SMART and IO approach offers a detailed examination of trade creation, trade diversion, and regional disparities.

RESULTS AND DISCUSSION

Trade creation and trade diversion in China

The impact of trade creation and trade diversion brought to China by the RCEP member countries is presented in this section, as shown in Table 1 below.

Trade creation

Under S1, China's trade creation totaled USD 975 million. This figure is expected to significantly increase to USD 8.7 billion in S2, indicating the growing impact of the RCEP tariff reductions as the agreement progresses. Among the member countries, Japan and South Korea contributed the most to trade creation in both scenarios. For instance, China generated USD 802 million and USD 159 million in S1 from Japan and South Korea, and the figures are projected to grow to USD 6.5 billion and USD 1.9 billion in S2.

Trade creation with the ASEAN countries also soared, increasing from USD 14 million in S1 to USD 60 million in S2. However, the overall contribution from ASEAN remained smaller compared to that from Japan and South Korea. Australia and New Zealand exhibited relatively limited trade creation effects, with the figures growing modestly from S1 to S2.

Trade diversion

Trade diversion effects are also significant, though smaller in magnitude compared to trade creation. In S1, China gained USD 835 million in trade diversion, which is estimated to escalate to USD 6.4 billion in S2. The key contributors to the trade diversion are Japan and South Korea. For example, China is forecasted to generate USD 4.8 billion and USD 1.5 billion in S2 from Japan and South Korea, compared to USD 654 million and USD 171 million in S1, respectively.

For the ASEAN countries, trade diversion is projected to grow from USD 10 million in S1 to USD 33 million in S2. Similarly, Australia and New Zealand showed minimum trade diversion effects, with incremental increases observed between the two scenarios.

Table 1 China's trade creation and trade diversion from the other RCEP member economies under the two scenarios

USD million	New Zealand		South Korea		Japan		Australia		ASEAN		Total	
	S1	S2	S1	S2	S1	S2	S1	S2	S1	S2	S1	S2
Trade Creation	0.01	0.04	159	1,963	802.00	6,506	0.40	235	14	60	975.41	8,764.04
Trade Diversion	0.02	0.07	171	1,543	654.00	4,797	0.38	53	10	33	835.40	6,426.07

Source: Authors, based on the WITS-SMART simulation

The sectoral analysis of trade creation and trade diversion

The following section presents that all Chinese industries have faced increased trade creation and trade diversion from S1 to S2. However, an in-depth study reveals that the distribution of trade creation and trade diversion across the industries is markedly uneven, as is shown in Table 2.

Japan

Japan is the biggest contributor to China's trade creation and trade diversion under RCEP, particularly in the high-tech and manufacturing industries, its contributions spanning all the three sectors, but being heavily concentrated in the secondary industries.

The primary sector

In the primary sector, Japan's contributions are modest but noteworthy, especially in the fuels industry. Trade creation and trade diversion in S2 amount to USD 75.4 million and USD 44 million, respectively, these effects reflecting Japan's capacity to supply refined petroleum products, which complement China's industrial demand. The other primary industries, such as animal and vegetable products, show negligible trade effects due to Japan's limited agricultural exports.

The secondary sector

Japan dominates the secondary sector, where the total trade creation reaches over USD 6.5 billion in S2. The machinery and electronics industry leads with the trade creation of USD 1.68 billion, driven by China's reliance on Japan for advanced machinery and electronic components. In the chemicals industry, trade creation and trade diversion are expected to surge from USD 296.5 million and USD 195.9 million in S1 to USD 1.4 billion and USD 745.2 million in S2, respectively, thus reflecting the growing demand for industrial chemicals in China. Additionally, the plastics and rubber industry generates the trade effects exceeding USD 600 million in S2, emphasizing Japan's position as the critical supplier of intermediate goods.

The tertiary sector

In the tertiary sector, Japan's contributions are primarily in Miscellaneous Goods and Textiles and Clothing, with the total trade creation and trade diversion effects of over USD 666 million and USD 186 million in S2, respectively. These industries highlight Japan's ability to integrate in China's value chains for consumer-oriented products. The trade effects in transportation and the other service-related industries remain at a minimum, indicating Japan's focus on manufacturing and goods.

South Korea

South Korea ranks second in terms of trade effects, with significant contributions in both the primary and secondary sectors, reflecting its advanced industrial base and regional integration under RCEP.

The primary sector

South Korea's contributions to the primary sector are primarily concentrated in the fuels industry. Trade creation and trade diversion in S2 are projected to reach USD 85.3 million and USD 89.7 million, respectively, these effects aligning with South Korea's role as the regional supplier of energy resources. The contributions to the other primary industries, such as animal and vegetable products, remain at a minimum, reflecting the country's industrialized economy.

The secondary sector

The secondary sector dominates South Korea's trade effects, with substantial growth in the key industries. In the chemicals industry, trade creation and trade diversion are expected to rise from USD 13.4 million and USD 16.7 million in S1 to USD 306.8 million and USD 137.7 million in S2, respectively, highlighting the increasing demand for South Korea's industrial chemicals. The machinery and electronics industry contributes significantly, with the total trade creation and trade diversion of USD 340.1 million and USD 360.4 million in S2, respectively, which reflects South Korea's position as the leading supplier of high-tech equipment and electronic components to China. The other secondary industries such as Metals and Plastics

and Rubber contribute moderately, emphasizing the diversified nature of South Korea's industrial exports.

The tertiary sector

In the tertiary sector, South Korea demonstrates competitive advantages in Textiles and Clothing and Transportation. The total trade creation and trade diversion in these industries are projected to increase to USD 156.5 million and USD 109 million in S2, respectively, these results indicating South Korea's ability to cater to China's demand for durable goods and intermediate materials, underscoring the integration of regional value chains.

Australia

Australia's trade contributions are concentrated in the primary sector with relatively limited impacts in the secondary and tertiary industries. Its trade effects under RCEP highlight its role as the key supplier of raw materials and agricultural products.

The primary sector

The animal products industry dominates Australia's primary sector contributions. Trade creation and trade diversion are estimated to rise to USD 228.8 million and USD 47.2 million in S2, respectively, driven by Australia's competitive livestock exports and China's growing demand for high-quality meat products. In the fuels industry, trade effects remain moderate, reflecting Australia's position as a supplier of coal and natural gas to China. Contributions to the other primary industries, such as vegetable and wood products, are at a minimum, reflecting Australia's focus on energy and livestock exports.

The secondary sector

Australia's impact in the secondary sector is negligible. Most industries, including chemicals, machinery, and textiles, show trade effects under USD 1 million. This limited impact reflects a lack of manufacturing complementarities between Australia and China under RCEP.

The tertiary sector

In the tertiary sector, Australia's contributions are at a minimum, with trade effects concentrated in the niche industries such as education and professional services, which are not captured in the current dataset, which highlights the resource-dependent nature of Australia's trade relationship with China.

New Zealand

New Zealand's contributions are the smallest among the RCEP members, focusing almost exclusively on the primary sector.

The primary sector

The animal products industry accounts for nearly all of New Zealand's trade effects under RCEP. Trade creation and trade diversion in S2 are expected to be less than USD 1 million, reflecting the country's small export volume and the niche focus on dairy and meat products. Contributions to the other primary industries are negligible, emphasizing New Zealand's narrow trade specialization.

The secondary and tertiary sectors

New Zealand has minimal impacts in the secondary and tertiary industries, with trade effects close to zero, which reflects the country's limited industrial base and focus on agricultural exports.

ASEAN

ASEAN countries significantly contribute to China's trade across all the three sectors, reflecting strong regional supply chain integration and trade facilitation under RCEP.

The primary sector

The vegetable products and wood products industries dominate ASEAN's primary sector contributions. Trade creation in the vegetable products industry is estimated to grow from USD 8.7 million in S1 to USD 36.8 million in S2, highlighting ASEAN's role as a supplier of raw materials for China's food and agricultural industries. Similarly, trade creation in the

wood products industry is estimated to increase to USD 2.4 million in S2, driven by ASEAN's supply of timber and related products.

The secondary sector

In the secondary sector, ASEAN's contributions are modest but diversified. The textiles and clothing industry is projected to generate trade creation of USD 9.2 million in S2, reflecting ASEAN's competitive advantage in low-cost manufacturing. The plastics and rubber industry is expected to contribute USD 0.4 million in trade creation in S2, emphasizing ASEAN's role in intermediate goods production. The other industries, such as chemicals and machinery, show limited contributions, underscoring the region's focus on light manufacturing.

The tertiary sector

ASEAN's role in the tertiary sector is limited, with trade creation in the transportation and miscellaneous goods industries totaling less than USD 10 million, which reflects the region's focus on goods trade rather than services.

The provincial-level impacts of imports and exports

This section illustrates the changes in imports and exports across China's different regions, as is shown in Table 3.

The eastern region

The eastern region, with its well-established industrial base and robust infrastructure, has experienced the most significant trade growth under RCEP. The region's performance is driven by its high concentration of export-oriented industries and advanced connectivity to global markets.

Guangdong: As China's leading exporting province, Guangdong exhibits the largest absolute trade growth. Imports are projected to rise from USD 461.7 million in S1 to USD 5.1 billion in S2, while exports are estimated to surge from USD 774.7 million to USD 8.6 billion. This remarkable growth is largely attributable to Guangdong's strong presence in the high-value-added sectors such as electronics, machinery, and textiles. The province benefits from reduced tariffs under RCEP, which enhances its competitive edge in global supply chains. Notably, the gap between imports and exports broadened under S2, highlighting Guangdong's pivotal role as the manufacturing hub that attracts intermediate goods for processing and re-export.

Jiangsu: Jiangsu follows closely, with imports increasing from USD 261.5 million in S1 to USD 2.9 billion in S2, and exports rising from USD 414.5 million to USD 4.6 billion. Compared to Guangdong, Jiangsu demonstrates a more balanced trade profile, driven by its diversified industrial structure encompassing machinery, chemicals, and renewable energy components, which diversification allows Jiangsu to leverage RCEP tariff reductions across multiple industries, ensuring steady growth in both imports and exports.

Shanghai: As an international financial and trade hub, Shanghai is projected to achieve combined imports and exports of USD 8.35 billion in S2, which is up from USD 749 million in S1. While its total trade volume is slightly lower than Guangdong's, Shanghai's trade growth reflects its role as the key logistics and distribution center. The city's infrastructure facilitates efficient import-export processes, amplifying the positive impacts of RCEP trade facilitation measures.

When speaking about the regional comparison, Guangdong's dominance among the eastern provinces in export-oriented manufacturing gives it a competitive edge, while Jiangsu's diversified industries enable balanced growth. Shanghai's role as a logistics hub complements these production-driven provinces, highlighting the region's interconnected trade ecosystem.

The central region

Traditionally less export-focused, the central region exhibited substantial growth under RCEP, underscoring its emerging potential in trade. The region's gains are particularly notable in the provinces investing in industrial development and the infrastructure.

Table 2 Trade creation and trade diversion in various Chinese sectors from the RCEP members under the two scenarios, in USD million

	New Zealand				Australia				South Korea				Japan				ASEAN			
	TC		TD		TC		TD		TC		TD		TC		TD		TC		TD	
	S1	S2	S1	S2	S1	S2	S1	S2	S1	S2	S1	S2	S1	S2	S1	S2	S1	S2	S1	S2
Animal	0.0	0.0	0.0	0.0	0.0	228.8	0.0	47.2	0.0	90.1	0.0	4.4	0.0	27.0	0.0	7.3	0.0	0.0	0.0	0.0
Vegetable	0.0	0.0	0.0	0.0	0.4	4.4	0.4	4.3	3.5	7.3	3.0	7.4	0.8	27.6	0.4	6.0	8.7	36.8	0.0	0.0
Food Products	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.1	267.6	12.9	37.8	5.6	632.3	31.1	89.9	0.6	1.2	0.0	0.0
Minerals	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.6	153.7	4.5	12.7	0.0	0.0	0.0	0.0
Fuels	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	53.7	85.3	47.4	89.7	51.5	75.4	12.8	44.0	0.0	0.0	0.0	0.0
Chemicals	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.4	306.8	16.7	137.7	296.5	1,414.6	195.9	745.2	0.0	1.4	0.0	0.0
Plas or Rubb	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.3	250.2	9.3	281.7	33.5	611.4	44.7	644.7	0.0	0.4	0.0	0.0
Hides and Skins	0.0	0.0	0.0	0.0	0.0	1.2	1.2	1.5	0.0	50.8	0.0	8.5	0.0	27.0	0.0	3.1	0.0	0.0	0.0	0.0
Wood	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.4	0.3	0.4	0.0	8.0	0.0	3.7	0.5	2.4	0.0	0.0
Text and Clot	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.5	7.0	94.3	8.0	51.9	15.0	186.8	8.5	127.0	3.1	9.2	0.0	0.0
Footwear	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.1	0.0	3.7	0.0	6.9	0.0	4.2	0.0	0.0	0.0	0.0
Stone and Glas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.1	21.2	9.1	25.0	16.8	145.3	8.1	119.8	0.0	0.0	0.0	0.0
Metals	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.5	143.3	14.3	123.4	209.2	685.2	157.9	559.1	0.0	0.0	0.0	0.0
Mach and Elec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	43.9	340.1	49.3	363.4	131.3	1,683.8	146.1	1,631.2	0.0	4.9	0.0	0.0
Transportation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	62.2	0.0	57.1	2.2	155.2	2.0	169.9	1.2	4.1	0.0	0.0
Miscellaneous	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	232.9	0.4	351.2	28.1	666.1	41.5	628.8	0.0	0.0	0.0	0.0
Total	0.0	0.0	0.0	0.0	0.4	234.6	1.8	55.5	159.1	1,961.6	170.7	1,543.3	802.1	6,506.3	653.5	4,796.6	14.1	60.4	0.0	0.0

Source: Authors, based on the WITS-SMART simulation

Hubei: Hubei stands out in the central region, with the imports increasing from USD 12.4 million in S1 to USD 138.1 million in S2 and the exports rising from USD 68.5 million to USD 762.4 million. This growth is driven by the province's burgeoning automotive and electronics sectors, which benefit from reduced input costs due to RCEP tariff reductions. Hubei's strategic location as a transportation hub further facilitates trade, enhancing its integration in the regional supply chains.

Henan: Henan's imports are projected to grow from USD 27.5 million in S1 to USD 309.3 million in S2, while the exports are estimated to increase from USD 61.1 million to USD 680 million. The province's focus on light manufacturing and agriculture contributes to this growth, with RCEP enabling greater access to raw materials and intermediate goods. However, compared to Hubei, Henan's trade growth is more modest, reflecting its less developed industrial base.

Anhui: Imports in Anhui are expected to rise from USD 50.2 million in S1 to USD 558.2 billion in S2, while its exports are estimated to increase from USD 103.5 million to USD 1.2 billion. Anhui's growth is largely driven by its electronics and machinery industries, which have increasingly aligned with the RCEP member markets. The province also benefits from the policies encouraging industrial upgrading, making it a rising player in regional trade.

In terms of the regional comparison, Hubei's superior performance highlights the benefits of the well-established industrial base and the strategic location, while Henan and Anhui illustrate the potential for growth in the provinces investing in trade-oriented development. The central region's progress underscores its transition from a domestically oriented economy to an emerging player in international trade.

Table 3 The impact of RCEP on China's provincial imports and exports, in millions USD

	S1			S2			
Regions	Imports	Exports	Subtotal	Imports	Exports	Subtotal	Total
Beijing	247.18	195.22	442.40	2,753.06	2,173.71	4,926.77	5,369.17
Tianjin	313.02	199.20	512.22	3,486.80	2,217.62	5,704.42	6,216.63
Hebei	42.97	96.70	139.67	478.39	1,074.63	1,553.02	1,692.69
Shanxi	11.60	18.97	30.57	129.30	210.83	340.13	370.71
Neimenggu	34.97	32.96	67.93	390.14	366.80	756.94	824.87
Liaoning	196.91	126.98	323.90	2,189.01	1,415.75	3,604.76	3,928.65
Jilin	127.94	24.42	152.36	1,426.74	271.91	1,698.64	1,851.00
Helongjiang	63.05	23.74	86.80	702.11	263.84	965.94	1,052.74
Shanghai	480.08	268.90	748.98	5,351.59	2,994.87	8,346.46	9,095.44
Jiangsu	261.52	414.46	675.98	2,908.46	4,604.73	7,513.19	8,189.17
Zhejiang	115.92	410.25	526.17	1,291.60	4,562.78	5,854.39	6,380.55
Anhui	50.16	103.54	153.70	558.52	1,152.06	1,710.58	1,864.27
Fujian	263.42	408.68	672.10	2,933.75	4,539.66	7,473.41	8,145.52
Jiangxi	24.93	139.99	164.92	277.43	1,554.98	1,832.41	1,997.33
Shandong	226.58	232.57	459.15	2,521.42	2,588.75	5,110.16	5,569.31
Henan	27.78	61.08	88.86	309.29	679.99	989.29	1,078.15
Hubei	12.40	68.53	80.93	138.09	762.44	900.53	981.46
Hunan	19.43	41.29	60.72	216.56	460.10	676.66	737.37
Guangdong	461.65	774.70	1,236.35	5,137.80	8,608.15	13,745.95	14,982.31
Guangxi	64.73	56.25	120.98	721.06	626.50	1,347.56	1,468.54
Hainan	37.74	43.05	80.80	419.86	479.41	899.28	980.07
Chongqing	63.65	150.29	213.95	709.30	1,673.80	2,383.10	2,597.05
Sichuan	22.91	41.35	64.26	255.28	460.36	715.64	779.91
Guizhou	62.16	51.42	113.58	692.06	571.97	1,264.03	1,377.61
Yunnan	17.99	43.93	61.92	200.47	489.31	689.79	751.71
Tibet	1.74	8.27	10.01	19.43	92.68	112.11	122.12
Shaanxi	22.86	52.59	75.45	254.61	585.41	840.01	915.46
Gansu	8.89	11.92	20.81	99.05	132.47	231.52	252.33
Qinghai	2.25	10.41	12.66	25.04	115.66	140.71	153.37
Ningxia	29.68	85.22	114.90	331.04	948.70	1,279.74	1,394.64
Xinjiang	152.72	52.61	205.33	1,693.54	584.35	2,277.89	2,483.22

Source: Authors, based on the ICIO and Chinese MRIO tables

The western region

While lagging behind the eastern and central regions, the western region showed notable growth under RCEP in absolute trade volumes. This progress highlights the potential for trade-led development in less industrialized areas.

Sichuan: Sichuan's exports are projected to grow from USD 41.4 million in S1 to USD 460.4 million in S2, while the imports are expected to increase from USD 22.9 million to USD 255.3 million. The province's growth is fueled by its agricultural exports and the emerging electronics manufacturing sector. RCEP tariff reductions provide Sichuan with greater market access for its agricultural products, while its electronics sector benefits from lower input costs.

Yunnan: Yunnan is expected to achieve imports of USD 200.5 million and exports of USD 489.3 million in S2, which is up from USD 18 million and USD 43.9 million in S1, respectively. The province's proximity to the ASEAN markets positions it as the key trade partner within the RCEP framework. Agricultural products, including rubber and coffee, dominate Yunnan's exports, reflecting its comparative advantage in the resource-based sectors.

Guizhou: Guizhou is projected to generate imports of USD 692.1 million and exports of USD 572 million in S2, which is a substantial increase from USD 62.2 million and USD 51 million in S1, respectively. The province's trade is primarily driven by its mineral resources and the emerging light manufacturing industries. However, the limited infrastructure yet remains a constraint on further growth.

In terms of the regional comparison, among the western provinces, Sichuan's diversified trade profile gives it a slight advantage over the resource-dependent provinces such as Yunnan and Guizhou. The western region's growth underscores the importance of continued investments in the infrastructure and industrial diversification to fully capitalize on the RCEP benefits.

The RCEP agreement has led to diverse trade impacts across China's regions. With its strong industrial base and connectivity, the eastern region remains the primary beneficiary, driving national trade growth. The central region demonstrates a substantial potential, supported by industrial upgrading and strategic investments. Although starting from a lower base, the western region shows promising progress, particularly in agriculture and resource-based exports. These findings emphasize the need for region-specific policies to address disparities and maximize the benefits of regional economic integration under RCEP.

CONCLUSION

This study examines the national and regional impacts of RCEP on China's trade, focusing on trade creation and diversion, sectoral disparities, and provincial-level changes. The results obtained in this study are indicative of the following main findings, namely:

Trade creation significantly exceeds trade diversion, with Japan and South Korea contributing the most to trade creation effects.

The high-tech and manufacturing sectors benefit the most, while the low-value-added industries experience smaller gains or even adverse effects.

Regional disparities are evident, with the coastal provinces such as Guangdong and Jiangsu achieving the biggest trade gains compared to the more modest growth in the inland regions.

Based on these findings, several policy recommendations are proposed.

Strengthening partnerships with the key RCEP members such as Japan and South Korea is critical, particularly in the high-tech sectors such as machinery and electronics. These collaborations can enhance China's industrial capabilities and its global competitiveness.

In a similar fashion, the ASEAN countries present the untapped potential in both the emerging and established sectors. Strengthening supply chain integration with ASEAN, particularly in renewable energy and advanced manufacturing, could yield substantial mutual benefits. As A. T. Nguyen and T. M. T. Tran (2021) emphasized, trade facilitation measures, including the reduction of nontariff barriers and improvements in institutional coordination, are critical for fostering regional supply chain integration and enhancing trade flows. These efforts should be coupled with exploring partnerships in rapidly evolving sectors so as to diversify trade opportunities and promote technological innovation.

In terms of regional development strategies, the uneven distribution of RCEP benefits across China's regions necessitates region-specific policy interventions to bridge the development gaps and maximize the economic potential of the agreement.

In the eastern region, which already benefits from the robust industrial bases and the strong export capabilities, policies should prioritize fostering the innovation-driven industries. Upgrading the high-value-added sectors such as advanced manufacturing and digital services will consolidate the region's role as a global manufacturing and trade hub.

For the central region, investments in the infrastructure and industrial modernization are critical to attract trade and investment. Policy support should focus on nurturing emerging industries like automotive and electronics to position the region as the key player in domestic and international value chains.

While lagging behind in trade volumes, the western region holds a significant potential for growth through strategic infrastructure development. Enhancing connectivity, both domestically and internationally, will facilitate the integration of the resource-based industries and light manufacturing into regional and global supply chains. Encouraging trade-oriented diversification can further elevate the region's economic profile.

Addressing industry-specific challenges. Sectoral heterogeneity in RCEP trade impacts necessitates tailored support for the industries faced up with unique challenges. Vulnerable sectors, particularly in the primary and tertiary industries, require targeted subsidies or tariff adjustments so as to mitigate potential adverse effects and enhance resilience. For instance, the resource-based industries in the primary sector may benefit from the policies aimed at improving efficiency and value addition.

While showing strong trade effects, the secondary sector should prioritize diversification to reduce dependency on high-tech imports. Encouraging the development of domestic capabilities in the key sectors such as machinery and chemicals will enhance self-sufficiency and support long-term industrial growth.

Limitations do exist in this research. This study relies on the pre-pandemic data potentially limiting its applicability to the post-COVID-19 trade dynamics. Future research should explore updated datasets to capture RCEP evolving impacts.

This study primarily focuses on tariff reductions, leaving nontariff barriers and broader legislative changes under RCEP unexplored. Considering the factors such as trade facilitation measures, regulatory harmonization, and digital trade agreements could provide a broader understanding of the RCEP effects.

The static models employed in this research study effectively capture the immediate impacts of RCEP. However, expanding the analysis in order for it to include dynamic models could reveal the long-term evolution of trade flows and economic interdependencies. Additionally, the parameter settings of the model need to be more realistic in the future. For example, export elasticity in the WITS-SMART tool is set to 99 by default and cannot be changed, which is an idealized setting.

By addressing these limitations, future research can deepen our understanding of RCEP multifaceted impacts, offering more precise guidance for policymakers navigating the complexities of regional economic integration.

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UNLOCKING NIGERIA'S NON-OIL EXPORT POTENTIAL: DO TRADE FINANCING AND DIGITAL PAYMENT PLAY A ROLE?

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Nigeria's poor non-oil export performance has been the focal point of the growth policy discourse since the 1970s, but the role of emerging driving factors has remained significantly less understood. Thus, this study explores the determinants of Nigeria's non-oil exports by explicitly considering trade credit and digital payment systems. The study employs the Autoregressive Distributed Lag Model and the monthly data from 2010 to 2023 so as to achieve its objective. The results show that increased trade credit and better e-payment systems significantly improve the non-oil export sector's performance. The one implication of this finding is that increasing trade credit and improving e-payment systems may serve as another alternative to unlocking and boosting Nigeria's non-oil export sector's potential. Therefore, the paper concludes that, with the promotion of trade credit and an increased use of e-payments, Nigeria can improve its non-oil export performance in order to foster sustainable economic growth.

Keywords: trade financing, digital payment, international trade, export, Nigeria

JEL Classification: F14, 016, O33

INTRODUCTION

In recent years, export financing and e-payment systems have become the essential drivers of export performance in developing economies, which is even more important where inadequate credit access and weak e-payment platforms remain significant challenges for export-oriented firms. This is because export financing boosts external trade by providing export-oriented domestic firms with the capital to expand their productivity, to innovate, and to target foreign markets. Along this line, e-payment systems also offer a platform for traders to conduct trade transactions through a secure and efficient channel, which is even more important in the quest for non-oil export-led economic growth, because e-payment systems reduce transaction costs, enhance transparency and speedy payment for goods and services. In Nigeria, however, limited access to export credit and the poor adoption of e-payment systems may have contributed to the weakening competitiveness of its exporters, especially those in

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the non-oil sector. The shortages and perhaps the inherent weakness of these critical trade enablers may have dampened the prospects of Nigeria's non-oil export growth, which remains a significant development agenda.

