DEC
2023
vol. 41, N°2

JOURNAL OF ECONOMICS AND BUSINESS

PROCEEDINGS OF RIJEKA

FACULTY OF ECONOMICS AND BUSINESS

Izdavač – Published by
SVEUČILIŠTE U RIJECI
EKONOMSKI FAKULTET
UNIVERSITY OF RIJEKA
FACULTY OF ECONOMICS AND BUSINESS
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Za izdavača – For the Publisher
SAŠA DREZGIĆ
Dekan – Dean

Priloge objavljene u časopisu referiraju baze – Abstracted and indexed in
Scopus (from 2008), Web od Science Core Collection (WoSCC) – Emerging Sources Citation Index (ESCI) (from 2019); EconLit (from 1993); CAB Abstracts (from 2007); EconLit with Full Text, EBSCO (from 2007); ABI/INFORM Collection, Proquest (from 2009); ProQuest One Business, Proquest (from 2009); Social Science Premium Collection – International Bibliography of the Social Sciences (IBSS), Proquest (from 2006); DOAJ (from 2007); ERIH PLUS (from 2016), RePEc (from 2009).

Časopis izlazi dva puta godišnje – Proceedings is issued twice a year

Zbornik radova Ekonomskog fakulteta u Rijeci tiskan je uz potporu –
Proceedings of Rijeka Faculty of Economics and Business is published being supported by

Ministarstva znanosti i obrazovanja
Republike Hrvatske, Zagreb
Ministry of Science and Education
of the Republic of Croatia, Zagreb

Zaklade Sveučilišta u Rijeci
University of Rijeka Foundation

Priprema za tisak – Prepress
Tempora, Rijeka

Adresa uredništva – Address of the Editorial Board
Ekonomski fakultet u Rijeci – Zbornik radova, Ivana Filipovića 4, 51000 Rijeka, Hrvatska – Croatia
tel.: +385 51 355 182; e-mail: proceedings@efri.uniri.hr; www.efri.uniri.hr

UDK:3:330(08) CODEN ZRHRFZ ISSN 1331-8004
ISSN 1846-7520 (Online)

ZBORNIK RADOVA EKONOMSKOG FAKULTETA U RIJECI
ČASOPIS ZA EKONOMSKU TEORIJU I PRAKSU

PROCEEDINGS OF RIJEKA FACULTY OF ECONOMICS
JOURNAL OF ECONOMICS AND BUSINESS

SVEUČILIŠTE U RIJECI
EKONOMSKI FAKULTET

UNIVERSITY OF RIJEKA
FACULTY OF ECONOMICS

Vol. 41	Sv. 2./No. 2	Str./pp. 353-572	Rijeka	Zima/Winter/2023

O ČASOPISU

Zbornik radova Ekonomskog fakulteta u Rijeci: časopis za ekonomsku teoriju i praksu/ Proceedings of Rijeka Faculty of Economics: Journal of Economics and Business, stalna je znanstvena publikacija Fakulteta. Izlazi od 1971. godine. U razdoblju od 1988. do 1993. izlazi u kontinuitetu jednom godišnje, a od 1993. u dva broja godišnje (proljeće i jesen). Koncepcija časopisa jest orijentacija na objavljivanje tekstova iz ekonomske teorije i ekonomske politike. Primarno je usmjeren na objavljivanje tekstova znanstvenog sadržaja, a samo iznimno i kvalitetnih stručnih radova. Drugi dio sadrži prikaze i ocjene knjiga, pregled nekih važnijih najnovijih izdanja znanstvenih djela u području ekonomskih i njima srodnih znanosti, te obavijesti o međunarodnim konferencijama, javnim pozivima i drugim važnim informacijama. Koncepciju, ciljeve i strategiju časopisa usmjerava Međunarodni savjetodavni odbor. Urednički odbor svojom politikom uređivanja časopisa provodi utvrđene odrednice Međunarodnog savjetodavnog odbora. Časopis je referiran u JEL-u (*Journal of Economic Literature*)/EconLit (*American Economic Association's Electronic Database*), Pittsburgh, Pennsylvania, USA od 1993. godine, a od 2007. i u bazama IBSS (*International Bibliography of the Social Sciences*), ProQuest, Cambridge, UK i DOAJ (*Directory of Open Access Journals*), Lund University, Sweden. Od lipnja 2008. referira se u bazi CAB Abstracts, UK, a od 31. srpnja 2008. godine do 31. prosinca 2018. godine i u bazama SSCI (*Social Sciences Citation Index*), *Social Scisearch* i JCR (*Journal Citation Reports/Social Sciences Edition*), Thomson Reuters, Philadelphia, USA. Thomson Reuters baze referiraju članke objavljene u svesku 1/2007. Časopisa i nadalje, a baza Proquest – ABI/INFORM, Ann Arbor, Michigan, USA referira Časopis od sveska 1/2006. Baza SCOPUS, Elsevier, B.V., Amsterdam, The Netherlands referira sve radove objavljene od 2008. godine. Časopis referira i EBSCO, Ipswich, MA, USA u svojim bazama EconLit with Full Text i SocINDEX u Abstracts&Indexing s referencama kao i baza ERIH PLUS od 2016. godine. Od 1. siječnja 2019. Časopis se referira u ESCI – Emerging Sources Citation Index (Clarivate Analytics).

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Zbornik radova Ekonomskog fakulteta u Rijeci: časopis za ekonomsku teoriju i praksu/ Proceedings of Rijeka Faculty of Economics: Journal of Economics and Business, has been a continuous scientific publication of the Faculty ever since 1971. However, in the period 1988–1993 it was issued annually, and it has been published twice a year ever since 1993 (spring and autumn/fall). The Concept of the Journal is focused on publishing articles dealing with economic theory as well as economic policies. It is primarily oriented to scientific papers, but it also publishes professional articles of exceptional quality that are estimated to contribute to economic theory and practice. The second part contains reviews of books and scientific works in the field of economics as well as those dealing with other related scientific fields. In addition, the Journal promotes international conferences, announces public tenders and provides useful information on other important events. The International Advisory Board sets mission and purpose, objectives and strategies of the Journal. Editorial Board sets the Journal policy, contents and layout, following the guidelines set by the International Advisory Board. The Journal has been abstracted and indexed in JEL (*Journal of Economic Literature*)/EconLit (*American Economic Association's Electronic Database*), Pittsburgh, Pennsylvania, USA since 1993, as well as in the IBSS (*International Bibliography of the Social Sciences*), ProQuest, Cambridge, UK, and DOAJ (*Directory of Open Access Journals*), Lund University, Sweden, since 2007. Furthermore, since June 2008 the Journal has been abstracted and indexed in CAB Abstracts, UK. From July 31, 2008 until December 31, 2018 the Journal was included in SSCI (*Social Sciences Citation Index*), *Social Scisearch* and JCR (*Journal Citation Reports/Social Sciences Edition*), Thomson Reuters, Philadelphia, USA, starting with No. 1/2007, while Proquest – ABI/INFORM, Ann Arbor, Michigan, USA starting with No. 1/2006. In addition, SCOPUS, Elsevier, B.V., Amsterdam, The Netherlands have started coverage of all published material of the Journal since 2008, and EBSCO, Ipswich, MA, USA also covers the Journal in their databases EconLit with Full Text and SocINDEX in Abstracts&Indexing with references as well as the ERIH PLUS database since 2016. Since January 1, 2019 the Journal has been included in ESCI – *Emerging Science Citation Index* (Clarivate Analytics).

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Zbornik radova Ekonomskog fakulteta u Rijeci • Časopis za ekonomsku teoriju i praksu • ISSN 1331-8004 • ISSN 1846-7520 (Online) • Vol. 41 • Sv. 2 • Rijeka • 2023.

Proceedings of Rijeka Faculty of Economics • Journal of Economics and Business • ISSN 1331-8004 • ISSN 1846-7520 (Online) • Vol. 41 • No. 2 • Rijeka • 2023

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Original scientific paper
UDC: 336.763:368
https://doi.org/10.18045/zbefri.2023.2.361

Optimizing insurers' investment portfolios: incorporating alternative investments*

Mihovil Anđelinović[1], *Filip Škunca*[2]

Abstract

The challenge posed by historically low-interest rates is particularly significant for insurance companies, especially those specializing in life insurance. This study investigates a potential solution by analyzing the impact of introducing low-correlation alternative investments into traditional investment portfolios. The research employs two methods: firstly, optimization using the Markowitz model, and the multicriteria optimization model is utilized to test the advantages of including alternative investments. Secondly, the study assesses the effects of interest rate fluctuations on both traditional and alternative investments through the Vector Autoregressive (VAR) model. The results from both optimization models during the analyzed period confirm the hypotheses, indicating that integrating alternative investments positively influences portfolio returns, risk management, and overall efficiency. Additionally, the study explores the influence of interest rate changes on domestic stocks, bonds, hedge funds, and managed futures. While there were theoretical expectations of a significant impact, confirming that interest rate changes have a stronger effect on bond and stock yields compared to hedge funds and futures yields remains inconclusive. Nevertheless, the research underscores the significance of diversifying investment portfolios with low-correlation alternative assets in the face of a low-interest rate period. These findings offer valuable insights for insurance companies seeking strategies to navigate the complexities of financial markets.

Keywords: *insurance companies, alternative investments, interest rates, investment portfolio, portfolio optimization*

JEL classification: *C32, G22*

* Received: 02-11-2023; accepted: 21-12-2023

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1. Introduction

Institutional investors in the European Union, particularly insurance and pension fund companies, are major investors in government bonds, with their value closely linked to interest rates. This connection presents a risk, partially managed through interest rate immunization. However, the decline in yields caused by low interest rates has created a structural challenge for insurance companies. They struggled to meet guarantees on life insurance policies through traditional investment returns, leading to the need for financing from alternative sources such as capital or borrowing. This emerging risk highlighted a pressing issue: how insurance companies handle this shortfall. This study explores a potential solution by investigating the incorporation of low-correlation alternative investments into portfolios, aiming to mitigate the challenges posed by the persistent low-interest-rate environment.

The term *Alternative investments* encompasses unconventional assets such as real estate, private equity, hedge funds, and commodities, expanding the investment landscape for investors. What sets alternative investments apart is their ability to expand investment possibilities and potentially enhance a portfolio's risk-return balance. This is because alternative investments typically have a low correlation with conventional investment forms. They are often less liquid, making their valuation complex, requiring investors to have longer investment horizons (Verbeek, 2010), thereby diversifying opportunities for investors (Anson, 2006). From the standpoint of institutional investors, the EU law governing management companies states that any collective investment undertaking not covered by the UCITS Directive[3] is deemed an alternative investment. This includes various investments such as hedge funds, risk and private capital funds, real estate-focused funds (e.g., REITs), commodity investments, infrastructure funds, and others (Basile, 2016).

Investments are a key component of an insurer's assets. They are regulated according to Solvency II regulatory framework where investment risk exposure is included in the calculation of capital requirements. In other words, according to current regulations, insurers can invest in any form of investment, but depending on its riskiness, they are obliged to reserve a certain amount of their own capital to cover potential losses or negative returns. Insurance companies are often conservative investors with a long investment horizon and invest a large part of their assets in government bonds which are perceived as a low-risk and non-volatile form of investment. For this reason, the largest share in the structure of investments is precisely such investments.

[3] Directive 2009/65/EC of the European Parliament and of the Council of 13 July 2009 on the coordination of laws, regulations and administrative provisions relating to undertakings for collective investment in transferable securities

It is important to point out that insurers today have the possibility to invest without limits in any form of investment (e.g. bonds, equity, real estate, other alternative investments etc.) if they have enough of their own capital to cover potential losses of such investment. The abolition of strict limits on permitted forms of investment has broadened the spectrum of selection of investments that insurers can include in their investment portfolio. Such an approach positively contributes to the development of financial markets, but on the other hand, it requires a greater level of focus and expertise in terms of risks that may arise from less common forms of investment.

During the analyzed period from 2006 to 2020, diversifying investment portfolios with alternative options could have alleviated the impact of low-interest rates on insurance companies' profits. Hedge funds and managed futures, unconventional investments, are now popular, especially among institutional investors (Schneeweis et al., 2011). Long-term correlations between the Credit Suisse Hedge Fund Index and standard stock and bond market indices, as depicted in Table 1, support this idea.

Table 1: Correlation Between Hedge Fund Returns and Traditional Investments (1994-2015)

Financial indices	Credit Suisse Hedge Fund Index	MSCI AC World GR (global stock market)	Barclays Global Aggregate TR (global bond market)
Credit Suisse Hedge Fund Index	1		
MSCI AC World GR	0.5677	1	
Barclays Global Aggregate TR	0.2776	-0.0059	1

Source: Authors as per Basile (2016)

The main research challenge lies in examining how incorporating alternative investments into institutional portfolios, particularly those of insurance companies, can counter the effects of prolonged low-interest rates. Another area of research involves finding the optimal balance between traditional and alternative investments. Insufficient research exists on how interest rate fluctuations affect both traditional (domestic stocks and bonds) and alternative investments, crucial for understanding the benefits of diversifying portfolios. Notably, there are limited local studies in this area. Investigating these fluctuations in Croatia's capital market gains importance, given the recent entry into the Eurozone, eliminating currency risks, and easing access to global financial markets.

Research on optimizing investment portfolios with alternative investments, such as hedge funds and managed futures, has shown significant advancements (Amin and Kat, 2003; Kat, 2005; Davó et al., 2013). Studies have highlighted the necessity of considering the non-normal distribution of returns in portfolio optimization (Keating and Shadwick, 2002; Bhaduri and Kaneshige, 2005; Anson et al., 2007; Abrams et al. 2012). Researchers have explored the impact of hedge funds and managed futures, emphasizing their positive effects on diversification, especially concerning higher moments of the return distribution like skewness and kurtosis. Incorporating alternative investments and using sophisticated techniques like multi-criteria optimization with higher moments can substantially enhance diversification (Kat, 2005; Abrams et al., 2012; Štimac, 2012; Flifel, 2014; Gautefall and Chen, 2017). For institutional investors, including insurance companies, these strategies hold the potential to improve risk-return profiles and create more resilient investment portfolios.

The study proposes two hypotheses. The first suggests that integrating alternative investments into a portfolio has a much more favorable effect on returns and risk compared to adding more traditional investments. Essentially, including alternative investments shifts the portfolio's efficient frontier upward. The second one states that fluctuations in interest rates impact traditional investments' returns more significantly than those of alternative investments. This aligns with the first hypothesis, emphasizing the benefits of alternative investments in low-interest-rate periods, which have been a persistent challenge for insurance companies.

The study is divided into six sections. The introductory part clarifies the research topic and the hypotheses. This is complemented by a review of existing research in the second section. The third section covers the applied research methodology. The fourth section presents the basis and results of the empirical analysis, detailing the variables used and their statistical characteristics. The fifth section explains the findings, their economic significance, and implications. The sixth section constitutes the conclusion, addressing the initial hypotheses and the paper's contribution, discussing limitations and challenges faced during the research, and providing directions for future research.

2. Literature review

Previous studies on optimizing investment portfolios by integrating alternative investments trace their origins back to papers like Lintner (1996), who first highlighted the low and occasional negative correlation between managed futures portfolios and portfolios comprising traditional investments in stocks and bonds. This finding enabled the creation of significantly more efficient portfolios. Kat (2005) examined the influence of adding hedge funds and managed futures

as alternative investments to portfolios composed solely of stocks and bonds. Findings revealed that if managed futures constituted at least 50% of the alternative investments, there were no adverse effects on the portfolio.

Amin and Kat (2003) studied the impact of integrating hedge funds into stock portfolios and determined that due to their low correlation, hedge funds positively influenced portfolios when combined with stocks. This conclusion was supported by Otruba et al. (2006) and Hoevenaars et al. (2008). Bacmann et al. (2008) analyzed the correlation between various hedge fund types and traditional investments, refuting the notion that hedge funds lacked the necessary diversification properties.

A significant study by Jaggi et al. (2011) revealed the positive effects of hedge funds on the risk-return relationship of investment portfolios. In the context of the insurance industry, Davó et al. (2013) emphasized the diversification benefits of including life insurance-linked funds. Carayannopoulos and Perez (2015) studied catastrophe bonds and concluded that they were suitable for diversification, especially in crisis-free periods.

Researchers acknowledged that investment returns, especially from alternative options like hedge funds, did not follow a normal distribution. Consequently, they explored multi-criteria portfolio optimization considering higher moments, starting in the late 1990s. Davies et al. (2009) used polynomial goal programming to allocate capital to hedge funds and traditional investments, emphasizing the need to combine them for positive portfolio performance. Bergh and Rensburg (2008) also favored multi-criteria portfolio optimization over the traditional Markowitz model, considering the non-normal distribution of hedge fund returns.

Additionally, managed futures were considered as alternative investments. Abrams et al. (2012) examined the impact of including managed futures indices in investment portfolios with hedge fund indices, U.S. stocks, and global bond market indices. They highlighted the benefits of including managed futures for diversification, liquidity, transparency, and efficient use of free cash, especially for institutional investors like insurance companies. Kat (2005) explored the effect of including managed futures in investment portfolios, demonstrating their significant positive impact on diversification and higher moments of the return distribution.

In a Croatian case study, Štimac (2012) applied classic Markowitz optimization to portfolios primarily consisting of mandatory and voluntary pension fund return indices (MIREX and open funds A, B, and C) and cash. These investments were combined with alternative forms such as real estate, commodities, private equity, and hedge funds from 2002 to 2010. The study confirmed that including alternative investments in MIREX led to higher returns and lower risks. However, this study did not employ multi-criteria optimization or consider higher moments of the return distribution such as skewness and kurtosis.

By building upon the foundations laid by past studies, this research endeavors to provide nuanced insights. The study aims to explore not only the diversification benefits of alternative investments but also their potential to counter the challenges posed by prolonged periods of low-interest rates. Through empirical analysis and a multi-criteria approach, this research aims to offer valuable insights, guiding institutional investors in making informed decisions when constructing resilient and balanced portfolios.

In the context of the influence of macroeconomic variables on the returns of forms of investment, a scarce number of domestic scientific papers dealing with this issue was recorded, especially when it comes to alternative forms of investment. Jakšić (2008) performed an analysis of the influence of the monetary aggregate M4 and interest rates on CROBEX was carried out using Johansen's co-integration approach. In the paper, it was determined that there is a connection between the variables in the long term. Variables representing interest rates were interest rates on long-term loans to companies in Kuna (HRK) with a currency clause. The analysis period was 02/2000-05/2007 with a monthly data frequency.

Anđelinović (2011) analyzed the impact of macroeconomic variables (industrial production, monetary aggregate M1, inflation) on returns and riskiness of asset classes (Croatian stocks and bonds, EU bonds, Croatian money) using the VAR methodology. The results of the VAR analysis in most cases do not show Granger causality, i.e. it has not been proven that the movement of selected macroeconomic variables and economic cycles precedes the movement of yield and riskiness of selected asset classes. The analysis period is 2000-2010 with a monthly data frequency.

Benigno (2016) investigated the relationship between changes in 10-year government bond yields and stock returns in 14 developed countries over the period 1999-2015. Empirical results indicated a significant heterogeneity of the observed countries regarding the relationship between interest rates and the stock market.

Lütkepohl and Netšunajev (2018) use a cointegrated structural vector autoregressive model to investigate the relationship between monetary policy in the euro area and stock markets. The model results indicate that contractionary monetary policy shocks lead to long-term declines in stock prices. The analysis period is 01/1999-12/2014 with a monthly data frequency.

Jareño et al. (2019) investigate the impact of a change in the level, slope and roundness of the interest rate curve on US stock sector indices using an asymmetric nonlinear cointegration approach.