In addition, the difficulty in accessing export finance combined with an inefficient e-payment system has constrained the exporters' expansion potential, impeded their liquidity position, and magnified payment risks. Furthermore, another challenge that exporters seek to overcome is the stringent market access conditions imposed by foreign countries (i.e. importers). Thus, to make Nigerian firms be more competitive and achieve trade efficiency, export financing, particularly trade credit and a sound e-payment system, are imperative. Thus, this raises the question of whether Nigeria should increasingly support trade credit and continuously adopt e-payment systems to unlock the potential of the non-oil export sector. This study hypothesizes that the answer is "yes" if their operation enhances the performance of the non-oil export sector, and "no" if it does not. Therefore, this study aims to examine the emerging role of the trade credit and digital payment systems on the performance of Nigeria's non-oil export sector.

In light of the foregoing, there are three major considerations that motivate the focus of this study. First, there is little (if any) empirical evidence on the role of export financing and e-payment systems in promoting the non-oil export sector's performance, except for the study by O. O. Awe, A. A. Adepoju, O. Aromolaran, M. Oladosun, D. E. Azuh and U. Okorie (2021) that examines the role of e-payment systems and trade financing on trade performance. Thus, updated empirical knowledge is important because trade credit and e-payments enhance trade volume, efficiency, diversity, and financial risk mitigation, which is critical, particularly in the case of Nigeria, where crude oil exports have crowded out non-oil exports, which is a more sustainable and stable source of revenue for the government. Moreover, the evidence shows that the export revenue impact of the oil price slump imposes a costly and painful adjustment process in Nigeria (Oyejide, 2015). Second, adverse oil shocks and dwindling oil revenue inflows are a wake-up call for Nigeria to take non-oil exports more seriously. However, doing this requires an efficient digital payment system and export credit support. Third, there are serious concerns that the rate of Nigeria's export diversification away from oil to non-oil has significantly remained very sluggish. For example, Nigeria's non-oil exports as a share of total exports were 17% in September 2021 but dropped to 5% in the same month in 2022, whereas oil exports accounted for over 90%. This is a source of severe concern for the government's quest to diversify from oil to non-oil exports. In this context, the role of the emerging drivers that are expected to stimulate non-oil exports such as export financing and digital payment systems cannot be downplayed[1]. Moreover, the use of e-payment systems and trade credit has continued to surge after COVID-19. Trade credit has astronomically increased from N1.1 trillion in September to N3.2 billion in September 2023.

In light of the modified export supply function predictions and the results obtained from the ARDL model, this study's analysis reveals that increases in trade credit and the usage of e-payment systems significantly raise the performance of the non-oil export sector in Nigeria, which finding implies that trade credit and e-payment can enhance the potential of Nigeria's non-oil export sector, thus contributing the important empirical information that can be used as the input in designing the policies aimed at improving the performance of the non-oil export sector so as to diversify and promote resilient export-led growth in Nigeria. This is important given the fact that Nigeria's main non-oil export products were cocoa (fermented and raw), sesame, cashew nuts, coconut, frozen shrimps and prawns, and ginger. However, Nigeria is relatively not doing well on non-oil exports compared to other countries. Some plausible reasons for this poor performance are the very challenging business environment, such as the high cost of technology and inadequate access to credit. Therefore, this study provides the information suggesting that, by promoting trade credit and increasing the use of e-payments, Nigeria can enhance its non-oil export performance in order to support export-led growth. In addition, the study also contributes to the existing

literature on the determinants of non-oil export performance, particularly the role of trade credit and digital payment systems.

Finally, this paper is organized into six sections. Following the Introduction, Section Two provides stylized facts, which is then followed by Section Three with its review of related studies. Section Four delineates the methodological framework so as to quantify the determinants of Nigeria's non-oil exports. In Section Five the empirical results are presented and discussed, while the paper's main conclusion and policy highlights are given in Section Six.

STYLIZED FACTS

In Nigeria, adequate trade financing and the adoption of digital payment systems can be pivotal for enhancing the country's non-oil export performance. In this light, the section examines the performance of Nigeria's non-oil exports, trade credit, digital payment, exchange rate, foreign exchange supply, and non-oil revenue from 2010 to 2023. The selection of these indicators for the stylized analysis was motivated by the fact that they are the drivers of export supply in Nigeria and would also serve as the foundation for the empirical framework of the paper outlined in Section Four. Table 1 shows that the performance of non-oil exports was quite volatile, increasing from US$223 million in 2010 to US$336 million in 2013, dropping to US$125 million in 2016 and peaking in 2019 at US$2.63 billion[2]. However, non-oil exports dropped again to US$846 million in 2021, up from US$138 million before shrinking to US$391 million and US$279 million in September 2022 and 2023, respectively.

As is shown in Table 1, trade-related financing increased but needs to be improved in order for it to drive non-oil exports in Nigeria. Trade credit increased from N783 billion to N954 billion in 2017 and maintained an upward trend from N1.07 trillion in September 2018 to N3.21 trillion in September 2023. In addition, it has been on the rise. The use of digital payment systems increased from N47.85 billion in September 2010 to about N103.97 trillion in September 2023, indicating a more ICT-intensive financial system.

Table 1 The key indicators

Year	Non-Oil Exports (US$' B)	Trade Credit (₦' B)	Digital Payment (N' B)	Official Exchange rate (N/US$)	Foreign Exchange supply (US$' M)	Non-oil Revenue (₦' M)
Sep-10	0.223	783.13	47.85	154.50	4,207.31	155,892
Sep-11	0.279	991.13	136.87	159.60	4,845.65	200,106
Sep-12	0.284	1,017.25	1,626.82	157.24	1,909.58	192,226
Sep-13	0.336	1,023.87	2,379.00	160.65	3,489.27	192,817
Sep-14	0.293	1,337.06	3,309.54	163.70	3,345.68	221,246
Sep-15	0.117	1,030.00	3,651.04	196.95	1,660.62	215,340
Sep-16	0.125	973.01	5,059.79	305.25	30.00	232,282
Sep-17	0.227	954.23	8,191.43	360.40	420.70	309,752
Sep-18	0.257	1,073.71	11,207.26	363.92	1,078.32	290,390
Sep-19	2.628	1,098.48	13,858.54	362.23	2,061.02	360,432
Sep-20	0.138	1,265.07	37,721.38	386.00	1,313.28	437,596
Sep-21	0.846	1,564.45	39,001.43	411.00	1,497.49	489,164
Sep-22	0.391	2,006.80	70,214.40	435.10	896.31	616,420
Sep-23	0.279	3,207.21	103,967.37	769.26	231.00	999,643

Source: Central Bank of Nigeria; Note: B means billion while M means million

In addition, Figures 1 and 2 plot the movement of some of the key indicators over time. Figure 1 demonstrates that the official foreign exchange rate was going up, indicating the depreciation of the impact of the recent devaluation of the naira. However, Figure 1 also reveals that the official FX supply was quite low, indicating the effects of the ongoing full pledge floating of the naira exchange rate.

Furthermore, Figure 2 indicates a strong correlation between trade credit and the adoption of digital payment systems. However, Figure 2 also shows a remarkable jump from 2019, which coincided with the adoption of online-based payments for goods and services due to COVID-19 and the government credit programs to support domestic firms during and after the pandemic. The link between trade credit and digital payment systems is critical for enhancing business efficiency and financial management. Trade credit allows businesses to buy goods and services on account, improving liquidity and fostering growth. Digital payment systems streamline the process, offering secure, quick, and transparent transactions. This integration reduces the risk of defaults, improves cash flow management, and fosters trust between trading partners.

LITERATURE REVIEW

Theoretical discussion

The theoretical connection between trade financing, digital payment, and export performance can be linked to the export supply functions. A. R. Bergstrom (1951) is amongst the earliest studies to have outlined the theoretical framework for analyzing export supply. The model predicts that the volume of exports is a function of the export price level and the general wage rate. However, the direction of the impact of the key determinants (the export price level & the general wage rate) on the volume of exports has remained ambiguous in the literature, in which light, the imperfect substitution model is broadly applied in the analysis of how exporters respond to conditions in their ability to supply goods and services to foreign markets. The model reflects the environment where exporters are faced with constraints and limitations in adjusting quantity due to, among other things, the production capacity, technology, and prevailing market conditions. I. Lukonga (1994) notes that exports could be better substitutes for domestic goods. Export demand is hypothesized to vary positively with the world economic activity and inversely with the export

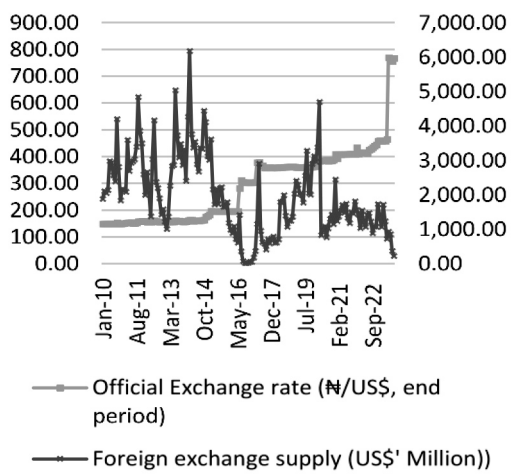

Figure 1 Exchange rate and FX supply

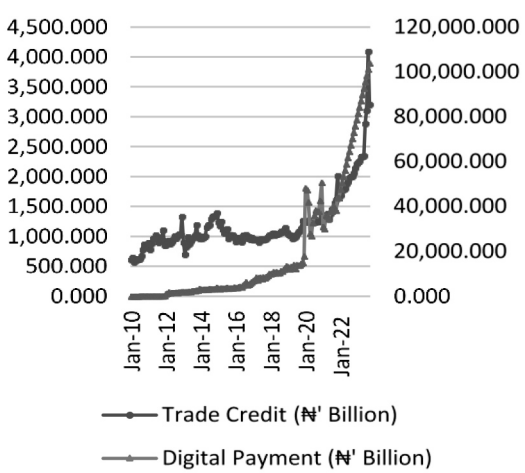

Figure 2 Trade credit and digital payment

Source: Central Bank of Nigeria

prices of the exporting country relative to the prices of foreign substitutes. In contrast, the export supply function is specified so as to positively depend on the cost of exports, negatively on input prices, and positively on the productive capacity. The model allows for the estimation of the demand- and supply-side determinants simultaneously.

In addition, A. Arize (1987) specifies a general export supply function, which assumes that firms are price takers and postulates that the supply of exports depends on the individual country's trend level of real income, deviations from this trend, and export and domestic prices. The volume of export supply is assumed to adjust towards the supplier's desired values. J. L. Newman, V. Lavy and P. de Vreyer (1995) analyze firm behavior by allowing firms and industries to produce two products in a joint production process. The firms are assumed to operate under a perfectly competitive setting in factor markets; therefore, all factor inputs are considered as exogenous. Export prices are also exogenous and operate under perfect competition in factor markets.

In sum, export supply functions are predicated on the notion that exporters respond to changes in different factors such as prices, production costs, exchange rates, and market conditions. The elasticity of export supply measures the responsiveness of the export quantity to changes in its driving factors. Higher elasticity indicates that exporters are more responsive to price changes or other factors. Lower elasticity suggests that exporters must be more responsive and face constraints in adjusting export quantities.

Empirical review

The empirical literature on the drivers of exports is large and has been evolving in recent years. However, the empirical findings of the literature appeared generally mixed with respect to the direction of the impact of the export supply determinants reflecting variations in terms of countries' structures, the methods used, and data measurements. For example, I. Lukonga (1994) found that domestic market conditions strongly influenced export performance in Nigeria. Specifically, the results showed that price incentives had a positive but small effect on agricultural exports. In contrast, the structural shift in the export supply function was linked to the export promotion incentives in the study. In addition, B. O. Oramah, O. Chukwurah and O. Ojeifo (1995) examined the operations of the Nigerian Export-Import Bank and found that the Bank had effectively provided credit support for Nigeria's non-oil exports in the period from 1991 to 1993.

Similarly, in Slovenia, J. Bekő (1999) found that exports were sensitive to trade cycles in global markets and that export supply had been price- and exchange-rate inelastic but income-sensitive between 1993 and 1997. In Japan, J. S. Mah (2006) established that the insurance system had not promoted export supply. J. S. Mah's (2006) findings also indicate that export relative price elasticity is around 0.8-1.0 and statistically significant, whereas no evidence supports the domestic demand pressure hypothesis in export supply. Using cointegration and error correction models, N. M. Nkang, S. O. Abang, O. E. Akpan and K. J. Offem (2007) examined Nigeria's palm kernel export supply function from 1970 to 2003. The long-term results showed that the producer price and foreign income negatively and significantly affected palm kernel exports. In addition, the estimates indicate that the producer price significantly undermined export supply, while foreign income was found to have an insignificant effect in the short run.

Furthermore, T. A. Oyejide (2015) established the fact that higher non-oil exports did not make up for revenue shortfalls in Nigeria following adverse oil price shocks but are crucial for economic growth in the medium to long run. Similarly, M. Raissi and V. Tulin (2018) found that Nigeria's exports were sensitive to international relative price competitiveness, the world demand, and energy shortages. The study also observed that supply-side constraints such as energy shortages dampened the price responsiveness in the short run. In a related context, R. Bhattacharyya and S. Ghosh (2019) observed that the decline in international prices during the recession had reduced the competitiveness of India's exports between 2001Q1 and 2014Q4. The results of the study also showed that the export firms had shifted their attention towards the domestic market due to the export deficit. In

Pakistan, S. I. Hussain, A. Hussain and M. M. Alam (2020) found the evidence that relative prices had an important influence on the export sector performance with respect to raw materials and value-added manufactured products. S. I. Hussain *et al* (2020) also produced evidence indicating that the cost of production significantly affected the growth of value-added manufactured and cotton waste exports. The findings also revealed that the production capacity and domestic demand pressure had significantly influenced the long-term export supply of almost all manufactured and primary export categories.

In addition, O. O. Awe *et al* (2021) use the Bayesian time-varying parameter dynamic linear model to reveal that domestic income and the lending rate influence non-oil export in Nigeria. Similarly, H. O. Ozekhome (2021) used the ARDL cointegration and error correction model to establish the fact that financial development had improved export diversification in both the short run and the long run in Nigeria between 1980 and 2021. In a related context in Pakistan, S. I. Hussain and U. Mazhar (2022) used the ARDL model to show that domestic demand pressure significantly reduced the supply of aggregate, primary, and manufactured exports in both the long run and the short run. Also, E. Frohm (2023) examines how margins adjust to bilateral and US-dollar exchange rate changes using fixed-effect regression on the bilateral trade data at the HS2-product level. The results showed that the exporter's exchange rate depreciation increased the nominal exports between the non-US countries, whereas the bilateral exchange rate had a negligible impact. In addition, K. Farid, T. Mahmood, M. Mumtaz and S. H. Ansari (2023) showed that FDI enhanced export in the long-term link between 2000 and 2020 in a panel of 5 large-scale manufacturing firms in Pakistan.

Using a fixed effect model, Z. Li, H. Chen, S. Lu, and P. Failler (2024) found more recently that better digital payment systems boosted trade performance and enhanced trade networks by reducing cross-border capital restrictions in 25 countries from 2012 to 2020. Interestingly, Li *et al*'s (2024) findings suggest that the impact of digital payment on external trade varies across countries with different levels of trade openness, which means that the policy environment matters. However, W. Gani (2024) used the ARDL model and observed that the pandemic had not affected industrial export performance during the COVID-19 pandemic in Tunisia from 2014 to 2022. Similarly, G. Palazzo (2024) examined the effect of the fundamental exchange rate dynamics on sectoral export performance in Argentina between 1980 and 2015. The results show that the probability of the export sector increases by 2.5% due to higher labor intensity during prolonged devaluation periods. The findings also indicate that export surges are more likely to occur in the sectors related to competitive industries. L. Brandt and K. Lim (2024) analyzed the determinants of Chinese export performance using the general equilibrium model and the results showed that foreign demand, better access to imported intermediates, and factor productivity growth were the main drivers of export performance in China.

METHODOLOGY

This study relies on the modified non-oil export supply function as the theoretical basis of its empirical framework. The model explains how non-oil export supply responds to several factors. For example, the model predicts that a higher relative price of exported goods relative to domestic products increases export supply. The model also suggests that the productive capacity is expected to have a positive effect on non-oil exports. The exchange rate is also crucial for non-oil exports because a weaker domestic currency makes exports cheaper and more competitive in global markets, increasing export supply. Finally, trade policies in the form of tariffs and non-tariff barriers can influence exports by stimulating or discouraging foreign trade. However, due to data limitations, it was impossible to include all the variables discussed above; however, in addition to the exchange rate and the relative price, the export supply specification of S. I. Hussain *et al* (2020) and W. Gani (2024) was slightly modified so as to account for trade credit and e-payment in line with the goal of this research study. Therefore, the empirical model is specified as follows:

$$nox_t = \alpha + \beta_1 tcre_t + \beta_2 epay_t + \beta_3 exr_t + \beta_4 fxp_t + \beta_5 fxs_t + \mu \quad (1)$$

According to Equation (1), *nox* represents the non-oil exports, *tcre* measures trade credit, *epay* denotes the sum of various e-payment systems, *exr* is the exchange rate, *fxp* is the relative price and *fxs* denotes foreign exchange supply. The β_i' are the estimable parameters of the model, and *t* stands for the time, whereas μ is the error term. The hypothesized signs of the elasticities are as follows: $\beta_1>0$, $\beta_2>0$, $\beta_3>0$, $\beta_4>0$, $\beta_5>0$. In addition, the empirical model embodies the hypothesis that if the export price for domestically produced goods in the international market is higher than the domestic price, it will increase the relative profitability of producing exportable goods. Firms tend to shift their resources from the non-traded sector to exportable production, which in turn would enhance the volume of the country's exports; hence, a positive estimate for the relative price coefficient is expected (Hussain *et al*, 2020). The exchange rate coefficient is expected to be positive because a higher exchange rate (indicating the depreciation of the domestic currency) makes exports cheaper in the international markets and spurs competitiveness (Gani, 2024). The higher the liquidity of the domestic foreign exchange market, the easier it is for non-oil exporters to access FX for their operations, such as importing intermediates. The key variables of interest, namely trade credit and e-payment, are expected to affect non-oil export performance positively.

However, for the empirical estimation of Equation (1), this study proxied the *nox* with the naira value of Nigeria's volume of non-oil exports measured in billions of US dollars. In addition, the findings of the study by Z. Li *et al* (2024) justify the inclusion of digital payment in Equation (1). Z. Li *et al* (2024) show that digital payment exerts an important influence on international trade. Furthermore, this study proxies the exchange rate with the nominal bilateral naira official exchange rate per unit of the US dollar. In addition, the evidence obtained from the studies by N. Milenković (2012), R. Kovačević (2022), G. Palazzo (2024), and L. Brandt and K. Lim (2024) provide the empirical justification for the inclusion of the exchange rate in Equation (1). Also, the findings of the studies by M. Čupić and S. Vržina (2024) and A. Matray, K. Müller, C. Xu and P. Kabir (2024) justify the inclusion of trade credit in Equation (1). Finally, the modified non-oil export supply model provides the theoretical basis for the inclusion of the relative price in Equation (1). The indices of the average world prices of Nigeria's major agricultural export commodities are used as the proxy for the relative price.

The estimation technique used is the ARDL bounds testing approach to cointegration and error correction model in order to analyze the short- and long-term relationships. This approach is applicable when variables combine stationary and non-stationary series. All the data used were sourced from the Central Bank of Nigeria's Statistical Bulletin online from January 2010 to September 2023.

RESULTS AND DISCUSSION

Table 2 presents the correlation matrix of the non-oil exports with e-payments and trade credit, which was found to be low at 9% and 7%, respectively. A negative correlation of about 4% is found between the non-oil exports and the relative price, whereas FX supply (fxs) has a positive correlation of about 14% with the flow of the non-oil exports. Overall, the correlation analysis does not indicate the evidence of multicollinearity. Therefore, this study can proceed with regression analysis. In addition, Table 3 reports the descriptive statistics, showing that the non-oil exports averaged US$465 million with the minimum and maximum values of about US$114 million and US$2.63 billion, respectively, which resulted in the standard deviation of about US$355 million.

In addition, Table 3 shows that the e-payments averaged about N18.8 trillion with the standard deviation of N28.8 trillion. During the sample period, the e-payments recorded the lowest value of N20.6 billion and the highest amount of N103.97 trillion. The average value of trade credit was 1.2 trillion with the standard deviation of N502 million, close to the minimum value of N572.5 million compared with the maximum trade credit of N4.09 trillion during the period of observation. The exchange rate average of N290.3 naira per US dollar fluctuates around N133 naira/US around the mean. The lowest exchange rate

Table 2 The correlation matrix

	nox	epay	tcre	exr	fxp	fxs
nox	1.000	0.089	0.072	0.043	-0.036	0.139
epay	0.089	1.000	0.912	0.843	-0.696	-0.342
tcre	0.072	0.912	1.000	0.775	-0.542	-0.271
exr	0.043	0.843	0.775	1.000	-0.756	-0.524
fxp	-0.036	-0.696	-0.542	-0.756	1.000	0.436
fxs	0.139	-0.342	-0.271	-0.524	0.436	1.000

Source: Authors

Table 3 The summary statistics

Indicator/measurement	Mean	SD	Median	Min	Max
nox (US$, mill)	464.47	354.79	373.99	114.14	2,627.87
epay (N, mill)	18,803,760.5	25,882,062.9	6,404,778.7	20,690.0	103,967,369.7
tcre (N, mill)	1,212,503.3	502,633.7	1,029,996.3	572,457.2	4,094,421.8
exr (naira/US$)	290.31	133.78	305.25	150.00	770.88
fxp (US$-based: 2010 = 100)	82.00	19.36	82.50	47.93	124.55
fxs (US$' mill)	1950.26	1149.57	1750.43	30.00	6179.92

Source: Authors

was N150, whereas the highest was N770.88 per dollar. The indices of the average world prices of Nigeria's major agricultural export commodities are used as the proxy for the relative price (fxp), and the average value is 82, with the standard deviation of about 19.4. The minimum value is 47.9, and the maximum value is 124.55.

Furthermore, Table 4 reports the variance inflation factor (VIF) for multicollinearity detection. Multicollinearity occurs when independent variables in a regression model are highly correlated, leading to unreliable estimated coefficients. Table 4 shows that the VIFs for the variables are all less than 5, suggesting that multicollinearity is not a concern. Further checks for stationarity using the ADF and PP techniques are conducted. The stationarity test result in Table 5 reveals that the variables are both I(0) and I(1) at varying significance levels, which means that the conventional test for long-term relationships, such as the Johansen cointegration technique, may not be appropriate. The results are validated by the outcome of the KPSS and the Zivot-Andrews unit root testing procedures, where structural breaks are taken into account.

Table 4 The variance inflation factors (VIF)

	Variable	VIF
1	lepay	4.4775374
2	ltcre	2.6447591
3	lexr	5.8320007
4	lfxp	2.7084047
5	lfxs	1.3258024

Source: Authors

The test results for the long-term relationship using the ARDL bound testing approach reported in Table 7 indicate the long-term association between the non-oil exports, trade credit, e-payments, and the other variables considered, which is because the F-statistic value of 4.404 exceeds the upper bond value of 3.807. This aligns with the findings of S. I. Hussain *et al* (2020) for Pakistan. The long-term estimates are presented in Table 8, which accounts for the fact that, while the second and fourth lags of electronic payment (epay) were negative and statistically significant, only the second lag was positive. This means that the long-term impact is not stable, which does not align with the findings of H. O. Ozekhome (2021), where

Table 5 The ADF and PP unit root testing

Variables	Augmented Dickey-Fuller (ADF)			Philip-Perron (PP)		
	Level	First diff.	Decision	Level	First diff.	Decision
nox	-0.332	-14.612*	I(1)	-9.1019**	-27.5921**	I(0)
epay	-2.648*	-8.067**	I(0)	-2.6145	-11.6846*	I(1)
tcre	0.2086	-11.5926	I(1)	-0.3711	-15.371**	I(1)
exr	2.3128*	-9.3168	I(0)	0.6254	-12.3025*	I(1)
fxp	-3.3472	-9.9437*	I(1)	-1.4434	-11.8999*	I(1)
fxs	-2.8684**	-9.1962	I(0)	-2.7242*	-11.8297**	I(0)

Source: Authors

Table 6 The KPSS and breakpoint stationarity tests

Variables	KPSS			Zivot-Andrews (ZA)				
	Level	First diff.	Decision	Level	Break date	First diff.	Break date	Decision
nox	0.2343	0.023**	I(1)	-5.1265	64	-14.88**	3	I(1)
epay	0.4273	0.101**	I(1)	-9.168**	24	-9.739**	26	I(0)
tcre	0.47**	0.127**	I(0)	-3.757	127	-12.40**	59	I(1)
exr	0.2505	0.079*	I(1)	-4.366	77	-13.712**	160	I(1)
fxp	0.200**	0.071**	I(0)	-5.51**	129	-11.127**	128	I(0)
fxs	0.204*	0.039**	I(0)	-3.883	100	-10.107*	81	I(1)

Source: Authors

financial development was found to positively and significantly impact export diversification in the long run. The difference could be traced to the difference in measurement and the indicators used.

In a similar fashion, Table 8 demonstrates that the effect of trade credit is unexpectedly negative but insignificant, whereas the exchange rate (exr) is, as expected, negative but statistically insignificant. The relative price of Nigeria's major agricultural export commodities is favorable at the levels with the coefficient of about 1.76, suggesting that higher prices increase non-oil exports. However, the estimated coefficient of the second lag is higher. Yet, it becomes negative, showing that Nigeria's non-oil exports drop due to high competition in global markets and limited market access for Nigeria's products. Finally, the estimates show that the long-term effect of domestic FX supply is negative and statistically significant (-0.263), which means that a percentage change in FX supply reduces non-oil exports. This can be explained by the non-oil exporters who often face challenges when accessing US dollars in a foreign exchange market. This constrains productivity and exports as well, because they have limited access to FX to enable them to purchase requisite intermediates.

Table 7 The bound testing result

F-statistic	p-value
4.40365745	0.01830081
lower	upper
2.64252343	3.80662074

Source: Authors

Digging further into the results, Table 8 reveals that the first and third lags of the electronic payments (e-pay) positively and significantly impact the non-oil export performance, which conforms with the result obtained by Li *et al* (2024), who found that digital payment exerted a significant positive impact on international trade and reduced cross-border capital restrictions. The export price coefficient (fxp) is positive and statistically significant, meaning

Table 8 The long-term estimates

Term	Estimate	Std. Error	p-value
(Intercept)	2.0711	1.3472	0.1264
L(lnox, 1)	0.0704	0.0789	0.3741
L(lnox, 2)	0.3001	0.0761	0.0001
L(lnox, 3)	0.1515	0.0798	0.0596
lepay	0.0043	0.2084	0.9836
L(lepay, 1)	0.4583	0.2953	0.1229
L(lepay, 2)	-0.7205	0.2935	0.0153
L(lepay, 3)	0.9141	0.3062	0.0033
L(lepay, 4)	-0.6097	0.2093	0.0042
ltcre	-0.0422	0.1977	0.8314
lexr	-0.1680	0.2040	0.4116
lfxp	1.7578	0.6811	0.0109
L(lfxp, 1)	-2.1523	0.6799	0.0019
lfxs	0.1764	0.1002	0.0804
L(lfxs, 1)	-0.1052	0.1354	0.4385
L(lfxs, 2)	0.1367	0.1329	0.3053
L(lfxs, 3)	-0.2627	0.1334	0.0509
L(lfxs, 4)	0.1335	0.0981	0.1758

Source: Authors

Table 9 The results of the short-term error correction model

Variable	Estimate	Std. error	Statistic	p-value
(Intercept)	2.071	0.398	5.198	0.000
d(L(lnox, 1))	-0.452	0.092	-4.889	0.000
d(L(lnox, 2))	-0.151	0.074	-2.047	0.042
d(lepay)	0.004	0.199	0.022	0.983
d(L(lepay, 1))	0.416	0.194	2.145	0.034
d(L(lepay, 2))	-0.304	0.197	-1.544	0.125
d(L(lepay, 3))	0.610	0.203	2.999	0.003
d(lfxp)	1.758	0.642	2.738	0.007
d(lfxs)	0.176	0.092	1.922	0.057
d(L(lfxs, 1))	-0.008	0.088	-0.085	0.933
d(L(lfxs, 2))	0.129	0.089	1.449	0.149
d(L(lfxs, 3))	-0.133	0.090	-1.486	0.139
ect	-0.478	0.091	-5.229	0.000

Post-estimation tests

Test type	Statistic	p-value
Breusch-Godfrey (autocorrelation)	5.6751	0.2248
Breusch-Pagan (heteroscedasticity)	6.2786	0.9014
Ramsey RESET (misspecification)	0.83804	0.4347
Jarque-Bera (normality)	82.201	0.2216

Source: Authors

that higher export prices stimulate non-oil exports, especially in the agricultural sector. In the short run, higher FX supply in the foreign exchange market by the CBN leads to an improvement in non-oil exports by about 0.18%, which means that non-oil exporters have higher productivity and export volumes given their greater access to FX in meeting their intermediate input demand. Finally, the diagnostics tests were performed satisfactorily, and no evidence of serial correlation, heteroscedasticity, or model misspecification was found. In addition, the Jarque-Bera normality test is also acceptable.

Furthermore, the result of the contemporaneous error correction model is given in Table 9, which describes how quickly the system returns to equilibrium after a deviation or shock. The negative sign indicates that the adjustment process corrects any disequilibrium. Specifically, it implies that, if there is a deviation from the long-run equilibrium, the variable will adjust in the opposite direction in order to correct the error. The value of 0.478 means that approximately 47.8% of the deviation from equilibrium is corrected each month. The speed of the adjustment of -0.478 signifies a moderate adjustment rate, suggesting that the variable corrects nearly half of the disequilibrium in one month, which is neither very fast nor slow.

In addition, Figure 2 shows the CUSUM and CUSUM of squares tests. The cumulative sum test is within the confidence range, indicating no evidence of a structural break or that the model's parameters are stable. Likewise, the cumulative sum of squares is also within the confidence range, suggesting no evidence of change in variance, which means that the model is

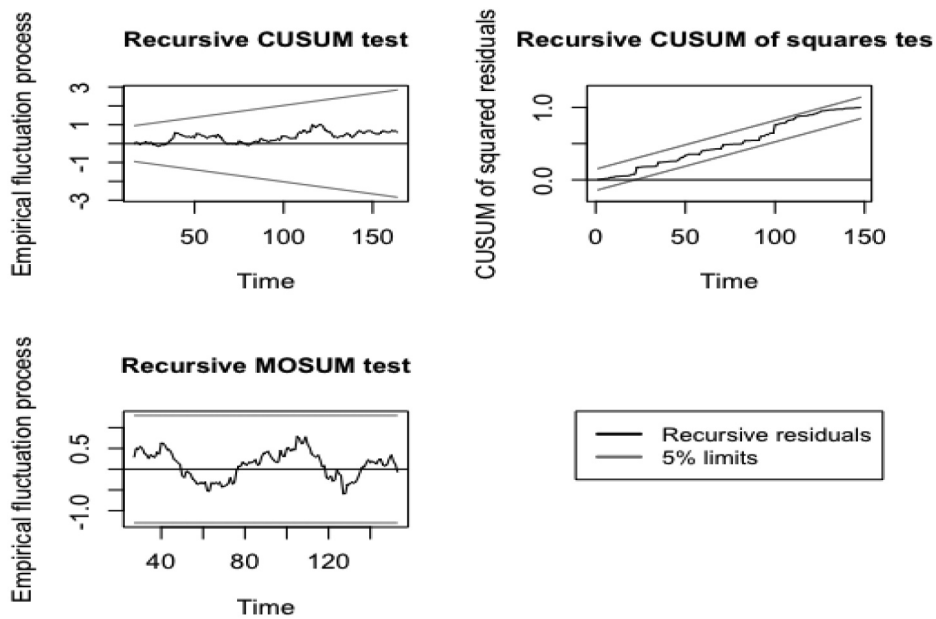

Figure 2 The parameter stability tests

Source: Authors

homoscedastic (i.e. it satisfies the constant variance requirement). The Recursive MOSUM (Moving Sum) test also detects structural changes in the model over time. The MOSUM statistics are within the confidence range, suggesting no significant structural change and validating the findings of the earlier parameter stability test.

CONCLUSION

This study analyzes the impact of trade financing and the e-payment system on non-oil export performance in Nigeria using data from January 2010 to September 2023. The main finding reveals a positive and significant impact of trade credit and the e-payment systems on non-oil export performance, which suggests that increased trade credit and e-payment systems significantly improve the performance of the non-oil export sector in Nigeria. The one implication of this finding is that increasing trade credit and continuously adopting e-payment may serve as another alternative to unlocking the potential of Nigeria's non-oil export sector. In addition, this study observes that the timing of the adoption of electronic payment with a three-period lag proves to be particularly advantageous for enhancing non-oil export performance in Nigeria.

For policy implications, the findings of the research study highlight the three key areas for consideration, namely (i) enhancing and scaling up the non-oil sector's incentives, such as agricultural credit guarantee schemes and non-oil export stimulation facility, so as to provide affordable finance, increase the export-orientation of domestic firms, and amplify non-oil exports; (ii) increasing investments and foreign exchange supply to the agriculture and manufacturing sectors in order to boost non-oil exports; and (iii) implementing the new roadmap outlined in Nigeria's trade policy in order to unlock the potentials of the non-oil sector. These policy considerations are implicative of the fact that Nigeria can enhance its non-oil export performance and drive sustainable economic growth in the long run. Therefore, this study concludes that, with the promotion of trade credit and the increased use of e-payments, Nigeria can improve its non-

oil export performance so as to foster sustainable economic growth. However, it may be of interest for future studies to address the limitations such as the availability and reliability of disaggregated data on export financing and payment systems. A more detailed breakdown of non-oil exports by sectors could offer deeper insights into the sector-specific effects. Considering the impact of e-payments on the digital infrastructure and the potential skewing of the results by using agriculture export prices instead of the export-to-domestic price ratio are also areas for future research consideration.

ENDNOTES

1 In this study, digital payment or e-payment refers to electronic transactions, facilitated by platforms like the NIBSS Instant Payment (NIP), NIBSS Fast Fund, NIBSS Electronic Funds Transfer (NEFT), and electronic card payments via PoS terminals, mobile payments, internet (Web) transactions.

2 https://nepc.gov.ng/cms/wp-content/uploads/2022/05/A-EMMERGING-ISSUES-DISRUPTING-NIGERIAS-NON-OIL-EXPORT-AND-INNOVATIVE-SOLUTIONS-new_compressed.pdf

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THE IDENTIFICATION OF THE BUSINESS CYCLE CHARACTERISTICS IN THE EUROPEAN UNION WITH REFERENCE TO THE REPUBLIC OF SERBIA

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A large number of papers indicate stylized facts related to the business cycles of different countries. However, the business cycle is a very complex phenomenon, which is not easy to measure and interpret. Therefore, in addition to the gross domestic product (GDP) as a standard measure of the business cycle, it is useful to analyze the cyclical behavior of the GDP components, the labor market variables, as well as nominal variables. This paper attempts to identify patterns in their movements during the period from the first quarter of 2009 to the third quarter of 2023. The goal is to provide a general overview of business cycles in contemporary developments within the European Union as a whole, Germany being the most developed EU country, with reference to the Republic of Serbia. Detailed statistical time series analysis was used to examine stylized facts, as well as the volatility of these variables, their correlation with the GDP, and their persistence. The general conclusion implies that the business cycle of Serbia does not lag behind more developed countries. Some observations were also made of the common tendencies that could be valid in most cases.

Keywords: volatility, correlation, persistence, business cycle, stylized facts

JEL Classification: E31, E32, F44

INTRODUCTION

Economic systems continuously experience various cyclical fluctuations with recognizable patterns and diverse origins. Characterized by the alternating periods of expansion and contraction, these fluctuations are influenced by many factors, such as technological progress, government policies and global economic conditions. Understanding the complexities and dynamics of these economic cycles is essential for policymakers, businesses and individuals to effectively navigate through varying economic conditions and uncertainties. The subject of this paper precisely implies a study of the stylized facts related to business cycles and the identification of their characteristics through the analysis of the

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cyclical components of the key macroeconomic variables on the example of the European Union, Germany and Serbia.

The aim of the research is to document the nature of these variables in the period after the global financial crisis and to examine whether the business cycle patterns that were established in the pre-crisis period are still valid in the changed economic context and modern crises. For this purpose, the cyclical behavior of the components of the gross domestic product (GDP) (personal consumption, government consumption, investments, exports and imports), the labor market variables (employment, unemployment and real wages) and the nominal variables (inflation, interest rates and the exchange rate) are examined. Identifying the characteristics of the cycle of these variables involves the examination of whether they are procyclical or countercyclical or not, whether they lead, coincide or lag behind the GDP or not, as well as to what extent they are persistent due to unforeseen shocks. The question is whether a group of developed and developing countries, such as the European Union, a developed country (such as Germany), and a developing country (such as Serbia), demonstrate similar cycle patterns or not, despite their differences. What they undoubtedly have in common is that the period following the global economic crisis has witnessed a sustained economic growth trend, especially after 2015 (Trpeski, Kozheski & Merdzan, 2024).

This paper relies on the idea that the phenomenon of the business cycle is not a simple fluctuation of the aggregate output, but rather a complex phenomenon which also includes different patterns of correlations between different time series. A common theme in this line of research implies that the business cycle phenomenon does not only consist of fluctuations in outputs, but it also comprises common patterns of the correlation between different aggregate time series (Backus & Kehoe, 1992). Therefore, the volatility of these time series, their correlation with the GDP and their persistence are examined, which enables the measurement of economic stability and exposure to risks, the identification of the leading indicators of the economic activity and the factors of economic growth, as well as the identification of the areas in which policy interventions or additional research are needed. The applied methodology first includes the extracting of the cyclical component from the observed time series using the HP filter, the checking of the stationarity of this cyclical component around zero using unit root tests, and finally the calculation of volatility, correlation and persistence using standard deviations, the correlation coefficients of the observed variables with the GDP and autocorrelation coefficients, respectively. The mentioned methodology is in accordance with the study by R. Fiorito and T. Kollintzas (1994) and R. Jovančević and V. Arčabić (2011). The data in this paper do not fully match the aforementioned papers bearing in mind the fact that a later period of time is covered in relation to them. The time series used are adapted to the available data for Serbia, which is why the results may differ.

Therefore, in accordance with the subject matter and goal of the research study, the following hypotheses are set:

H1: Serbia's business cycles do not lag behind the business cycles of the European Union and Germany.

H2: The GDP components are procyclical and coinciding in nature, investments are more volatile compared to consumption, and the movement of government spending is stable.

H3: Employment is procyclical, and real wages are a countercyclical variable.

H4: Inflation and interest rates show a procyclical and lagged effect with the highest persistence of inflation.

The paper is structured into a few sections. First, the previous literature related to the presented problem and the stylized pertaining to business cycles are presented. This is followed by the section describing the research data, based on which the results for further discussion are obtained. The final section summarizes and offers possible conclusions.

LITERATURE REVIEW

The recognition of stylized facts about the entire set of time series is considered to be the key step in macroeconomic research (Harvey & Jaeger, 1993). The importance of monitoring them is reflected in considering the possibilities for the country's preventive action in order to eliminate the negative effects of the cycle. However, it is very often the case that these stylized facts ignore certain exceptions, which is the reason why it is important to pay attention to each individual case. Regarding business cycles, stylized facts originate from the famous paper written by A. F. Burns and W. C. Mitchell (1946), who are credited with interpreting the behavior of macroeconomic variables without a model.

The papers by F. E. Kydland and E. C. Prescott (1982, 1988, 1990, 1991) inspired many other authors to examine the stylized facts of business cycles. Namely, they tried to explain the basic characteristics of business cycles in the USA using the stochastic dynamic general equilibrium models that are able to generate artificial data. These are the models that were later modified or continued by numerous authors in their respective papers. Among others, their followers are also R. Fiorito and T. Kollintzas (1994), who rely on the Real Business Cycle Theory (the RBC theory), which points to the stylized facts that include the procyclicality of labor productivity, the volatility of hours worked, the correlation between consumption and leisure, the persistence of business cycles, and the neutral impact of the monetary policy. According to the RBC theory, business cycle fluctuations as such are the result of real shocks to the economy, not of changes in the monetary policy or other nominal factors. R. Fiorito and T. Kollintzas (1994) single out only the most controversial stylized facts of the RBC theory, and group them into the three types, namely (1) the consumption, income, and output components, (2) the price and monetary variables, and (3) the production factors. Using the example of developed countries, the authors conclude that the GDP and its components are procyclical, and that consumption generally fluctuates less (with the exception of the United Kingdom), on the one hand, whereas on the other, investments generally fluctuate more in relation to the real GDP. They confirm the finding by F. E. Kydland and E. C. Prescott for the US that prices are countercyclical in all countries, whereas money supply does not indicate a uniform pattern, but rather differs between countries and depends on the definition of money supply. They also conclude that fixed investments are about three to four times more volatile than consumption, and that both variables are coincident. These results are valid in most of the countries observed by the authors, whereas there are exceptions for some countries.

As far as the government spending is concerned, the results vary from one country to another. The same is in the case of money supply, which does not show a unique behavior pattern, nor does it show a strong correlation with the GDP at any lag, either. The authors also provide the evidence of the countercyclical and leading nature of real interest rates, with greater volatility relative to the GDP. In most cases, the consumer price index is a countercyclical and leading indicator. The countercyclicality of prices and the weak correlation between money supply and the output are consistent with the RBC theory. Regarding the production factors, the labor input is considered to be procyclical and less volatile than the output, whereas employment lags behind the output. The relationship between real wages and the output varies by country. Specifically in Germany, no correlation was perceived between these two variables.

When speaking about the financial variables, the literature usually emphasizes the lagged effect of interest rates. This means that, even when a recession begins, it is possible that interest rates will continue to rise, additionally affecting consumers and the economy which are already affected by the decline in the economic activity (Praščević, 2008).

In the existing literature, there are papers that deal with the nature of such variables in developing countries as well. For example, S. Zarić (2018) examines the key characteristics of the cycle of the macroeconomic variables in Serbia, namely volatility, synchronization, time coincidence and persistence. The research concludes that, according to these characteristics of the cycle, Serbia does not

significantly differ from the European developing countries. C. Ghate, R. Pandey and I. Patnaik (2013) provide the stylized facts pertaining to the business cycles of transition countries, only to conclude that, with the flow of the business cycle, investments and imports showed a procyclical character, whereas the nature of the net exports and the nominal exchange rate was countercyclical. When Serbia in the period from 2015 to 2019 is concerned, E. Jakopin (2020) finds that the largest contributions to the GDP growth were being made by the macroeconomic aggregates of investment and personal consumption. The conclusion about the positive impact of investments on the GDP per capita for the European Union is reached by O. Schneider (2022), who indicates that a more efficient allocation of labor to highly productive regions should raise the overall growth rate in the EU and limit wage increases. Regarding persistence in the European developing countries, the results obtained by Z. Mladenović, K. Josifidis and S. Srdić (2013) suggest the persistence of real exchange rates due to accumulated unexpected random shocks. Additional stylized facts also indicate the procyclicality of the monetary policy. E. C. Prescott (2016) provides an overview of all the papers that illustrate the RBC theory from the methodological point of view or extend the applicability of neoclassical growth theory.

The topic similar to the topic of this paper has been dealt with in the recent literature by M. Orellana, R. Mendieta, S. P. Rodríguez, S. Vanegas and J. Segovia (2023), who analyze a set of the macroeconomic variables for Ecuador related to the demand side, the labor market, the nominal variables, as well as the variables related to the openness of the economy. The above-mentioned study provides an assessment of the co-movements, persistence and volatility of each of these macroeconomic variables. The authors find that the cyclical behavior of these variables changed after the dollarization process. M. M. H. I. Elwia (2024) examines the characteristics and dynamics of the economic fluctuations in Egypt. The author concludes that population consumption, total investment and the unemployment rate are the coincident variables followed by import, the nominal exchange rate, openness, the stock market indicator and the interest rate as the leading variables, on the one hand, and ultimately government consumption, export, exchange, net export, the real exchange rate, the real effective exchange rate, prices, the nominal indicators of the banking sector, real earnings and money supply M0 and M2 are the lagged variables. M. Spychała and J. Spychała (2024) analyzed the most important characteristics of the cyclical fluctuations in the European Union, and they isolated the business cycle fluctuations based on the indicators of the dynamics of the gross domestic product. The authors' findings suggest that the business cycle fluctuations were synchronized until the financial crisis of 2008 and the debt crisis that followed, and that the COVID-19 pandemic then prompted a record synchronization of the business cycle. Nevertheless, one of the main conclusions of this paper implies the differences in business cycles and that they largely depend on the development of the observed region.

DATA

The analysis carried out in this paper starts with the description of the data used in the research study. In accordance with the previously elaborated literature, the components of the GDP representing the measure of the business cycle are important. Then, the labor market variables are analyzed, bearing in mind the fact that it was also affected during the 2008 crisis, especially those lower-income individuals. The unexpected onset of the COVID-19 pandemic also led to a global economic crisis, which severely destabilized labor markets and disrupted their previous equilibrium (Trpeski *et al*, 2024). Therefore, employment, unemployment and real wages are analyzed. In this way, various aspects of the real economy are covered. In addition to the real variables, the nominal variables implying inflation, interest rates and the exchange rate are also included. Thus, a set of variables is chosen as in the paper by R. Jovančević and V. Arčabić (2010), except for the data on the stock prices, which are not available for Serbia. Within the observation units, the European Union is selected as a whole, providing a combination of the developed and developing countries that operate within the common institutional framework and reduced economic and trade barriers, following Germany as a developed country, i.e. the most developed country in the EU,

and the Republic of Serbia, as a developing country. The time period after the financial crisis of 2008 is observed, namely the period from the first quarter of 2009 to the third quarter of 2023. For Serbia, the time series are somewhat shorter, due to the limited time coverage for the labor market variables. Namely, these time series for Serbia are available from 2010 with the exception of the real wages which are available from 2011. So, an assessment is made for the year 2010. Table 1 summarizes the variables, the observed time period and the data description. The observed time series are seasonally adjusted, then expressed through logarithms (except for the indices and the percentages), where necessary.

The data were taken from the publicly available statistical databases of Eurostat, IMF IFS, the Bundesbank, and the National Bank of Serbia, so the results can easily be replicated.

METHODOLOGY

In the literature, ensuring stationary stochastic processes is mentioned as the first step in such an analysis (Leitner, 2007), which is achieved in this paper by detrending the time series. There are a lot of ways to smooth a time series and thereby extract a trend. In this paper, the decomposition of the seasonally adjusted time series into the trend and the cycle is carried out using the Hodrick Prescott (HP) filter, which is a linear filter very popular in macroeconomic research. Although there are the papers that highlight the disadvantages of this filter (King & Rebelo, 1993; Cogley & Nason, 1995), the great advantage of this method is its ability to make the data stationary, and also the fact that it is not necessary to model time series, as is the case with other filters (Marczak & Beissinger, 2013).

The general framework for the decomposition of each time series into the trend and the cycle is:

$$y_t = y^g_t + y^c_t + \varepsilon_t, \; t = 1, 2, ..., T \tag{1}$$

where t denotes the time and y_t the natural logarithm of the observed time series. The time series y_t is broken down into the trend y^g_t, the cycle y^c_t and the irregular component ε_t. With the HP filter, the irregular component is zero, thus any disturbance left in the data after detrending is attributed to the cycle component. As suggested by R. J. Hodrick and E. C. Prescott (1997), the smoothing parameter of 1600 is used for the quarterly data.

Table 1 The database

Variables	Observed time period			Data description
	EU27	Germany	Serbia	
GDP	09:1-23:3	09:1-23:3	10:1-23:3	In millions of euros (2010=100)
Private consumption	09:1-23:3	09:1-23:3	10:1-23:3	In millions of euros (2010=100)
Government spending	09:1-23:3	09:1-23:3	10:1-23:3	In millions of euros (2010=100)
Investments	09:1-23:3	09:1-23:3	10:1-23:3	In millions of euros (2010=100)
Export	09:1-23:3	09:1-23:3	10:1-23:3	In millions of euros (2010=100)
Import	09:1-23:3	09:1-23:3	10:1-23:3	In millions of euros (2010=100)
Employment	09:1-23:3	09:1-23:3	10:1-23:3	Survey data, in thousands
Unemployment	09:1-23:3	09:1-23:3	10:1-23:3	Survey data, in thousands
Real wages	09:1-23:3	09:1-23:3	10:1-23:3	Nominal Wage Index/HICP
Inflation	09:1-23:3	09:1-23:3	10:1-23:3	Harmonized index of consumer prices
Interest rates	09:1-23:3	09:1-23:3	10:1-23:3	Short-term interest rates - money market (instead of EU27 data for the Eurozone)
Exchange rate	09:1-23:3	09:1-23:3	10:1-23:3	Real effective exchange rate

Source: Author

To measure the volatility of a particular variable, the standard deviation of that variable is first used. Additionally, the ratio of the standard deviations of the observed variables and the standard deviation of the GDP is calculated, showing how many times the given variable is more volatile than the GDP. The variables with a ratio greater than one are considered as more volatile than the GDP, whereas those with a ratio less than one are considered as less volatile.

The ratio between the standard deviation of the variable *X* and the standard deviation of the GDP is the measure of the relative volatility or variability of that variable compared to the total economic activity represented by the GDP. Multiplying this ratio by 100 yields the percentage that provides the standardized measure of the dispersion of the variable *X* in relation to variability in the GDP. A higher coefficient indicates a greater relative volatility of the variable *X* compared to the GDP, whereas a lower coefficient suggests that *X* is less volatile relative to the overall economic activity. This measure is particularly useful when comparing the variability of the different variables that may have different measurement units or scales. Also, relative volatility is one of the measures used by R. Fiorito and T. Kollintzas (1994) to check the sensitivity of the results to the choice of the detrending method, taking into consideration the fact that there are authors who indicated that the HP filter could affect those measurements.

Observing correlation, i.e. the time co-movement of the macroeconomic variables with the GDP, is important because it enables the identification of the causal links and changes in the economy. The analysis enables the understanding of the behavior of various variables in relation to economic cycles, which contributes to a better forecasting of the economic activity and the formulation of effective economic policies. This co-movement is measured by the correlation coefficient between the observed cycles and the GDP. In addition to the analysis for the current period, the correlation is also calculated for the previous two and the next two periods for the selected variables, which is done because, for the analysis of cyclical movements, it is important to observe what happens both in the previous period and in the following period, in which way it is also possible to see whether the variable leads or lags in relation to the GDP.

For the given variable *X* and the GDP as the measure of the output *Y*, the measure of correlation reads as follows:

$\rho(j)$, where $j \in \{0, \pm1, \pm2, ...\}$ and where

$\rho(j)$ is correlation coefficient between Y_t and $X_{t \pm j}$,

where *X* is
- the leading variable, if $|\rho(j)|$ is maximum for the negative *j*
- coincident variable, if $|\rho(j)|$ is maximum for the zero *j*
- lagging variable, if $|\rho(j)|$ is maximum for the positive *j*
- procyclical variable, if $\rho(j)>0$
- The countercyclical variable, if $\rho(j)<0$

In other words, the highest correlation coefficient is used for interpretation. The positive sign indicates that the variable is procyclical, and the negative sign indicates that it is countercyclical, whereas the coefficient height indicates the strength of the relationship with the GDP. The coefficients ϱ(j) from 0.5 to 1 are said to be highly correlated, whereas for the coefficient values from 0.2 to 0.5 are said to demonstrate the weaker relationship. The ϱ(j) values below 0.2 indicate a very low correlation or no correlation at all. The threshold 0.2 is chosen because it is an approximate value at which the null hypothesis regarding the significance of the correlation coefficient is rejected at the 5% significance level.