3. Methodology

Given that the research focuses on investment portfolios, the initial step involves defining them. An investment portfolio, as a variable, comprises the allocations of selected investment forms calculated using a relevant optimization method, representing the solution of the applied model. A traditional investment portfolio includes exclusively traditional investment forms, while the portfolio's return is defined as the first central moment of the return distribution. The portfolio's return is measured as the weighted sum of the allocations obtained for alternative and traditional investment forms through the conducted optimization. On the other hand, the portfolio's risk is defined as the variance/standard deviation of the investment portfolio, representing the second central moment of the return distribution.

Portfolio efficiency is defined as a relevant measure of portfolio performance based on the tested hypothesis. In the Markowitz optimization model, the Sharpe and Sortino ratios are used because the model assumes normality, eliminating the need to include higher moments in the model and measures. The Sharpe ratio is obtained by the following expression:

$$SR_i = \frac{E(r_i) - E(r_f)}{\sigma_i} \tag{3.1.}$$

where SR_i represents the Sharpe ratio of the investment class, $E(r_i)$ the expected return of the investment class i, $E(r_f)$ the expected return on a risk-free asset (e.g. treasury bill), and the risk of σ_i investment class measured by the standard deviation. The Sortino ratio is obtained using the same expression as the Sharpe ratio, except that the standard deviation of below-average returns is taken in the denominator.

Consequently, evaluating efficiency only requires these ratios, as their values depend solely on the first two moments of the return distribution. Conversely, in the multi-criteria optimization model, the Omega measure is used since it is a pertinent measure of portfolio efficiency when the distribution does not follow a normal shape (Šego et al., 2018). The omega ratio was developed by Keating and Shadwick (2002) to overcome the inadequacy of many traditional efficiency measures applied to forms of investment classes whose return distributions deviate from the assumption of normality. Omega measure is obtained by the following expression:

$$\Omega(r): = \frac{\int_r^b [1 - F(x)]dx}{\int_a^r F(x)dx} \tag{3.2.}$$

where $F(x)$ represents the cumulative distribution of the yield function, bounded by endpoints a i b, together with a defined threshold r (Keating and Shadwick, 2002).

The first hypothesis will be tested by optimizing the portfolio using both the Markowitz and multi-criteria models, incorporating the mentioned variables. The results of the optimization process will determine the outcome of the test. All calculations and optimizations were conducted using the R programming language. Monthly returns were computed based on the provided data, along with variance, skewness, and kurtosis data for each index or asset form.

When optimizing with N investment forms, calculating N expected returns, N+1 variances and covariances, N+2 coefficients for skewness and co-skewness, and N+3 coefficients for kurtosis and co-kurtosis is necessary. As the number of variables increases, the complexity grows exponentially. However, symmetry reduces the calculation to *only* N+2 coefficients for skewness and co-skewness, and N+3 coefficients for kurtosis and co-kurtosis (Škrinjarić, 2013). Using a multifactor model can help manage the exponential increase in parameters when more variables are included (Boudt et al., 2015). The general co-skewness coefficients are determined through the formula:

$$s_{ijk} = E\left[(R_i - E(R_i))(R_j - E(R_j))(R_k - E(R_k))\right] \tag{3.3.}$$

while the coefficients for co-kurtosis are calculated using the formula:

$$k_{ijkl} = E\left[(R_i - E(R_i))(R_j - E(R_j))(R_k - E(R_k))(R_l - E(R_l))\right] \tag{3.4.}$$

Estimating coefficients in small samples can be highly variable. Shrinkage estimators offer a solution, as proposed by Boudt et al. (2017) for analyzing hedge fund portfolios. These estimators consider expected returns, variance, and skewness, enhancing accuracy. Ledoit and Wolf (2003) employ a similar method for stock return covariance estimation, while Martellini and Ziemann (2010) stress the significance of advanced estimators for co-skewness and co-kurtosis parameters, particularly in multi-moment portfolio analysis.

The second hypothesis will be examined using the VAR methodology, focusing on the Vector Autoregressive (VAR) model. This test aims to enhance understanding of how changes in interest rates affect the returns of chosen traditional and alternative investments. It seeks to validate if the assumed impact of variables in the model aligns with economic theory, particularly the relationship between interest rates and traditional investments like bonds. Economic theory suggests a specific connection between macroeconomic variables and financial markets, such as the influence of interest rate fluctuations on stock and bond returns. The official Eurostat tool (JDemetra+) was employed to check for seasonal components in time series variables as a preliminary step. The VAR model can be defined as per Guidolin and Pedio (2018):

$$y_t = \boldsymbol{a}_0 + A_1 y_{t-1} + A_2 y_{t-2} + \ldots + A_p y_{t-p} + \varepsilon_t = \boldsymbol{a}_0 + \Sigma_{i=1}^{p} A_i y_{t-1} + \varepsilon_t, \tag{3.5.}$$

where $y_t = [y_1t\ y_2t\ \dots\ y_Nt]$' is a N-dimensional vector containing N endogenous stationary variables, $a_0 = [a_{10}\ a_{20}\ \dots\ a_{N0}]$' is a N-dimensional vector of constants, A_1, A_2, … , A_p are N×N matrices of autoregressive coefficients, and $\varepsilon_t = [\varepsilon_1t\ \varepsilon_2t\ \dots\ \varepsilon_Nt]$' is the vector of random processes.

The initial step in every VAR analysis involves testing the stationarity of variables, requiring unit root tests. Stationarity testing employs the Phillips Perron and Augmented Dickey Fuller (ADF) tests. Both tests are robust; ADF corrects autocorrelation through lags, while the Phillips-Perron test applies non-parametric corrections to the test statistic. VAR model estimation was performed using R studio. Relevant functions were utilized to link time series of observed variables, and the lag order (p) was determined using the *VARselect* function, which automatically generated the optimal lag order based on the following information criteria: Akaike Information Criterion (AIC), Schwarz Criterion (SC), Hannan-Quinn Criterion (HQIC), and Final Prediction Error (FPE).

After model estimation, innovation analysis commenced with the Granger causality test for each individual variable in the model concerning others. Granger causality determines the order of variables in impulse response function and variance decomposition. Causality, in the Granger sense, does not necessarily mean one variable causes another; instead, it signifies that including prior values of variable A contributes to a better description of the dynamics of variable B. The innovation analysis further utilized impulse response functions to discern the impact of shocks on specific variables within the model. Additionally, variance decomposition was performed, assessing the proportion of forecast errors explained by shocks in all variables. The variance of each variable could be dissected into components caused by shocks in the variable itself and portions resulting from shocks in other variables.

4. Empirical data and analysis

This section examines the impact of including alternative investments on the portfolio and how it responds to changes in interest rates. It begins by outlining the statistical insights of chosen variables before transitioning into model estimation.

4.1. Variables and descriptive statistics

Main variables for hypothesis testing include alternative and traditional investment forms, with monthly returns spanning from 2006 to 2020, totaling 180 observations. When comparing investment returns, annualization is done by compounding daily or monthly returns into yearly figures, based on trading days (252) or months (12) (Romero and Balch, 2015).

The variable *Alternative forms of investment* signifies the proportion of alternative investments (hedge funds and managed futures) in the portfolio, represented by financial indices. *Hedge fund returns'* data is sourced from the Barclay Hedge Fund Index, while *managed futures* data come from the Barclay BTOP50 index. Both indices lack exchange-traded funds (ETFs) tracking their movements. The variable *Traditional forms of investment* represents the proportion of traditional investments, including domestic and foreign government bonds, stocks, corporate bonds, and cash equivalents. Monthly returns for domestic and foreign stocks and bonds are based on corresponding indices. Data is obtained from Zagreb Stock Exchange and Bloomberg.

Due to data availability limitations, adjustments were made to *domestic stock* and *bond* series, supplementing earlier periods with monthly returns of the CROBEX and CROBIS base indices. Monthly returns for *US stock market* movements are represented by changes in the S&P 500 Index from 2006 to 2020. Similarly, monthly changes in returns for *European stock markets* are captured by the MSCI Europe Index during the same period. For *global stock market* movements, data are derived from the S&P Global 1200 Index, and for emerging markets, the MSCI Emerging Markets Index is used, both covering the period from 2006 to 2020. All data regarding foreign stocks are sourced from Bloomberg and are in the form of exchange-traded funds reflecting overall market performance.

Regarding *foreign government bonds in the EU market*, monthly changes in returns are tracked using the FTSE EMU Government Bond Index (EGBI) from 2006 to 2020. *Corporate bond performance in the EU market* is assessed through the Barclays Euro Corporate Bond Index during the same period. For *US government bonds*, the Barclays U.S Aggregate Bond Index is used, and for global bonds, the Barclays Global Aggregate Bond Index is employed. Data for *bonds in developing markets* are represented by the J.P. Morgan Euro EMBI Global Diversified Index, all sourced from Bloomberg. These indices, reflecting the overall bond market performance, are structured as exchange-traded funds traded on the stock exchange.

Cash equivalents' returns data are from the ZB Plus fund, a short-term bond fund, reflecting changes in Croatian money market funds due to regulatory shifts by the Croatian Financial Services Supervisory Agency (HANFA). These adjustments account for investments in short-term, highly liquid instruments like short-term bonds, cash, deposits, and treasury bills.

Table 2 presents the statistical summary of monthly returns for chosen domestic and foreign traditional as well as alternative investment options spanning from January 2006 to December 2020, comprising a total of 180 data points.

Table 2: Descriptive statistics for chosen investment alternatives

Type of investment	Index	Expected return	Std. dev.	Skewness coefficient	Kurtosis coefficient	Jarque-Bera	*p*-value
Croatian Government Bonds	CROBIStr	0.0025	0.012	-0.137	3.299	82.18	0.00
Croatian Stocks	CROBEXtr	0.0003	0.067	-0.925	7.157	409.79	0.00
Cash	ZB Plus[4]	0.0018	0.002	1.739	3.906	205.14	0.00
EU Bonds	FTSE EMU	0.0034	0.012	-0.030	0.333	0.86	0.65
EU Stocks	MSCI Europe	0.0013	0.056	-0.781	2.036	49.39	0.00
Hedge funds	Barclay Hedge Fund	0.0044	0.020	-1.221	4.728	212.36	0.00
Futures	BTOP50	0.0020	0.019	0.137	-0.174	0.79	0.67
US Bonds	Barclays U.S Aggregate	0.0037	0.009	0.109	1.072	8.97	0.01
US Stocks	S&P 500	0.0061	0.044	-0.889	2.247	61.59	0.00
Global Bonds	Barclays Global Aggregate	0.0033	0.015	-0.239	1.010	9.37	0.01
Global Stocks	S&P Global 1200	0.0042	0.047	-0.961	2.662	80.82	0.00
EM Bonds	J.P. Morgan Euro EMBI	0.0042	0.114	-0.291	86.175	55698.77	0.00
EM Stocks	MSCI EM	0.0033	0.064	-0.934	3.541	120.23	0.00
EU Corporate Bonds	Barclays Euro Corporate	0.0030	0.012	-1.564	9.587	762.70	0.00

Source: Authors' calculations

Table 3 presents a correlation coefficient matrix illustrating the relationships among the observed investment forms.

[4] Refers to the funds itself.

Table 3: Correlation matrix

	#	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Croatian Government Bonds	1	1													
Croatian Stocks	2	0.37	1												
Cash	3	-0.14	-0.03	1											
EU Bonds	4	0.20	-0.16	0.10	1										
EU Stocks	5	0.30	0.60	0.02	-0.07	1									
Hedge funds	6	0.32	0.66	0.06	-0.10	0.88	1								
Futures	7	-0.01	-0.03	0.03	0.28	0.07	0.12	1							
US Bonds	8	0.16	0.00	0.17	0.60	0.09	0.05	0.20	1						
US Stocks	9	0.30	0.59	-0.04	-0.07	0.88	0.87	0.04	0.03	1					
Global Bonds	10	0.22	0.20	0.17	0.38	0.45	0.32	0.20	0.72	0.30	1				
Global Stocks	11	0.31	0.63	-0.01	-0.08	0.96	0.92	0.06	0.07	0.97	0.39	1			
EM Bonds	12	-0.01	0.07	0.03	0.14	0.11	0.10	0.10	0.11	0.12	0.08	0.11	1		
EM Stocks	13	0.29	0.59	0.11	-0.07	0.86	0.88	0.06	0.16	0.78	0.48	0.87	0.13	1	
EU Corporate Bonds	14	0.36	0.31	0.16	0.56	0.46	0.55	0.13	0.49	0.46	0.46	0.49	0.11	0.47	1

Source: Authors' calculations

4.2. Portfolio optimization using Markowitz and Multi-criteria models

The Markowitz optimization process starts with traditional investments, including Croatian bonds, stocks, and the money market. Additional foreign traditional investments and alternative variables are gradually added. Constraints ensure realistic allocations, with Croatian bonds making up 40-50% of the portfolio. The optimization minimizes risk based on insurance companies' preferences, employing 10% increments for practical application.

Another reason for conducting optimization with constraints lies in the current insurance regulatory framework, such as Solvency 2, governing investments. Although formal limits for investing assets no longer exist, the new regulation mandates capital requirements contingent upon the riskiness of the assets. In essence, insurers are required to reserve more capital for high-risk assets and less for those considered lower risk. Hence, when conducting optimization, weight constraints were established to ensure that portfolios include a higher proportion of domestic bonds. These bonds are identified as investments with the lowest risk according to Solvency 2 guidelines. Moreover, they hold the most significant share in insurers' investment portfolios.

Table 4 presents results of portfolio optimization for the first ten portfolios.

Table 4: Optimization results (portfolios 1-10)

Type of investment/ # of portfolios	Shares in the portfolio									
	1	2	3	4	5	6	7	8	9	10
Croatian Government Bonds	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4
Croatian Stocks	0.2	0.2	0.0	0.0	0.1	0.2	0.0	0.0	0.1	0.1
Cash	0.3	0.1	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.1
Hedge funds	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.1	0.1
Futures	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.1	0.1
EU Bonds	0.0	0.1	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.1
EU Stocks	0.0	0.1	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.1
Moments and efficiency measures										
Return	0.0017	0.0018	0.0023	0.0020	0.0020	0.0021	0.0027	0.0025	0.0022	0.0022
StdDev	0.0165	0.0205	0.0088	0.0125	0.0140	0.0186	0.0084	0.0077	0.0121	0.0149
Skewness	-1.818	-2.034	-1.142	-1.508	-2.057	-1.684	-0.998	-0.335	-1.570	-1.755
Kurtosis (Excess)	8.976	9.156	4.400	5.272	8.818	7.584	4.238	1.492	6.309	6.425
Sharpe Ratio	0.101	0.088	*0.265*	0.164	*0.141*	0.112	*0.322*	0.321	*0.185*	0.148
Sortino Ratio	0.131	0.110	*0.396*	0.223	*0.180*	0.145	*0.508*	0.563	*0.251*	0.193

Source: Authors' calculations

Portfolio 1 includes Croatian traditional investments – domestic bonds, stocks, and cash. Portfolios 2-10 combine foreign traditional and alternative investments to analyze their impact on returns and risks, testing Hypothesis 1. Portfolios 2-5 add EU bonds and stocks to domestic investments. Portfolio 2, with 10% of each foreign traditional type, is less efficient than Portfolio 1, compared using Sharpe and Sortino ratios. Portfolios 3 and 4, allocating 30% to EU bonds and stocks, outperform Portfolio 1, affirming their positive influence on returns and risks, with Portfolio 3 showing the highest ratios.

Portfolios 6-9, incorporating domestic traditional and alternative investments, also outperform Portfolio 1. Including alternative forms proves more beneficial than additional EU investments. Among simulated portfolios, Portfolios 7 and 8, with 20% hedge funds and 10% managed futures, are the most efficient. Portfolio 10, with diverse allocations, performs better than the initial one. Table 5 summarizes optimization results with additional US and global bonds and stocks.

Table 5: Optimization results (portfolios 11-19)

Type of investment/ # of portfolios	Shares in the portfolio								
	11	12	13	14	15	16	17	18	19
Croatian Government Bonds	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4
Croatian Stocks	0.2	0.0	0.0	0.1	0.2	0.0	0.0	0.1	0.1
Cash	0.1	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.1
US Bonds	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.1	0.1
US Stocks	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.1	0.1
Global Bonds	0.1	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.1
Global Stocks	0.1	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.1
Moments and efficiency measures									
Return	0.0021	0.0026	0.0026	0.0023	0.0025	0.0029	0.0032	0.0026	0.0028
StdDev	0.0207	0.0097	0.0125	0.0142	0.0202	0.0085	0.0121	0.0136	0.0171
Skewness	-1.951	-1.040	-1.366	-1.937	-2.045	-1.230	-1.283	-2.040	-1.906
Kurtosis (Excess)	9.077	4.953	5.265	8.736	9.257	6.075	4.939	8.856	7.894
Sharpe Ratio	0.103	*0.269*	0.210	*0.160*	0.122	*0.349*	0.262	*0.189*	0.167
Sortino Ratio	0.130	*0.414*	0.299	*0.210*	0.155	*0.547*	0.382	*0.249*	0.219

Source: Authors' calculations

Portfolios 11-19 examined the impact of adding more foreign traditional investments, including US and global financial market bonds and stocks. Although these additions slightly improved the efficiency of Portfolio 1, consisting of Croatian market investments, the improvement was minimal compared to including alternative forms. When US bonds and stocks were added, some portfolios performed better than those with alternative forms. Notably, Portfolio 8 (20% managed futures, 10% hedge funds) demonstrated the best performance with the highest Sortino ratio. Refer to Table 6 for a detailed summary of the optimization results.

Table 6: Optimization results (portfolios 20-27)

Type of investment/ # of portfolios	Shares in the portfolio							
	20	21	22	23	24	25	26	27
Croatian Government Bonds	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Croatian Stocks	0.2	0.0	0.0	0.1	0.2	0.1	0.1	0.1
Cash	0.1	0.2	0.2	0.2	0.1	0.1	0.2	0.1
EM Bonds	0.1	0.2	0.1	0.1	0.0	0.0	0.0	0.1
EM Stocks	0.1	0.1	0.2	0.1	0.0	0.0	0.0	0.1
EU Corporate Bonds	0.0	0.0	0.0	0.0	0.2	0.3	0.2	0.1
Moments and efficiency measures								
Return	0.0011	0.0010	0.0016	0.0013	0.0020	0.0023	0.0022	0.0015
StdDev	0.0261	0.0245	0.0207	0.0202	0.0184	0.0127	0.0118	0.0208
Skewness	-2.916	-8.951	-3.486	-3.832	-1.921	-1.904	-1.872	-3.640
Kurtosis (Excess)	1.483	9.967	2.218	2.431	8.836	7.882	8.005	2.189
Sharpe Ratio	0.043	*0.039*	0.075	*0.064*	0.110	*0.184*	*0.185*	0.070
Sortino Ratio	0.051	*0.042*	0.090	*0.075*	0.140	*0.242*	*0.245*	0.082

Source: Authors' calculations

Incorporating additional investment forms (Portfolios 20-27) showed mixed results. Including emerging market securities didn't enhance Portfolio 1's efficiency, while introducing EU corporate bonds at 20% marginally improved Sharpe and Sortino ratios. More notable improvements were observed in Portfolios 25 and 26, albeit still falling short of Portfolios 6-9, which included alternative forms. Generally, alternative investments positively impacted portfolio returns and risk, measured by

Sharpe and Sortino ratios. Exceptions were seen in just two portfolios, emphasizing the overall efficacy of alternative investments.

Optimizing the portfolio with the described multi-criteria model begins with obtaining an efficient point, which is the starting point for the second optimization phase:

$$(E^*(R_P), \sigma_P^{2*}, S_P^*, K_P^*) = (0.0031, 0.006, -0.352, 0.481).$$

The efficient portfolio aims for maximum returns, minimum variance, maximum skewness, and minimum kurtosis. However, extreme values for skewness and kurtosis were not attainable due to defined constraints ensuring result comparability between Markowitz and multi-criteria optimization. The initial optimization phase, presented in Table 7, used a classical model, and the second phase employed a multi-criteria approach. The complexity of the analysis was managed using the R programming package, involving 210 covariance coefficients, 560 skewness coefficients, and 2.380 kurtosis coefficients.