Persistence indicates the sustainability i.e. durability of a certain variable due to unforeseen random shocks. In other words, persistence indicates how long a variable stays in a certain phase of the cycle. If the variable is persistent, it means that, due to a temporary shock, there is longer lasting change in the observed variable as an effect, which means change that does not immediately disappear. Thus, a more persistent variable indicates greater stability. Persistence analysis is important for identifying trends, guiding strategies, managing risks, understanding cyclical patterns, and improving economic modeling. Persistence is measured by the autocorrelation coefficient of each

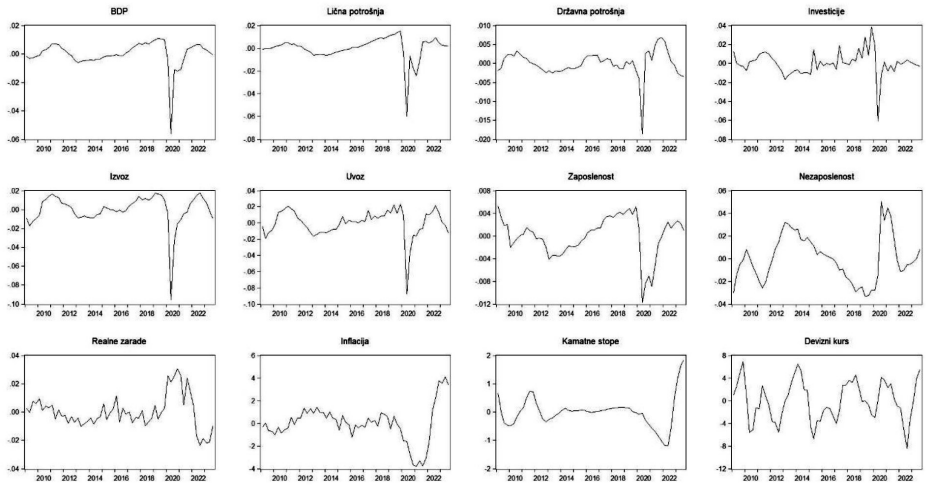

Figure 1 The cyclical components of the key macroeconomic variables in the European Union

Source: Author

observed variable three quarters ahead, in which way it is possible to observe the delayed effects and align with the dynamics of the business cycle.

For the given variable X, the persistence measure is:

$\phi(j)$, where $j \in \{0, +1, +2, ...\}$, where

$\phi(j)$ is the autocorrelation coefficient between X_t and X_{t+j},

when $\phi(j)$ is significant for the larger j, the more persistent X is.

RESEARCH RESULTS AND DISCUSSIONS

The detrending method applies to the data described above, which separate the cycles of the observed time series. In Figures 1, 2 and 3 these cycles are presented for the EU, Germany and Serbia, respectively.

As is already mentioned, it is important that the obtained cycles represent stationary time series, which is first checked using the ADF (Augmented Dickey-Fuller) and the KPSS (Kwiatkowski-Phillips-Schmidt-Shin) unit root tests.

Table 2 shows the results of the unit root tests applied to the data (in level) on the previously obtained cyclic components of all the variables using the HP filter. As the calculated values of the ADF test statistics are less than the critical value at the significance level 5%, the null hypothesis of the presence of the unit root is rejected as such and a conclusion is made that the cycles of the observed variables are stationary time series, i.e. I(0) processes. Also, all the calculated values of the KPSS test statistics are less than the critical values at the significance level 5%, so the null hypothesis is not rejected as such, and it is concluded that the observed cycles are stationary, i.e. I(0) processes. According to the ADF test, certain variables (the real wages in Germany and the inflation in Serbia) indicate the presence of the unit root. However, the reason for this lies in the presence of breaks in the series which the ADF test is sensitive to. The KPSS test then has better performance and shows that the series are stationary, as well as the graphical representation of the correlogram which indicates that there is no unit root.

Volatility

The volatility indicators were calculated in accordance with the previously described methodology. According to the results shown in Table 3, the most volatile in the set of the observed variables are the

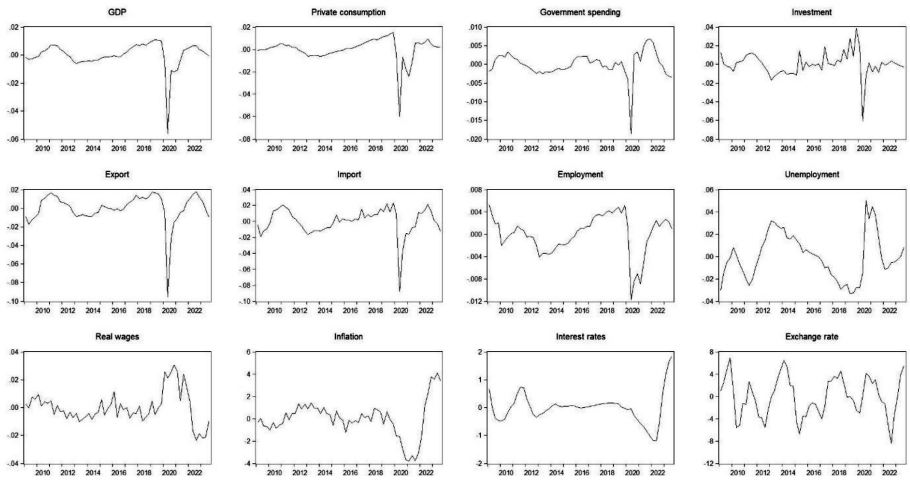

Figure 2 The cyclical components of the key macroeconomic variables in Germany

Source: Author

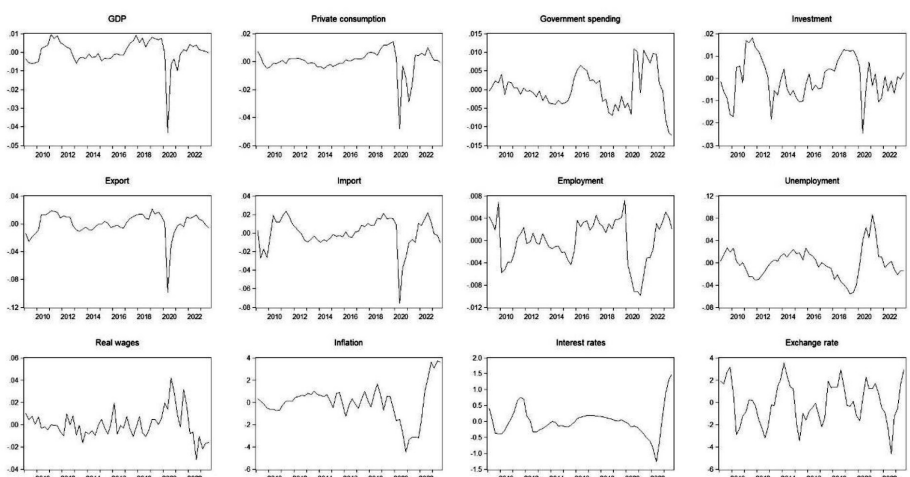

Figure 3 The cyclical components of the key macroeconomic variables in Serbia

Source: Author

inflation, interest rates and exchange rate variables, which together belong to the set of the nominal variables, among which the most oscillations were recorded within the exchange rate, only to be followed by the inflation variable. The exchange rate volatility is undesirable, taking into account the fact that it causes panic in the forex market because the forex traders and users are unclear about what to envisage in the market on a daily basis (Osazevbaru, 2021). In the set of the remaining, real variables, unemployment stands out as the most volatile, which is also the case at the level of the European Union, in Germany and in Serbia as well. Then there are imports in the EU, exports in Germany and investments in Serbia. The least volatile, i.e. the most stable variable in the EU in the observed period was government spending, which is also the case in Serbia. Government spending is considered as the most stable variable, which is

Table 2 The unit root tests for the cyclical components obtained using the HP filter

Variables	ADF (*k*)			KPSS		
	EU	Germany	Serbia	EU	Germany	Serbia
GDP	-4.41 (0)	-4.81 (0)	-4.97 (0)	0.05	0.05	0.06
Private consumption	-4.59 (0)	-5.00 (0)	-4.85 (0)	0.05	0.05	0.05
Government spending	-4.63 (0)	-5.54 (9)	-3.94 (0)	0.05	0.05	0.09
Investments	-5.89 (0)	-3.77 (0)	-3.06 (0)	0.07	0.06	0.08
Export	-4.02 (0)	-4.36 (0)	-3.92 (0)	0.04	0.05	0.05
Import	-4.02 (0)	-3.75 (0)	-4.72 (0)	0.05	0.04	0.04
Employment	-3.70 (3)	-3.11 (0)	-3.65 (4)	0.07	0.05	0.07
Unemployment	-3.05 (2)	-4.10 (3)	-4.74 (2)	0.09	0.05	0.07
Real wages	-4.08 (4)	-1.66 (3)	-3.90 (0)	0.07	0.08	0.09
Inflation	-6.25 (4)	-3.99 (7)	-2.44 (1)	0.07	0.07	0.09
Interest rates	-4.80 (1)	-4.34 (1)	-3.66 (10)	0.05	0.05	0.07
Exchange rate	-4.56 (1)	-4.10 (1)	-3.12 (3)	0.04	0.04	0.06

Note: When modeling time series, the Stock-Watson test showed that the relevant test statistic is τ_{μ} which applies to the model with only one constant. The critical values are available from the *EViews* output and for the significance level 5% they are -2.92 and 0.46 for the ADF and the KPSS tests, respectively. The notation *k* in the ADF test refers to the number of the correction factors that need to be added in order to eliminate autocorrelation.

Source: Author

Table 3 The volatility of the observed variables in the European Union, Germany and Serbia

Variable	Standard deviation (σ_x)			Relative volatility (σ_x/σ_{BDP})		
	EU	Germany	Serbia	EU	Germany	Serbia
GDP	0.009	0.007	0.007	1.000	1.000	1.000
Private consumption	0.011	0.009	0.009	1.222	1.286	1.286
Government spending	0.003	0.005	0.008	0.333	0.714	1.143
Investments	0.013	0.009	0.026	1.444	1.286	3.714
Export	0.016	0.017	0.023	1.778	2.429	3.286
Import	0.017	0.016	0.023	1.889	2.286	3.286
Employment	0.004	0.004	0.009	0.444	0.571	1.286
Unemployment	0.020	0.027	0.035	2.222	3.857	5.000
Real wages	0.012	0.012	0.025	1.333	1.714	3.571
Inflation	1.650	1.593	2.945	183.333	227.571	420.714
Interest rates	0.540	0.446	1.183	60.000	63.714	169.000
Exchange rate	3.554	1.840	3.785	394.889	262.857	540.714

Source: Author

attributed to the factors such as tight budget controls, economic cooperation and policy harmonization. The stable movement mentioned confirms the part of the hypothesis H2 that relates to government spending. The most stable variable in Germany is employment, due to the factors such as strong labor market policies, a strong focus on vocational training and close cooperation between employers and trade unions. In Germany, too, government spending is quite stable and less volatile than the output.

The results reveal that investments fluctuate more than consumption in the EU and Serbia, while in Germany they fluctuate equally. Thus, the hypothesis H2 is accepted in this aspect for the EU and Serbia, whereas it is rejected for Germany. This instability often arises from the larger waves of optimism and pessimism that cause cyclical fluctuations, i.e. they

arise from the "animal spirit" of investors, as described by J. M. Keynes, where instinct and social psychology can cause fluctuations in investments. It forms a part of the broadly held belief that investment shocks set off business cycles. The "animal spirit", i.e. investing based on instinct, is less pronounced in Germany, bearing in mind the fact that, in this country, the volatility of investments and consumption is equal, which can be attributed to stricter regulations that can limit speculative activities and reduce irrational investor behavior. The high volatility of investments and short-term interest rates reported in the literature (Praščević, 2008) is most pronounced in Serbia, where employment is also found to be more volatile than the GDP, whereas this is not the case in the EU and Germany. It is interesting that the literature (Male, 2010) states that the output volatility in developing countries is higher than that in developed countries, which is not the case here. More precisely, the volatility of Serbia's output is identical to the volatility of Germany's output, i.e. it is slightly lower than the volatility of the EU output.

Correlation

Based on the methodology for presenting the correlation of the observed variables with the GDP that has been described above, the ordinary correlation coefficients (Table 4) were calculated, and their statistical significance was tested (the *p*-values are presented in brackets).

The results show that, in the observed time period, the GDP components are mostly procyclical and coincide with the GDP, which partially confirms the initial hypothesis H2. The exception is government spending in Serbia, which is a procyclical but lagging variable. This means that the GDP growth leads to an increase in government spending with a lag of one quarter. The same finding of the lagging nature of government spending is also obtained for Croatia in the paper by R. Jovančević and V. Arčabić (2010). The lag of government spending in relation to the GDP is noticeable in Germany as well, but in the opposite direction. The reason for this countercyclicality lies in the possibility that, in more developed countries, the private sector can use resources more efficiently, and excessive government spending can lead to inefficiency. On the other hand, in less developed countries where the private sector may be less developed or limited, an increase in government spending may have a stronger impact on stimulating economic growth, as the government is often the key driver of development.

Employment is a procyclical variable, which corresponds to the usual findings. In the EU, employment is coinciding, which is in line with the RBC theory, whereas in Germany it is lagging, as in R. Fiorito and T. Kollintzas (1994). These authors believe that the lagged effect in employment exists due to the belief that labor institutions in Europe create higher adjustment costs and barriers to the flow of information. Unemployment in Serbia turned out to be a procyclical variable, leading one quarter in relation to the GDP, which is contrary to the results obtained in the previous literature, which suggest the countercyclicality of this variable and its lagging character, as is shown by the results for the EU and Germany. The reason for this may be the probability that economic growth in Serbia does not follow increased demand for labor quickly enough, bearing in mind the fact that it is a good (negative) sign in moments t+1 and t+2, but statistical significance is not ensured. On the other hand, there are reports saying that the time at which unemployment reaches the turning point is unclassified (Praščević, 2008), which indicates the possibility of its leading character. Furthermore, when the labor market is concerned, real earnings show countercyclical behavior, which is in line with the previous research. They lag behind in the EU and Germany, whereas they are the leading variable in Serbia. The conclusion that in Serbia first there are changes in wages, then in the business cycle, may be a consequence of the less bargaining power of employees in relation to their wages than it is the case in more developed countries. This confirms the hypothesis H3 that employment is a procyclical variable, whereas real wages are a countercyclical variable for all the units of observation.

Inflation and interest rates prove to be the procyclical and lagging variables in the EU, which is expected

Table 4 Correlation of observed variables with GDP in the European Union, Germany and Serbia

Variable	European Union				
	t-2	t-1	t	t+1	t+2
GDP	0.268 (0.048)	0.484 (0.000)	1.000	0.483 (0.000)	0.266 (0.05)
Private consumption	0.192 (0.159)	0.443 (0.001)	0.971 (0.000)	0.46 (0.000)	0.341 (0.011)
Government spending	0.363 (0.006)	0.364 (0.006)	0.643 (0.000)	-0.07 (0.612)	-0.319 (0.018)
Investments	-0.064 (0.644)	0.148 (0.28)	0.795 (0.000)	0.456 (0.001)	0.202 (0.139)
Export	0.312 (0.02)	0.457 (0.000)	0.970 (0.000)	0.553 (0.000)	0.228 (0.094)
Import	0.24 (0.078)	0.379 (0.004)	0.930 (0.000)	0.613 (0.000)	0.274 (0.043)
Employment	0.17 (0.216)	0.39 (0.003)	0.821 (0.000)	0.725 (0.000)	0.552 (0.000)
Unemployment	-0.123 (0.371)	-0.268 (0.048)	-0.435 (0.001)	-0.772 (0.000)	-0.655 (0.000)
Real wages	-0.147 (0.286)	-0.422 (0.001)	-0.421 (0.001)	-0.416 (0.002)	-0.431 (0.001)
Inflation	0.013 (0.925)	0.189 (0.168)	0.278 (0.04)	0.39 (0.003)	0.469 (0.000)
Interest rates	-0.039 (0.777)	0.055 (0.689)	0.127 (0.356)	0.241 (0.076)	0.311 (0.021)
Exchange rate	0.07 (0.614)	0.013 (0.927)	-0.139 (0.312)	-0.265 (0.051)	-0.219 (0.108)
Variable	Germany				
	t-2	t-1	t	t+1	t+2
GDP	0.218 (0.11)	0.415 (0.002)	1.000	0.408 (0.002)	0.203 (0.138)
Private consumption	0.005 (0.972)	0.256 (0.059)	0.857 (0.000)	0.343 (0.01)	0.295 (0.029)
Government spending	0.136 (0.321)	0.053 (0.699)	0.047 (0.732)	-0.399 (0.003)	-0.422 (0.001)
Investments	0.152 (0.267)	0.306 (0.023)	0.721 (0.000)	0.44 (0.001)	0.25 (0.065)
Export	0.258 (0.057)	0.401 (0.002)	0.948 (0.000)	0.48 (0.000)	0.193 (0.159)
Import	0.26 (0.055)	0.409 (0.002)	0.889 (0.000)	0.591 (0.000)	0.331 (0.014)
Employment	-0.07 (0.614)	0.297 (0.028)	0.458 (0.000)	0.519 (0.000)	0.506 (0.000)
Unemployment	-0.13 (0.345)	-0.37 (0.006)	-0.628 (0.000)	-0.713 (0.000)	-0.572 (0.000)
Real wages	-0.208 (0.128)	-0.317 (0.019)	-0.257 (0.058)	-0.409 (0.002)	-0.342 (0.011)
Inflation	0.053 (0.699)	0.211 (0.122)	0.245 (0.071)	0.354 (0.008)	0.462 (0.000)
Interest rates	0.118 (0.39)	0.201 (0.141)	0.26 (0.055)	0.245 (0.071)	0.231 (0.089)
Exchange rate	0.015 (0.913)	0.013 (0.923)	-0.142 (0.302)	-0.22 (0.106)	-0.127 (0.354)
Variable	Serbia				
	t-2	t-1	t	t+1	t+2
GDP	0.062 (0.659)	0.356 (0.009)	1.000	0.357 (0.009)	0.062 (0.659)
Private consumption	0.051 (0.716)	0.231 (0.096)	0.823 (0.000)	0.32 (0.019)	0.094 (0.501)
Government spending	-0.086 (0.538)	-0.045 (0.746)	0.243 (0.079)	0.465 (0.001)	0.398 (0.003)
Investments	-0.046 (0.743)	0.258 (0.062)	0.535 (0.000)	0.198 (0.155)	0.021 (0.881)
Export	0.027 (0.846)	0.305 (0.026)	0.714 (0.000)	0.233 (0.093)	-0.058 (0.679)
Import	-0.03 (0.833)	0.309 (0.025)	0.763 (0.000)	0.261 (0.06)	0.067 (0.632)
Employment	-0.053 (0.704)	0.007 (0.961)	0.188 (0.178)	0.107 (0.444)	0.061 (0.664)
Unemployment	0.356 (0.009)	0.379 (0.005)	0.347 (0.011)	-0.031 (0.824)	-0.218 (0.117)
Real wages	-0.167 (0.233)	-0.283 (0.04)	-0.125 (0.374)	0.188 (0.177)	0.14 (0.317)
Inflation	-0.09 (0.521)	-0.11 (0.433)	-0.078 (0.578)	0.013 (0.925)	0.108 (0.443)
Interest rates	0.021 (0.881)	-0.009 (0.947)	0.01 (0.944)	0.044 (0.753)	0.05 (0.725)
Exchange rate	0.136 (0.331)	0.123 (0.382)	0.131 (0.349)	0.096 (0.495)	0.091 (0.518)

Note: The values in the tables are the ordinary correlation coefficients, and the *p*-values are in parentheses.

Source: Author

Table 5 The persistence of the observed variables in the European Union, Germany and Serbia

Variable	European Union		
	t+1	t+2	t+3
GDP	0.484 (0.000)	0.268 (0.046)	0.147 (0.278)
Private consumption	0.452 (0.001)	0.264 (0.050)	0.238 (0.077)
Government spending	0.419 (0.001)	0.229 (0.09)	0.134 (0.323)
Investments	0.244 (0.070)	0.053 (0.700)	0.115 (0.399)
Export	0.555 (0.000)	0.282 (0.035)	0.097 (0.478)
Import	0.546 (0.000)	0.263 (0.051)	0.146 (0.284)
Employment	0.799 (0.000)	0.57 (0.000)	0.397 (0.003)
Unemployment	0.845 (0.000)	0.652 (0.000)	0.416 (0.001)
Real wages	0.728 (0.000)	0.633 (0.000)	0.437 (0.001)
Inflation	0.861 (0.000)	0.738 (0.000)	0.509 (0.000)
Interest rates	0.822 (0.000)	0.475 (0.000)	0.135 (0.320)
Exchange rate	0.717 (0.000)	0.275 (0.04)	-0.109 (0.424)
Variable	Germany		
	t+1	t+2	t+3
GDP	0.419 (0.001)	0.218 (0.107)	0.21 (0.12)
Private consumption	0.39 (0.003)	0.176 (0.195)	0.245 (0.069)
Government spending	0.627 (0.000)	0.458 (0.000)	0.349 (0.008)
Investments	0.595 (0.000)	0.371 (0.005)	0.267 (0.046)
Export	0.500 (0.000)	0.246 (0.068)	0.047 (0.729)
Import	0.594 (0.000)	0.345 (0.009)	0.101 (0.46)
Employment	0.712 (0.000)	0.507 (0.000)	0.292 (0.029)
Unemployment	0.841 (0.000)	0.641 (0.000)	0.408 (0.002)
Real wages	0.468 (0.000)	0.341 (0.01)	0.248 (0.065)
Inflation	0.839 (0.000)	0.63 (0.000)	0.505 (0.000)
Interest rates	0.789 (0.000)	0.39 (0.003)	0.021 (0.877)
Exchange rate	0.691 (0.000)	0.286 (0.032)	-0.039 (0.774)
Variable	Serbia		
	t+1	t+2	t+3
GDP	0.355 (0.010)	0.062 (0.665)	-0.23 (0.100)
Private consumption	0.376 (0.006)	0.130 (0.360)	-0.012 (0.933)
Government spending	0.524 (0.000)	0.304 (0.028)	0.156 (0.270)
Investments	0.684 (0.000)	0.285 (0.040)	0.077 (0.587)
Export	0.543 (0.000)	0.155 (0.271)	-0.025 (0.858)
Import	0.372 (0.007)	0.037 (0.792)	0.088 (0.536)
Employment	0.875 (0.000)	0.650 (0.000)	0.368 (0.007)
Unemployment	0.795 (0.000)	0.499 (0.000)	0.107 (0.450)
Real wages	0.603 (0.000)	0.236 (0.092)	-0.007 (0.959)
Inflation	0.895 (0.000)	0.705 (0.000)	0.49 (0.000)
Interest rates	0.797 (0.000)	0.405 (0.003)	0.054 (0.706)
Exchange rate	0.711 (0.000)	0.215 (0.126)	-0.235 (0.093)

Note: The values in the tables are the autocorrelation coefficients, and the *p*-values are given in parentheses.

Source: Author

and identical to the findings in the paper by R. Jovančević and V. Arčabić (2010). In the case of Germany, inflation is also procyclical and lagging, whereas interest rates are not significant. In the case of Serbia, the nominal variables are not significant at all for the observed lags, as well as the exchange rate in the EU and in Germany. In the case of inflation and interest rates, the reason for this may lie in the fact that these variables become significant at later lags due to the nature of higher delays in these variables. On the other hand, the insignificance of the exchange rate is expected, bearing in mind the fact that real exchange rates are affected not only by domestic macroeconomic conditions but also by conditions in other countries, which is the reason why relative, rather than domestic, measures of the business cycle and other macroeconomic conditions are relevant for determining the exchange rate (Prasad & Chadha, 1997). Theory envisages that the cyclical movements of the real exchange rate during the business cycle depend on the relative importance of the various shocks that drive the cycle (Prasad & Chadha, 1997). Regarding the nominal variables, however, the hypothesis H4 pertaining to the procyclical and lagging nature of inflation and interest rates can be accepted.

Persistence

In accordance with the presented methodological framework for measuring the persistence of the observed variables, the autocorrelation coefficients (Table 5) were calculated, and their statistical significance was tested (the *p*-values are presented in parentheses).

The results show the statistical significance of all the variables in *t*+1, whereas in *t*+2 and *t*+3 only certain variables remain significant. Those variables are more persistent compared to the variables whose significance ceases in the next two quarters. The most persistent variable in all the observed countries is inflation, which completes the validity of the hypothesis H4. After three quarters, it is perceived that inflation retains almost or over 50% of its initial value, which is quite high and indicates stable inflation in the observed period. In addition to inflation, employment is also very persistent in Serbia. The high persistence of this variable is seen both in the EU countries and in Germany, where a greater number of the variables show persistence than it is the case in Serbia. It is interesting that investments have shown greater persistence in Serbia compared to the countries of the European Union. As is shown by E. Jakopin and A. Gračanac (2023), investments in the period from 2015 to 2021 were the key driver of economic growth in Serbia. Real exchange rates also exhibit the characteristic of persistence, bearing in mind the fact that the autocorrelation coefficient for this variable is significant in *t*+2 for the EU and Germany, as well as in *t*+1 for Serbia.

The results obtained for the volatility, correlation and persistence of the observed variables confirm the initial hypothesis H1, i.e. that the business cycles of Serbia do not lag behind the business cycles of the European Union and Germany. Advanced econometric techniques evaluate the ARMA models and impulse response functions that refer to persistence. However, these advanced techniques are not the subject matter of this paper, bearing in mind the fact that the aim is to provide a general picture of business cycles by studying the stylized facts about the cycles in terms of their volatility, correlation and persistence. The approach is based on the idea of A. F. Burns and W. C. Mitchell (1946), who seek to interpret the behavior of macroeconomic variables without a model.