Table 7: Values of moments of 4 portfolios obtained by optimization from the first stage (P1-P4)

Moments	Portfolio			
	1 (MAX return)	2 (MIN risk)	3 (MAX skewness)	4 (MIN kurtosis)
Return	0.0031	0.0029	0.0027	0.0026
StdDev	0.032	0.006	0.007	0.008
Skewness	-4.092	-0.646	-0.352	-0.365
Kurtosis (Excess)	3.130	1.979	0.705	0.481

Source: Authors' calculations

The portfolio structures obtained from the first optimization will be presented alongside those from the second phase.

In the second phase of the optimization, the goal was to minimize the distance from the efficient point $(E^*(R_P), \sigma_P^{2*}, S_P^*, K_P^*) = (0.0031, 0.006, -0.352, 0.481)$, with equal weights given to each moment ($\lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = 1$). The results, shown in Table 8, yielded the point $(E(R_P), \sigma_P^2, S_P, K_P) = (0.0031, 0.007, -1.229, 4.688)$. The distances of obtained moments from the efficient point were calculated, with the largest deviation observed in the kurtosis coefficient and the smallest in return and standard deviation, nearly reaching 0.

Table 8: Moment values of the optimal portfolio obtained by multi-criteria optimization (second phase)

Moments		Distance	
Return	0.0031	d_1	0.00002
StdDev	0.007	d_2	0.00049
Skewness	-1.229	d_3	0.87784
Kurtosis	4.688	d_4	4.20720

Source: Authors' calculations

Table 9 compares the structures of different portfolios obtained in the two phases of multi-criteria optimization.

Table 9: Structure investment portfolios obtained by multi-criteria optimization

Type of investment	Shares in the portfolio				
	First phase				*Second phase*
	P_1 MAX return	P_2 MIN risk	P_3 MAX skew.	P_4 MIN kurt.	
Croatian Government Bonds	0.00	0.20	0.18	0.18	0.18
Croatian Stocks	0.00	0.00	0.01	0.00	0.00
Cash	0.00	0.20	0.19	0.17	0.20
Hedge funds	0.20	0.08	0.06	0.00	0.18
Futures	0.00	0.09	0.20	0.18	0.02
EU Bonds	0.00	0.20	0.12	0.16	0.20
EU Stocks	0.00	0.00	0.00	0.03	0.00
US Bonds	0.20	0.20	0.18	0.13	0.20
US Stocks	0.20	0.00	0.01	0.00	0.00
Global Bonds	0.00	0.00	0.04	0.12	0.02
Global Stocks	0.20	0.00	0.00	0.02	0.00
EM Bonds	0.20	0.00	0.00	0.01	0.00
EM Stocks	0.00	0.00	0.00	0.00	0.00
EU Corporate Bonds	0.00	0.03	0.01	0.00	0.00
Total	1.00	1.00	1.00	1.00	1.00

Source: Authors' calculations

In the final step of this analysis, the results of two types of optimizations were compared. Equal constraints were applied to investment allocations in both Markowitz and multi-criteria optimization for a fair comparison. The latter proved to be the most efficient, as confirmed by the Omega ratio. The normality test indicated non-normality in several portfolios, justifying the use of the Omega ratio. Only the MIN kurtosis portfolio showed potential normality according to the Jarque-Bera test. Table 10 contains the results.

Table 10: Results of Markowitz (MV5) and multi-criteria (MVSK6) optimization

Measure	Multi-criteria optimization			Markowitz optimization			
	MVSK (w_o=EW)	MVSK (w_o=DR)	MVSK (w_o=ERC)	MAX return	MIN risk	MAX skew.	MIN kurt.
Expected return	0.0031	0.0029	0.0029	0.0031	0.0029	0.0027	0.0026
Stand. deviation	0.007	0.006	0.006	0.032	0.006	0.007	0.008
Skewness	-1.229	-0.646	-0.646	-4.092	-0.646	-0.352	-0.365
Kurtosis	4.688	1.979	1.979	3.130	1.979	0.705	0.481
Omega[7]	3.536	3.394	3.394	1.390	3.394	2.738	2.373
Jarque-Bera	210.18	41.88	41.89	575.80	41.89	7.44	5.73
p-value	0.000	0.000	0.000	0.000	0.000	0.024	0.057

Source: Authors' calculations

Given that the multi-criteria model simultaneously optimizes the first 4 central moments of the distribution, their efficiency is still at a certain level higher than the *MIN risk* portfolios obtained by Markowitz optimization.

4.3. Estimating the impact of interest rate changes within the VAR model

The results of the VAR model aim to enhance understanding of the intensity of the impact of interest rate changes on the returns of selected traditional and alternative investment forms. This study seeks to emphasize the diminished influence of interest rate fluctuations on alternative investments, reducing the risk of abrupt changes. The analysis covers domestic stocks and bonds as conventional investments, and hedge funds and managed futures as alternative options.

[5] Mean-Variance (MV).

[6] Mean-Variance-Skewness-Kurtosis (MVSK)

[7] Loss threshold set to 0 according to the initial settings of the Omega function in R studio.

The initial step involves conducting stationarity tests. Results indicate that, with a significance level of 5%, all observed variables are stationary, as evidenced by the test statistics and p-values, leading to the rejection of the null hypothesis of non-stationarity, except for the EURIBOR variable. In the case of EURIBOR, the null hypothesis of non-stationarity can be rejected at a 10% significance level, with a lag of 1 in the ADF test yielding a p-value of 0.01. Similarly, the Phillips Perron test supports the rejection of the null hypothesis for the EURIBOR variable, confirming its stationarity. Following the determination of the integration order of the analyzed time series, further VAR analysis can proceed.

Table 11 shows the results of the VAR model estimation, but only for the interest rate variable (i.e., EURIBOR).

Table 11: Results of a VAR(1) model – EURIBOR variable

Variable	Estimate	Std. error	t statistic	Pr (>| t |)
EURIBOR	0.4137	0.0688	6.01	0.000
CROBIStr	-1.7367	1.7301	-1.00	0.32
CROBEXtr	0.1533	0.39	0.39	0.69
Hedge Fund	-0.7934	1.2708	-0.62	0.53
MFutures	0.6054	1.0315	0.59	0.56
const	-0.0339	0.0205	-1.65	0.10

Source: Authors' calculations

Following the model estimation, it is necessary to conduct an innovation analysis, starting with the implementation of the Granger causality test for each individual variable in the model concerning the other variables. The null hypothesis of the Granger causality test assumes no causality in the Granger sense. Consequently, the test results indicate that the EURIBOR variable does not cause other variables in the Granger sense, except for the Hedge funds variable, where the null hypothesis is rejected.

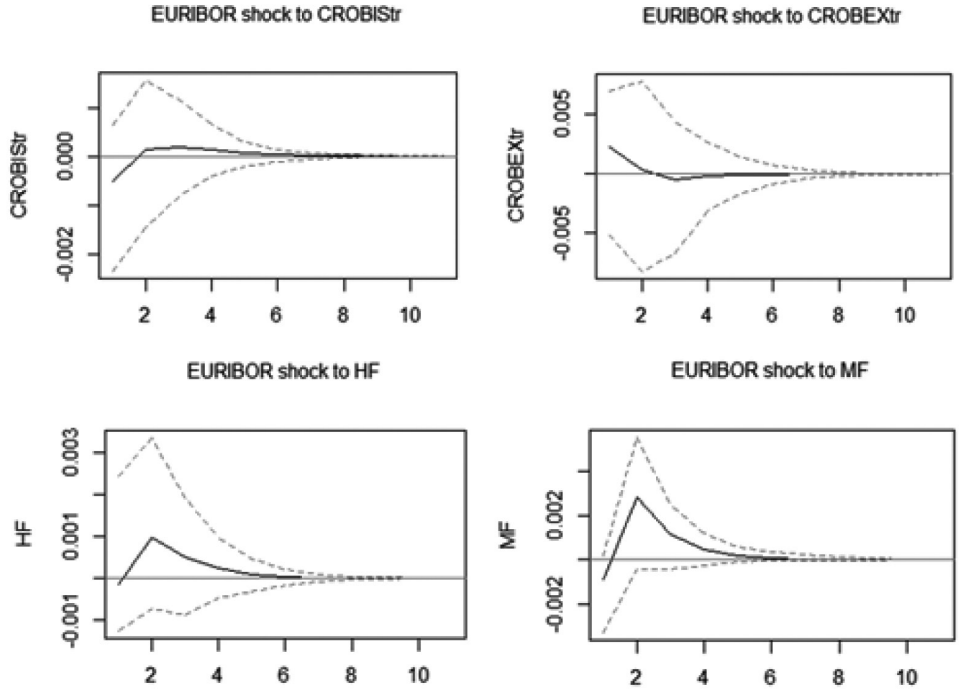
Table 12: Results of the Granger causality test for the VAR(1) model

Variable	Test stat (F-test)	p-value	Interpretation
EURIBOR	1.24	0.29	cannot reject H_0
CROBIStr	1.36	0.26	cannot reject H_0
CROBEXtr	0.31	0.87	cannot reject H_0
Hedge Fund	3.98	0.00	rejecting H_0
MFutures	1.48	0.21	cannot reject H_0

Source: Authors' calculations

Picture 1 displays the innovation analysis conducted over a period of 10 months.

Picture 1: Impulse response function for the VAR(1) model and the shock in the EURIBOR variable



Source: Constructed by authors

A one-standard deviation interest rate change doesn't significantly impact other variables within the 95% confidence interval.

Table 13: Coefficients of the impulse response function (EURIBOR impulse variable)

N	CROBIStr	CROBEXtr	Hedge Fund	MFutures
1	-0.00050632	0.00231476	-0.00014509	-0.00089154
2	0.00014389	0.00029372	0.00097661	0.00281624
3	0.00018526	-0.00052517	0.00051283	0.00112809
4	0.00013433	-0.00012119	0.00023965	0.00046064
5	0.00007289	-0.00004496	0.00009637	0.00017668
6	0.00003496	-0.00002364	0.00003613	0.00006772
7	0.00001562	-0.00001387	0.00001296	0.00002594
8	0.00000668	-0.00000758	0.00000453	0.00000996
9	0.00000278	-0.00000382	0.00000156	0.00000383
10	0.00000113	-0.00000180	0.00000053	0.00000147
11	0.00000045	-0.00000081	0.00000018	0.00000057

Source: Authors' calculations

The impulse response coefficients show a drop in yields on domestic bonds, hedge funds, and managed futures in the first month, stabilizing thereafter.

Table 14: Variance decomposition of VAR (1) model – EURIBOR variable

N	EURIBOR	CROBIStr	CROBEXtr	Hedge fund	MFutures
1	1.000000	0.000000	0.000000	0.000000	0.000000
2	0.991050	0.005936	0.000000	0.001370	0.001640
3	0.987170	0.008987	0.000001	0.001979	0.001859
4	0.986070	0.009852	0.000002	0.002171	0.001902
5	0.985830	0.010045	0.000002	0.002216	0.001909

Source: Authors' calculations

Variance decomposition reveals that EURIBOR, representing interest rate changes, explains only a small part of the variations in selected investment yields. This weak explanatory power could be due to the choice of the interest rate variable (3M EURIBOR) and the insignificance of certain variables in the VAR model.

In conclusion, it's important to note that several tests, including autocorrelation of residuals and heteroskedasticity, were conducted in this analysis. Due to the extensive nature of the study, detailed results were not included in this summary but are available upon request.

5. Findings and discussion

The first hypothesis suggested that integrating alternative forms of investment into portfolios would have a stronger positive impact on both returns and risks compared to adding more traditional investment forms. This hypothesis was confirmed by testing different combinations of domestic and foreign traditional as well as alternative investments. The study provided valuable insights into the empirical effects of including alternative investments in portfolios. Simulated portfolios, retaining shares of domestic traditional forms, accurately reflected real investment portfolios, offering practical applications for institutional investors based on the tested hypothesis.

When it comes to the empirical limitations of this research, it is necessary to mention the exemption of the asset liability management principle in performing optimization. The formation of insurers' investment portfolios is greatly influenced by the structure of liabilities. The impact of this approach was mitigated by imposing constraints on the wights of domestic investments, where a significant share is occupied by government bonds, which approximates the real structure of the investment portfolio of insurance companies.

Results of testing the first hypothesis conform with previous research findings of Kat (2005), Otruba et al. (2006), Hoevenaars et al. (2008), Jaggi et al. (2011), Abrams et al. (2012, 2014) and Štimac (2012) since adding hedge funds and managed futures to a portfolio of traditional investments significantly improves the portfolio efficiency. Main difference here is that in this research domestic (Croatian) bonds and stock are used, but also other foreign traditional investment classes while the observed period is very versatile and long.

This hypothesis also included testing if using a multi-criteria optimization model, incorporating multiple distribution moments, would result in a more efficient investment portfolio than one optimized using the traditional Markowitz model. Results from the testing have confirmed it, indicating that the multi-criteria model consistently outperformed the Markowitz optimization model, considering various constraints. This flexibility allowed investors to adjust preferences according to their investment goals, offering room for further analysis by optimizing different weights for specific central moments of the distribution.

With regards to portfolio composition using multi-criteria optimization, results are in line with Davies et al. (2009) since performing optimization without constraints on minimum allocation, hedge funds squeeze out domestic and foreign equities due to high co-asymmetry. Comparing the results of testing the hypothesis with findings of Bergh and Rensburg (2008), a portfolio obtained with multicriteria optimization outperformed the ones obtained with Markowitz optimization when compared using Omega measure. According to the findings of Gautefall and Chen (2017), this research demonstrates that portfolios optimized for higher moments outperform those optimized using the traditional Markowitz framework.

The purpose of testing the second hypothesis was to gain a more in-depth understanding of how changes in interest rates affect the returns of specific traditional and alternative investments. However, the results from the VAR analysis did not show a significant correlation or influence of interest rate changes on stock and bond returns, contrary to economic expectations. Additionally, the impact of interest rates on alternative investments was not assumed beforehand due to the limited research available on the effects of interest rates on hedge funds and managed futures.

While this hypothesis was not entirely confirmed based on the test results, it cannot be completely dismissed considering previous research findings. Despite this, the hypothesis testing provided valuable insights into the relationship between the variables studied. To expand the scope of hypothesis testing, it is feasible to choose another variable representing interest rate movements, such as returns on money market instruments, long-term loan rates, or the ECB refinancing rate. However, due to the stability of the variables in the model, the applicability of cointegration methods, as demonstrated in Jakšić's (2008) work, for further testing the impact of interest rates on specific types of investments remains uncertain.

Economic theory and logic assume a certain direction and intensity of the connection between macroeconomic variables and financial markets, or in this case changes in interest rates on the yields of stocks and bonds. Given the more intense interrelationship between interest rates and traditional forms of investment, changes in interest rates are expected to have a weaker impact on changes in the yield of alternative forms such as hedge funds and futures. Unfortunately, this perceived relationship couldn't be confirmed by testing the second hypothesis which was the case with other previous research.

6. Conclusion

By incorporating non-traditional investments into institutional portfolios, a balanced strategy that considers both returns and risks becomes achievable. The empirical findings from the research support the initial hypothesis. Examining the impact of introducing non-traditional investments to a portfolio of Croatian assets, the study demonstrated that these alternatives had a positive influence on portfolio efficiency, as indicated by the Sharpe and Sortino ratios. Furthermore, when comparing a multi-criteria optimization model with the conventional Markowitz model, the study revealed the superior efficiency of the multi-criteria approach, providing valuable insights for investors. The second hypothesis, which explored the effect of changes in interest rates on various investments, produced nuanced results.

A significant contribution of this study is the development of a sophisticated multicriteria optimization model, enabling stakeholders to strike an optimal balance

between traditional and alternative investments. Unlike previous studies, this research accounts for the non-normal distribution of variables, providing a more accurate representation of real-world investment scenarios. Addressing a gap in the literature, the study optimizes portfolios by incorporating reference alternative investments like hedge funds and managed futures alongside traditional assets, enriching the understanding of diversification and risk management within Croatia's financial landscape. The study offers valuable insights and practical applications, serving as a crucial tool for researchers and practitioners in the finance industry.

However, like most scientific research, it has limitations. It relies on historical data, which could lead to errors in estimating key return distribution parameters. To counter this, a significant time series of 180 monthly observations from 2006 to 2020 was employed. Differences in data characteristics among financial indices were addressed, and limitations related to insurance companies' obligations were abstracted, with a focus on life insurance companies. The optimization models, particularly the Markowitz model, have constraints due to their periodic nature and reliance on historical data. The VAR methodology used for testing also faces limitations related to autocorrelation and heteroskedasticity of residuals.

By overcoming limitations such as historical data use, this study forms a robust foundation for future research in insurance companies' investments and wider institutional and professional investor domains. Suggestions for future research include employing advanced methods to assess investment returns, incorporating various alternative investment forms, testing results over different time periods, and analyzing investor reactions post Croatia's entry into the eurozone.

Research shows that including alternative investments significantly enhances portfolio efficiency, as measured by Sharpe and Sortino ratios, in most tested combinations. This diversification benefit underscores the importance of incorporating these investments. Practical results highlight the advantages of a multi-criteria model coded in R, made accessible for investors. For those heavily invested in bonds and stocks, adding hedge funds and managed futures of specific maturity, or reducing bond and stock allocations can mitigate interest rate risks. These findings confirm that combining alternative and traditional investments creates a more efficient portfolio compared to one with only traditional investments.

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Optimizacija investicijskih portfelja osiguratelja uključivanjem alternativnih oblika ulaganja

Mihovil Anđelinović[1], *Filip Škunca*[2]

Sažetak

Povijesno niske kamatne stope predstavljaju značajan izazov za društva za osiguranje, posebice ona specijalizirana za životna osiguranja. Ovaj rad istražuje potencijalno rješenje analizirajući učinak uključivanja alternativnih ulaganja niske korelacije u tradicionalne investicijske portfelje. U tu svrhu, koriste se dvije metode. Prva metoda, optimizacija pomoću Markowitzovog modela i višekriterijski model optimizacije koristi se za testiranje prednosti uključivanja alternativnih oblika ulaganja. Kao drugo, rad procjenjuje učinke fluktuacija kamatnih stopa na tradicionalna i alternativna ulaganja putem modela vektorske autoregresije (VAR). Rezultati iz oba optimizacijska modela tijekom analiziranog razdoblja pokazuju da integracija alternativnih ulaganja pozitivno utječe na povrate portfelja, upravljanje rizikom i ukupnu učinkovitost. Osim toga, rad istražuje utjecaj promjena kamatnih stopa na domaće dionice, obveznice, hedge fondove i ročnice. Unatoč teoretskim očekivanjima značajnog utjecaja, nije moguće u potpunosti potvrditi da promjena kamatnih stopa jače utječe na promjenu prinosa obveznica i dionica nego što utječe na prinose hedge fondova i ročnica. Sveukupno, istraživanje naglašava značaj diversifikacije investicijskih portfelja s alternativnom imovinom niske korelacije kao odgovor na izazov niskih kamatnih stopa, pružajući vrijedne uvide društvima za osiguranje za snalaženje na financijskim tržištima.

Ključne riječi: *društva za osiguranje, alternativna ulaganja, kamatne stope, investicijski portfelj, optimizacija portfelja*

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Original scientific paper
UDC: 336.22(497.5)
https://doi.org/10.18045/zbefri.2023.2.391

Linear determinants of the effective tax burden of ICT companies in the Republic of Croatia*

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Abstract

The actual tax burden of a company often differs from that prescribed by law, but there are also differences among the companies themselves. The question arises whether there are systematic explanations for these differences and whether they can be related to the type of business activity, asset structure, debt and other determinants. Therefore, the main objective of the research is to identify the determinants of the effective tax burden of ICT companies in the Republic of Croatia. The time horizon includes companies from the section J information and communication (NACE Rev. 2), in the period from 2008 to 2016. Using an unbalanced sample and dynamic panel regression with the Arellano-Bover/ Blundell-Bond estimator, the determinants of the effective tax burden identified were as follows: effective tax burden from the previous period, company size, debt, capital and labor intensity, inventory intensity, profitability, and business cycles. However, the determinants differ according to the size classes of the company and the divisions. Compared to previous research, the subject is focused on companies of all sizes, not only large companies including not only listed companies but all companies in an industry that contributes to the homogeneity of the sample and the reliability of the results.

Key words: *effective tax burden, ICT activity, dynamic panel regression*

JEL classification: *H2, C23*

1. Introduction

The issue of the tax burden of corporate income tax arises not only in the period of tax reforms and increasing international tax competition, but it is constantly present in the implementation of the country's economic policy. Kostal (2000) notes

* Received: 29-03-2023; accepted: 11-12-2023

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that there is insufficient empirical research on the issue of corporate tax burden. However, in the last decade, there has been a significant increase in research on this topic. The existence of different approaches and indicators of the effective tax burden, as well as their selection, depend on the empirical question to be answered. The choice of a particular method has a decisive impact on the results and therefore answers only certain questions. First, the research questions to be answered dictate the choice of approach to measuring the tax burden. The latter concludes that there is no universally accepted method for measuring the tax burden of companies.

The simplest measure of tax burden is the nominal tax burden, which is measured by the statutory tax rate. However, a high/low statutory tax rate does not simultaneously mean that a high/low amount of tax is paid, because the amount of tax depends on the tax base (Devereux et al., 2002), which amount depends on the use of tax credits, tax reliefs, and tax exemptions allowed by a country's tax system (Bretschger and Hettich, 2002). Since the nominal corporate tax rate does not take into account tax breaks, exemptions, and incentives that affect the size of the tax base, it does not show the actual tax burden. To measure the actual or effective tax burden, one must focus on effective tax rate (ETR). According to Harris and Feeny (2003) the effective tax rate, as a measure of the effective tax burden, provides a complete picture of tax performance because, unlike the statutory tax rate, it includes the use of various tax breaks, exemptions and incentives allowed by the tax legislation.

In the period from 2001 to 2016, corporate profits in the Republic of Croatia were taxed at the proportional statutory corporate income tax rate of 20%. In Croatian law, there are tax incentives and reliefs that make it possible to reduce the tax burden, so that few companies pay a profit tax at the statutory rate. However, the effect of the tax incentives is not uniform among companies. Some companies benefit from more tax incentives than others, resulting in differences in effective tax rates across companies. While some companies pay a lower effective tax rate than the statutory rate, other companies may even pay a higher effective tax rate than the nominal rate. An important tax policy issue is whether the government should tax certain activities more favourably or aim for neutral taxation. For tax policymakers to adequately address this policy issue, the following empirical questions need to be examined: (1) Are there differences in corporate tax burdens?; (2) Are there systematic explanations for these differences, and can they be related to the nature of corporate activity, asset structure, debt, and other factors? This study aims to provide answers to the questions raised. In addition to the government on the one hand, the question of the actual tax burden is also important for the companies themselves. In most business decisions, the tax implications have to be taken into account. Therefore, it is of interest for the management to know the determinants that affect the effective tax burden in order to influence them and thus the effective tax burden.

In this study, companies considered from the ICT sector are those that, in terms of their main activity, are classified in section J information and communication

according to the National Classification of Economic Activities (NACE Rev. 2) (Eurostat, 2008). The selection of this activity is determined by its economic importance, and Korent (2018) states that section J is one of the three most important activities in the Croatian economy. According to Mamić Sačer et al. (2013), the mentioned activity was the most profitable in 2009, measured by the net profit margin as the ratio of net profit to total revenue in the amount of 7.7%. According to the data of the National Statistics Institute (DZS, 2021) in 2020, this section achieved year-on-year growth in gross value added of 4.92% (measured in basic prices). Better results were achieved only by the construction sector, with a growth of 5.94%, while the gross value added of the entire Croatian economy decreased by 6.67%. The *info.biz* database managed by the Financial Agency (FINA) shows that the number of exporters in section J is growing faster than in the overall economy. While the number of exporters from the information and communication section increased by 19.44% in 2021 compared to the previous year, it increased by 11.66% at the level of the whole of Croatia (FINA, 2022). The above facts suggest that section J is more resistant to economic downturns.

The main research objective arises from the described problem, namely the study of the determinants of the effective tax burden of companies from the ICT sector in the Republic of Croatia. In addition to the main research objective, secondary research objectives also arise. The first relates to the study of the existence of differences in determinants in relation to the size categories of companies from the ICT sector and the second to the categories of divisions of section J.

From the defined problem and set research goals, the set research hypotheses are as follows:

H1: *The selected set of determinants has a significant linear impact on the effective tax burden of companies in section J information and communication in Croatia.*

H2: *Determinants of the effective tax burden of companies in section J information and communication differ depending on the category of company size.*

H3: *Determinants of the effective tax burden of companies in section J information and communication differ depending on the companies division in section J.*

The work consists of six parts. After the introduction, the second part of the paper contains a literature review of research on the determinants of the effective tax burden of companies. The third part of the paper presents the research methodology, while the fourth part describes the research data and variables. The fifth part of the paper presents the results of the analysis. The sixth part discusses the main findings and concludes the paper.

2. Literature review

According to Nicodeme (2001) an ex-post[2] micro approach is used to identify the impact of determinants on the effective tax burden of companies. The advantage of this approach is that it uses real data and concurrently allows for a multidimensional analysis of the effective tax burden, such as an industry analysis or an analysis in terms of the size of the company. (Nicodeme, 2001) The ex-post micro approach measures effective tax rates based on historical and current data from the financial statements of existing companies (Giannini and Maggiulli, 2002). Nicodeme (2002) states that this approach takes into account the effects of the macroeconomic context, the behaviour of companies and the tax administration, and all the characteristics of the tax system. Based on the above, this approach is optimal to achieve the set research objective. Ex-post micro effective tax rates are usually calculated as the ratio between taxes paid and an indicator of company performance from financial statements such as pre-tax profit or gross operating profit (Nicodeme, 2001). Because the ex-post micro effective tax rate indicates how many units of tax are paid per unit of profit, the rates are often referred to in the literature as average effective tax rates (Callihan, 1994; Bansadja, 2011). In general, these effective tax rates (ETR) are defined as the amount of tax paid on the tax base, expressed as a percentage (Callihan, 1994). They express the tax rate paid on total profits (Bansadja, 2011). In the studies on the determinants of effective tax burden, ETR represents a dependent variable (measured by various indicators). Since the main objective of this paper is to identify the determinants that affect the companies' effective tax burden, the literature review in Table 1a, 1b, 1c, 1d, 1e, 1f, and 1g systematizes selected research papers in which the ex-post effective micro tax rate (ETR) was used as a dependent variable. From this, it can be seen that these studies mainly focus on companies listed on the stock exchange of a specific country. For these companies, there is an obligation to publish financial statements due to information transparency, so the availability of data is relatively easy. There are a small number of studies that cover companies across the industry. For example, Moreno-Rojas et al. (2017) look at companies in the tourism industry, Omer et al. (1993) look at the pharmaceutical and oil industries and Bubanić and Šimović (2021) look at the telecommunications industry. As for the size of the companies studied, most of the research focuses on large companies. The data source for this type of research is mainly publicly available databases. Most of the studies are longitudinal. The most commonly studied determinants of effective tax burden firm size, debt, capital intensity, inventory intensity, and profitability. To find out which determinants affect the effective tax burden, regression analysis, especially panel regression analysis, has been predominantly used.

[2] In the literature it can also be found under the term *backward-looking approach.*

Table 1a: Overview of existing research on ex-post micro effective tax rate (ETR)

Author(s) (year) of research	Country/s	Analysis period	Analyzed companies and data source	Variables	The scientific method
Stickney and McGee (1982)	United States of America	1978-1980	Large companies from the database Annual Compustat Industrial File	Capital intensity Extent of foreign operations Extent of natural resource involvement Size of companie Leverage	Cluster Analysis
Omer et al. (1993)	United States of America	1980-1986	Pharmaceutical and oil industry companies from the database Annual Compustat Industrial File	Size of companie	Spearman Rank Correlations
Kim and Limpaphayom (1998)	Hong Kong, Korea, Malaysia, Taiwan and Thailand	1979-1892 (Hong Kong), 1980-1992 (Korea), 1977-1992 (Malaysia), 1975-1992 (Taiwan and Thailand)	Companies listed on the country's stock exchange. Database provided by the Sandra Ann Morsilli Pacific-Basin Capital Markets Research Center (PACAP) at the University of Rhode Island.	Size of companie Leverage Future growth Profitability	Panel ordinary least squares (OLS) regressions

Source: Authors' compilation

Table 1b: Overview of existing research on ex-post micro effective tax rate (ETR)

Author(s) (year) of research	Country/s	Analysis period	Analyzed companies and data source	Variables	The scientific method
Buijink et al. (1999)	EU 15 (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom)	1990-1996	Consolidated financial statement dana from the Worldscope financial statement (CD-ROM) database.	Size of companie Number of employees Research and development Investments Level of foreign sales Industry Leverage	Multiple regression
Feeny et al. (2002)	Australia	1993-1996	IBIS Enterprise Database contains information on an annual basis for medium to large firms in Australia	Depreciation Size of companie Interest payments Research and development	Panel regression (Fixed Effects Model and Random Effects Model)
Harris and Feeny (2003)	Australia	1993/1994-1996/1997	Large Business and International (LB&I) taxentities from the ATO taxreturn database	Capital intensity Leverage Size of companie Extent of foreign operations Profitability Research and development	Panel regressions Pooled ordinary least squares (OLS)

Source: Authors' compilation

Table 2c: Overview of existing research on ex- post micro effective tax rate (ETR)

Author(s) (year) of research	Country/s	Analysis period	Analyzed companies and data source	Variables	The scientific method
Derashid and Zhang (2003)	Malaysia	1990-1999	Companies listed on the stock exchange	Sector of activity Size of companie Leverage Capital intensity Inventory intensity Profitability Percentage of government equity ownership Year effects	Multiple regression
Rego (2003)	United States of America	1990–1997	Data from COMPUSTAT U.S. Multinational Corporations	Size of companie Pre- tax accounting income Companie report foreign assets or foreign income Interaction variable of size and companie report foreign assets or foreign income Interaction variable of Pre- tax accounting income and companie report foreign assets or foreign income	Ordinary least squares (OLS) regression
Janssen (2005)	Netherlands	1994-1999	REACH data base	Size of companie Size of companie Capital intensity Extent of international activities Profitability Leverage Public company	Panel Ordinary least squares (OLS) regression

Source: Authors' compilation

Table 3d: Overview of existing research on ex-post micro effective tax rate (ETR)

Author(s) (year) of research	Country/s	Analysis period	Analyzed companies and data source	Variables	The scientific method
Liu and Cao (2007)	China	1998-2004	Companies listed on the stock exchange	Size of companie Leverage Asset mix Profitability Ownership structure Overemployment	Panel estimations with the random effect model
Costa et al. (2012)	Portugal	2006-2010	SABI data base	Size of companie Leverage Capital intensity Inventory intensity Profitability Location Sector of activity	Panel Estimations by generalized least square EGLS method
Chiou et al. (2014)	China	2007-2009	Companies listed on the stock exchange	Leverage Capital intensity Inventory intensity State ownership; Profitability Size of companie Total of outstanding shares	Panel regression with two-sided vinsorization
Lazăr (2015)	Romania	2000-2011	Companies listed on the stock exchange	Leverage Capital intensity Size of companie Labor intensity Profitability Dummy variable if companie recorded a net operating loss (NOL) Dummy variable for tax reform	Fixed effects panel data estimation

Source: Authors' compilation

Table 4e: Overview of existing research on ex-post micro effective tax rate (ETR)

Author(s) (year) of research	Country/s	Analysis period	Analyzed companies and data source	Variables	The scientific method
Andreas and Savitri (2017)	Indonesia	2009-2014	45 largest companies listed on the stock exchange	Size of companie Leverage Capital intensity Profitability Inventory intensity	General multiple regression model
Moreno-Rojas et al. (2017)	Spain	2008-2013	Companies in the tourism sector (hotels or travel agencies); data from the SABI database.	Size of companie Leverage Profitability Type of company (hotels or travel agencies)	Dynamic panel model whit Arellano-Bond Generalised Method of Moments (GMM) estimator
Vintilă et al. (2018)	Romania, Hungary, Poland, Bulgaria, Slovenia	2000-2016	Companies listed on the stock exchange of the analyzed countries	Firm characteristics (profitability, firm-level control); Assets structure (capital and inventory intensity, equity multiplier); Indebtedness (solvency ratio and financial leverage); Additional (liquidity, audit fees and statutory rates)	Panel regression estimated by generalized least squares (GLS) with White's method

Source: Authors' compilation

Table 5f: Overview of existing research on ex-post micro effective tax rate (ETR)

Author(s) (year) of research	Country/s	Analysis period	Analyzed companies and data source	Variables	The scientific method
Dias and Reis (2018)	Denmark, Slovenia, Finland, Luxembourg, United Kingdom	2012-2014	Bureau van Dijk's Amadeus data base	Nominal tax rate Size of companie Leverage Capital intensity Profitability	Model of Linear Regression method of estimation of the ordinary squared minimums
Aksoy Hazır (2019)	Turkey	2007-2016	Companies listed on the stock exchange	Size of companie Leverage Capital intensity Inventory intensity Profitability	Panel data estimation using fixed effects model (FEM), random effects model (REM) and pooled ordinary least squares (pooled OLS)
Bubanić and Šimović (2021)	Croatia	2008–2017	Telecommunications companies; data from the Financial Agency	Size of companie Leverage Capital intensity Inventory intensity, Profitability Labour intensity Economic cycle	Panel regression analysis dynamic panel-data estimation

Source: Authors' compilation

Table 6g: Overview of existing research on ex-post micro effective tax rate (ETR)

Author(s) (year) of research	Country/s	Analysis period	Analyzed companies and data source	Variables	The scientific method
Fernández-Rodríguez et al. (2021)	Brazil, Russia, India, China, South Africa, Mexico, Indonesia, Nigeria, Turkey	2006-2015	Companies listed on the stock exchange	Size of companie Leverage Capital intensity Inventory intensity, Profitability Companie's sales growth Discretionary accruals Deferred tax liability Gross Domestic Product growth Government effectiveness Regulatory quality Rule of law	Regressions are estimated using the Panel Corrected Standard Errors (PCSE) estimator

Source: Authors' compilation

3. Methodology

Descriptive and inferential statistics methods are used for research purposes and conclusions. Descriptive statistics is used primarily to describe the sample. Panel regression analysis is used to identify the determinants that affect the effective tax burden. Conducting a panel analysis is most appropriate for the research subject because the data on which it is conducted contain a temporal and spatial component. The spatial dimension is represented by a sample of companies from the section J information and communication, i.e., ICT companies, while the temporal dimension of the research focuses on annual observations from the time horizon of 2008 to 2016. The time frame is restricted to 2016, given that significant tax changes began in 2017 and persisted well after that year. The aforementioned could affect the results because the time after 2017 is so brief and subject to so many changes. This makes 2016 the final year covered by this research. In addition, the choice of the method is also determined by its advantages over static cross-sectional analysis or time series analysis, which are reflected in the following: (1) the combination of cross-sectional data and time series allows for a larger number of observations, and therefore the results are more informative and allow for greater variability (Baltagi, 2005); (2) a larger number of observations allows for a larger number of degrees of freedom, which helps to reduce collinearity and increases the efficiency of the estimator, i. e. increasing the strength of the tests (Škrinjarić, 2011); (3) the problem of multicollinearity is reduced (Škrabić Perić, 2012); (4) heterogeneity between data is allowed, which reduces the problem of bias in the results, i.e. estimators obtained by panel analysis are assumed to be unbiased (Baltagi, 2005); (5) it is possible to avoid the possible problem of endogeneity; (6) allows solving and analysing more complex problems (Baltagi, 2005; Brooks, 2008).

According to the criterion of data availability, we use unbalanced panel data, common for typical empirical economic research (Baltagi, 2005), for three basic reasons. First, the number of companies in the industry fluctuates over time due to entry and exit. Second, such research typically excludes companies with negative gross profit or negative income tax expense because it is problematic to interpret a negative effective tax rate (Zimmerman, 1983; Liu and Cao, 2007). Third, excluding companies with a negative income tax rate and negative pre-tax business income and observing firms that survived in all of the above years would lead to a significant reduction in the sample size, which could consequently affect the impartiality of the results. The study uses a short panel characterized by many observation units (many companies) and several time periods (9 years, from 2008 to 2016) (Cameron and Trivedi, 2010).

It is realistic to assume that the effective tax burden from the previous period affects the effective tax burden of the current period. The above analysis requires the use of the dynamic panel method. Dynamic panel models include a dependent variable

that is lagged by one or more time periods depending on the characteristics of the dependent variable (Mamić, 2015). In studies on identifying factors affecting the effective tax burden of companies, some authors used dynamic panel models using the generalized method of moments (GMM) (Harris and Feeny, 2003; Moreno-Rojas et al., 2017; Bubanić and Šimović, 2021). This is also used in the present study. In addition, an autoregressive panel data model is used in which the lagged values of the dependent variable are included as independent variables (Greene, 2003). Arellano and Bond (1991) developed the difference method GMM dynamic panel estimator to solve problems with the autoregressive model. In the case of unbalanced panel data or when T (time horizon) is small, data loss occurs when the first difference step is transformed. For example, if there is no data for Y_{it}, the data for ΔY_{it} and ΔY_{it-1} will be lost in the first difference transformation (Bostanci et al., 2018). Due to these problems, Arellano and Bover (1995) improve the difference method GMM by developing an efficient estimator of instrumental variables using the method of orthogonal deviations. This method, instead of calculating the difference between the current period and the previous period, the average of the future values of the variables is used. In this way, the data loss caused by the difference GMM method is minimized, especially in the case of unbalanced panel data. This method, which balances the original and transformed systems and estimates them together as one system, is called the GMM system. The GMM system is based on the combination of the difference equation and the level equation and has been shown to have proportionally higher estimation performance than GMM (Bostanci et al., 2018). In the present study, Arellano-Bover/Blundell-Bond estimator was used as one of the methods of GMM system with *one-step system*. Its use is justified considering that an unbalanced sample is used and the time horizon is short. Fernández-Rodríguez and Martínez-Arias (2014) state that the GMM model controls for the presence of company-specific unobserved effects and the endogeneity of the explanatory variables. The same authors note that this method solves three relevant econometric problems: (1) the presence of unobserved company-specific effects, which are eliminated by introducing the lagged value of the regressor; (2) autocorrelation in the data with respect to the dependent variable of effective tax burden, which captures the dynamic nature of effective tax rates; and (3) likely endogeneity of the explanatory variables. Moreno-Rojas et al. (2017) find that the inclusion of a lagged variable of the effective tax burden allows for an adjustment between the long-run and the short-run assessment of the impact of the effective tax rate. The inclusion of a lagged dependent variable as an explanatory variable in the model avoids the problem of overestimation of parameters caused by the use of static models.