CONCLUSION

The existing literature has highlighted the stylized facts pertaining to the business cycles of different countries. However, the business cycle is a highly complex phenomenon which is not easy to measure and interpret. This paper examines the stylized facts concerning the cyclical movement of the key macroeconomic variables in the period following the 2008 crisis, using detailed statistical analysis. By analyzing the European Union as a whole, Germany as the most developed economy in the EU, and the

Republic of Serbia as a diverse set of observation units it investigates the volatility, correlation with the GDP, and the persistence of the GDP components, the selected labor market variables, and the nominal variables. The contribution of this paper lies in the identification of the cyclical movement characteristics not only of the gross domestic product as the standard measure of the business cycle, but also of the other mentioned macroeconomic variables. The paper has managed to reveal certain regularities in their movement in the period after the global financial crisis, thus providing a general overview of business cycles. There are very few papers addressing this topic in the case of Serbia, which is yet another contribution of this study.

The research results indicate that the cycles in the observed period were mainly characterized by the following: higher investment volatility compared to consumption and the stability of government spending; the procyclical and coincident nature of the GDP components; procyclical employment and countercyclical real wages; the procyclical and lagging effects of inflation and interest rates; the insignificance of the exchange rate; and the highest persistence of inflation, which retains about 50% of its initial value after three quarters, indicating stable inflation during the observed period. It is important to note that the results for Serbia do not significantly differ from those for the EU and Germany, in which sense Serbia's business cycle can be said to be similar to those of more developed countries. The standard finding in the literature that the output in developing countries is more volatile than that in developed countries does not apply to Serbia, since its output is equally volatile as that of Germany.

In addition to these general conclusions, individual exceptions have also been found. For example, the high volatility of investments and short-term interest rates is perceived in Serbia. The reason for that lies in the fact that developing countries are generally more vulnerable to external economic shocks, such as financial crises or geopolitical tensions, or changes in global interest rates, prices and capital flows. These external factors can spill over to domestic financial markets and lead to increased volatility in short-term interest rates. Consequently, the aforementioned shocks could have led to greater volatility in investments in the observed period. In the EU and Germany, there is no case showing that the volatility of employment is higher in relation to the GDP, either. However, the findings concerning the correlation of these variables with the GDP are mostly confirmed in the EU, whereas there are exceptions when Germany or Serbia are concerned. In particular, government spending has proven to be lagging behind and to have different signs. Therefore, it can be concluded that the character of the spending of the state is largely influenced by the country's development level. The exceptions that occur in Serbia also concern unemployment and real wages, which relates to the nature of the still developing labor market.

The persistence analysis indicated stable inflation during the observed period in the EU and in Germany and Serbia well. In this regard, the recorded stability of interest rates in Serbia indicates the effective monetary policy that maintains stable inflation and supports growth and employment, which is the second most stable variable according to the results.

The analysis could be improved by expanding the set of the observed variables (for example the inclusion of additional labor market variables, such as average labor productivity and hours per worker), or by breaking down the already observed variables into subcategories (for example the division of investments into the fixed investments of the economy, resident investments and investments in stocks). Based on the other empirical research studies, it is possible to divide the observed time period into sub-periods. The results obtained by carrying out statistical analysis could further be examined by forming an adequate model and conducting advanced econometric analyses. For example, a conclusion with respect to persistence can be made on the basis of the impulse response functions obtained from the VAR model.

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THE IMPACT OF SOCIAL MEDIA MARKETING ACTIVITIES ON CONSUMER BEHAVIOR TOWARDS GREEN PRODUCTS - AN ANALYSIS OF LOCAL AND GLOBAL COMPANIES

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Considering the significance of the Internet and communication with consumers in the online environment primarily through social media, as well as the growing importance of sustainability in modern business, this paper aims to analyze consumer behavior regarding green products in the context of social media. Specifically, social media marketing activities of local and global companies in the Republic of Serbia were analyzed, incorporating the five aspects: entertainment, interaction, trendiness, customization, and electronic word-of-mouth. Empirical research was conducted using the survey method and the SEM analysis was applied so as to determine that the mentioned aspects of social media differently affected the attitudes towards the green products of local and global companies. A positive moderating influence of the global identity on the relationships in the models was found. The main contribution of the paper relates to the analysis of the relationship between social media marketing activities and consumer behavior towards green products, with a comparative analysis of local and global companies.

Keywords: sustainability, green marketing, consumer behavior, social media, local companies, global companies

JEL Classification: M31

INTRODUCTION

The internet has significantly changed modern business both for companies and consumers. Companies' visibility on the Internet through their websites (Kocić, Šapić & Sofronijević, 2022) and social media has become necessary for communication with consumers and businesses as a whole. In particular, the importance and role of social media in modern global business is witnessed by the number of users and popularity. In 2023, there were almost five billion users of social media, which is over 60% of the total world population and more than 90% of the total number of Internet users (Backlinko team, 2024). These trends in the growth of social media users have started a new era of business for global brands

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and companies, in which they are forced to find new, interactive ways to communicate with consumers (Gallaugher & Ransbotham, 2010). The increasing importance of social media has led companies worldwide to include this type of media in their marketing plans as part of their overall business strategy.

Sustainability has become an essential concept in the contemporary business environment. The rising significance of various problems concerning the environment, such as climate issues or pollution, compels companies to react to these matters through their promotional channels. By creating appropriate content on their social media, brands can incorporate different issues concerning sustainability and create a perception of responsible behavior among consumers. On the other hand, consumer behavior and their concern for sustainability will shape consumption for years to come. Therefore, understanding how consumers make purchasing decisions, especially those regarding green products, is paramount for brand and marketing managers.

In the scientific literature, the impact of social media marketing activities on the attitudes and the acceptance of green products has been analyzed in a certain number of studies (Pop, Săplăcan & Alt, 2020; Sun & Wang, 2020; Gupta & Syed, 2022). In addition, in certain studies, the authors investigated the impact of this type of marketing activity on the consumer purchasing behavior of global brands (Godey, Manthiou, Pederzoli, Rokka, Aiello, Donvito & Singh, 2016; Hassan & Sohail, 2021). However, there are no studies that analyze the influence of social media marketing activities concerning green products in the context of global and local companies. This study aims to overcome this research gap and investigate the connection between social media marketing activities and consumer behavior regarding the purchase of the green products of local and global companies. Bearing in mind the fact that Serbia is a developing country, this issue is gaining in importance given the fact that sustainability and green marketing are more prevalent in developed countries (Feng, Hu, Afshan, Irfan, Hu & Abbas, 2023). To test the hypotheses, empirical research was conducted using survey methods and the obtained data were analyzed using the structural equation model, i.e. SEM analysis.

The paper is structured into a few sections. The introductory considerations are followed by the literature review in which the concepts of green marketing and social media marketing activities, as well as their connection which is reflected in the defined research hypotheses, are analyzed. The most important part of the paper is empirical research, in which the hypotheses from the conceptual model are tested using appropriate statistical techniques. At the end of the paper, the obtained results are analyzed in the discussion, as well as the implications and limitations of the paper in the conclusion section.

LITERATURE REVIEW

Green marketing

In recent years, green marketing has been gaining in importance, both in the marketing literature and in the business practices of companies. Green products are "those that can be recycled, require less natural resources, and act as a non-polluter for the earth, with environmentally friendly packaging" (Gupta & Syed, 2022).

Over time, companies have increased the use of social media for the promotion of their green products. In particular, companies and brands can use social media to communicate to consumers the characteristics and production methods of their green products and maintain their brands' green credibility (Kang & Kim, 2017).

Various research has shown that online technologies, such as Web 2.0 and social media, can significantly spur pro-environmental behavior. The Technologies for Pro-environmental Action Model (TPAM), which describes how environmental actions and behavior can be facilitated through the specific functions of Web 2.0 and social media, is a model related to the application of technology for environmental action (Ballew, Omoto & Winter, 2015). Specifically, the model explains that pro-environmental behavior

(such as purchasing hybrid vehicles, recycling, or the consumption of energy sources) is influenced by various functions of Web 2.0 and social media (i.e. informational, relational, and experiential ones) which create personal, social, and contextual paths for this type of consumer behavior.

Social media marketing activities (SMMA)

Social media can be defined as "online application programs, platforms, or media that facilitate interactions, collaboration, or content sharing" (Richter & Koch, 2007). Online social media websites and applications, such as Facebook, Instagram and YouTube, among others, have seen continuous growth in the number of users and popularity in general, leading to many world-renowned companies and brands using them for promotional purposes. In fact, companies have increasingly been using social media for communication with consumers and the promotion of their products in the last few years (Okazaki, Díaz-Martín, Rozano & Menéndez-Benito, 2015). A. J. Kim and E. Ko (2010) established a framework for the analysis of social media, which implies that they have five basic dimensions, namely entertainment, interaction, customization, trendiness, and electronic word-of-mouth.

Entertainment

Consumers often use social media to have fun, escape from everyday responsibilities, and for enjoyment. Social media users can be described as pleasure-seekers who have fun and enjoy this activity (Manthiou, Chiang & Liang (Rebecca), 2013). Entertainment implies that users use social media to relax or escape from problems or routines, as a way to improve their emotional state, then for cultural or aesthetic enjoyment, and as a way to pass their time faster, which all implies that "social media users consume brand-related content on social media for enjoyment, relaxation, and entertainment" (Muntinga, Moorman & Smit, 2011).

It has empirically been confirmed that, as an aspect of social media, entertainment positively influences consumer attitudes towards green products (Wang, Chowdhury, Deng & Wang, 2019; Gupta & Syed, 2022). In addition, A. J. Kim and E. Ko (2012) found that entertainment positively impacted consumer evaluations of brands, as well as the development of brand-consumer relationships. Bearing in mind the previous statements, the following hypothesis is defined:

H1: Social media entertainment has a positive and statistically significant effect on attitudes towards green products.

Interaction

Social media provide an opportunity for discussion and opinion exchange between consumers. Thus, companies can gain an insight into the consumers who participate in the social media platforms of specific brands through their mutual interactions. Consumers interact with each other in cyberspace and discuss products, brands, or companies (Muntinga *et al*, 2011). Consumer interactions essentially change the nature of communication between brands and users, i.e. consumers, and motivate the expansion of user-generated content (UGC) in social media as well (Bazi, Filieri & Gorton, 2020).

The previously mentioned TPAM model implies that social motivations influence pro-environmental behavior, these motivations being fulfilled through interactions in social media. The interaction feature enables consumers to feel as if they were part of the community through groups and conversations with other users. Companies can use this increased sense of consumer commitment to encourage green behavior. Therefore, using this feature of social media enables the creation of online communities that have the potential to motivate environmental actions (Ballew *et al*, 2015).

The previous theoretical claims are supported by the findings of empirical studies. In particular, M. Gupta and A. A. Syed (2022) show that interaction strongly influences consumer preferences for green products. Similarly, Y. Wang *et al* (2019) show that interaction affects preferences for green products. Bearing in

mind the theoretical aspects and the conclusions of the empirical research, the hypothesis reads as follows:

H2: Interaction in social media has a positive and statistically significant effect on attitudes towards green products.

Customization

As an aspect of social media, customization enables companies to establish customized information and customized information searches, through which feature consumers can plan and customize the products they want to buy. An example of customization could be sending personalized messages or emails to consumers, with special offers or incentives, allowing consumers to customize products to their unique needs. Y.-Q. Zhu and H.-G. Chen (2015) point out the fact that customization is based on the two types of messages that can be sent to consumers: customized messages and broadcast messages. Customized messages target a specific person or a smaller number of people, such as messages on the Facebook platform, whereas broadcast messages are aimed at all the people who may be interested (messages on the Twitter platform).

Social media customization enables an individual approach to consumers, where it largely differs from traditional media, which means that companies can individually optimize information for specific consumers (Seo & Park, 2018). Customization also serves as an instrument companies use to point out to consumers what makes their brands unique and to improve their attitudes and loyalty to their brands (Martin & Todorov, 2010).

There are studies showing that customization is a significant determinant in the process of making decisions on purchasing products (Godey *et al*, 2016). When green products are concerned, a similar result was obtained in the research study conducted by M. Gupta and A. A. Syed (2022), whereas Y. Wang *et al* (2019) found that customization positively influenced purchase commitment, but did not have any influence on preferences for green brands. These results made it possible to define the following hypothesis, which reads:

H3: Social media customization has a positive and statistically significant effect on attitudes towards green products.

Trendiness

Consumers can have access to the latest, current news and topics for discussion through social media. Additionally, consumers can gain an insight into the recent news and information about products and the company, resulting in social media being used as a search engine. Therefore, consumers may have more confidence in news and information gathered from social media than in those learned from traditional media (Naaman, Becker & Gravano, 2011). Accordingly, this aspect of social media is defined as "providing the latest information about products or services" (Godey *et al*, 2016).

D. G. Muntinga *et al* (2011) point out the fact that trendiness in social media fulfills the four types of motivation in consumers, namely: surveillance, knowledge, pre-purchase information, and inspiration. Surveillance means that consumers can perceive and inform themselves about their social environment. Knowledge relates to the fact that consumers search for information about brands online so as to benefit from other consumer knowledge and experience and to find out more about the desired product. Pre-purchase information means that consumers can read reviews of products or discussions about brands when making a purchase decision. Inspiration refers to the situation when consumers are getting new ideas, based on information about brands, implying that this is what inspires consumers.

Gathering information and following the latest trends in social media have a significant impact on the purchase of green products among younger consumers, as is proven by S. Xie and G. R. Madni (2023). Also, a similar result was obtained in the research conducted by the authors Y. Wang *et al* (2019), who show that trendiness influences consumer

preferences towards green products. Bearing in mind the previous statements, the following hypothesis is defined:

H4: Social media trendiness has a positive and statistically significant effect on attitudes towards green products.

Electronic word-of-mouth

Electronic word-of-mouth involves online social media interaction between consumers pertaining to brands (Muntinga *et al*, 2011). Research has shown that consumers find electronic word-of-mouth to be characterized by greater credibility, empathy, and relevance, than the information sources created by companies on the Internet (Gruen, Osmonbekov & Czaplewski, 2006). Instead of just following companies' ads, consumers value other consumer experiences and knowledge shared in social media by those other consumers. Social media are perfect for this type of word-of-mouth, since users can create and share information about brands to their friends, family, and peers, without any restrictions at all (Kim & Ko, 2012; Godey *et al*, 2016).

According to S.- C. Chu and Y. Kim (2011), electronic word-of-mouth in social media can be perceived from the three perspectives: opinion seeking, opinion giving, and opinion transmission. Opinion-seeking consumers usually look for advice or reviews from other consumers when they want to decide on purchasing a desired product. Some consumers prefer to give their opinions on various topics (commonly known as opinion leaders), and they have a considerable effect on consumer attitudes and behavioral intentions. The latter perspective implies that the transmission of an opinion in the online environment is the feature of electronic word-of-mouth that facilitates the flow of information among consumers.

Numerous studies have pointed to the importance of electronic word-of-mouth propaganda on consumer behavior. M. A. Saeed, A. Farooq, W. Kersten and S. I. Ben Abdelaziz (2019) showed that consumer behavior regarding the purchase of green products was influenced by both positive and negative information about sustainability in their social media. Similar results were obtained in a study carried out by M. Gupta and A. A. Syed (2022), where, of all the aspects of social media marketing, electronic word-of-mouth had the greatest influence on the attitudes consumers had towards green products. The previous results allow the following hypothesis to be defined:

H5: Electronic word-of-mouth in social media has a positive and statistically significant effect on attitudes towards green products.

Consumer behavior in the context of purchasing green products

According to the Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1980) and the Theory of Planned Behavior (TPB) (Ajzen, 1991), attitudes demonstrated in the purchase decision-making process precede the intention to buy certain products. In addition, according to these theories, intentions lead to actual behavior, which is the reason why they are used as a human behavior predictor. This theoretical approach is used in a large number of studies that focus on predicting consumer behavior within the framework of social media marketing (Kim & Ko, 2012), as well as green marketing (Pop *et al*, 2020; Sun & Wang, 2020). Bearing in mind the above-mentioned theoretical aspects, the following hypothesis is defined:

H6: Attitudes towards green products have a positive and statistically significant effect on the intention to purchase these products.

Global consumer identity

The notions of the local and global identities have emerged in the domain of consumer psychology as one of the consequences of globalization (Arnett, 2002). Consumers with a strong global identity feel a greater connection with people outside their country than with those in their local environment, whereas people with a strong local identity feel more connected to people in the local environment (Zhang & Khare, 2009). In other words, the global identity

means that "consumers feel they belong to a global community and identify with a global lifestyle" (Tu, Khare & Zhang, 2012).

Numerous studies have shown that the development of the global identity in individuals can be a consequence of the influence of globalization and foreign cultures (Alden, Steenkamp & Batra, 2006; Steenkamp & De Jong, 2010). The assumption is that an increased sense of connectedness to world culture leads individuals with a pronounced global identity to feel greater personal responsibility for the matters, such as pollution and climate issues among others, affecting the well-being of the world. This strong feeling of personal concern and responsibility towards the well-being of the world should in turn encourage them to behave in a way that is better for the environment, such as buying environmentally friendly products, i.e. green products, which claim has empirically been tested in several studies. Specifically, S. Ng and S. Basu (2019) found that individuals with a pronounced global identity will have the feeling of personal responsibility towards the environment. Additionally, because they feel personally responsible, these individuals will tend to demonstrate pro-environmental behavior, such as the purchase of green products. For this reason, this research study investigates the moderating influence that the global identity has on the relationships in the model. Accordingly, the following hypothesis is defined:

H7: The global consumer identity has a moderating influence on the relationships between the social media marketing activities: a) entertainment, b) interactions, c) customization, d) trend following and e) electronic word-of-mouth and consumer attitudes towards green products.

The research model and the relationships between the variables in it are shown in Figure 1.

METHODOLOGY

Bearing in mind the defined hypotheses and the research model, a questionnaire was compiled covering the five aspects of marketing in social media (the independent variables), as well as the dependent variables related to consumer behavior. In addition, the global identity was included as the moderator variable. The questionnaire consisted of the 22 statements originally found in the previously conducted studies and modified for the needs of the green product research. The respondents evaluated the statements using the five-point Likert scale.

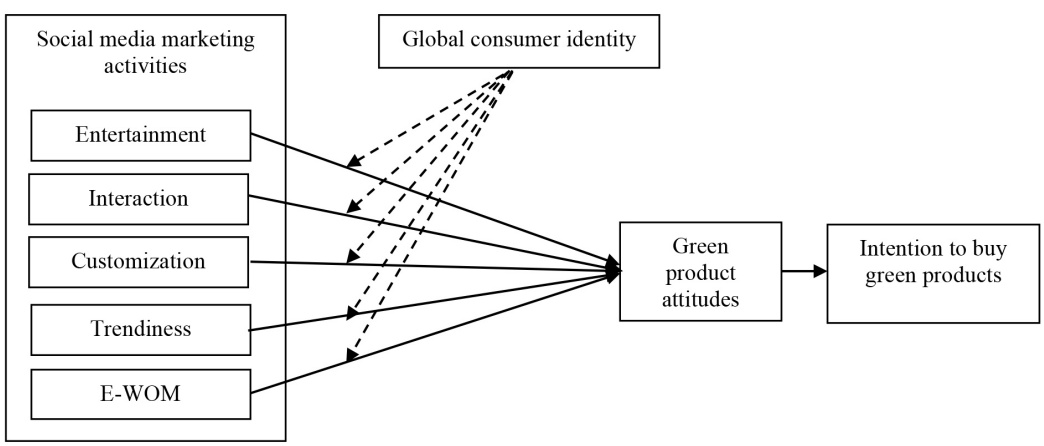

Figure 1 The conceptual research model

Source: Authors

The variable relating to the social media marketing activities was conceptualized and adjusted according to the studies conducted by B. Godey *et al* (2016) and A. J. Kim and E. Ko (2012). The global identity was taken from the paper by L. Tu *et al* (2012). The variable attitudes towards green products were formed according to the papers by the authors M. Gupta and A. A. Syed (2022) and J.- H. Kim and Y. J. Hyun (2011), whereas the intentions to buy a green product were taken from the paper by the authors A. J. Kim and E. Ko (2012). Additionally, all the statements in the questionnaire were adapted for the case of the global and local companies operating in the Republic of Serbia. At the beginning of the questionnaire, the respondents were informed about the research subject and said whether they had previously bought green products from local and global companies or not. To add, the respondents also said whether they used social media to gather information about companies and products or not. Only the questionnaires filled out by the respondents who said that they had had the experience of buying this type of product and who were social media users were included in the analysis.

After having collected the surveys, statistical data processing was carried out in the IBM SPSS and AMOS programs. Descriptive statistics, confirmatory factor analysis, and SEM analysis were implemented in order to analyze the relationships in the research models, as well as the analysis of the interaction effect of the global identity on the selected relationships in the models.

The sample characteristics

The survey process was conducted in the period from November 2023 to January 2024. The questionnaires were collected in person on the territory of the city of Kragujevac and other larger cities of Šumadija District. After compiling the first version of the questionnaire, it was tested on a group of 30 students, in which way minor corrections were made to the questionnaire. The corrections were made to the ambiguities and the wording of certain questions. In the survey main phase, 350 surveys were prepared. Upon completion of the survey process, a fact was established that 23 surveys were not completed correctly, which is the reason why they were eliminated from further analysis. The final sample consisted of 327 valid surveys. Descriptive statistics were used to determine the structure of the sample, as is shown in Table 1.

Table 1 The descriptive statistics pertaining to the respondents' characteristics

Demographic characteristic		% of the respondents
Sex	Male	48.3
	Female	51.7
Age	18-24	28.2
	25-34	19.6
	35-44	19.8
	45-54	23.5
	55 and older	8.9
Education	High school	48.7
	Undergraduate study	14.1
	Graduate and postgraduate studies	37.2
Occupation	Manager, entrepreneur	14.6
	Professor, doctor, engineer	15.2
	Clerk, worker	35.4
	Student	24.9
	Other occupations	9.9

Source: Authors

RESEARCH RESULTS

The first step in the hypothesis testing is to create research models and check their validity. Table 2 shows the validity indicators of the models. Bearing in mind the fact that the research included the green products of both global and local companies in Serbia, two research models were formed. Various indicators were used to analyze the validity of the models. Primarily, the $\chi 2/df$ indicator whose value was less than 3 was used in the case of the valid model (Bagozzi & Yi, 1988), the condition that was

Table 2 The model validity analysis

Indicators of the model validity	Research model - Local green products	Research model - Global green products	Recommended value
χ2/df	1.652	1.974	<3
GFI	0.921	0.902	>0.9
IFI	0.952	0.932	>0.9
TLI	0.939	0.912	>0.9
CFI	0.951	0.932	>0.9
RMSEA	0.045	0.055	<0.08

Source: Authors

met by both models. The indicators GFI, IFI, TLI, and CFI should have a value greater than 0.9 (Byrne, 1998), which was also fulfilled in both models. Finally, the RMSEA value should have a value less than 0.08 (Hair, Black, Babin, Anderson & Tatham, 2006). According to the indicators in the table, the assumptions of validity are fulfilled in both models.

Table 3 contains the results of the confirmatory factor analysis. Namely, the convergent validity of the model is achieved if the values of the average extracted variance (AVE) are above the level of 0.5 (Fornell & Larcker, 1981), which is fulfilled in the case of all the variables in both analyzed models. In addition, the values of the composite reliability of all the variables in the analyzed models are above 0.7, which also meets the established criterion for the validity of the model (Fornell & Larcker, 1981). The largest number of the statements in the models have the values of factor loadings exceeding 0.7, and the values of Cronbach's Alpha coefficient of all the formed variables exceed 0.7, which indicates their good internal consistency (Nunnally, 1978).

Table 4 presents the results of the hypothesis testing. Regarding the local green products, the variables with a statistically significant impact on the purchasing attitudes are entertainment and electronic word-of-mouth, which indicates that the hypotheses H1 and H5 are confirmed. Conversely, interaction, customization, and trendiness are not confirmed as the predictors of attitudes towards buying green products, so the hypotheses H2, H3, and H4 are not confirmed.

When the green products of the global companies that operate in the Republic of Serbia are concerned, a fact is established that all the aspects of the social media marketing activities, except for customization, significantly and positively influence consumer attitudes towards green products, which means that the hypotheses H1, H2, H4, and H5 are supported, whereas the hypothesis H3 is not. Additionally, a fact is also established that these attitudes have a very strong impact on consumer intentions to buy green products in the case of both types of the companies, which is why the hypothesis H6 is confirmed in both models.

The results of the analysis of the moderating influence of the global identity on the relationships in the models are shown in Table 5. In the case of the green products of the local companies, a fact is established that the global consumer identity has a significant moderating influence in the case of the influence of entertainment on social media, as well as the influence of electronic word-of-mouth propaganda on consumer attitudes, which confirms the hypotheses H7a and H7e in the case of the local companies. Apart from that, a positive and statistically significant moderating influence of the global consumer identity on the social media marketing activities of the green products of the global companies is established in the case of all the observed relationships in the model, except in the case of customization. This confirms all the hypotheses related to the interaction effect of the global identity on the relationships in the models (H7a, H7b, H7d, and H7e) for the global companies, except for the relationship between customization and consumer attitudes.