The relevant set of variables whose influence on the companies' effective tax burden is studied was selected based on a literature review of the most commonly used determinants and the availability of data for their calculation. The linear impact of the selected variables on the effective tax burden is examined using dynamic panel

regression and the Arellano-Bover/Blundell-Bond estimator. The test is performed according to the following expression (1) that is (2):

$$\begin{aligned} \textit{effective tax rate}_{it} &= \beta_1 * \textit{effective tax rate}_{it-1} + \beta_2 * \textit{size of companie}_{it} + \\ &+ \beta_3 * \textit{leverage}_{it} + \beta_4 * \textit{capital intensity}_{it} + \beta_5 * \textit{inventory intensity}_{it} + \\ &+ \beta_6 * \textit{profitability}_{it} + \beta_7 * \textit{labour intensity}_{it} + \beta_8 * \textit{real GDP growth}_{t} + \varepsilon_{it} \end{aligned} \quad (1)$$

abbreviated

$$\begin{aligned} ETR_{it} &= \beta_1 * ETR_{it-1} + \beta_2 * SIZE_{it} + \beta_3 * LEV_{it} + \beta_4 * CAPTINT_{it} + \\ &+ \beta_5 * INVINT_{it} + \beta_6 * PROF_{it} + \beta_7 * LABINT_{it} + \beta_8 * RGDP_{t} + \varepsilon_{it} \end{aligned} \quad (2)$$

where the symbol *i* denotes the company, the symbol *t* the year, and ε_{it} symbolizes the random error.

The same model is applied to a total of nine sub-samples in terms of company size categories and to sub-samples in terms of divisions. This makes it possible to compare the results and draw more appropriate conclusions. The sub-samples in terms of size consist of three categories: small, medium and large companies. The categorization was done according to the concept used by the Finance Agency, which is based on the provisions of the Accounting Act (NN 109/2007) (Hrvatski sabor, 2007). At the end of 2015, the new Accounting Act (NN 78/2015) (Hrvatski sabor, 2015) was adopted, which came to force in 2016 and categorize companies into micro, small, medium and large. In order to ensure the comparability of results depending on the size category of the company, the study re-categorized the companies from 2016 into small, medium and large companies according to the criteria of the Accounting Act (NN 109/2007). In addition, the companies were divided into six sub-samples with regard to the divisions of section J Information and Communication (NACE Rev. 2), namely: J58 Publishing activities, J59 Motion picture, video and television programme production, sound recording and music publishing activities, J60 Programming and broadcasting activities, J61 Telecommunications, J62 Computer programming, consultancy and related activities, and J63 Information service activities (Eurostat, 2008).

4. Empirical data and analysis

This chapter provides a description of the used data, variables, and indicators of these variables based on the previous literature review besides the sampling process described along with the final research sample.

4.1. Data and variables

The data used for this research are data on the companies that make up the defined sample and macroeconomic data, i.e., the variable. The data are secondary in nature and come from the Finance Agency and the National Statistics Office databases. Variables and indicators of variables that have a theoretical basis and for whose calculation data are available are used. The indicators of variables at the company level are defined for each company and each observed year. The macroeconomic variable is defined on an annual basis. Table 7 provides an overview of the research variables, the ways in which they are measured, and the existing research in which the aforementioned variables and their indicators have been used. The primary variable of interest, the dependent variable, is the effective tax burden. This variable is measured by the effective tax rate (ETR). Determinants whose influence on the effective tax burden is to be demonstrated are independent variables. The independent variables used in the study are company size (SIZE), debt (LEV), capital intensity (CAPTINT), inventory intensity (INVINT), profitability (PROF), labour intensity (LABINT) and the macroeconomic variable that measures the influence of the business cycle, the real GDP growth rate (RGDP). Fernández-Rodríguez and Martínez-Arias (2012) used the GDP determinant in their study, but it was measured in nominal terms.

Table 7: Variables and their indicator

Variable (abbreviation)	Calculation of variable indicators		Author/-s (year)
	Numerator	Denominator	
Dependent variable			
Effective tax burden (ETR)*	Corporate income tax	Profit before tax – (Deferred tax liability / Nominal tax rate)	Stickney and McGee (1982); Omer et al. (1993) Derashid and Zhang (2003);Chiou et al. (2014)
Independent variables			
Company size (SIZE)**	Natural logarithm of total income		Stickney and McGee (1982); Kim and Limpaphayom (1998); Buijink et al. (1999);Rego (2003)
Debt (LEV)**	Financial expenses	Total income	Harris and Feeny (2003); Feeny et al. (2002)
Capital intensity (CAPTINT)**	Amortization	Total income	
Inventory intensity (INVINT)**	Inventory	Total assets	Gupta and Newberry (1997); Richardson and Lanis (2007); Fernández-Rodríguez and Martínez-Arias (2012)
Profitability (PROF)**	Profit after tax (net profit)	Total assets	Janssen (2005); Liu and Cao (2007); Costa et al. (2012); Vintilă et al. (2017); Vintilă et al. (2018)
Labor intensity (LABINT)**	Employee expenses	Total income	Lazăr (2014); Lazăr (2015)
Business cycle (RGDP)***	Real GDP growth rate		Fernández-Rodríguez and Martínez-Arias (2012)

Note: * The data source for the calculation of the indicators is the database of the Finance Agency and the corporate income tax rate in the observed period according to the Corporate Income Tax Act, i.e. the company's financial statements, in particular the balance sheet and the income statement, and the proportional nominal corporate income tax rate of 20%.

** The data source for the calculation of the indicators is the database of the Finance Agency, i.e. the annual financial statements of the companies, in particular the balance sheet and the income statement.

*** The source of data on annual growth rates of real gross domestic product are the databases of the Central Statistical Office.

Source: Authors' compilation

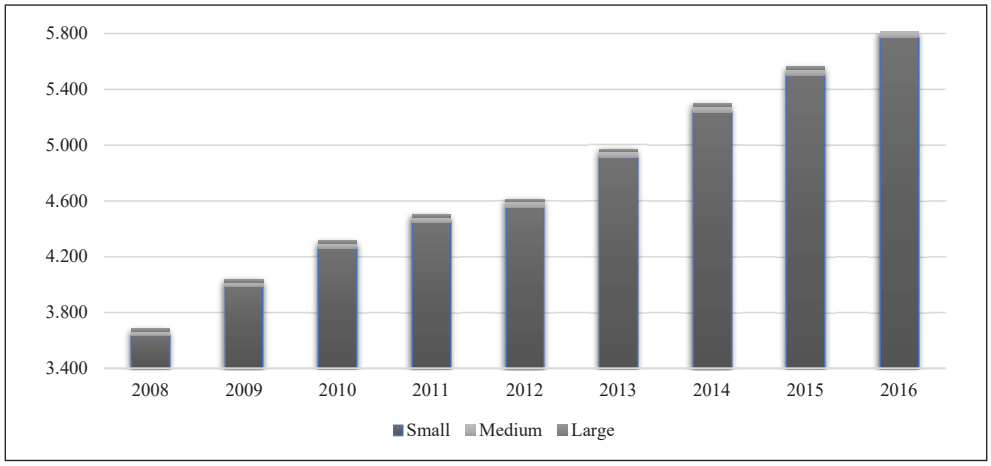
4.2. Sampling procedure and research sample

The statistical research set consists of companies, i.e., data on companies that form annual observations for companies registered in the Republic of Croatia in the section J information and Communication (NACE Rev. 2), in the period from 2008 to 2016, and registered in the database of the Financial Agency (FINA). Figure 1 shows the number and distribution of companies in the section J Information and Communication based on the size criteria of the Accounting Law (NN 109/2007) for the period from 2008 to 2016. The restriction to the period after 2007 is, on the one hand, the result of a break in the time series of the data caused by the revision of the methodology for the statistical application of the National Classification of Economic Activities, which took place in 2007 and was applied from 1. January 2008, and, on the other hand, for the period until 2017, when there was a change in the legal regulations, i.e., a tax reform in which the statutory profit tax rate was reduced from 20 to 18, i.e., 12 percent[3]. (Hrvatski sabor, 2016). And even after that year, considerable and frequent modifications to this tax form continued. This significant change in the profit taxation system could distort the research results and lead to wrong conclusions. Indeed, Guenther (1994) shows that companies usually respond to changes in the law one year after the tax law takes effect. Also, Fernández-Rodríguez et al. (2019) do not take into account the period between the two tax reforms in their study. Due to the relatively short period after the reform and frequent tax changes, which can make the results uncertain, the last year considered is 2016. Since this is a 9-year period, the study in question can be considered longitudinal.

Figure 1 and Figure 2 show the number of companies in terms of size classes of companies from section J and in terms of divisions. It can be seen that the largest number consists of small companies, which have been previously suppressed in similar studies, and of companies from division J62.

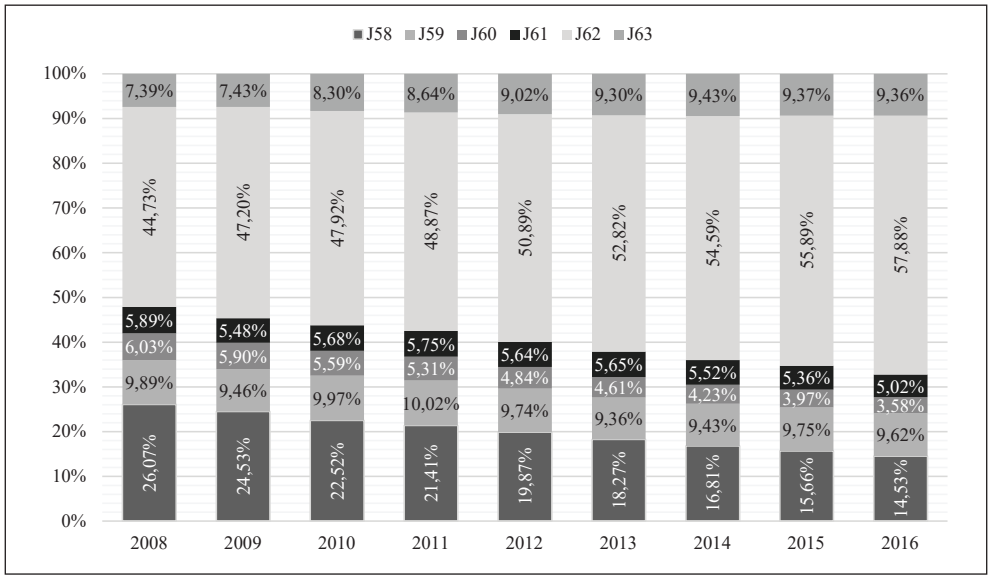
[3] For more information, see the Law on Amendments to the Law on Profit Tax (NN 115/2016). (Hrvatski sabor, 2016)

Figure 1: Number and distribution of companies in the section J Information and Communication based on the size criteria of the Accounting Act (NN 109/2007) for the period 2008 to 2016



Source: Authors' compilation

Figure 2: The structure of the number of companies in the section J Information and communication depending on the divisions of NACE Rev. 2 for the period from 2008 to 2016



Source: Authors' compilation

An unbalanced sample from the statistical set described earlier is used to conduct the study. Table 8 shows the steps of the sample design process. This shows that from the total number of companies in section J information and communication in the observed period from 2008 to 2016 (company-year: 42,797), the observations of companies whose denominator of the effective tax rate (ETR) was less than zero in a given year were excluded. Thus, the entire company is not excluded from the sample, but only the observation in a particular year in which the ETR was strictly negative. In the third step, the winsorization method is applied in the cases where the ETR value is greater than 100, then its value is set to 100. According to the researcher, this method is useful because if the ETR value is greater than 100%, it means that the income tax liability was higher than the tax base, which may be related to tax liabilities from past periods. Also, by using winzorization, less data is lost in the research, which should lead to more realistic results. In the fourth step, if both the numerator and denominator are equal to zero, the observation is not excluded from the study, but is set equal to zero. In the last step, observations of indicators are excluded if they are incomplete or invalid[4]. Based on the described procedure, the final study sample was formed.

Table 8: The process of creating a sample for conducting empirical research

Step	Description of the steps of the sampled formation process
1	Number of companies from the section J information and communication in the period 2008 - 2016 - companies: 42,797.
2	Exclusion of a single observation for companies for which the numerator and denominator of the ETR (dependent variable) were less than zero in a given year.
3	Using the winsorization method for ETRs larger than 100% and setting them to 100%.
4	If both the numerator and denominator of the ETR are zero, the ETR is zero, as are the indicators of the independent variables.
5	Exclusion of observations in a given year for a given indicator of a variable (dependent and independent variable) that is incomplete or invalid.

Source: Authors' compilation

Appendix

Table 12 in the Appendix shows, among others, the total number of year-observations included in the final sample for each variable used. For example, the number of year-

[4] For example, the profitability variable measured by the indicator of net profitability of assets (ratio between net profit/loss and total assets), the value of total assets may be zero, resulting in an invalid value of the indicator. Such observation was eliminated in a single year, but not the whole company. However, the bigger problem is that both the numerator and denominator of the ETR can be negative, which from a mathematical point of view gives a positive result (-/- = +). Such a value is incomplete, because relating a negative tax expense to a gross loss does not imply a tax liability and tax burden. Therefore, such values are excluded from the analysis.

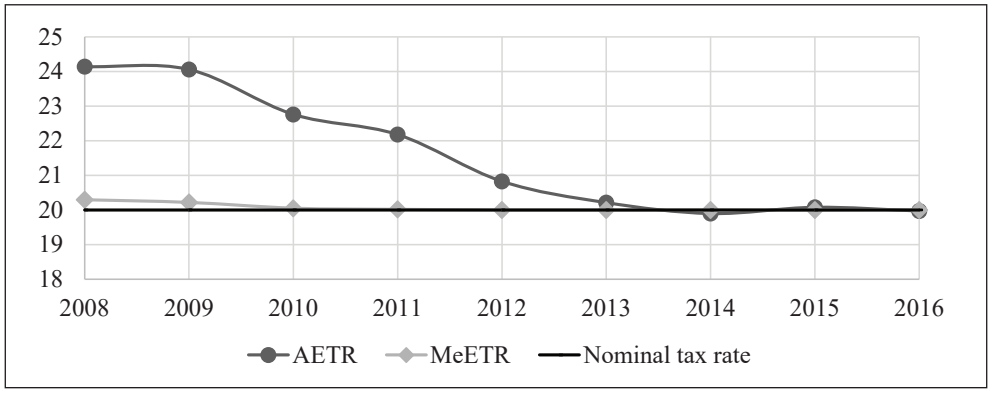
observations for the ETR variable is 27,735 and for the INVINT variable is 42,797, which is characteristic of an unbalanced sample.

5. Results and discussion

Appendix

Table 12 in the Appendix shows the results of descriptive statistics for all variables used in the research. Looking at the variable of primary interest, i.e., the variable of the effective tax burden, it can be seen from Figure 3 that the average ETR[5] (AETR, average effective tax rate) tends to decrease and converge to the statutory income tax rate over the observed period. The median effective tax rate (MeETR)[6] is close to the statutory corporate income tax rate over the observed period, also with a decreasing trend, which means that half of the companies effectively pay taxes at a rate equal to or below MeETR and the other half at a rate equal to or above MeETR.

Figure 3: Average and median effective tax rate



Source: Authors' compilation

As mentioned in the methodology, the dynamic panel regression method used to create an estimation model identifies the linear determinants of the effective tax burden for ICT companies in the Republic of Croatia. For this purpose, a total of 10 models were estimated: 1 model for the entire sample (section J), 6 models for sub-samples related to divisions (J58, J59, J60, J61, J62 and J63), and 3 sub-samples related to company size classes (small, medium, large). Variables that are

[5] Average ETR of sample companies by year.

[6] Median ETR of companies from the sample by year.

statistically significant at least at the 10% level are considered as determinants of the effective tax burden.

Table 4 shows the results of the assessment of the determinants of the effective tax burden for the entire sample of section J information and communication. From this, it can be seen that all the selected variables are identified as determinants of the effective tax burden at a 1% level of significance, except for the determinant of real GDP, which is statistically significant at a 5% level. Thus, the main objective of the research was achieved, i.e., the determinants of the effective tax burden of ICT companies in the Republic of Croatia are the effective tax burden from the previous period (ETR L1, lagged dependent variable), company size, debt, capital intensity and inventory intensity, profitability, labour intensity, and real GDP growth rate. The effective tax burden from the previous period is a determinant of the effective tax burden of the current period, implying that ETR L1 positively affects the effective tax burden of the current period. Other determinants also have a positive effect on the effective tax burden, with the exception of the determinant of profitability, the growth of which influences the reduction of the effective tax burden.

Table 5 and Table 6 show the results of the assessment of the determinants of the effective tax burden for the subsamples in terms of divisions and company size categories. Thus, the secondary research objectives were achieved, i.e., the determinants of the effective tax burden for the defined subsamples were identified. The variable of the effective tax burden from the previous period was identified as a determinant of ETR in all subsamples, except for division J63, with a statistically significant positive impact at the 1% and 5% levels, respectively. The variables of company size and profitability consistently show a statistically significant positive or negative impact on ETR, except for the subsample of large companies. Other determinants differ across the subsamples.

The results for the sub-sample of small companies and the sub-sample division J62 are consistent with the results for the entire sample of section J, both in terms of statistical significance and in the direction of influence on the variable of primary interest. These results are not surprising given that the company structure is dominated by small companies, as well as companies from division J62 (see Figure 1 and Figure 2).

The statistically significant positive impact of the lagged variable on the current-period effective tax rate in all models except sub-sample J63 is consistent with the research findings of Harris and Feeny (2003) and Moreno-Rojas et al. (2017), which indicate the presence of temporal adjustments between companies' long-term and short-term effective tax rates. Company size, measured by the logarithm of total income, is rarely considered in this type of research, but a statistically significant positive impact is consistent with the results of Rego`s (2003) research in all models, except the sub-sample of the large company category, thus confirming the so-called

political cost hypothesis (Omer et al., 1993)[7]. The variable of profitability of net assets was identified as a determinant in all models, except for the category of large companies, with a statistically significant negative impact on ETR. This is contrary to the research findings of Gupta and Newberry (1997), Janssen (2005) and Liu and Cao (2007), but consistent with the research findings of Vintilă et al. (2018), who found that higher profitability provides more financial resources that can be used to invest in activities to reduce the effective tax burden, i.e. companies direct their efforts and resources toward financial and tax planning. When statistically significant, the debt variable has a positive impact on ETR. Indeed, interest acts as a tax shield (Orsag, 2015; Dvorski et al., 2018), as it reduces taxable profit and thus tax expense. In the present case, however, interest appears to have a stronger effect on reducing the denominator of the effective tax indicator than on reducing the numerator, ultimately leading to higher effective tax rates and thus a positive impact of debt on ETR. Capital intensity is a determinant of the effective tax burden for the entire sample of section J information and communications companies, for divisions J62 and J63 and for small companies, with a positive impact. Harris and Feeny (2003) in their study used a dynamic panel regression and find a negative effect of this variable on ETR, however, the mentioned authors conducted the study on a sample of large and international companies. Based on the results of this study, the negative impact of capital intensity on the ETR of medium and large companies is visible, even though the result is not statistically significant. Inventory intensity was characterized as a determinant of ETR for the whole section J and sub-samples J58 and J62, as well as for small and medium companies, with a positive effect, consistent with the results of Fernández-Rodríguez and Martínez-Arias (2012), such that companies with smaller inventories are subject to a lower effective tax burden. Profitability is statistically significant with a negative impact in section J and in all sub-samples, except for large companies. This is consistent with part of the research findings of Vintilă et al. (2017), which they explain by saying that the overall profitability of a company is reflected in the level of taxation, i.e., they find that a company that is profitable from a financial perspective can lower the effective tax rate as part of that profitability. In other words, more profitable companies can expend more accounting effort to reduce the effective tax burden. The determinant of labour intensity in section J and divisions J59, J60, J62, and J63, as well as in small companies, has a positive statistically significant effect on ETR, which is in contrast to the results of Lazăr`s (2015) study. The impact of the business cycle, measured by the growth rate of real GDP, was confirmed to have a statistically significant impact throughout section J, divisions J60 and J62, and small companies, with a positive effect. Thus, in times of recession, the effective tax burden of companies decreases and vice versa.

[7] The political cost hypothesis is confirmed by the statistically significant positive effect of the size variable on the effective tax burden of companies, suggesting that large companies have a higher effective tax burden than small companies. For more information, see Zimmerman (1983) and Omer et al. (1993).

Table 9: Results of the assessment of the determinants of the effective tax burden for the entire sample of section J information and comunication

System dynamic panel-data estimation			Number of obs		=	19,153
Group variable:	id		Number of groups		=	5,099
Time variable:	YEAR					
			Obs per group:			
			min		=	1
			avg		=	3.756227
			max		=	8
Number of instruments =	42		Wald chi2(8)		=	2,019.33
			Prob > chi2		=	0
One-step results						
ETR	Coef.		Std. Err.	z	P>z	[95% Conf. Interval]
ETR L1.	0.3158692	***	0.0156315	20.21	0.000	0.285232 0.3465065
SIZE	0.8808658	***	0.1444494	6.1	0.000	0.5977502 1.163981
LEV	0.1101455	***	0.0407168	2.71	0.007	0.0303421 0.1899489
CAPTINT	0.1632791	***	0.028959	5.64	0.000	0.1065204 0.2200377
INVINT	0.07513	***	0.023112	3.25	0.001	0.0298313 0.1204288
PROF	-0.041246	***	0.0040973	-10.07	0.000	-0.0492769 -0.033216
LABINT	0.1346359	***	0.0165303	8.14	0.000	0.102237 0.1670348
RGDP	0.1003855	**	0.0489268	2.05	0.040	0.0044907 0.1962803
Instruments for differenced equation						
GMM-type:	L(2/.).ETR					
Standard:	D.SIZE	D.LEV	D.CAPTINT	D.INVINT	D.PROF	D.LABINT D.RBDP
Instruments for level equation						
GMM-type:	LD.ETR					

Note: * p<.1; ** p<.05; *** p<.01 indicate statistical significance levels

Source: Authors' compilation

Table 10: The results of the assessment of the determinants of the effective tax burden for sub-samples with regard to the divisions of section J

Variable	ETR J58	ETR J59	ETR J60	ETR J61	ETR J62	ETR J63
ETR L1.	0.2712551***	0.2580999***	0.2557507***	0.1413119**	0.3387003***	0.0139366
SIZE	1.758333***	1.494912***	1.213157**	2.381632***	0.7101119***	2.937769***
LEV	0.0351913	0.3002226*	0.2851077	0.2616457	0.133139**	0.1430638
CAPTINT	0.1136282	0.0560081	0.381172	0.0742184	0.2001246***	0.258438***
INVINT	0.0982241**	0.0157239	-0.2900275	0.131776	0.1173219***	-0.0771362
PROF	-0.0617497***	-0.4030498***	-0.3690136***	-0.3350358***	-0.0281785***	-0.1921136***
LABINT	0.0658933	0.1248946*	0.238343*	-0.0206324	0.1184744***	0.2052197***
RGDP	-0.0529816	-0.2007853	0.4712753*	0.1754894	0.1871825***	-0.2125692

Note: * p<.1; ** p<.05; *** p<.01 indicate statistical significance levels

Source: Authors' compilation

Table 11: The results of the assessment of the determinants of the effective tax burden for sub-samples with regard to the size of the company

Variable	ETR Small	ETR Medium	ETR Large
ETR L1.	0.3170775***	0.2181564***	0.2942729**
SIZE	0.863861***	1.219998***	0.0202994
LEV	0.1051857**	1.671668***	1.51205
CAPTINT	0.1624205***	-0.0036912	-0.1892655
INVINT	0.0742562***	0.3399432**	1.467683
PROF	-0.041078***	-0.6916378***	0.2069198
LABINT	0.1348565***	-0.0948688	0.5097166
RGDP	0.1102228**	-0.2006293	-0.6385828

Note: * p<.1; ** p<.05; *** p<.01 indicate statistical significance levels

Source: Authors' compilation

As the preceding review of the literature shows, research on the determinants of the effective tax burden in the world is not new. However, they are mainly focused on large listed companies. In contrast, the present study includes companies of all sizes in the investigation, which contributes to a significant reduction of this gap. In this context, the present study points out the existence of differences among determinants in terms of company size categories, which are not considered at all in previous research. With the exception of a few studies (Omer et al. (1993), Moreno-Rojas et al. (2017), and Bubanić and Šimović (2021)), the previous studies do not focus on complete activities. However, the presence of significant heterogeneity across companies due to different activities, whether observed or not, can significantly affect the results. By including companies from one industry, the sample becomes more homogeneous and the results focusing on a specific industry are more reliable. In addition, to control for unobserved heterogeneity, we used a dynamic panel model with the Arellano-Bover/Blundell-Bond estimator, which is not the case in most previous studies.

The research findings suggest that there are systematic explanations for the differences in the effective tax burden of companies and that they can be associated with the type of the company's activities, asset structure, debt, and other identified determinants. The above suggests that company management should manage these determinants with the goal of reducing the effective tax burden. If it is in the interest of tax policymakers to encourage entrepreneurs to engage in the observed activity, it is suggested that the identified determinants should be taken into account and policies designed to address them and reduce the tax burden.

6. Conclusion

The main research objective was achieved through the conducted research, therefore, the identified determinants of the effective tax burden of ICT companies in Croatia are effective tax burden from the previous period, company size, capital and labour intensity, profitability, inventory intensity, debt, and the business cycle. Accordingly, the first research hypothesis, H1, is supported. The secondary research objectives were also achieved. The first research objective shows the existence of differences between the determinants of ETR depending on the size class of the company. While the determinants of the effective tax burden for small companies are the same as those previously highlighted for all ICT companies, capital and labour intensity, and the business cycle were not identified as determinants in the medium-sized category. In the large company category, only the effective tax burden of the previous period is a determinant of ETR. The second research hypothesis is confirmed by the aforementioned. The second research objective indicates the existence of differences between the determinants of effective tax burden depending on the division of section J. While in division J62 all variables examined are

statistically significant, the statistically significant determinants differ in the other divisions, except for the determinants of company size and profitability, which are statistically significant in all divisions. This proves the third research hypothesis. Therefore, depending on the size and division in which the company operates, management should control the variables that have a statistically significant impact on the effective tax burden so that it can be reduced.

Without diminishing the scientific contribution of the study, certain limitations must nevertheless be taken into account. First, the limitation relates to the time horizon in which the last year studied was 2016, and therefore the results cannot be generalized to future periods. In addition, the results cannot be generalized to other activities. The results of the study for section J are consistent with the results for division J62 and for small companies, which is due to the fact that companies from the aforementioned categories of the sub-sample make up the largest share of all companies in section J. The peculiarity of the studied activity section J is that it contains a small number of large companies, so the estimates for the mentioned category are less reliable. For future scientific research, it is suggested to extend the research horizon to the period after 2017 and compare the results with this one in order to identify the differences between the determinants of the effective tax burden before and after 2017, when the nominal corporate income tax rate has decreased. Since the nominal tax rate is lower, the effective tax burden is expected to decrease. However, it is difficult to forecast changes in ETR determinants. It is also desirable to extend the study to other activity sections in order to compare the results with the existing ones and analyse the possible differences between the determinants depending on the sector of the economy.

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Appendix

Table 12: Descriptive statistics of the used variables

Year		ETR	SIZE	LEV	CAPTINT	INVINT	PROF	LABINT	RGDP
2008	N	2,559	3,576	3,682	3,663	3,682	3,682	3,662	3,682
	Mean	24.14	12.37	8.44	1,772.84	7.75	0.84	1,945.10	1.90
	Max	100.00	22.63	100.00	2,048,300.00	100.00	628.88	1,849,740	1.90
	Min	0.00	0.00	0.00	0.00	0.00	-1,263.51	0.00	1.90
	Median	20.29	12.93	0.00	2.34	0.00	2.39	15.19	1.90
	SD	19.23	3.33	19.71	43,400.31	16.91	54.21	45,846.90	0.00
2009	N	2,624	3,926	4,036	4,009	4,036	4,036	4,019	4,036
	Mean	24.06	12.21	7.72	275.75	7.68	-2.71	1,591.94	-7.30
	Max	100.00	22.42	100.00	268,461.50	100.00	1,274.96	1,722,275	-7.30
	Min	0.00	0.00	0.00	0.00	0.00	-3,960.00	0.00	-7.30
	Median	20.22	12.78	0.00	2.32	0.00	1.47	16.41	-7.30
	SD	19.99	3.35	18.89	5,461.85	17.02	104.65	40,771.13	0.00
2010	N	2,736	4,139	4,311	4,282	4,311	4,311	4,286	4,311
	Mean	22.76	12.08	54.54	731.95	8.27	-3,109.84	3,066.47	-1.30
	Max	100.00	22.84	181,600	1,066,750.00	98.50	4,257.04	4,588,980	-1.30
	Min	0.00	0.00	0.00	0.00	0.00	-9,406,300	0.00	-1.30
	Median	20.05	12.62	0.00	1.96	0.00	1.26	15.69	-1.30
	SD	19.52	3.31	2,766.26	18,822.63	17.98	147,734.60	82,809.54	0.00

Source: author's calculations

Table 13: Descriptive statistics of the used variables (continued)

Year		ETR	SIZE	LEV	CAPTINT	INVINT	PROF	LABINT	RGDP
2011	N	2,883	4,316	4,502	4,460	4,502	4,501	4,476	4,502
	Mean	22.18	12.02	154,620.90	655.46	8.22	-201,119.10	3,608.62	-0.10
	Max	100.00	22.78	696,000,000	637,660.00	100.00	5,742,000	4,725,500	-0.10
	Min	0.00	0.00	0.00	0.00	0.00	-892,000,000	0.00	-0.10
	Median	20.02	12.58	0.00	1.80	0.00	1.41	15.88	-0.10
	SD	19.57	3.34	10,400,000	14,069.64	18.34	13,300,000	98,316.85	0.00
2012	N	2,993	4,408	4,610	4,572	4,610	4,609	4,588	4,610
	Mean	20.83	12.06	6,576.51	715.01	8.35	-3,613.68	3,718.24	-2.30
	Max	100.00	22.70	30,000,000	1,259,000.00	99.94	8,895.68	2,732,600	-2.30
	Min	0.00	0.00	0.00	0.00	0.00	-7967800	0.00	-2.30
	Median	20.00	12.56	0.00	1.60	0.00	1.67	16.24	-2.30
	SD	19.00	3.21	441,852.20	20,588.73	18.80	142,141.70	80,709.75	0.00
2013	N	3,351	4,762	4,970	4,939	4,970	4,968	4,948	4,970
	Mean	20.21	12.00	6,072.56	1,243.53	7.76	-7,822.91	4,667.39	-0.40
	Max	100.00	22.61	30,000,000	1,338,700.00	99.98	213,614.30	7,115,800	-0.40
	Min	0.00	0.00	0.00	0.00	0.00	-13,400,000.00	0.00	-0.40
	Median	20.00	12.50	0.00	1.03	0.00	2.48	16.13	-0.40
	SD	18.16	3.24	425,543.40	28,771.16	18.36	268,512.50	132,358	0.00

Source: author's calculations

Table 14: Descriptive statistics of the used variables (continued)

Year		ETR	SIZE	LEV	CAPTINT	INVINT	PROF	LABINT	RGDP
2014	N	3,569	5,071	5,293	5,263	5,294	5,293	5,269	5,294
	Mean	19.90	11.99	406.38	2,553.35	7.52	-29,168.05	2,822.38	-0.30
	Max	100.00	22.55	2,011,300	8,588,700.00	100.00	218,300	4,222,300	-0.30
	Min	0.00	0.00	0.00	0.00	0.00	-118,000,000	0.00	-0.30
	Median	20.00	12.49	0.00	0.91	0.00	2.77	16.72	-0.30
	SD	16.85	3.26	27,650.52	121,035.30	18.25	1,645,761	80,091.43	0.00
2015	N	3,876	5,330	5,560	5,529	5,561	5,558	5,522	5,561
	Mean	20.08	12.02	115,343.10	1,150.28	7.25	-214,211.10	3,491.00	2.50
	Max	100.00	22.52	638,000,000	1,941,000.00	100.00	276,900	4,260,800	2.50
	Min	0.00	0.00	0.00	0.00	0.00	-1,030,000,000	0.00	2.50
	Median	20.00	12.56	0.00	0.82	0.00	3.53	16.98	2.50
	SD	16.40	3.27	8,559,102	31,656.72	17.99	13,800,000	79,769.86	0.00
2016	N	4,144	5,528	5,831	5,793	5,831	5,831	5,774	5,831
	Mean	19.97	12.20	5,720.48	973.92	6.71	-7,653.22	3,810.38	3.50
	Max	100.00	22.54	30,000,000	3,081,800.00	100.00	16,800,000	4,500,500	3.50
	Min	0.00	0.00	0.00	0.00	0.00	-21,300,000	0.00	3.50
	Median	20.00	12.64	0.00	0.82	0.00	4.04	17.45	3.50
	SD	15.37	3.12	394,275.30	42,126.71	17.37	423,502.50	110,224.20	0.00
Total	N	28,735	41,056	42,795	42,510	42,797	42,789	42,544	42,797
	Mean	21.33	12.10	33,501.90	1,141.09	7.67	-55,242.44	3,270.01	-0.20
	Max	100.00	22.84	696,000,000	8,588,700.00	100.00	16,800,000	7,115,800	3.50
	Min	0.00	0.00	0.00	0.00	0.00	-1,030,000,000	0.00	-7.30
	Median	20.01	12.62	0.00	1.35	0.00	2.32	16.35	-0.30
	SD	18.12	3.26	4,571,653	50,489.67	17.93	6,611,014	89,745.65	2.92

Source: author's calculations

Linearne odrednice efektivnog poreznog opterećenja ICT poduzeća Republike Hrvatske

Marijana Bubanić[1]

Sažetak

Stvarno porezno opterećenje poduzeća često se razlikuje od onog propisanog zakonom, ali razlike postoje i među samim poduzećima. Postavlja se pitanje postoje li sustavna objašnjenja za te razlike i mogu li se one povezati s vrstom djelatnosti, strukturom imovine, dugom i drugim odrednicama. Stoga je glavni cilj istraživanja utvrditi odrednice efektivnog poreznog opterećenja ICT poduzeća u Republici Hrvatskoj. Vremenski horizont uključuje poduzeća iz područja J Informacije i komunikacije (NKD 2007), u razdoblju od 2008. do 2016. Korištenjem nebalansiranog uzorka i dinamičke panel regresije s Arellano-Bover/ Blundell-Bond procjeniteljem, identificirane su odrednice efektivnog poreznog opterećenja, i to: efektivno porezno opterećenje iz prethodnog razdoblja, veličina poduzeća, dug, kapitalni i radni intenzitet, intenzitet zaliha, profitabilnost i poslovni ciklus. Međutim, odrednice se razlikuju s obzirom na veličinu poduzeća i odjeljak djelatnosti. U odnosu na prethodna istraživanja, predmetno je usmjereno na poduzeća svih veličina, a ne samo na velika poduzeća, te uključuje ne samo listana poduzeća, već sva poduzeća iz analizirane djelatnosti, što doprinosi homogenosti uzorka i pouzdanosti rezultata.

Ključne riječi: *efektivno porezno opterećenje, ICT djelatnost, dinamička panel regresija*

JEL klasifikacija: *H2*

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Original scientific paper
UDC: 314.15-026.48(497.5)
https://doi.org/10.18045/zbefri.2023.2.427

The determinants of regional migration in Croatia*

Ana Grdović Gnip[1]

Abstract

Migration has had a great impact on Croatia, especially after it joined the EU. Thus, several studies have focused on international migration compared to regional migration which is under investigation. This study sheds some light on the determinants of internal migration at the NUTS3 level in Croatia in the 2000-2019 period relying on a fixed effects panel estimation. The results show that regional migration in Croatia is in line with the stylized facts on migration. The living standard and (labour) productivity measures, along with employment and wages are the main economic drivers of migration inflows and outflows. However, regions with substantial tourism activity attract inflows and disincentivize outflows of people, while regions with a high share of agriculture, forestry, and fisheries in the value-added decrease internal migration inflows. Moreover, environmental protection results also being a significant determinant of regional migration.

Keywords: *internal migration, regional migration, labour productivity, Croatia*

JEL classification: *R23, J24, C23*

1. Introduction

The movement of population is essential for any economy. On an individual level, it allows people to achieve higher productivity, better wages, and living standards, as well as to meet their aspirations. On a societal level, migration enhances labour markets. If this is considered on an inside-the-borders level, then migration also helps adjust local markets asymmetries (Blanchard et al., 1992).

In the literature, there are two facets of migration. On the one hand, migration is examined at an international level (migration flows outside the country borders), while on the other hand, at an internal level (migration flows inside the country

* Received: 22-10-2023; accepted: 28-12-2023

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borders). The first has been more studied than the second, but only prevailing in the Croatian case. The voluminous (international) migration literature arose after WWII when wage and living standard differentials among countries became more prominent. Empirical works focussed on different migration patterns and outcomes, ranging from labour market outcomes (Card, 2001), innovation (Stephan and Levin, 2001), public finances (Coppel et al., 2000), and the housing market (Saiz, 2007). The literature that discusses internal (regional) migration is much less extensive and often country-specific. It is so because significant internal migration patterns are evident only in countries that face distinctive regional disparities in employment opportunities and/or living standards (Bonifazi, 2015), and in countries that are affected by civil unrest and/or conflicts (Lichtenheld and Schon, 2021), and in countries that exhibit environmental degradation and/or natural disasters (Gao at al., 2023).

This paper aims to address internal migration in the Croatian case and to respond to the following research question: which factors can explain the movement of people across Croatian regions? Croatia exhibited substantial (e)migration flows in the last decade, particularly after joining the European Union (EU). Thus, the relatively scarce empirical literature details the effects of such (international) migration levels (Župarić-Ilijć, 2016; Draženović et al., 2018). However, the empirical literature on regional migration in Croatia is almost non-existent. Therefore, this paper aims to shed some light on the determinants of regional migration inflows and outflows while questioning the effect of different economic, societal, and environmental factors. The empirics based on NUTS3 level classification covers 20 regions plus the City of Zagreb within the 2000-2019 period. The applied econometric (macro) approach involves a panel data estimation based on the fixed effects, which the Hausman test proved to be more consistent than the random effects.

The main results show that regional migration patterns in Croatia are aligned with the stylized facts about migration. Economic factors, such as GDP per capita, employment, or wages, significantly determine the inflow and outflow of regional migration. It is also true for the tourist activity proxied with the number of tourist nights per region. Namely, regions with significant tourist activity show higher regional migration inflow and lower migration outflow. It is in line with expectations, especially if one considers the fact that such regions register significantly higher levels of seasonal employment and that a high share of domestic residents is one reason to perform a tourism-related activity during the summer. Moreover, the environmental factor proxied with the regional investment in environmental protection significantly determines regional migration, as well as the social factor captured by the share of elderly (65+) in the total population.

The organization of the paper is as follows. The next Section reviews the literature on migration with an emphasis on internal (regional) migration. Section 3 describes the data and outlines the methodology. Section 4 presents the results, while Section 5 gives concluding remarks and discusses the possible directions for further research.

2. Literature review

The economic literature on migration became prominent after WWII when large migration flows affected economic outcomes in countries across the globe[2]. Most of the migration arose due to labour reasons and wage differentials between countries, regions and/or areas. Basically, any individual maximizes utility subject to a budget constraint and accommodates to labour market conditions. Thus, to optimize his/her utility, an individual tends to migrate where the wage differential is larger[3] and living standards are higher, but the overall effect of immigration will depend, among others, upon country- and/or region-specific labour market dynamics, competition or skill and education structure.