Table 3 The confirmatory factor analysis (CFA)

Variables	Local green products	Global green products
Entertainment	AVE=0.628 CR=0.835 α=0.800	AVE=0.604 CR=0.820 α=0.787
The content of the social media of my preferred green product is interesting.	0.754	0.791
It's fun to use the social media of my preferred green product.	0.805	0.788
Gathering information about my preferred green product in social media is fun.	0.817	0.751
Interaction	AVE=0.621 CR=0.866 α=0.763	AVE=0.610 CR=0.860 α=0.806
Mutual communication/interaction is possible in the social media of my preferred green product.	0.613	0.836
Conversations or opinion exchange with other users are possible in the social media of my preferred green product.	0.882	0.878
Information exchange with other users is possible in the social media of my preferred green product.	0.803	0.784
I can simply express my opinion in the social media of my preferred green product.	0.828	0.597
Customization	AVE=0.607 CR=0.821 α=0.710	AVE=0.604 CR=0.820 α=0.716
In the social media of my preferred green product, there is a possibility to search for the information I need.	0.864	0.721
The social media of my preferred green product offer information, which I need in real life.	0.789	0.754
The social media of my preferred green product offer a user-friendly service.	0.672	0.851
Trendiness	AVE=0.617 CR=0.761 α=0.702	AVE=0.622 CR=0.765 α=0.715
It's very trendy to use the social media of my preferred green product.	0.870	0.866
The social media of my preferred green product offer the latest and most current information.	0.691	0.703
Electronic word-of-mouth	AVE=0.618 CR=0.763 α=0.706	AVE=0.618 CR=0.760 α=0.738
I like to express my opinion about my preferred green product.	0.718	0.652
I like to pass information about the products or services of my preferred green product to my friends.	0.849	0.901
Global identity	AVE=0.629 CR=0.835 α=0.762	AVE=0.630 CR=0.836 α=0.762
I identify as a global citizen (a citizen of the world).	0.796	0.840
It is important for me to know of global events.	0.811	0.772
I think people need to be more aware of how connected we are with the rest of the world.	0.771	0.768
Attitudes towards green products	AVE=0.636 CR=0.839 α=0.766	AVE=0.608 CR=0.822 α=0.779
I am willing to make a special effort to buy preferred green products.	0.716	0.843
I prefer green products over other products, if they are of a similar quality.	0.773	0.771
I prefer green products over other products, even when their price is slightly higher.	0.893	0.720
The intention to buy a green product	AVE=0.630 CR=0.773 α=0.773	AVE=0.745 CR=0.854 α=0.853
I would like to buy a preferred green product.	0.789	0.878
I would like to recommend my preferred green product to others.	0.799	0.848

Source: Authors

Table 4 The SEM analysis

Hypotheses		Local green products	Hypothesis testing	Global green products	Hypothesis testing
H1:	Entertainment → Attitudes towards green products	0.304***	Supported	0.279**	Supported
H2:	Interaction → Attitudes towards green products	0.023ns	Not supported	0.274**	Supported
H3:	Customization → Attitudes towards green products	0.103ns	Not supported	0.071ns	Not supported
H4:	Trendiness → Attitudes towards green products	0.140ns	Not supported	0.298***	Supported
H5:	Electronic word-of-mouth → Attitudes towards green products	0.405***	Supported	0.360***	Supported
H6:	Attitudes towards green products → The intention to buy a green product	0.882***	Supported	0.852***	Supported

Note: *p<0.1; **p<0.05; ***p<.001, ns - not significant.

Source: Authors

DISCUSSION OF THE RESULTS

The research conducted has established numerous relationships between the analyzed variables in the models related to the influence of social media marketing activities on the attitudes and intentions pertaining to the purchase of the green products of the local and global companies. Overall, social media marketing activities are a better predictor of consumer attitudes towards green products from global companies than from local ones. Of the five analyzed aspects of marketing on social media, there are two aspects influencing consumer attitudes towards green products of the local companies, whereas in the case of the global companies, all the analyzed activities influence consumer attitudes towards these products, except for social media customization.

In the case of local companies, entertainment, and electronic word-of-mouth have a statistically significant effect on consumer attitudes towards green products, which indicates that the fun and hedonic aspects of social media are important to consumers when green products are in question. In addition, other users' recommendations for and experiences with green products which they share in social media are very important to consumers. On the other hand, interaction with local companies via social media, customization, and trendiness are not significant predictors of attitudes towards green products, which may indicate the insufficient presence of local companies in social media in terms of up-to-date and relevant pieces of information about green products. This results in a lower level of interaction with consumers. Neither do consumers perceive the social media of the local companies as current and "trendy", which local companies can improve through the promotion of green products. The above results can also be interpreted by the fact that, as a concept, sustainability in developing countries is at the initial level of development (Feng *et al*, 2023) and that local companies do not fully use the possibilities of social media to promote their green products.

On the other hand, social media marketing activities of global companies related to the promotion of green products have a much greater impact on consumer perceptions of these products. All the aspects of global companies' social media, except for customization, have a positive influence on consumer attitudes, with electronic word-of-mouth and trendiness exerting the greatest one. The results obtained are consistent with the results of previous research (Seo & Park, 2018; Gupta & Syed, 2022), which implies that the interaction consumers have with global companies is important to them, as well as the exchange of opinions

Table 5 Testing the relationships in the model (SEM) - The moderation effects

Selected relationships in the model (Dependent variable: Attitudes towards green products)		Local green products	Hypothesis testing	Global green products	Hypothesis testing
H7a:	Entertainment × Global Identity	0.667**	Supported	0.517***	Supported
H7b:	Interaction × Global Identity	0.231ns	Not supported	0.439***	Supported
H7c:	Customization × Global Identity	0.252ns	Not supported	0.096ns	Not supported
H7d:	Trendiness × Global Identity	0.112ns	Not supported	0.535**	Supported
H7e:	Electronic word-of-mouth × Global Identity	0.731***	Supported	0.716***	Supported

Note: *p<0.1; **p<0.05; ***p<.001, ns - not significant.

Source: Authors

and experiences with other users of green products that is achieved through social media. In addition, consumers use the social media of global companies because they are fun, current, up-to-date, and follow trends in green products.

The moderating influence of the global identity on the relationships in the models is very pronounced, especially in the case of the green products of the global companies. Namely, the connection and identification of consumers with people around the world, world events, and global culture strengthen the relationship between the marketing activities of the local and global companies in social media and the attitudes towards green products. In the case of the local companies, the interaction effect of the global identity is visible in the relationship between entertainment and electronic word-of-mouth, as the two aspects of social media, and the attitudes towards green products. For the global companies, the interaction effects are present in all the relationships of the model, except in the case of the link between customization and consumer attitudes. This indicates that global consumer identification significantly strengthens positive attitudes towards green products, which they form based on the use of social media. It should also be noted that the coefficients indicating the strength of the interaction are extremely high, which indicates that consumer global identity is a characteristic that can significantly influence their willingness to buy green products. Therefore, this segment of consumers is extremely important for the promotion of green products, which is the result that corresponds to the results of the previously conducted research (Ng & Basu, 2019).

CONCLUSION

This research study is focused on the impact of social media marketing activities on consumer behavior with respect to the green products of the local and global companies operating in the Republic of Serbia. The results of the conducted empirical research are significant from both the theoretical and especially the practical point of view given the fact that they provide an insight into the antecedents that consumers perceive as significant when the promotion of green products through social media is concerned.

The theoretical implications of the research are multiple. Bearing in mind the fact that the practice of green marketing is in the initial stage of its development in developing countries compared to developed countries, there is not a large number of the papers that analyze these issues in detail. Consequently, it is very significant to analyze how consumers from developing countries perceive the marketing activities of companies in social media, which may influence their purchase of green products. In the era of digitization and the

emphasized importance of sustainability, both in the business done by companies and in the way consumers behave, these results provide an insight into the aspects of marketing in social media that are important to consumers when making decisions on purchasing green products.

The practical implications refer to the possibilities for marketing managers not only in the Republic of Serbia but in other countries as well to apply the obtained results which particularly indicate that local companies do not use the potential of social media sufficiently enough, considering that consumers do not perceive these activities as sufficiently current, informative, and with a high level of adaptability to users. On the other hand, in the case of foreign companies, all the analyzed activities have an impact on consumer behavior, except for customization. Given the fact that global companies mostly come from developed markets, where business sustainability and green marketing are at a higher level, these results can provide local companies with concrete guidelines for creating content in social media. The very significant and positive influence of the global identity on the relationships in the models indicates that consumers with this characteristic represent an extremely important segment for marketing campaigns, both for global companies and for local ones.

The limitations of this research study primarily reflect in the fact that the research was conducted on the territory of Kragujevac and Central Serbia, which may represent an obstacle in terms of the generalization and applicability of the results in other countries. Also, the research focused on green products in a general sense. In subsequent research, different types of green products, such as food, clothing, or cosmetic products can be analyzed so as to obtain specific results for different industries. Finally, further studies may include additional variables in the analysis, either independent or moderator variables, in order to provide a deeper understanding of how consumers perceive marketing activities in social media and their importance for purchasing green products.

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INVESTMENT OPPORTUNITIES EVALUATION: A COMPARATIVE ANALYSIS AND THE MULTI-CRITERIA RANKING OF TOP-LISTED COMPANIES

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Investors are faced with the challenge of identifying the most promising companies for their potential investment in the stock market. This research study aims to propose a systematic approach to the selection of top-listed companies for investment, focusing on the two levels of analysis - the ratio analysis based on liquidity and profitability, and the multi-criteria ranking using the PROMETHEE method. The observed companies are divided into two groups: group A, which includes companies with a PE ratio above 50, and group B, which includes companies with a PE ratio below 5. The findings of the study highlight the fact that companies with higher PE ratios tend to exhibit better overall business performance as observed on an individual basis and based on the ratio analysis. Although there are noticeable differences in the ratio indicators between the companies, these differences are not significant when the overall review is considered. The combination of ratio analysis and the PROMETHEE method provides an effective method for evaluating their business performance, giving guidance to investors and decision-makers in selecting the most promising investment opportunities. The results of the multi-criteria ranking show that the companies that belong to group B have a better rank than the others, and that investors should invest in the companies Vale S.A. and Tesla, Inc. as well.

Keywords: ratio analysis, PROMETHEE method, stock market, investment, comparative analysis

JEL Classification: G11, M49

INTRODUCTION

In the global marketplace, many companies list their shares on the stock exchange. Some of them have suffered severe losses in many crises and market disruptions over the past decade. However, this has yet to contribute to the withdrawal of companies from the global market. The fact that they have survived even during the market disruption caused by many crises shows they are strong and financially sound businesses. With publicly available information about companies, their performances can easily be

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monitored and analyzed. Business performance analysis is considered to be very important to various stakeholders, especially to investors.

To decide where to invest, many investors conduct several analyses so as to become more knowledgeable of the operations of the companies they might invest in. Investors have a variety of ways to evaluate the performance of companies they are considering for investment. They can follow companies' business by analyzing their stock market operations, which is possible today, considering the fact that many stock exchanges publicly reveal such data. Although information is still costly, there are some resources that can be acquired with the minimal investment of time and money. Yahoo's Finance is the website that provides this kind of information free of charge. This website specializes in providing information about the companies whose shares are traded on the stock exchange. On the website itself, there are several possibilities for searching, monitoring, and analyzing selected companies. Beside the information on the volume of trade, the basic information about the companies and the most important company financial reports is also available. Thus, investors can find almost everything they need in one place.

In this paper, a comparative analysis of the companies whose shares are traded the most on the stock exchange is performed. The two groups of companies were created according to the height of the PE ratio (the profit/earnings ratio). Based on the selected companies, the ratio numbers were calculated, which were then used as the input parameters for the multi-criteria ranking. The multi-criteria ranking was conducted in order to determine which company to invest in among the selected ones. The structure of the paper is as follows: after a brief literature review, the research model and the methodology used in this research study are presented together with the research hypothesis and the research data. Then, the results of the ratio analysis that present the input data for a further analysis are discussed, after which reduction in the criteria for a further analysis is explained. Finally, the results of the multi-criteria ranking performed using the PROMETHEE method is presented and analyzed. The results of the multi-criteria ranking can be used by investors to enable them to decide which company to invest in.

LITERATURE REVIEW

Ratio analysis and multi-criteria ranking are useful tools that can be used in various situations. While ratio analysis strictly relates to financial problems, multi-criteria ranking, such as the PROMETHEE method, has a much broader use. Therefore, there are a lot of papers methodologically structured based on these tools in economics and managerial issues (Arsić, Nikolić & Jevtić, 2021; Jevtić, Radojičić & Jemović, 2022a).

The analysis of the literature enables the identification of many groups of authors who have dealt with ratio analysis in their research studies. The primary use of ratio analysis is to evaluate company performance (Delen, Kuzey & Uyar, 2013; Husna & Satria, 2019).

In their research studies, some groups of authors most often use the following groups of ratios: profitability ratios, liquidity ratios, efficiency ratios, and financial leverage ratios (Innocent, Mary & Matthew, 2013; Yuniningsih, Pertiwi & Purwanto, 2019; Terdpaopong, Rickards & Manapreechadeelert, 2020; Jevtić, Radojičić & Jemović, 2022b). However, as the list of ratio numbers is broad, so the selection of individual ratio numbers varies among the authors. Some authors focus on only one group of ratio numbers, such as profitability ratios (Mijić, Zekić & Jakšić, 2017; Domanović, Vujičić & Ristić, 2018; Bunea, Corbos & Popescu, 2019; Tadić, Jevtić & Jančev, 2019; Husain, Sarwani, Sunardi & Lisdawati, 2020). Profitability ratios are considered to be an important tool in macroeconomic analysis.

Ratio analysis is an essential tool in analyzing business performance for both companies and banks. Therefore, it is used by certain groups of authors in their research so as to enable them to measure bank performance (Đukić & Novićević, 2013; Kevser & Leyli, 2019).

In the literature, there are researchers who use ratio analysis results to conduct correlation analysis

(Mohamad & Saad, 2010; Alarussi & Alhaderi, 2018), on the one hand, whereas on the other, there are authors who combine ratio analysis with other business indicators to carry out correlation analysis (Sondakh, 2019; Nguyen & Nguyen, 2020). Some of them analyze the impact of debt and profitability on stock prices (Saputra, 2022), whereas others are focused on the factors that affect profitability (Burja, 2011). Certain authors use the PROMETHEE method to make significant financial and business decisions (Durkalić, Furtula & Borisavljević, 2019; Mousavi & Lin, 2020; Marcu, Duta & Manea, 2022). Ratio analysis and the PROMETHEE method are combined by certain groups of authors so as to conduct comparative analysis based on specific criteria (Krstić, Fedajev & Nikolić, 2018; Fedajev, Jevtić & Nikolić, 2020; Jevtić *et al*, 2022a).

The literature review shows that some papers combine ratio analysis and multi-criteria ranking. It should also be highlighted that there is no paper comparing business performances for the chosen companies, which is the reason why the contribution of this paper precisely reflects in the fact that it enables the identification of both success indicators and business limitations of the multinational companies through the application of multi-criteria analysis and ranking. Using the results obtained as the starting point, other companies' results and performance indicators can be compared.

DATA AND METHODOLOGY

The defined goal of this study was examined using the applied research model presented in Figure 1.

To conduct a comparative analysis of business operations with the most active stocks on the market for international companies using multicriteria ranking, the following two samples are selected (Table 1).

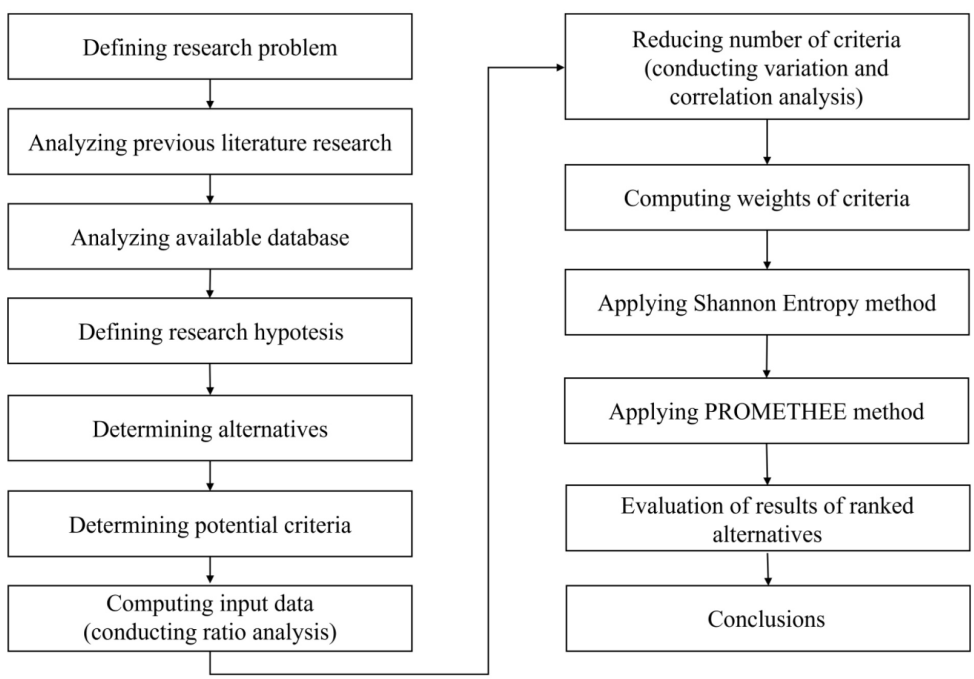

Figure 1 The defined research model

Source: Authors

Table 1 The list of the selected companies

Group A (the companies whose PE ratio is above 50)		
Code	*Name*	*PE ratio*
TSLA	Tesla, Inc	72.43
AMZN	Amazon.com, Inc.	101.81
SHOP	Shopify Inc.	200.46
PCG	PG&E Corporation	138.30
CCJ	Cameco Corporation	193.55
PINS	Pinterest, Inc.	71.17
Group B (the companies whose PE ratio is under 5)		
Code	Name	PE ratio
PBR	Petroleo Brasileiro	2.93
HPE	Hewlett Packard	4.50
PBR-A	Petroleo Brasileiro Ptrobras	2.63
CPG	Crescent Point Energy Corp.	3.25
LUMN	Lumen Technologies, Inc.	3.46
F	Ford Motor Company	4.04
VALE	Vale S.A.	3.26

Source: Yahoo Finance (2022, October)

According to Yahoo Finance's list of the companies that are the most active in the market, the selected companies were chosen out of the top 100 list according to the PE ratio value. The first group included the companies whose PE ratio exceeds 50 (group A). The second group comprised the companies listed under the top 100 whose PE ratio is under 5 (group B). Ratio analysis was carried out for the two groups. The indicators included were also divided into categories, including traditional, most common ratio indicators requiring only data from the Balance Sheet (BS) and the Income Statement (IS). This analysis also included the ratio indicators whose computation required data obtained from the Cash Flow Statement (CFS) apart from those obtained from the Balance Sheet and the Income Statement. The selected indicators reflect the level of the company's liquidity, solvency, and leverage level, on the one hand, and profitability, on the other. The chosen indicators are listed in Table 2.

Taking into consideration the fact that debt is known to affect liquidity, this analysis includes the ratio numbers related to it grouped under the liquidity aspects. The company's bigger liabilities are also known to negatively affect its liquidity. To make an additional comparison, in this case a comparison between the indicators, these companies are analyzed taking into consideration the indicators that provide the same type of information. The data for computing the listed ratio indicators originate from Yahoo's finance website, which contains three financial statements, namely the Balance Sheet, the Income Statement, and the Cash Flow Statement.

As the results of the ratio analysis only show partial analysis, they are used as inputs for a further analysis in this paper which aims to perform a multi-criteria ranking of the companies based on the ratio indicators. The next step in the analysis implies reduction in the number of the selected indicators using the variation coefficient and the correlation coefficient. Then, such a reduced number of indicators is used in the multi-criteria ranking of the listed companies. The multi-criteria ranking is performed using the PROMETHEE method, combined with the entropy method. The entropy method is used to compute the weighted coefficients necessary for multi-criteria ranking, these coefficients reflecting the impact of each indicator on the multi-criteria ranking.

Table 2 The list of the ratio indicators

Indicators → Aspects ↓	The indicators whose data are obtained from the BS and the IS	The indicators whose data are obtained from the CFS, the BS and the IS
The liquidity, solvency and leverage aspects	Quick ratio (Acid test) - QR	Current liabilities coverage ratio - CLCR
	Long-term assets to the long-term debt ratio - LTA/LTD	Debt coverage ratio - DCR
	Debt ratio - DR	Dividends coverage ratio - DVCR
The profitability aspects	Return on assets - ROA	Operating income quality - OIQ
	Return on equity - ROE	Cash Return on invested assets - CRIA
	Net profit margin - NPM	Cash return on invested Capital - CRIC

Source: Authors

Finally, after conducting the ranking based on the PROMETHEE method, the stability intervals are computed and analyzed. They are computed for the analyzed criteria, used for ranking, and present the level of the criteria stability.

Based on the foregoing, the set hypotheses read as follows:

H1: Individually observed, the companies belonging to Group A demonstrate better performances compared to the companies belonging to Group B from the liquidity aspect.

H2: Individually observed, the companies belonging to Group A demonstrate better performances compared to the companies belonging to Group B from the profitability aspect.

H3: There is a significant difference in the business performances between the ranked companies belonging to Group A compared to those belonging to Group B taking into consideration the net preference flow value.

RESULTS AND DISCUSSION

The results of the ratio analysis

As is mentioned, the first step of the analysis is based on the selected ratio indicators for the two groups of companies. The indicators are categorized into two sections and are derived from the financial statements that provide the essential information for the analysis. Some of the indicators provide similar data as well. Therefore, the results of the ratio analysis are explained in a way to compare the computed values.

The first group of indicators reflects the liquidity, solvency, and leverage of the selected companies. The results are presented in the table below (Table 3).

Table 3 shows the indicators related to the liquidity of the companies of the two major groups and for all the analyzed companies as well. The QR shows that almost all the observed companies have the values greater than acceptable. The PINS and SHOP companies achieve a great liquidity level, which specificity may be explained by the fact that these two companies operate without inventory. That cannot be accepted as a rule, because AMZN is also a company known as the one operating almost without inventory, but its QR is close to 1. The rest of the companies observed have the value close to 1, which indicates acceptable liquidity. PCG and CPG are the less liquid companies according to the QR ratio.

Liquidity can also be analyzed using the data listed in the CFS (Cash Flow Statement), in which case, according to the literature review, a company is liquid if its achieved ratio value is minimum 0.4 or greater. Taking that fact into consideration, and based on the computed value, SHOP and PINS are the most liquid companies. For these two companies, the values of these indicators are 4.39 and 6.11, respectively, whereas for the rest of the companies observed, the values of

Table 3 The results of the ratio analysis for liquidity, solvency, and leverage

	QR	CLCR	LTA/LTD	DR	DCR	DVCR
TSLA	1.26	1.04	3.76	0.49	0.58	8.29
AMZN	0.96	0.27	2.08	0.67	0.13	2.84
SHOP	14.97	4.39	3.19	0.17	1.13	7.57
PCG	0.68	0.01	1.54	0.75	0.00	-
CCJ	4.56	3.48	2.60	0.36	0.47	275.01
PINS	13.69	6.11	1.49	0.14	2.85	3.42
PBR	0.91	0.42	1.88	0.60	0.10	-
HPE	0.73	0.20	2.55	0.65	0.11	10.46
PBR-A	0.91	0.42	1.88	0.60	0.10	-
CPG	0.48	0.02	3.20	0.41	0.00	2.21
LUMN	1.66	0.05	1.19	0.80	0.01	2.95
F	1.03	0.22	1.36	0.81	0.10	67.34
VALE	1.21	0.79	1.84	0.61	0.22	-

Source: Authors

these indicators are acceptable (Novićević Čečević & Đorđević, 2021). Yet, there are three companies that are not liquid at all, namely the companies PCG, CPG, and LUMN, whose value of the CLCR indicator is below 0.1.

The ratio between the long-term assets and the long-term debt is the next analyzed indicator. This ratio number represents the companies' solvency. Based on the value of this ratio listed in the table above, it can be concluded that they all have more than the acceptable value of the observed indicator.

The next group of indicators concerns the level of the companies' debt. Based on the value of the DR indicator, it can be concluded that some of the analyzed companies are independent as the share of the debt in the total asset sources is low, like SHOP and PINS. There are companies whose debt is significant. Those companies have a share of the total debt in the total asset sources greater than 70% or 0.7. Those companies are PCG, LUMN, and F. The DCR is the indicator that provides more detailed information about the possibility of the company to pay the debt. It represents the company's ability to pay the debt using the cash generated by its operating activities. PINs is the only company able to service its debt using the net cash generated from the operating activities and to keep enough for investments. Taking this rule into account, its several companies (PCG, CPG, and LUM) are not liquid.

The DVCS is the other indicator used in consideration for this analysis. It shows the company's ability to service its dividends using the cash generated from the operating activities. This indicator relates to the service of debt, and therefore it is listed under this indicator's group. Some of the companies did not pay their dividends in the last year, namely PCG, PBR, PBR-A, and VALE. The rest of the analyzed companies paid for it regularly. CCJ paid the most dividends using the net cash from the operating activities.

The next group of the analyzed indicators relates to the company's profitability. The results are presented in Table 4.

As the ROA and CRIA indicators represent the return of total assets and cash returned on invested assets, they should be analyzed as a pair. It is interesting to notice the fact that some companies which finished the business year with a loss generated sufficient money from their operating activities, such as PCG and CCJ. Taking into consideration both named indicators, VALE is the most profitable company. It is also interesting to notice that some of the listed companies that have a significant value for the ROA indicator, such as SHOP and CPG, have a lower level of the CRIA indicator. It is common practice for

Table 4 The results of the ratio analysis for profitability

	ROA	ROE	NPM	OIQ	CRIA	CRIC
TSLA	8.88%	18.28%	0.10	0.57	18.50%	38.08%
AMZN	7.93%	24.13%	0.07	0.54	11.02%	33.51%
SHOP	21.85%	26.18%	0.63	0.53	3.78%	4.53%
PCG	-0.09%	-0.34%	-0.00	0.87	2.37%	9.56%
CCJ	-1.36%	-2.12%	-0.07	-0.24	6.10%	9.46%
PINS	8.95%	10.41%	0.12	0.43	21.29%	24.78%
PBR	11.40%	28.64%	0.24	0.87	21.68%	54.45%
HPE	5.94%	17.16%	0.12	0.37	10.18%	29.40%
PBR-A	11.40%	28.64%	0.24	0.87	21.68%	54.45%
CPG	25.78%	43.74%	0.84	0.77	16.31%	27.67%
LUMN	3.51%	17.17%	0.10	0.66	11.21%	54.91%
F	6.98%	36.97%	0.13	0.62	6.14%	32.54%
VALE	25.09%	65.11%	0.41	1.20	28.71%	74.49%

Source: Authors

companies to achieve greater revenues compared to cash inflows. A more specific situation is noticeable in the companies such as TSLA, LUMN, PBR, PBR-A, and PINS. The results of the analyzed indicators show these companies are more successful in generating cash than in achieving revenues.