Thus, the economic effects of immigration are examined in a multifaceted way. Some studies focus on labour market outcomes of immigration (Card, 2001 and 2007; Borjas, 2006; Peri and Sparber, 2009), while others point its effects on innovation (Stephan and Levin, 2001; Gauthier-Loiselle and Hunt, 2008), public finances (Coppel et al., 2000; Roodenburg et al., 2003) or housing market (Saiz, 2007; Gonzalez and Ortega, 2009) of the hosting country.

Narrowing on the labour market outcomes, the immigration effect highly depends on the composition of skills of immigrants. In case of complementary skills, immigration can lead to increased productivity by filling the gaps of the native workforce. Borjas' (2003) seminal paper on the effect of immigration on wages, concludes that the inflow of low-skilled immigrant workers lowers the wages of the native workers, leading to an overall decrease in labour productivity. D'Amuri et al. (2010) find that the wage and employment displacement effects from 1990s immigration to Germany were concentrated among the immigrants themselves, with little impact for natives. While considering a detailed skill composition of the immigrant population, Peri (2012) suggests that an increase in the share of immigrants in the labour force has a positive effect on labour productivity and does not crowd out employment. That is especially true for industries that require complex tasks and higher levels of education. The study of Ottaviano and Peri (2012) goes even more further by considering different schooling levels as well as experience levels and reinforces the conclusion how immigration positively impacts labour productivity.

[2] Refer to Kerr and Kerr (2011) for an extensive literature review on economic consequences of migration.

[3] It is worth mentioning that the search and/or improvement of economic conditions is not the only reason for migration. Other reasons include to join family, to escape from conflicts, persecutions, or human rights violations, as well as to move in response of the adverse effects of climate change, natural disasters, or other environmental problems (IOM, 2021). Moreover, corruption (Poprawe, 2015) and mistrust in institutions (Voicu and Tufiş, 2017) also significantly affect migration flows.

The literature that discusses internal (regional) migration is not extensive and often focussed on country-specific cases. This is so because significant internal migration patterns are evident only in countries that face large regional disparities in employment opportunities and/or living standards (Bonifazi, 2015), in countries that are affected by civil unrest and/or conflicts (Lichtenheld and Schon, 2021), and in countries that exhibit environmental degradation and/or natural disasters (Gao at al., 2023). Moreover, international migrants are unlikely to fill in the high skilled labour force gaps that regions face (Coombes, 2010). Smith et al. (2010) show that London benefits from a *brain drain* from other regions in England due to the risk of becoming trapped in low skill equilibrium. Namely, skilled locals migrate to other regions with better opportunities because at the local level there are just a few jobs that require high skills.

Basile and Causi (2005) indicate that the unemployment rate, regional GDP and wages as well population age structure are the main determinants of internal migration in Italy in the 1996-2000 period. Similarly, Bonifazi (2013) pinpoints that internal migration in Italy in the 1960s is largely driven by the economic and demographic growth of urban areas in the North and the impairment of the rural areas in the Central and Southern part. However, just a year later Bonifazi et al (2014, 2015) emphasize that the foreign population increment affects internal mobility in Italy at most, while almost a decade later Bonifazi et al (2021) add that the specific feature of delayed youth transitions from home observed in the 2020s augment even more internal migration flows in Italy.

Windzio (2004) emphasizes that workplace-related interregional migration in Germany became of major relevance since the early 1970s exhibiting a North to South shift, while Windzio (2007) adds evidence of a massive East to West shift after Germany's reunification. According to Farwick (2009), population losses in East Germany coupled with urbanisation cause a considerable shrinking of central cities (Eichstädt-Bohlig et al., 2006). Moreover, substantial migration of highly skilled labour from less to more developed regions decreases human capital levels necessary for further development of the less developed regions (Friedrich and Schultz, 2008).

Worth mentioning are also the works that deepen the internal migration analysis by investigating migration flows between urban and rural areas (rather than between administrative regions or geographical areas). Bocquier and Costa (2015) show that, besides the better survival prospects in urban areas, it is mainly changes in economic production that increase net migration to urban areas, through land pressure, productivity increase, institutional changes, and other factors. These authors conclude that in Sweden and Belgium migration explain most of the urbanisation in the long term, and the same is true for the Netherlands according to Baudin and Shelter (2016) as well as for France, Italy and Germany according to Bocquier and Brée (2018).

The empirical evidence of internal migration in Croatia is relatively scarce, especially if one considers the economic implication of population movement across regions. On the one hand, Stojčić et al. (2015) use spatial methods to explore the impact of internal migration on innovation activities in Croatia in the 2005-2013 period. They find the presence of a negative intraregional and positive interregional impact of inter-county and international migration patterns on regional innovation activity. On the other hand, Pitoski et al. (2021) implement a network analysis to examine internal migration in Croatia and conclude that internal migration significantly affected urbanization as well as the systematic abandonment of large cities in the East of Croatia. These two works are rare examples of studies that tackle internal migration in Croatia. Other works mainly focus on the emigration of Croats and demographic losses, particularly in the period after Croatia joined the EU. Župarić-Ilijć (2016) pinpoints that Croatian net migration balances significantly worsened after the accession to the EU, while Vidovic and Mara (2015) show that emigration patterns after joining the EU intensified significantly, due to higher economic development and better quality of life in other EU member states. Draženović et al. (2018) reinforce the same conclusions. Moreover, they pinpoint, on the one hand, that access to the single EU market was the main economic driver of emigration flows in Croatia since 2013, while on the other hand, demographic factors and the prevalence of corruption arise as the main non-economic factors of emigration of Croats.

3. Data and methodology

The empirical part of this study relies on macro-level aggregated data collected in a longitudinal fashion across 21 Croatian regions during the 2000-2019 period. The year 2019 is selected as the ending year for two main reasons: First, to avoid the bias that would be implicitly induced by including the COVID-19 period when the movement of people was restricted if not prohibited; second, detailed national account statistics on a regional level are not available for recent years, so the utmost extension (no matter the COVID-19 exogenous shock) could go until 2020. Additionally, it is worth mentioning that, due to data availability, some alternative models are based on a shorter period to keep the panel data balanced. These short periods may be either 2004-2019 or 2008-2019. All the data are collected from the Croatian Bureau of Statistics (CBS).

The 21 regions (or 20 regions and the City of Zagreb in particular) correspond to the NUTS (The Nomenclature of Territorial Units for Statistics) level 3, which, compared to the NUTS level 2 did not suffer any changes in the observed period. Moreover, a larger number of modelled entities allows for more variability and heterogeneity and thus leads to more unbiased and consistent results.

The dataset is constructed to align with the theoretical and empirical literature, and consists of the following (set of) variables:

- Internal migration: this is the main dependent variable, and it is defined as the inflow of internal migration, the outflow of internal migration, and the net internal migration level.
- Economic variables: this set of variables captures the factors that can be classified as economic reasons to migrate. In particular, these are the economic variables:
  a) GDP per capita as a measure of living standards across regions;
  b) wages to capture eventual wage differentials with a distinction between gross and net wages;
  c) labour productivity measures, that are calculated using national account data; in particular productivity measured as GDP per person employed, and gross value added per person employed;
  d) labour market data: employment and unemployment in persons (registered administrative data);
  e) structural economic activity-related data: total sale value of products, value of completed construction works, number of tourist nights, share of gross value added in ICT, financial activity and agriculture, forestry, and fishing. All economic variables in levels are denominated in euros and refer to real terms, obtained by using the consumer price index with the base year set to 2015;
- Social variables: these sets of variables are meant for some living conditions across Croatian regions. In particular, these refer to:
  a) population data: such as the natural rate of population change, population levels, net migration levels (which differs from the net internal migration as it includes (international) immigration and emigration in Croatian regions),
  b) number of graduated students which accounts for eventual schooling migration,
  c) population aging: the share of people aged 65+ in the total population;
- Environmental factors: the environment can be considered as a push as well as a pull factor. In the case of a push factor, the environmental variables refer to the negative consequences of environmental degradation and/or climate change, while in the case of pull factors they refer to the attractiveness of the environment. I use two measures to proxy for the latter.
  a) A dummy variable that corresponds to one in case a particular region has a national or natural park on its territory. Worth mentioning that in Croatia

there are 8 national parks and 12 natural parks, which are geographically located across 12 regions.

b) The amount of total realised investments in assets, methods, practices, technologies, processes, and equipment for environmental protection. This variable captures the attitude of a particular region toward environmental protection.

Figure 1 shows the underlying heterogeneity of the dependent variable, and the net internal migration flow in particular[4]. First, it is worth mentioning that on a regional level in the observed 2000-2019 period, the net internal migration rate was on average negative (-125 persons annually). Second, it is possible to observe that the largest stream of net internal migration is exhibited for the City of Zagreb. Third, the regions that exhibit a positive internal migration in all of the observed years are only four (County of Istria, County of Primorje-Gorski Kotar, County of Zadar and County of Zagreb), compared to the seven regions that in all observed periods register a negative net internal migration, i.e. population loss (County of Bjelovar-Bilogora, County of Slavonski Brod-Posavina, County of Osijek-Baranja, County of Požega-Slavonia, County of Sisak-Moslavina, County of Virovitica-Podravina and County of Vukovar-Sirmium). The lower panel of Figure 1, which groups the dataset across years, shows that net internal migration flows follow the business cycle pattern, i.e. the flow is more positive and larger in case of expansion periods and tends to shrink and incline to the negative values in periods of recession. It is possible to observe that in the 2009-2013 period, which corresponds to the economic crisis and recession, the net internal migration varies less.

[4] Refer to Appendix 1 for the same Figures related to the internal migration inflow data and the internal migration outflow data.

Figure 1: Heterogeneity of the net internal migration flow in Croatia across regions (upper panel) and across time (lower panel)

Source: Author's calculation

The empirical methodology is based on a panel data regression involving a balanced panel over the 2000-2019 period in the baseline specification and over a shorter span in alternative specifications. As aforementioned, a panel estimation over 20 regions and the City of Zagreb allows for more variability by making the estimates more efficient and for more control over unobserved components. A similar econometric approach, applied by Alvarez et al. (2020), assessed the internal migration trends across OECD countries. Worth mentioning is that some of the works that inspect internal (regional) migration employ an embed gravity model approach within the panel estimation to allow for the accountability of distance between entities (Etzo, 2011). However, in all of such models, internal migration refers to cities and municipalities rather than regions, for which one can precisely measure the distance between entities (i.e., municipalities, cities). Given that this work relies on regional data, such an approach wouldn't be efficient.

The panel data on internal migration, as obvious, include two dimensions, the temporal measure and the geographical measure, which can better explain the individual heterogeneity and better deal with the omitted variables (Wooldridge, 2002). It is known that migrants are heterogenous, and many variables may affect the choice of migration. Among the panel estimation techniques, the fixed and random effect models are those mostly applied. The fixed effect estimator allows for the unobserved effects to be correlated with the regressors, which is not the case of the random effect estimator, as the same correlations brings inconsistency. Thus, all the performed models are estimated using both, the fixed and the random effects, and then tested using the Hausman test (Hausman, 1978). The latter inspects the consistency of the random effect model, i.e. the extension of the correlation between the unobserved effects and the covariates. For all performed models, the Hausman test has rejected the random effect estimator in favour of the fixed effects estimator, and thus the results presented in Section 4, correspond to the estimates obtained under the fixed effect or *within* panel variant.

The applied panel model is of a simple form as follows:

$$IM_{it} = \alpha_i + X_{it}\beta + \varepsilon_{it} \tag{1}$$

where IM_{it} is the internal migration variable (net, inflow, outflow) of region i in time t and X_{it} a set of independent variables for region i in time t, which include economic, social and environmental determinants of migration decisions, as previously explained. Moreover, given that the economic factors for migration also include some macroeconomic time series (like GDP, productivity, wages, and similar) there is a possible threat of serial correlation that leads to the underestimation of the standard errors (and biased inference consequently). The Breusch-Godfrey test for serial correlation in panel models indicates the expected serial correlation among the macroeconomic variables, so the presented estimation

results do not rely heteroskedasticity robust standard errors, but on clustered standard errors. Additionally, in some cases the log-log equation setup is used (between migration flows and economic factors) for an easier interpretability of the estimates.

4. Results

The starting models include among the dependent variables the minimum main factors and controls that according to the theory and/or previous empirical works stem as important and significant. This means that equation explaining the regional migration (*RM*) inflows and outflows includes GDP per capita in real terms (*GDPpc*), population levels (*Pop*) and employment levels (*Empl*). Moreover, the model adds the net (international) emigration and immigration flows (*InternMigr_net*) to control for population attitude toward migration. For an easier interpretation, both the dependent and independent variables (except the net (international) migration variable which is in many of the observed datapoints negative) are transformed in logarithms and thus the coefficients indicate elasticities. Table 1 shows the results of these estimations.

Table 1: Panel (fixed effects) estimation results of the baseline models

	Dependent variable	
	$\log(RM_{it}^{inflow})$	$\log(RM_{it}^{outflow})$
$\log(GDPpc_{it})$	0.216* (0.1051)	0.252** (0.0923)
$\log(POP_{it})$	0.618*** (0.1738)	0.313* (0.1498)
$\log(Empl_{it})$	-0.428** (0.1546)	-0.650*** (0.1332)
$InternMigr\_net_{it}$	0.0005*** (0.000008)	0.0003*** (0.000007)
Adj. R^2	0.1532	0.1237
Num. obs.	399	399

Notes: Clustered standard errors in parenthesis; * – significant at the 10% level, ** – significant at the 5% level, *** – significant at the 1% level.

Source: Author's calculation

It is possible to observe that the main theoretical factors are confirmed also in the Croatian case and that the estimates have the expected sign. A 1% increase in the regional GDP per capita increases the migration inflow from other regions by 0.2% and the migration outflow to other regions by 0.3%. Similarly, if employment in a region increases by 1%, then the migration inflow from other regions decreases by 0.4%, while the migration outflow by 0.7%. Worth mentioning is that the GDP per capita, as well as employment (or unemployment), are considered both pull and push factors of migration. The size of both (GDP per capita and employment) effects is larger (and more significant) in the case of outflows than inflows, leading to an overall conclusion about a negative net effect of internal migration. However, to deal with a precise and proper magnitude of the effect, one would need a detailed dataset on regional migration that diversifies the inflows according to regions of origin and outflows according to regions of destination. In that case, the magnitude of the effect of productivity or employment increases would be proper. Thus, in this work, the focus is on the sign and significance of the factors.

Table 2 shows different alternative models' estimation results, that encompass the inclusion and/or replacement of different factors discussed in the previous Section. First, the estimates remain robust if the GDP per capita is replaced by labour productivity (model (1)), which remains consistent also in other specifications (model (4)). Moreover, if the demographic factor is proxied with the ratio of people aged 65+ in the total population, results remain consistent, and the estimate shows that a larger share of the elderly decreases the migration inflows (model (6)). Second and in line with the theoretical foundations, wages are a significant determinant of regional migration inflows. An increase in wages attracts migrants. Third, if the structure of regional economic activity is considered then it is possible to observe the following: On the one hand, tourism significantly affects (and attracts) the inflow of people from other regions, while the value of sales and construction are not statistically significant (model (3)). On the other hand, if the gross value added in agriculture, forestry, and fishery (*GVA_aff*) as well as ICT and financial sectors (*GVA_ict* and *GVA_fin*, respectively) are considered, then all three results being statistically significant with a difference that the ICT and financial sectors lead to an increase in migration inflows, while the primary sector decreases the same inflows and results as an unattractive determinant (model (4)). Fourth, the environmental factor proxied with the investment in environmental protection (*Eco_inv*) is significant and positively affects the migration inflows (model (5)).

Table 2: Panel (fixed effects) estimation results of the alternative models, for the regional migration inflows

Dependent variable: $\log(RM_{it}^{inflow})$						
	(1)	(2)	(3)	(4)	(5)	(6)
$\log(GDPpc_{it})$		0.219* (0.1053)	0.189* (0.1120)		0.283* (0.1513)	0.233* (0.1347)
$\log(POP_{it})$	0.505** (0.1544)		0.764** (0.2556)	0.662* (0.4071)	0.470* (0.2640)	
$\log(Empl_{it})$	-0.574*** (0.1184)		-0.541* (0.2369)	-0.662* (0.3816)	-0.337* (0.1774)	-0.521* (0.2927)
$InternMigr\_net_{it}$	0.00006*** (0.0000)	0.00006*** (0.0000)	0.00006*** (0.0000)	0.00003** (0.0000)	0.00003** (0.0000)	0.00003** (0.0000)
$\log(LProductivity)_{it}$	0.502*** (0.1028)			0.606*** (0.1338)		
$\log(Wages\_gross)_{it}$		0.603** (0.2260)				
$Pop\_natchange_{it}$		0.0001** (0.00003)				
$\log(Sales)_{it}$			-0.023 (0.0410)			
$\log(Constr)_{it}$			-0.421 (0.0329)			
$\log(Tourist\_night)_{it}$			0.149*** (0.0333)			
GVA_aff_{it}				-0.002** (0.0097)		
GVA_ict_{it}				0.009*** (0.0266)		
GVA_fin_{it}				0.010*** (0.0255)		
$\log(Eco\_inv)_{it}$					0.031*** (0.0108)	
Old_ratio_{it}						-0.010* (0.0055)
Adj. R^2	0.1952	0.1542	0.2513	0.2508	0.1718	0.2213
Num. obs.	399	378	210	210	210	210

Notes: Clustered standard errors in parenthesis; * – significant at the 10% level, ** – significant at the 5% level, *** – significant at the 1% level.

Source: Author's calculation

Similarly, the analysis is conducted for the regional migration outflows, and the results are presented in Table 3. If the results are to be compared to those in the previous Table, then the main differences are as follows. First, the population variable is not significant when modelling migration outflows, meaning that moving from region *i* does not depend on the population of region *i*. Again, in this case, as previously mentioned, a more detailed dataset capturing precisely which are the destination countries would give a proper estimate of the population effect. However, the same conclusion is valid also when the share of elderly (65+) is considered (model (6)). Second, the larger the sales value, the construction value of the tourist activity, and the lower the outflows to other regions. It is in line with the expectations as a higher volume of economic activity disincentives migration and should offer better income/welfare opportunities (model (3)). Third, when the shares in gross value added in selected sectors are considered all three estimates are of significant value and with merely unexpected signs (model (4)). An increase in the agriculture, forestry, and fishing value-added share decreases migration outflows and this is in line with the expectation. However, it seems that an increase in the share of gross value added in the financial and ICT sectors in region *i* increase outflows from the same region *i*. These surprising results should be additionally inspected with a micro (per individual) approach as macro data cannot provide the underlying reasons. Eventually, the education structure of the migrant population could provide insights in this respect.