When the next two indicators, namely ROE and CRIC, are concerned, there is a noticeably similar situation. These indicators follow the trend determined by the previous two indicators.

The NPM indicator shows that in almost all the analyzed companies there is a positive relationship between the net income and the operating revenues. CPG achieved the greatest NPM. This company achieves 0.84 cents of its net income on each dollar of its operating revenues. PCG and CCJ are the companies with a net loss and the negative values of this indicator.

OIQ is the last indicator included in this analysis. Based on the values listed in the table below, a fact can be established that almost half of the analyzed companies charge approximately half of the goods sold. The extreme values are recognizable for CCJ, which has a negative value for this indicator, which can be understood given the fact that this company has a serious problem when charging its receivables. The opposite extreme value for this indicator is the value for the company VALE, whose indicator exceeds the prescribed value, which is only possible in situations when a company charges for goods in advance. That tells a lot about the financial policies that the management of this company implement.

The selection of the indicators for the application of the PROMETHEE method (the variation and correlation coefficients)

The variation coefficient values were used to select the indicators (the ranking criteria) and they were calculated for all the indicators. The obtained values of the variation coefficient less than 0.1 imply no significant differences between the observed alternatives (companies) according to the observed criterion, so they can be excluded from further consideration. Table 5 gives the values of the variation coefficient for the observed indicators.

Based on the data shown in Table 5, the variation coefficient value is not less than 0.1 for any indicator, so no indicator is excluded in this step. The final decision on which indicators to use for multi-criteria analysis was made based on the value of correlation coefficients between data pairs in each group of indicators.

Table 5 The variation coefficients

Indicators	Coefficient of variation
QR	1.51
CLCR	1.49
LTA/LTD	0.36
DVCR	2.25
DR	0.40
DCR	1.77
ROA	0.84
CRIA	0.60
ROE	0.74
CRIC	0.60
NPM	1.14
OIQ	0.55

Source: Authors

Those indicators whose correlation coefficient values are above 0.7 for a certain pair of data will be excluded from a further analysis because they have almost the same trend. Also, the correlation coefficients whose value is 0 or approximately 0 will be ignored as these pairs of indicators do not correlate. The correlation direction is neglected in this analysis as well. Table 6 accounts for the values of the correlation coefficients for each observed pair of coefficients.

Based on the values shown in Table 6 and the foregoing explanation, it can be decided which indicators should be included in further analysis. By analyzing the first group of indicators, it can be noticed that the lowest correlations are those between the following indicators: 0.04 between LTA/LTD and DVCR, and 0.07 between DVCR and DCR. Therefore, these three indicators are chosen for further analysis.

The same selection method is applied for the choice made from the second group of indicators. The chosen indicators include CRIC and NPM with the lowest value of the correlation coefficient (0.06), and NPM and CRIA with the second lowest correlation.

The results of the PROMETHEE method

After narrowing down the number of the indicators, the weight coefficients necessary for the application of the PROMETHEE method are then calculated in the paper and computed based on the Entropy method.

Table 7 shows the parameters used to implement the multi-criteria ranking based on the PROMETHEE method using the computed weight coefficients, as well as the chosen criteria (parameters or indicators).

Based on the values presented in Table 7, it can be concluded that all the indicators have approximately the same weight value and there are minor differences between them.

Table 6 The correlation coefficients for the observed groups of indicators

	QR	CLCR	LTA/ LTD	DVCR	DR	DCR	ROA	CRIA	ROE	CRIC	NPM
QR	1	0.93	0.12	-0.00	-0.83	0.85					
CLCR		1	0.12	0.25	-0.87	0.91					
LTA/ LTD			1	0.04	-0.49	-0.00					
DVCR				1	-0.13	-0.07					
DR					1	-0.77					
DCR						1					
ROA							1	0.48	0.83	0.29	0.92
CRIA								1	0.57	0.78	0.23
ROE									1	0.64	0.66
CRIC										1	0.06
NPM											1

Source: Authors

By applying the above-mentioned parameters, the ranking of the selected companies is performed. The *Visual Promethee software is used* for the multi-criteria ranking based on the PROMETHEE method. Table 8 shows the movement of the net preference flow, and the ranking of the selected companies based on the net preference flow. The new preference flow represents the difference between the positive preference flow (Phi +) and the negative preference flow (Phi -).

Based on the results of the multi-criteria analysis (Table 8), it can be concluded that only half of the observed companies operate efficiently, which can be seen based on the positive value of the net preference flow, VALE and TSLA standing out among them. The remaining companies, whose net preference flow is positive, achieve approximately equal efficiency in business. The rest of the analyzed companies have a negative preference flow. The least effective companies are LUMN and PCG, as their net preference flows are the worst.

Figure 2 presents the advantages and disadvantages of each ranked company. The rainbow diagram is used for this as it presents the identified indicators and their effect on each company's effectiveness. Therefore, all the indicators stand out as the advantages of the two top-ranked companies, while almost all the indicators are highlighted as the disadvantages of the worst-ranked companies.

Figure 2 shows that the top-ranked companies in each group have only one indicator below the line. From left to right in the figure, the number of the advantages decreases for the ranked companies, while the number of the indicators showing disadvantages simultaneously increases. Thus, the last two companies only have two of the observed indicators

Table 7 The parameters of the multi-criteria analysis

Parameters	LTA/LTD	DCR	DVCR	NPM	CRIA	CRIC
Preferences: Min/Max	Max	Max	Max	Max	Max	Max
Weight	0.1700	0.1723	0.1723	0.1734	0.1635	0.1483
Function	Usual	Usual	Usual	Usual	Usual	Usual

Source: Authors

Table 8 The results of the PROMETHEE method

Rank	Company Code	Company Group	Phi (Net preference flow)	Phi + (Positive preference flow)	Phi + (Negative preference flow)
1	VALE	B	0.3995	0.5992	0.1997
2	TSLA	A	0.3166	0.6080	0.2914
3	PBR	B	0.1811	0.4484	0.2673
3	PBR-A	B	0.1811	0.4484	0.2673
4	CPG	B	0.1781	0.4741	0.2961
5	SHOP	A	0.0882	0.5010	0.4128
6	PINS	A	-0.0053	0.4470	0.4523
7	HPE	B	-0.0083	0.4455	0.4538
8	CCJ	A	-0.1054	0.3970	0.5024
9	AMZN	A	-0.1904	0.3545	0.5449
10	F	B	-0.1946	0.3453	0.5398
11	LUMN	B	-0.3197	0.2898	0.6096
12	PCG	A	-0.5209	0.0672	0.5881

Source: Authors

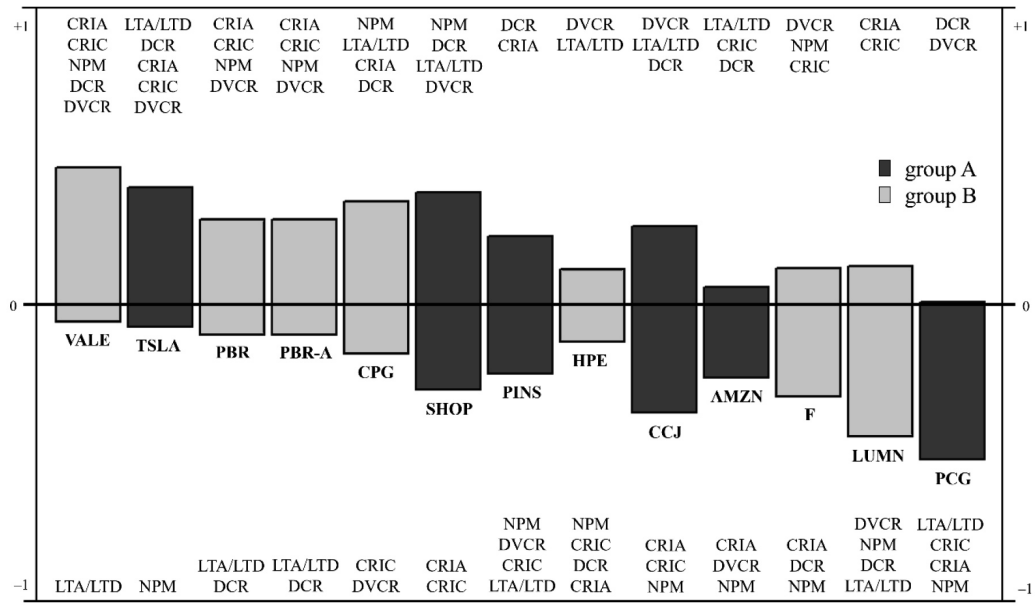

Figure 2 The advantages and disadvantages of the ranked companies

Source: Authors

as advantages. It is also interesting to notice that some companies ranked in the middle have more indicators recognized as disadvantages than those recognized as advantages.

After the ranking, the Visual PROMETHEE software computes the additional data related to the observed scenarios. In this analysis, only one scenario is observed. As the ranking of the alternatives (i.e. companies) is performed based on the selected criteria, stability analysis provides additional information about the extent to which the criteria may vary yet not affecting the ranking itself. The stability levels for the observed criteria are presented in Table 9.

It can be seen that the NPM and CRIA are the most stable criteria based on the stability intervals of the observed criteria listed in Table 9. The range of these two criteria is significant, so they can change in the interval borders without affecting the ranking. The other analyzed criteria are highly sensitive and have minimal stability intervals. The final ranking may be affected by minimal change.

Table 9 The stability levels of the observed indicators

Criteria (indicators)	Stability level
LTA/LTD	16.66% - 17.25%
DCR	16.99% - 17.74%
DVCR	16.85% - 17.57%
NPM	10.49% - 17.71%
CRIA	16.05% - 21.83%
CRIC	14.55% - 15.58%

Source: Authors

CONCLUSION

In this paper, a multi-criterion ranking of the selected companies is performed based on the indicators of the previously made ratio analysis. Based on the list of the 100 companies whose shares are traded the most, the two groups created make up the sample for the analysis. One group includes the companies whose

PE ratio is over 50 (Group A), whereas the other includes the companies whose PE ratio is less than 5 (Group B). After the sample had been selected, ratio indicators were selected as well. The ratio indicators were calculated based on the data obtained from the Balance Sheet and the Income Statement, as well as the data obtained from the Cash Flow Statement for each observed company.

The results of the ratio analysis show that, from the point of view of liquidity, the companies belonging to Group A have better individual values for the observed indicators. As a fact was established that these companies are more liquid, the first hypothesis of the paper is confirmed as such (H1).

The results of the ratio analysis related to the profitability indicators show that there are no significant differences in the values of the profitability indicators between the companies classified in Groups A and B. Bearing in mind the fact that there are no differences, the hypothesis H2 is not proven.

Neither has the third assumption put forward in this document been confirmed. The basic initial assumption implies a significant difference between the ranks of the companies after the application of the multi-criteria ranking. However, the results show no significant differences between them, which is seen through an equal number of the companies with a positive net preference flow and the same number of them with a negative net preference flow in each of the two observed groups.

Based on all the foregoing, one general conclusion can be made. From the point of view of the individual indicators and the comparative analysis carried out between them and the multi-criteria ranking, the business performance of individual companies indicates that investors should invest in the companies whose net preference flow is positive and has the greatest value. The results indicate that there should be two companies, the one from Group A - Tesla Inc. (TSLA - ranked second) and the other from Group B - Vale S.A. (VALE - ranked first). The rest of the companies with the positive value of the net preference flow could also be considered for investment (Group A: SHOP, Group B: PBR, PBR-A, CPG). In this regard, it is recommended that a more detailed analysis should be conducted when deciding which company should be invested in and all the possibilities should be explored.

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THE FACTORS INFLUENCING STUDENTS' ENTREPRENEURIAL INTENTIONS: AN ANALYSIS USING THE THEORY OF PLANNED BEHAVIOR

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This study applies the Theory of Planned Behavior to investigate the impact of personal attitudes towards entrepreneurship, social norms, and perceived behavioral control on students' entrepreneurial intentions. Conducted on a sample of 184 students in Croatia, the research study applies the practical adaptation of the TPB model so as to reflect the realistic context in which students develop their entrepreneurial intentions. The multiple regression analysis conducted in the study reveals that all the components of the theory positively and significantly affect entrepreneurial intentions. The most influential factor is perceived behavioral control, only to be followed by personal attitude and social norms. These findings enhance the understanding of the critical elements shaping students' entrepreneurial aspirations. Additionally, the study offers useful information for higher education institutions, helping them understand students' entrepreneurial behavior and guiding the development of targeted programs and internal policies. Ultimately, this research serves as a valuable resource for a broader academic community to help them design the strategies that promote students' entrepreneurial ambitions.

Keywords: entrepreneurship, entrepreneurial intentions, students, theory of planned behavior

JEL Classification: A22, A23, I23, M21

INTRODUCTION

In today's fast-evolving market environment characterized by rapid technological advancements, shifting social dynamics, and increasing demand for innovative solutions, entrepreneurship has risen to a pivotal role, becoming essential for market competitiveness and survival. Recognizing the fact that entrepreneurial skills and mindsets are indispensable tools for success in the 21st century (Obschonka, 2014, Obschonka, Hakkarainen, Lonka & Salmela-Aro, 2017), the education system is tasked with nurturing these skills in future entrepreneurs by offering the necessary support to fuel their entrepreneurial initiatives. In developed economies, regions with a high concentration of employees holding a higher education diploma tend to experience the greatest entrepreneurial economic growth (Molnar, Josipović & Baškot, 2024). The

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research conducted by S. Primario, P. Rippa and G. Secundo (2022) highlights the crucial contribution of higher education institutions in developing human and social capital, both of which are foundational to driving innovation and enhancing competitiveness. Through education, students gain the knowledge and hands-on experiences that improve their capacity to learn, absorb new information, and acquire key resources, all of which helps them to recognize potential opportunities (Wilson, Kickul & Marlino, 2007). In this context, higher education institutions hold a responsibility not only to promote innovation and entrepreneurial thinking (Corazza & Saluto, 2021; Sansone, Ghezzi, Landoni & Rangone, 2024) but also to actively support the growth of students' entrepreneurial intentions by fostering the environment that encourages the initiative, creativity, and practical learning experiences.

While science has made significant strides in highlighting the importance of building competencies, knowledge, and skills in entrepreneurship (Corazza & Saluto, 2021; Primario *et al*, 2022; Wang, You, Wang, Wang, Lai & Su, 2023; Adeel, Daniel & Botelho, 2023; Sansone *et al*, 2024), this field still remains an active area of scientific and research inquiry. Often regarded as a microcosm of society, students typically display the talents that embody proactive attitudes and dedication to entrepreneurial pursuits. However, a gap in empirical research persists concerning their entrepreneurial intentions in emerging economies, Croatia being no exception. Moreover, recent findings (Singer, Šarlija, Pfeifer & Peterka, 2022) indicate that Croatia's entrepreneurial environment is still not sufficiently supportive. Among the Croatians, only two factors (namely the domestic market dynamics and the quality of the physical infrastructure, such as telecommunications and transportation) positively impact entrepreneurial activity. Conversely, the restrictive aspects of the entrepreneurial landscape include the insufficient prioritization of supportive government policies, the regulatory framework with significant market entry barriers, and inadequate contributions from the education sector toward fostering entrepreneurial competencies in young people, the latter factor underscoring the need for the studies focused on students and their entrepreneurial tendencies.

Given the fact that students are anticipated to redefine business paradigms and shape the future of entrepreneurship on a global scale and recognizing their heightened responsiveness to shifts in a rapidly evolving environment, there is a strong rationale for ongoing research in their readiness for entrepreneurial challenges. This approach calls for a systematic, scientifically grounded examination of the diverse factors influencing their entrepreneurial aspirations and behaviors, providing the insights that may inform the policies and practices aimed at nurturing the next generation of entrepreneurs.

A review of the existing literature highlights robust empirical support for the Theory of Planned Behavior (TPB) in explaining how the personal attitude, social norms, and perceived behavioral control influence behavioral intentions across diverse contexts (Finisterra Do Paco, Ferreira, Raposo, Rodrigues & Dinis, 2011; Iqbal, Melhem & Kokash, 2012; Širola, 2020; Su, Zhu, Chen, Jin, Wang, Lin & Xu, 2021; Sampene, Li, Khan, Agyeman & Opoku, 2023). Despite this fact, there yet remains a substantial gap in the research addressing students' entrepreneurial intentions in Croatia through the lens of the TPB. This study aims to address this gap by examining the cognitive factors (namely attitudes, social norms, and perceived behavioral control) that impact Croatian students' entrepreneurial intentions. Through the application of the TPB model, this study seeks to provide valuable insights into students' entrepreneurial orientations. These insights could be instrumental for Croatian higher education institutions as they refine their educational strategies and policies so as to better support entrepreneurial skills. Moreover, the study's findings have the potential to contribute to the global academic discourse on fostering entrepreneurship among students, offering the perspectives that are relevant not only in Croatia but also in a broader international context.

The paper is so structured as to include the Introduction, the Analysis of the Fundamental Concepts Derived from Prior Research, the Explanation for the Research Methodology and the Interpretation of the Research Findings. The Conclusion synthesizes the entire work, discussing

the theoretical and practical implications of applying the acquired knowledge and elaborating on the theoretical and practical contributions of the research study.

LITERATURE REVIEW

This section provides an overview of the previous research that has applied the Theory of Planned Behavior, only to be followed by a presentation of the research model along with the description of the model's variables.

The application of the Theory of Planned Behavior in previous research studies

Although entrepreneurship has been studied for over 300 years, no clear and universally accepted definition has remained. The concept is defined in various ways, from narrow interpretations focused on the dynamic process of starting a business to the broader views that encompass traits such as diligence, self-confidence, initiative, innovativeness, and risk-taking (Van Gelderen, Brand, Van Praag, Bodewes, Poutsma & Van Gils, 2008), as well as the commitment to achieving specific goals by combining resources, recognizing change, and creating new value (Hisrich, Peters & Shepherd, 2011). Nevertheless, there is a general consensus now on the complexity and multi-dimensional, interdisciplinary nature of entrepreneurship, which continues to evolve driven by a multitude of factors and circumstances (Leitão, Lasch & Thurik, 2011). Within the scientific field of management, definitions of "entrepreneurship" commonly emphasize entrepreneurs' personal characteristics or attitudes, individual and organizational entrepreneurial behaviors, and entrepreneurship as a socioeconomic phenomenon (Tien, Minh, Ngoc & Nhan, 2019). As S. Adeel *et al* (2023) succinctly state, "entrepreneurship is usually defined as an individual's ability to turn ideas into viable new ventures."

In recent years, the Theory of Planned Behavior (TPB) has become a popular model for examining students' entrepreneurial intentions (Liñán & Chen, 2009; Iqbal *et al*, 2012; Entrialgo & Iglesias, 2016; Širola, 2020; Su *et al*, 2021; Piri Rajh, Rajh & Horvat, 2022). The TPB offers a relevant framework for predicting entrepreneurial intentions through educational processes and the learning context (Ajzen, 1991; Fayolle, Gailly & Lassas-Clerc, 2006; Iqbal *et al*, 2012). According to the TPB, there are three main variables that influence the entrepreneurial intention: perceived behavioral control (PBC), which represents an individual's perception of how feasible it is to perform a behavior; attitude toward entrepreneurship, reflecting one's personal belief in behaviors or traits such as entrepreneurial spirit; and social norms, which reflect the perceived approval of the influential figures, such parents, friends, or colleagues, of entrepreneurship. These factors are found to directly shape entrepreneurial intentions (Ajzen, 1991; Iqbal *et al*, 2012; Al-Jubari, 2019; Su *et al*, 2021).

Y. Su *et al* (2021) provide a thorough overview of the TPB, emphasizing the fact that perceived behavioral control is central to the model. They highlight the fact that, while entrepreneurial attitudes and PBC shape the intention from within, social norms add an external layer of the influence based on the entrepreneur's surroundings. When these factors are aligned, the entrepreneur's intention to start a business strengthens, thereby increasing the likelihood of the entrepreneur launching a venture.

In prior studies, the TPB has extensively been analyzed from multiple perspectives in the context of entrepreneurship (Iqbal *et al*, 2012; Munir, Jianfeng & Ramzan 2019; Al-Jubari, 2019; Otache, 2019; Al-Jubari, Hassan & Liñán, 2019; Duong, Nguyen, Ngo, Nguyen & Nguyen 2020; Su *et al*, 2021). For example, A. Iqbal *et al* (2012) examined the influence of different TPB variables on the entrepreneurial intention, whereas I. Al-Jubari *et al* (2019) included the additional factors like need satisfaction, need frustration, and attitudes towards entrepreneurship. H. Munir *et al* (2019) investigated risk-taking propensity, the locus of control, the proactive personality, and the gender as the additional factors influencing entrepreneurial intentions. Similarly, C. Duong *et al* (2020) considered personal attitude, self-efficacy, social capital, and

country norms, whereas J. Maes, H. Leroy and L. Sels (2014) included the gender, personal attitude, social norms, and perceived behavioral control. Y. Su *et al* (2021) expanded the TPB by examining entrepreneurial intentions among students and adding perceived faculty support as a new variable.

These previous studies form a critical foundation for this research study by offering the theoretical frameworks and methodologies that have already proved to be effective in similar contexts. Analyzing prior research has highlighted the gaps in knowledge that this study seeks to address, as well as the identification of the relevant factors that influence this research topic. These insights have facilitated the development of a tailored research model, building upon the established concepts, simultaneously incorporating new dimensions specific to the current study. The following sections will detail the model's variables, further underscoring the value of the prior research in shaping the study's scientific contributions.

The research model

The Theory of Planned Behavior (TPB) suggests a strong link between the entrepreneurial intention and successful entrepreneurial performance. *Intention* is regarded as a critical predictor of behavior, reflecting an individual's willingness to undertake entrepreneurial activities (Liñán & Chen, 2009). This concept encompasses the three primary factors that influence behavior: personal attitudes towards entrepreneurship, social norms, and perceived behavioral control (Liñán & Chen, 2009), which serve as the main hypotheses in this research study.

Entrepreneurial intention (EI) is a composite variable where values greater than zero indicate a higher inclination towards an entrepreneurial career, whereas values less than zero suggest a greater inclination towards alternative careers, i.e. a lower inclination towards an entrepreneurial career. EI represents a focused decision on targeted behavior and is considered as the best single predictor of planned behavior.

Personal Attitude (PA) towards entrepreneurship is a composite variable assessing an individual's career path orientation based on their positive or negative evaluation of an entrepreneurial career compared to alternative careers (Ajzen & Fishbein, 1975). Higher values of this variable indicate a more positive perception of the outcome of starting an entrepreneurial career.

Social Norms (SN) is a composite variable, where higher scores indicate a greater belief that a future entrepreneurial career aligns with the opinions of the respondent's social environment. In other words, *social norm* refers to the perceived social pressure to perform or avoid a certain type of behavior. It is assumed to be shaped by a full range of accessible normative beliefs about the expectations of the key referents, such as one's spouse, family, friends, supervisor, and co-workers (Širola, 2020).

Perceived Behavioral Control (PBC) is a composite variable that represents an individual's personal beliefs about their own control over planned behavior, in which sense this variable reflects the beliefs related to access to the resources and opportunities necessary to carry out a certain type of behavior (Ajzen, 1991). The importance of this construct stems from its predictive ability, which reflects an individual's perception of the (in)ability to control behavior. In other words, the fewer obstacles an individual expects (control belief) and the greater the belief in the resources and opportunities needed for an entrepreneurial career, the higher PBC towards an entrepreneurial career.

This study employs an adapted version of the Theory of Planned Behavior (TPB) model customized so as to better reflect the practical context in which students form their entrepreneurial intentions. Specifically, adjustments are made to the social norms variable, incorporating the role of faculty professors' support in fostering entrepreneurial initiatives. By including this additional particle, the model more accurately captures the environmental influences on students' entrepreneurial intentions, offering a more realistic analysis of their entrepreneurial behavior. Furthermore, the other key variables of the Theory,

namely entrepreneurial intentions (EI), personal attitude (PA), and perceived behavioral control (PBC), have also been modified. Each of these variables is condensed into a total of four particles, offering a more streamlined and focused approach compared to previous research. This approach is further detailed in the research methodology section, which explains the specific modifications made to each variable and the reasoning lying behind these changes.

The study addresses the following research question: Can entrepreneurial intentions among Croatian students be predicted using the components of the Theory of Planned Behavior? In order to answer the research question, the following hypotheses were formulated:

H1: Personal attitude (PA) towards entrepreneurship has a positive effect on entrepreneurial intentions (EI) among the students.

H2: Social norms (SN) have a positive effect on entrepreneurial intentions (EI) among the students.

H3: Perceived behavioral control (PBC) in the students has a positive effect on their entrepreneurial intentions (EI).

Figure 1 illustrates the proposed hypotheses within the conceptual model, followed by the equation (1) formulated for the multiple regression model.

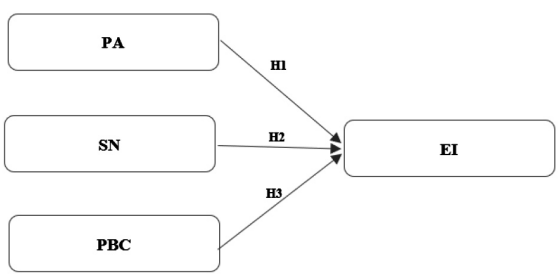

Figure 1 The research model

Source: Authors

$$EI = a + b_1PA + b_2SN + b_3PBC \quad (1)$$

RESEARCH METHODOLOGY

To address the research question, an empirical study was conducted, and a structured questionnaire was developed. The questionnaire was organized into four sets of questions. The first set collected socio-demographic information from the respondents. The second set focused on exploring the entrepreneurial characteristics of the participants, which were assessed through four categories: independence, the leadership ability, responsibility, and organizational skills, as defined by A. Hunjet, G. Kozina and M. Milković (2012). The third set examined the participants' attitudes towards the role of the faculty in fostering entrepreneurial initiatives. Although these sets of questions were not used to test the hypotheses directly, they did provide a valuable framework for describing the respondents' profiles and enriched the information about the research sample.

The research done by A. Iqbal *et al* (2012) served as the basis for constructing the last set of the questions applied for testing the hypothesis through examining the participants' entrepreneurial intentions. While the literature review has identified various models for examining entrepreneurial intentions (EI), the Theory of Planned Behavior (TPB) offers a comprehensive framework for their analysis (Ajzen, 1991; Iqbal *et al*, 2012). As the Theory posits that most actions are planned, the intention driving a specific behavior comes before the behavior itself (Ajzen & Fishbein, 1975). The individuals who carefully consider their future actions vary in terms of the three predictors of future behavioral intentions: the attitude towards a specific behavior, social norms, and perceived behavioral control. Considering this theory in the realm of entrepreneurship, it is reasonable to anticipate that the students' beliefs and attitudes towards entrepreneurship will impact the development of their entrepreneurial intentions. In that sense, I. Ajzen (1991) suggested, and A. Iqbal *et al* (2012) applied, a six-item scale for entrepreneurial intention (EI) measurement, whereas personal attitude (PA) was measured using a five-item scale, social norms (SN) using a three-item scale and perceived behavioral control (PBC) using a six-item scale. For the purposes of this research, however,

all the research variables were reduced to four relevant, clear and comprehensible particles. The scientific grounding for these adjustments lies in the need for clarity and specificity in measuring the variables that influence entrepreneurial intentions. By condensing these variables into fewer particles, the study aims to enhance the reliability and validity of the measurements, making it easier to analyze the relationships between these variables and entrepreneurial intentions. This approach aligns with the best practices in the research methodology, where simplification can lead to more robust findings and clearer implications for practice. At the same time, in addition to reducing the particles of the variables EI, PA and PBC, the SN variable was adapted in such a way that, in addition to the three originally defined items (Ajzen, 1991), it also contains an additional, newly created particle called "faculty professors", which emphasizes the influence of the teacher's authority on the entrepreneurial behavior of their students. Namely, as a source of inspiration and motivation, professors' authority can significantly influence students' entrepreneurial intentions. By sharing their knowledge, experiences, and advice, the professors who are experts in entrepreneurship can provide essential support and mentorship to the students aspiring to become entrepreneurs. Additionally, professors' authority can also impact entrepreneurial intentions through the educational program and the curriculum. Professors have the opportunity to incorporate practical exercises, projects, and business simulations in their lessons, thereby encouraging entrepreneurial thinking among the students. By adding the newly created particle to the SN variable, the questionnaire is further aligned with the actual experiences and practices of the students as the target population.

In addition to the above-mentioned adaptation of the model, this research was also customized in another methodological aspect. In relation to the previous studies (Ajzen, 1991; Iqbal *et al*, 2012; Širola, 2020), in whose studies a seven-point Likert scale was suggested and applied, all the scales in this research were measured on a five-point Likert scales, ranging from 1 (strong disagreement) to 5 (strong agreement), which was done in order to reduce the possibility of confusion and in order to facilitate decision-making among the research participants who are used to being graded in an educational system applying grades from 1 to 5.

The research was conducted on a sample of university students in Croatia, specifically those enrolled in economics programs, with the focus on entrepreneurship courses as part of their curricula. These students represent the target group of the study as they are actively engaged in learning entrepreneurship and are at a critical stage where they must make decisions on their future career paths. By focusing on the students of the faculties of economics, the research study aims to capture insights from the individuals who are more likely to consider entrepreneurial careers due to their academic background and exposure to entrepreneurship education.

In the first research phase, the universities (and their respective faculties as the legally autonomous entities within them) offering economics programs were selected so as to identify the institutions relevant to the study. The selection focused on the six prominent public institutions in Croatia known for their high-quality education in economics and the related fields with comprehensive entrepreneurship curricula. The aim was to gather insights from the students attending these universities (faculties) since they are considered to be highly representative of the academic training that shapes entrepreneurial intentions in Croatia. The online questionnaire was developed and distributed via the social media platforms, such as Facebook groups, that gather students from the selected faculties, and on the official Facebook pages of the chosen institutions as well. The call to participate in the survey explicitly stated that it was intended for the students enrolled in the economics programs at the specified institutions. Additionally, an initial open-ended question was included in the survey asking the respondents to specify the institution they were attending, thus ensuring that the data reflected the views of the students coming from the relevant academic backgrounds. The chosen distribution method combining the reach of social media with clear targeting maximized the participation and

ensured the sample accurately represented the target population. Data collection took place in February 2024 applying an online survey method via the Google Forms. Out of 190 distributed questionnaires, 184 were deemed usable for the analysis, resulting in the response rate of 96.8%. The collected data were then analyzed using appropriate statistical methods, with the IBM SPSS Statistics 23 software package being utilized for the analysis.

RESEARCH RESULTS

In this section, a descriptive analysis of the sample is presented, providing an overview of the respondents' characteristics and a brief respondent profile description. This is followed by the descriptive statistics for the key variables in the model. Finally, the hypothesis testing is performed based on the established multiple regression model.

The general characteristics of the research sample: the descriptive statistics

The educational level and the gender are typically taken into consideration and analyzed when examining the basic characteristics of the sample units, as is also done in this study.

Table 1 The respondents' socio-demographic Profile (N=184)

Description	Respondents	
	Frequency	Percentage
Gender		
Male	52	28.3
Female	132	71.7
Year of study		
1st year	74	40.2
2nd year	10	5.4
3rd year	2	1.1
4th year	59	32.2
5th year	39	21.2

Source: Authors

From the point of view of the respondents' gender, the majority of the respondents in the study sample are female (71.7%). Most of the respondents are first-year students (40.2%), which is followed by the fourth-year students (32.2%) and the fifth-year students (21.2%), as indicated in Table 1.

In order to systemize the students' entrepreneurial attributes as the input for their future entrepreneurial activity, the study explored the students' entrepreneurial traits. To this end, the respondents were asked to choose from the statements provided within the various categories (independence, leadership, responsibility, organizational abilities) the statement that describes them the best.

According to their self-evaluations, most of the respondents in the sample had developed entrepreneurial traits: 53.3% reported that they did all of their work independently and 60.95% stated that they could win over most people when they start doing something. Furthermore, the respondents showed a high level of responsibility for what they were doing (75.6%), together with a high level of organizational abilities, indicated by their intention to have a plan and a clearly defined line of action (76.6%).

Starting from the assumption that the students' attitudes towards the faculty they are attending are a good source of information and a distinct signal of the limitations that students may come across in the educational process, the study identifies the role of the faculty in encouraging students' entrepreneurial initiatives, as is presented in Table 3.

The findings indicate the fact that the role of the faculty in encouraging students' entrepreneurial initiatives is strong since, through its educational program, the faculty builds the entrepreneurial spirit (52.2%), provides the study cases of successful entrepreneurs (66.8%), brings the knowledge needed to develop a business plan (54.3) and emphasizes the importance of teamwork (82.6%).

The comprehensive overview of the research sample enables the assertion of the fact that the respondents' self-evaluation in the variables reflecting the entrepreneur profile indicates that the students exhibit the key entrepreneurial traits manifested through independence, tenacity, responsibility and

Table 2 The self-evaluation of the students' entrepreneurial traits - the share (%)

Entrepreneurial traits	Item	Percentage
Independence (Am I independent by nature?)	I do all my work independently. Nobody has to tell me what to do.	53.3
	All I need is a little nudge to get started but then I continue on my own.	40.8
	Easy does it. I don't do anything until I have to.	6.0
Leadership (Do I have the ability to lead others?)	Usually, I can win over most people when I start something.	60.9
	I can give orders if someone else tells me what I need to do.	20.1
	Usually I leave leadership to others, but I will join them if I like what they're doing.	19.0
Responsibility (Am I capable of taking on responsibility?)	I like being responsible for what I'm doing and I like to see the results of my work.	75.6
	I will take on responsibility if I have to; otherwise, I would rather leave it to someone else.	19.0
	There is always some "know-it-all" who wants to show off how smart they are. I am happy to let them do that.	5.4
Organizational abilities (Am I a good organizer?)	Before starting anything, I always want to have a plan and a clearly defined line of action.	76.6
	I can manage well until things start getting too complicated. That's when I usually give up.	12.5
	I have everything nicely planned out and then some huge problem emerges. That's why I tend to deal with things as they come.	10.9

Source: Authors

Table 3 The role of the faculty in encouraging entrepreneurial initiative - the share (%)

Items	Yes	No
The faculty played the key role in fostering my entrepreneurial spirit.	52.2	47.8
At the faculty, I analyzed the case studies of successful entrepreneurs.	66.8	33.2
At the faculty, I learned how to develop a business plan.	54.3	45.7
The faculty emphasized the importance of teamwork.	82.6	17.4

Source: Authors

organizational abilities. Additionally, the respondents demonstrate a favorable view of the faculty as the supporter of their entrepreneurial endeavors, the findings laying a promising foundation for a further exploration of the students' entrepreneurial initiatives that are discussed in the following section of the paper.

The descriptive analysis of the main variables

As the preliminary step in the research done in students' entrepreneurial intentions, this section provides the description and data analysis of the key variables used to develop the hypotheses. The instrument demonstrated internal consistency, with Cronbach's alpha values ranging from 0.814 for social norms to 0.947 for entrepreneurial intentions. All Cronbach's alpha coefficients are within acceptable ranges with the values exceeding 0.7064, which indicates their satisfactory to high reliability for measuring the individual constructs (Nunnally & Bernstein, 1994).

All the items within the EI variable were given medium average scores, indicating that the students displayed moderate entrepreneurial intentions. The item rated the highest was "My professional goal is to become an entrepreneur." (M=3.43, SD=1.129), whereas the item rated the lowest was "I have a firm intention to start a firm one day." (M=3.26; SD=1.130).

Table 4 The students' entrepreneurial intention (EI)

Items	Min	Max	Mean	Std. Deviation	Cronbach's alpha	Average Mean
I am ready to do anything to be an entrepreneur.	3	5	3.35	1.191	0.947	3.33
My professional goal is to become an entrepreneur.	3	5	3.43	1.129		
I am determined to create a firm in the future.	2	5	3.28	1.161		
I have a firm intention to start a firm one day.	2	5	3.26	1.130		

Source: Authors

Table 5 Personal attitude (PA) towards entrepreneurship

Items	Min	Max	Mean	Std. Deviation	Cronbach's alpha	Average Mean
Being an entrepreneur would entail great satisfaction to me.	2	5	3.96	1.053	0.883	3.73
A career as an entrepreneur is attractive to me.	3	5	3.85	1.096		
If I had the opportunity and resources, I'd like to start a firm.	3	5	3.70	1.128		
Among various options, I would rather be an entrepreneur.	2	5	3.42	1.069		

Source: Authors

Table 6 The social norms

Items	Min	Max	Mean	Std. Deviation	Cronbach's alpha	Average Mean
Your close family	2	5	3.72	1.200	0.814	3.39
Your friends	3	5	3.64	1.251		
Your faculty professors	3	5	3.60	1.224		
Your colleagues	2	4	2.58	1.113		

Source: Authors

The total mean average of the PA variable is 3.73, with "Being an entrepreneur would entail great satisfaction for me." as the item rated the highest (M=3.96; SD=1.053) and "Among various options, I would rather be an entrepreneur." as the item rated the lowest (M=3.42; SD=1.069). Such results indicate that, according to the students' perception of and attitudes towards entrepreneurship, opportunities and resources play the key role in starting their own business ventures. Although the students are aware of a lack of current resources, it is believed that, if they had them available, they would be inclined to start their own business.

Table 6 displays the respondents' social norms (SN). The total mean 3.39 suggests that the family, friends, faculty professors, and college peers influence the students by encouraging them to consider or plan an entrepreneurial career. The students seem to be more influenced by their close family (M=3.72), only to be followed by their friends (M=3.64) and faculty professors (M=3.60), whereas peers (M=2.58) have a slightly lesser, but still significant impact. Faculty

Table 7 Perceived behavioral control

Items	Min	Max	Mean	Std. Deviation	Cronbach's alpha	Average Mean
To start a firm and keep it working would be easy for me.	3	5	3.44	.945	0.892	3.14
I am ready to start a viable firm.	2	5	3.19	1.107		
I know the necessary practical details to start a firm.	2	5	3.05	1.142		
If I tried to start a firm, I would have a high probability of making a success.	2	4	2.87	1.058		

Source: Authors

professors exert almost the same level of influence on the students as their friends do, with the means 3.60 and 3.64, respectively, which suggests that professors play a significant role in shaping students' entrepreneurial intentions, as much as their friends who offer support and advice do. However, peers have a noticeably lesser impact, which is indicative of the fact that, while they still may influence the students, their role in fostering the students' entrepreneurial intentions is less pronounced. In contrast, the students may be more influenced by their parents' opinions due to their reliance on their parents for financial support, which is a factor deeply rooted in the Croatian culture and family structure.

The total mean average of the PBC variable is 3.14, with "To start a firm and keep it working would be easy for me." as the item rated the highest (M=3.44; SD=0.945) and "If I tried to start a firm, I would have a high probability of making a success." as the item rated the lowest (M=2.87; SD=1.058). A. Iqbal *et al* (2012) provide an explanation for the notably low mean average of this factor compared to the other three, suggesting that it may stem from certain reluctance and hesitation among college students. This apprehension could be linked to their doubts about their self-confidence in taking risks and their ability to establish a business or start a venture from the ground up, which may feel beyond their current capabilities and mindsets.

Multiple regression analysis: the hypotheses testing

Considering multiple regression analysis (with the selected two-way testing, 5% significance, the test power 80 %, and the three predictors), the G*Power 3.1.9.7 program, which is a statistical power analysis program based on Cohen's sampling formula, recommends a minimum sample size of 77 units. Since this study involves a total of 184 respondents, the criterion for conducting the research was successfully met. The mutual linearity of the variables in the multiple regression model was tested using a scatter plot.

By analyzing each individual diagram shown in the matrix, it is evident that there is an approximate linear relationship between all the variables of the model. The correlation analysis table presents the Pearson correlation coefficients (r) and their statistical significance (p). All the independent variables are highly correlated with the dependent variable, and the independent variables are also statistically significantly correlated with each other.

The following variables: personal attitude (PA), perceived behavioral control (PBC) and social norms (SN) are the independent variables of the model, and they are statistically significantly ($p<0.001$) related to the entrepreneurial intention (EI) dependent variable. The mentioned connections have a positive sign and thus suggest an increase in the values in the variables (both the dependent and the independent): PA (r1=0.739), PBC (r1=0.746), SN (r1=0.686).

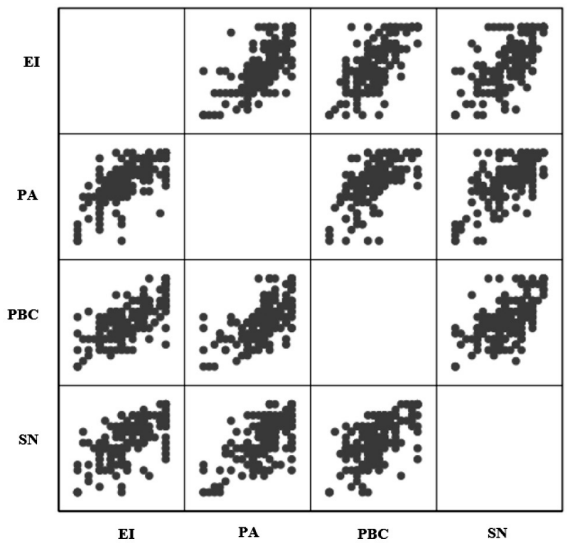

Figure 2 The matrix notation of the scatter plots for the model variables

Source: Authors

Table 8 The correlational analysis of the variables

	EI	PA	PBC	SN
EI	1			
PA	.729	1		
PBC	.746	.643	1	
SN	.686	.653	.609	1

Source: Authors

Following the correlation analysis, a multiple regression analysis was carried out so as to examine the influence of the independent variables on the dependent variable, specifically in order to determine whether the students' EI could be predicted based on the PA, PBC, and SN variables.

The first part of the table below provides the level of the predictive ability of the set model via the information on the multiple correlation coefficient (R), the determination coefficient (R^2), and its corrected value (Adjusted R^2), as well as the evaluation of the overall statistical significance of the set model (the F-ratio). The second part of the table presents the unstandardized and standardized coefficients. Since all the independent variables, as well as the dependent variable, were measured using different measurement units, it is recommended that the standardized coefficients should be interpreted, in which way the comparability of the variables of the multiple regression model is ensured.

According to the data shown in the table, the equation for the multiple regression model reads as follows:

$$EI = -0.369 + 0.321 * PA + 0.235 * SN + 0.397 * PBC \quad (2)$$

Multiple regression analysis was used to test whether the entrepreneurial intentions (EI) variable could be predicted based on the elements of the Theory of Planned Behavior. The variables: personal attitude (PA), perceived behavioral control (PBC) and social norms (SN) predict entrepreneurial intentions statistically significantly ($F3, 180=134.211$, $p<0.001$). The variables of the model explain 69.1% of the variation in entrepreneurial intentions. The predictive ability of all the three independent variables of the analyzed multiple regression model is justified because all the independent variables contribute statistically significantly to the model. The PBC (perceived behavioral control) variable has the most predictive power in explaining entrepreneurial intentions ($b2=0.397$, $t=6.927$, $p<0.001$), only to be followed by personal attitude ($b1=0.321$, $t=5.354$, $p<0.001$) and finally social norms ($b3=0.235$, $t=4.062$, $p<0.001$).

The regression analysis indicates that all the dimensions of the Theory of Planned Behavior (TPB) significantly influence the level of entrepreneurial intentions, thereby confirming support for all three hypotheses.

DISCUSSION

The Theory of Planned Behavior is highly regarded for its effectiveness in predicting entrepreneurial intentions across various contexts. This study's findings further validate this reputation, with a significant power 69.1% in the explained variance observed in this research, in which way this study also

Table 9 The overview of the output results of the multiple regression analysis

Indicator					
R	0.831				
R^2	0.691				
Adjusted R^2	0.686				
Std. Error	0.60033				
Durbin-Watson	2.033				
F-ratio	134.211				
Sig.	.000				
	Unstandardized Coefficients		Standardized Coefficients		
Independent variables	B	Std. Error	Beta	t	Sig.
(Constant)	-.369	.193		-1.910	.058
PA	.368	.069	.321	5.354	.000
SN	.262	.065	.235	4.062	.000
PBC	.458	.066	.397	6.927	.000

The dependent variable: EI

Source: Authors

aligns with the previous research in the components of the TPB (Ajzen, 1991; Finisterra Do Paco *et al*, 2011; Iqbal *et al*, 2012; Al-Jubari, 2019; Širola, 2020; Su *et al*, 2021; Sampene *et al*, 2023), highlighting its consistency and reliability in predicting entrepreneurial behavior.

The descriptive indicators of the research sample indicate that the respondents exhibit entrepreneurial traits based on the evaluation results. However, they express moderate entrepreneurial intentions. Nevertheless, the results indicate that all the dimensions of the TPB strongly and significantly influence entrepreneurial intentions. In this regard, the PBC variable has the greatest impact, only to be followed by PA, and finally SN. This outcome can be explained by the nature of the variables in the context of entrepreneurship. Perceived behavioral control (PBC) refers to an individual's belief in their capacity to manage and carry out the actions required for entrepreneurial success. Among the students, particularly among those studying economics and entrepreneurship, a strong sense of control over future business activities directly enhances their confidence in entering entrepreneurial ventures. The more they believe they possess the necessary skills, knowledge, and resources to start a business, the stronger their entrepreneurial intention becomes, increasing their likelihood of taking proactive steps toward entrepreneurship. Therefore, the results are as expected, with the PBC being the most influential factor as it reflects the students' self-confidence and their perception of their own ability to tackle business challenges. In contrast, while still significant, personal attitude (PA) has a lesser impact as it represents the general attitude towards entrepreneurship which may not necessarily lead to action without a belief in success. Social norms (SN) have the least predictive power because, although external encouragement can play a role, it has proven to be less important than internal confidence and personal beliefs.

However, the results of this study partially diverge from the previous research in the impact of social norms (SN) on entrepreneurial intentions (EI). For example, E. Rajh, J. Budak, J. Ateljevic, L. Davcev, T. Jovanov and K. Ognjenovic (2016) reported the lowest regression analysis result ($\beta = 0.05$, $p < 0.01$) between these variables, whereas D. Širola (2020) found no correlation between SN and EI. Similarly, in a single regression analysis, A. Iqbal *et al* (2012) revealed an insignificant impact of SN on EI among the university students. Conversely, R. L. Engle, N. Dimitriadi, J.

V. Gavidia, C. Schlaegel, S. Delanoe, I. Alvarado, X. He, S. Buame and B. Wolff (2010) found that, in Costa Rica, SN accounted for 40% of the variance in EI. This study, however, has yielded different results, indicating a stronger influence of SN on EI among the students ($b3 = 0.235$, $t = 4.062$, $p < 0.001$). I. Ajzen (1991) suggested that the combined effect of perceived behavioral control (PBC), subjective norms (SN), and personal attitudes (PA) contributed more significantly to entrepreneurial intentions (EI) than their independent effects. This conclusion also aligns with the findings of this study.

CONCLUSION

Research in entrepreneurial intentions has gained an increasing attention in recent years. Yet, it has remained a field with many unanswered questions, particularly when viewed in the context of the economies such as Croatia that are facing significant constraints in overall entrepreneurial development. This makes the investigation of students' entrepreneurial intentions a compelling area of study given the fact that students are potential new entrepreneurs who could drive innovation, support economic resilience, and reduce youth unemployment, highlighting the need for ongoing research from multiple perspectives. Conducted on a sample of Croatian students, this study provides insights into their entrepreneurial behavior, offering the input for the development of the tailored entrepreneurial programs and internal policies that foster entrepreneurial intentions.

The results of the multiple regression analysis carried out in this study provide strong support for all three hypotheses, confirming the fact that the elements of the Theory of Planned Behavior (TPB) significantly influence entrepreneurial intentions (EI). Hypothesis 1, which proposes that personal attitude (PA) positively affects entrepreneurial intentions among students, is supported by the findings as personal attitude is found to have a statistically significant positive relationship with EI ($b1 = 0.321$, $p < 0.001$). This aligns with the expectation that a favorable attitude towards entrepreneurship enhances students' intentions to engage in entrepreneurial activities. Hypothesis 2, suggesting that social norms (SN) positively affect entrepreneurial intentions, is also confirmed by the data. Social norms show a positive and statistically significant effect on EI ($b3 = 0.235$, $p < 0.001$), supporting the idea that societal and cultural influences can shape students' entrepreneurial aspirations. Finally, Hypothesis 3, which says that perceived behavioral control (PBC) positively affects entrepreneurial intentions, is strongly supported as PBC exhibited the highest predictive power ($b2 = 0.397$, $p < 0.001$). These results indicate that the students who perceive themselves as those who have the ability and resources to successfully pursue entrepreneurial ventures are more likely to form entrepreneurial intentions.

Although the study did not explicitly reveal the role of the educational system in promoting entrepreneurial initiatives, on the one hand, it did provide a clearer and more comprehensive framework for assessing environmental influences on students' entrepreneurial intentions by incorporating a multidimensional support aspect from faculty professors within social norms (SN), on the other, which also underscores the faculty's responsibility in bridging the gap by integrating relevant courses in the curriculum to educate students in entrepreneurship.

This study offers contributions to both theory and practice. The theoretical aspect advances the understanding of entrepreneurial intentions and enriches the entrepreneurship literature by emphasizing and more precisely determining the factors fostering them. At the practical level, the study highlights the importance of providing incentives for students to engage in entrepreneurial activities, with higher education institutions serving as a crucial support system that should consistently be developed and customized in order to meet students' needs. Additionally, these outcomes contribute to the evidence base used to assess the current and shape future incentive policies aimed at fostering entrepreneurial behavior. These results could especially be beneficial in encouraging actions at the micro-level, originating directly from higher education institutions rather than depending on the slow-moving bureaucratic system.

This study has several limitations that should be considered when reviewing the results. The study has a spatial limitation, as it focuses exclusively on the Croatian students enrolled in economics programs, particularly on those taking entrepreneurship courses as part of their curricula. Therefore, future research should aim to expand the scope so as to include students from other faculties, not only in Croatia but internationally as well. Furthermore, future studies should broaden the focus so as to include students from non-economic science, such as technical and other fields of study, in order to assess their entrepreneurial intentions. A comparative analysis between the students of the faculties of economics and those coming from other disciplines would provide valuable insights into whether entrepreneurial intentions differ across various academic domains or not, and how these differences may impact a broader entrepreneurial ecosystem.

Additionally, the study assesses the respondents' attitudes, which inherently involves a certain degree of subjectivity in their self-evaluation when completing the questionnaire. To address this subjectivity, future studies could benefit from collecting objective data from statistical sources or conducting longitudinal studies, which may provide more reliable insights into actual entrepreneurial intentions and behaviors. Furthermore, it is crucial to recognize the fact that the focus on entrepreneurial intentions does not always align with actual future behavior.

Given the fact that this study is exploratory in its character and conducted on a relatively small sample, caution should be exercised in generalizing the findings until similar studies have been conducted. Lastly, future research could explore the actual behaviors of students' post-intention to evaluate the alignment between their intentions and outcomes. While the findings of this study cannot be generalized, on the one hand, they can be considered indicative, on the other. This research has raised numerous questions that present challenges for future scientific analysis and discourse.

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