Table 3: Panel (fixed effects) estimation results of the alternative models, for the regional migration outflows

Dependent variable: $\log(RM_{it}^{outflow})$						
	(1)	(2)	(3)	(4)	(5)	(6)
$\log(GDPpc_{it})$		0.1699* (0.0923)	0.307* (0.1613)		0.236* (0.1249)	0.507** (0.1500)
$\log(POP_{it})$	0.184 (0.1291)		0.349 (0.2967)	0.584* (0.2823)	0.573 (0.4640)	
$\log(Empl_{it})$	-0.851*** (0.0989)		-0.650** (0.2810)	-0.656* (0.3816)	-0.625* (0.3274)	-0.493* (0.2554)
$InternMigr\_net_{it}$	0.00002* (0.0000)	0.00003*** (0.0000)	0.00003*** (0.0000)	0.00003** (0.0000)	0.00002** (0.0000)	0.00003** (0.0000)
$\log(LProductivity)_{it}$	0.623*** (0.0860)			0.604*** (0.0990)		
$\log(Wages\_gross)_{it}$		0.8846** (0.1931)				
$Pop\_natchange_{it}$		-0.0001** (0.00003)				
$\log(Sales)_{it}$			-0.004*** (0.0007)			
$\log(Constr)_{it}$			-0.075*** (0.0196)			
$\log(Tourist\_night)_{it}$			-0.115*** (0.0188)			
GVA_aff_{it}				-0.004** (0.0072)		
GVA_ict_{it}				0.008*** (0.0197)		
GVA_fin_{it}				0.011*** (0.0188)		
$\log(Eco\_inv)_{it}$					0.027*** (0.0091)	
Old_ratio_{it}						0.003 (0.0168)
Adj. R^2	0.1983	0.1407	0.3846	0.3718	0.2821	0.2614
Num. obs.	399	378	210	210	210	210

Notes: Clustered standard errors in parenthesis; * – significant at the 10% level, ** – significant at the 5% level, *** – significant at the 1% level.

Source: Author's calculation

Besides the presented alternative models, other specifications performed are to check for the robustness of the results. These include the replacement of GDP per capita with regional gross value added or GDP per employee. No matter which we consider, the results remain robust, and both living standards and productivity determine internal migration in Croatia. Similarly, using the net wages compared to the gross wages leads to the same conclusions. The personal income surtax that may lead to differences among net wages across regions does not have any significant role in leading to different migration patterns. Including the number of graduates, i.e., controlling for eventual schooling migrations, does not affect the results, and estimates are statistically insignificant. Additionally, the baseline specifications were estimated using the pooled OLS estimator to check whether conclusions would significantly differ, no matter the fact that the LM test results supported the fixed effects of the pooled estimation. Furthermore, the panel estimation performed on 20 regions only omits the case of the City of Zagreb, given that the City of Zagreb has a sort of *double* treatment in the administrative organization of the country. The City of Zagreb is both a city and a region, as well as it represents a high concentration of economic activity and people with significantly above average values of any indicator (outliers). Also, in this case, the aforementioned conclusions remain robust.

5. Conclusions

This paper studies the impact of economic, social, and environmental factors on internal migration flows in the Croatian case during the 2000-2019 period. Internal migration flows are based on the NUTS3 level and comprise 20 regions plus the City of Zagreb.

The main results show that regional migration patterns in Croatia are aligned with the stylized facts about migration. That is, GDP per capita and employment significantly determine the inflow and outflow of regional migration. Moreover, in both cases, the environmental factor proxied with the regional investment in environmental protection significantly determines regional migration. It is also true for the tourist activity proxied with the number of tourist nights per region. Namely, regions with significant tourist activity show higher regional migration inflow and lower migration outflow. It is in line with expectations, especially if one considers the fact that such regions register significantly higher levels of seasonal employment and that a high share of domestic residents is one reason to perform a tourism-related activity during the summer.

This study applies a macro approach to investigating the internal migration determinants. A micro-approach could give better insights into the reasons for movements. However, a macro approach that diversifies the migration inflows according to regions of origin and migration outflows according to regions of

destination would allow for a proper estimation of the magnitude of the effect of each determinant. Therefore, this is a limitation of this work and the reason why it limits to inspecting the sign and significance of the factors. Moreover, an improved dataset could also assess on a better level an eventual endogeneity bias between GDP with regional migration. This study assumes that an increase in GDP increases the inflow of migrants (which is in line with the migration literature), rather than vice versa, and thus to correct for eventual reverse causality the models use the population proxy and productivity levels.

Another valuable extension would be to inspect the internal migration determinants among municipalities and cities (rather than regions). This would allow us to apply distances between entities and perform a gravity model approach within the panel technique. Such a three-dimensional method is more suited to inspect differentials of wages, living standards, or productivity and give a proper evaluation of the size of the effect.

Acknowledgment

This work has been supported by the project "MI – jučer, danas, sutra" (UP.04.2.1.06.0018) co-financed by the European Social Fund.

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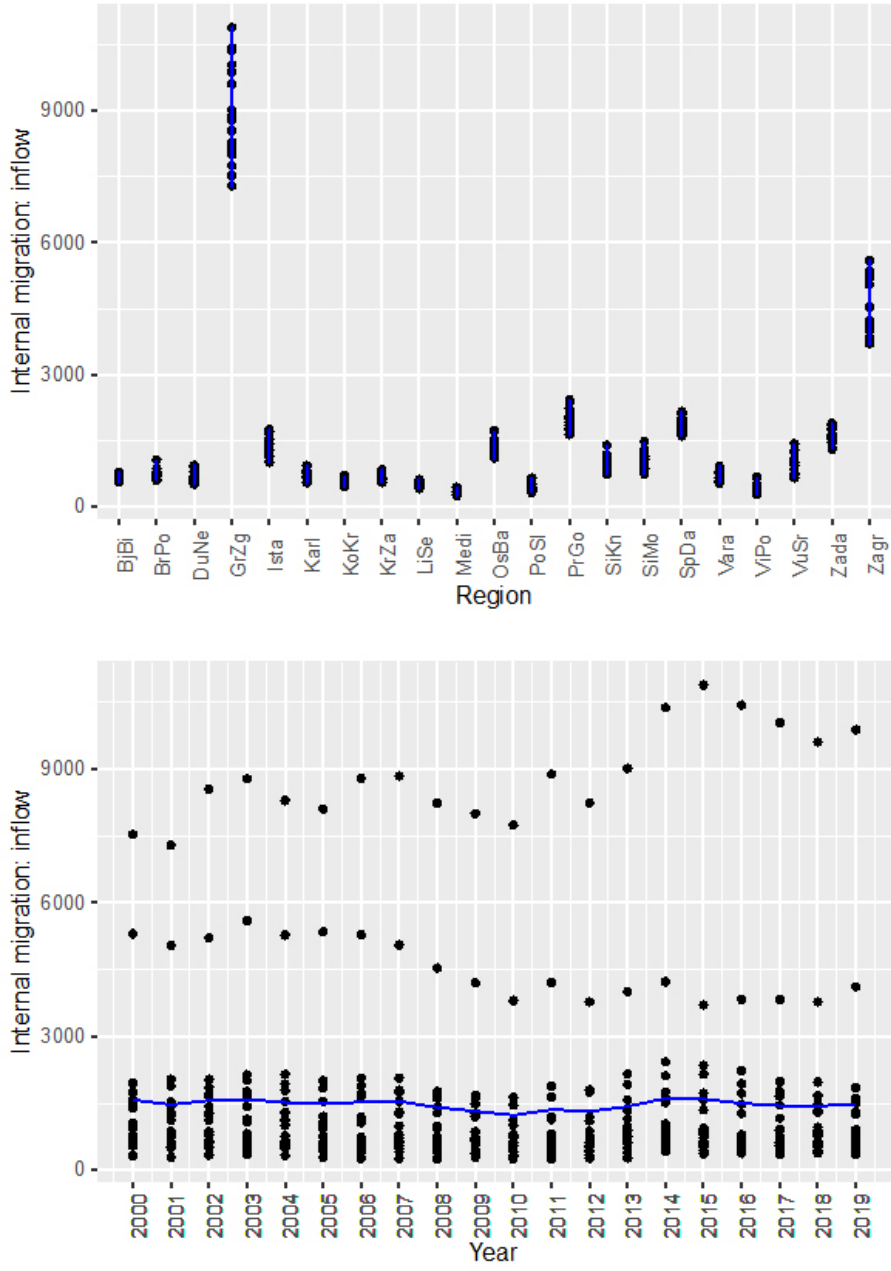
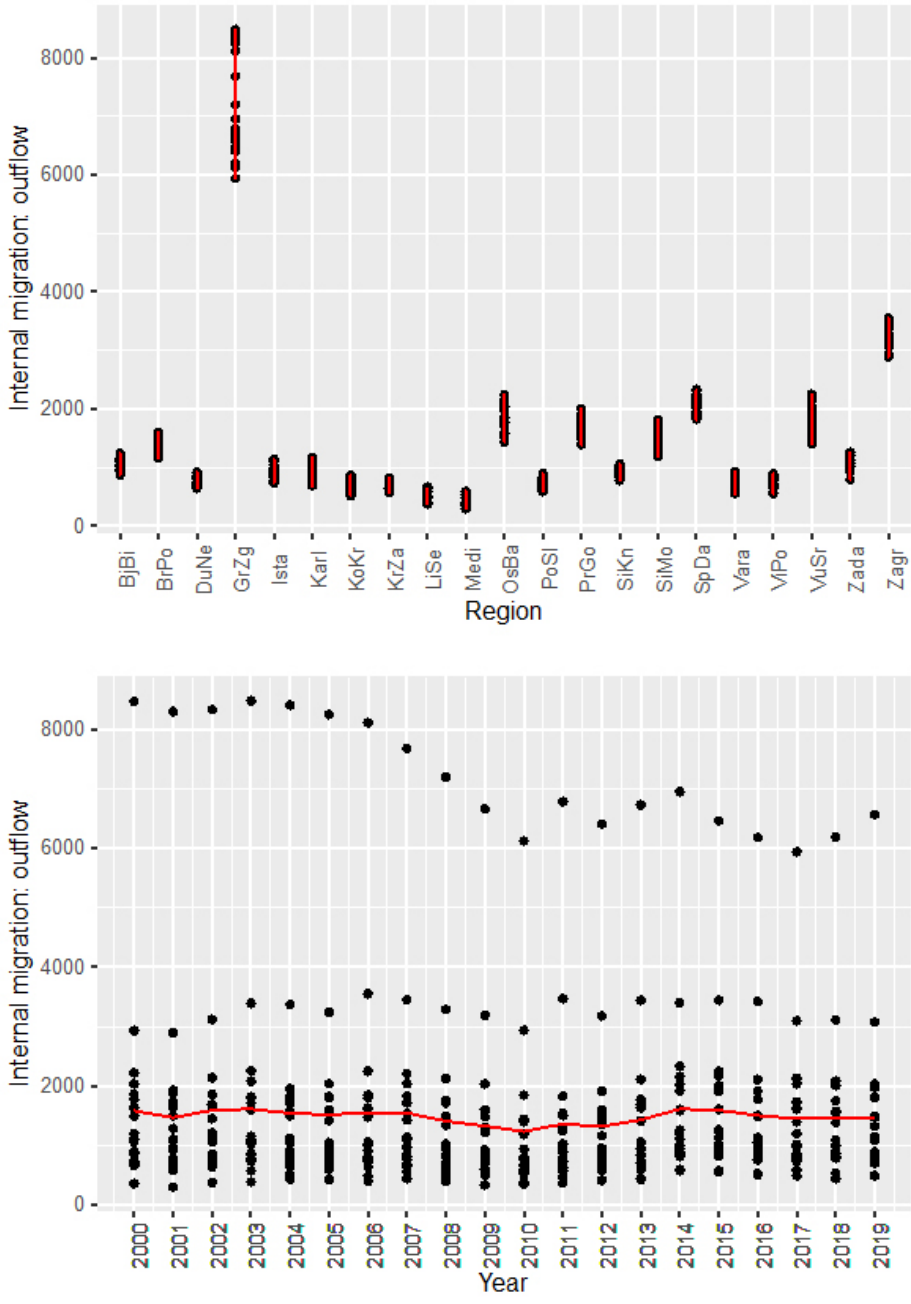
Appendix A

Figure A1: Heterogeneity of the internal migration inflow in Croatia across regions (upper panel) and across time (lower panel)



Source: Author's calculation

Figure A2: Heterogeneity of the internal migration outflow in Croatia across regions (upper panel) and across time (lower panel)



Source: Author's calculation

Odrednice unutarnjih migracija u Hrvatskoj

Ana Grdović Gnip[1]

Sažetak

Migracije su obilježile značaj utjecaj u Hrvatskoj, posebice nakon njezinog ulaska u Europsku Uniju. Stoga se nekoliko studija usredotočilo na istraživanje (međunarodnih/vanjskih) migracija, dok su unutarnje migracije na primjeru Hrvatske gotovo nezastupljene u znanstvenoj literature. Ovaj rad istražuje determinante unutarnjih migracija na razini NUTS3 u Hrvatskoj u razdoblju od 2000. do 2019. godine koristeći panel s fiksnim učincima. Rezultati ukazuju kako su regionalne migracije u Hravtskoj u skladu s teoretskim postavkama. Životni standard i mjere produktivnosti rada su, uz zaposlenost i place, glavni ekonomski čimbenici odnosno pokretači migracijskih priljeva i odljeva. Dodatno, županije koje ostvaruju značajne turističke rezultate privlače priljev i destimuliraju odljev ljudi. Povećanje udjela dodane vrijednosti u sektoru poljoprivrede, šumarstva i rabarstva također smanjuje migracijske priljeve među županijama. Štoviše, zaštita okoliša također je značajna odrednica regionalnih migracija u Hrvatskoj

Ključne riječi: *unutarnje migracije, migracije među županijama, produktivnost rada, Hrvatska*

JEL klasifikacija: *R23, J24, C23*

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Original scientific paper
UDC: 658.3:005.334
https://doi.org/10.18045/zbefri.2023.2.449

The role of risk factors, partner compatibility, organizational creativity and co-creation value on firm performance: evidence from SMEs in Vietnam*

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Abstract

This research aims to analyze how risk and compatibility between partners affect organizational creativity, co-creation value, and firm performance in a developing economy. The PLS-SEM method was utilized to process and evaluate a dataset of 454 valid cases from property owners, chief executives, vice presidents, broad assistants, and department managers of SMEs in Vietnam. The results validated the connections between risk variables, partner compatibility, organizational creativity, co-creation value, and firm performance. This study further enhances the current knowledge base in the realm of partner selection and provides valuable insights that can be applied in managerial contexts. Companies must consider external factors like risk and partner compatibility to improve organizational creativity, co-creation value, and firm performance. While risk factors, partner compatibility, organizational creativity, co-creation value, and business performance have garnered significant attention in academic circles globally, there is a shortage of studies exploring the interrelationships among these five phenomena together. This research is one of the initial studies that presents a complete model elucidating the interconnections between different categories.

Keywords: *risk factors, partner compatibility, organizational creativity, co-creation value, and firm performance*

JEL classification: *D81, M12, O15, O30*

* Received: 02-12-2023; accepted: 19-12-2023

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1. Introduction

Globalization and Industrial Revolution 4.0 are the biggest business threats. Globalization increases volatility, hyper-competition, demographic shifts, knowledge-based competition, and demassification in some industries while others experience substantial growth all present challenges for today's managers. Changing business conditions have halted many businesses (Falk et al., 2021). Uncertainty puts pressure on companies to make strategic decisions. Internal and external environmental factors often determine a company's success or failure. Due to Vietnam's uncertain business climate, many SMEs have had to close or halt operations, resulting in decreased revenue, earnings, and employment and an increase in unemployment (Quang et al., 2022). Phan and Archer (2020) say SMEs struggle most with capital and talent. Many Vietnamese SMEs are privately owned, lack resources, and rely on human labor. To combat these two trends, SMEs collaborate with diverse partners (Zhang and Liang, 2022). This optimizes their limited resources and boosts their creation market position. Therefore, to thrive in today's rapidly evolving, businesses need cooperation with partners to improve operational effectiveness, boost performance, and keep up with the competition (Wang et al., 2023).

Partnerships are crucial to business performance, especially in uncertain situations (Ahmad Qadri, 2021). Organizations have been enhancing their recognition of collaborative endeavors with external partners within their operational framework in order to optimize their business processes (Pfohl and Gomm, 2009). This study emphasizes the importance of partner selection on company creation and performance. Specifically, this study explores external factors of partner selections, especially risk factors and partner compatibility. While a partner's capabilities are a necessary condition for a successful partnership, another important factor in the search for a good partner, in particular when thinking about the risks inherent in any cooperation is whether the partners can work together. Cropper et al. (2011) have proposed risk-oriented factors to evaluate global partners in the context of the manufacturing industry for the purpose of uncertainty consideration. Risk factors refer to the most recent and arguably one of the most significant capabilities and contributions to the competitiveness and viability of an organization. Risk factors require the identification and monetization of risk events, probability of occurrence, and the firm contingencies for alternative solutions to uncertainty events. Therefore, risk factors can combine resources in the company to boost organizational creativity, value co-creation, and business performance, especially in an uncertain environment (Mamédio et al., 2019). Moreover, partners help develop and implement corporate strategies, which boost creativity, performance, and market responsiveness. The concepts of good fit of resources, trust, communication, complementarity, goal correspondence, compatible cultures, and competency sharing have been proposed as the aspects that contribute to successful collaboration (Chan et al., 2008). Yuliansyah (2021) asserts the success

of an organization in effectively addressing various issues relies on the adoption of a cooperative approach to strategy formulation. Partner collaboration integrates resources, capabilities, and knowledge, improving performance and adapting organizations to complex and uncertain conditions (Gnyawali and Park, 2009). Coordination of internal and external resources to generate and capture value is essential for managing a collaborative project (Scuotto et al., 2017). According to Massa et al. (2017), partner selection theories, which assume environmental stability, are difficult to implement due to organizations' complex and dynamic nature. Therefore, partner compatibility has positive effects on organizational creativity, value co-creation, and business performance, especially in an uncertain environment. Creativity and value co-creation mediate the relationship between external factors like business partners and business performance (Kortmann and Piller, 2016). Hence, the establishment of partnerships can foster conducive settings that promote creativity and the collaborative generation of value, thereby playing a pivotal role in the enhancement of overall performance (Cavallo et al., 2020).

The impact of the partnership on creativity, value co-creation, and firm performance is important (De Marchi et al., 2020). Many authors have discussed those relationships, but few empirical studies have examined them together. Alves (2013) finds that collaboration across organizations increases their potential for creation by allowing information sharing, resource pooling, division of labor, risk reduction, and complementary skill development, which increases innovation potential. The company selected collaboration partners to encourage creative problem-solving (Nambisan et al., 2019). In an international environment, choosing a good partner is the most important part. The effects of risk variables and partner compatibility in partnership selection on creativity, value co-creation, and firm performance have not been sufficiently studied. This study evaluates a conceptual framework and validates assumptions about risk, partner compatibility, organizational creativity, value co-creation, and firm performance. Therefore, this research suggests evidence in these areas by gaining a deeper understanding of how external determinants of partner selection might impact firm success in Vietnam.

Partner selection criteria have been refined by many companies since partners are crucial to success (McGehee et al., 2015). A growing number of academics and industry professionals believe that collaboration determines and improves performance (Blijleven et al., 2019). Despite citing external partner characteristics in partner selection criteria, prior research has ignored them. They also recommend hypothesis-combining research with specific partners to fill the gap. Therefore, this study fills a significant need in partner selection theories. Second, these areas have been studied mostly in the developed world. This research will demonstrate that these principles can be implemented in Vietnam, a growing Asian nation, particularly for SMEs. Manufacturing is unique, so partner selection theory emphasizes supply chain management. This research examines how partner selection fosters company

creativity and co-creation to help developing nations manage uncertainty. Third, a theoretical study examined the relationship between partner selection, value co-creation, creation, and firm performance. Lastly, the findings from this study can also be used to offer powerful and scientifically proven recommendations for promoting firm performance in Vietnam. This research can also give evidence-based recommendations for increasing workplace efficiency and SMEs in Vietnam. Regarding this matter, we put forward the following research hypotheses:

H1: Risk factor has a positive influence on organizational creativity.

H2: Risk factor has a positive influence on value co- creation.

H3: Risk factor has a positive influence on firm performance.

H4: Partner compatibility has a positive influence on organizational creativity.

H5: Partner compatibility has a positive influence on value co-creation.

H6: Partner compatibility has a positive influence on firm performance.

H7: Organizational creativity has a positive influence on value co- creation.

H8: Organizational creativity has a positive influence on firm performance.

H9: Value co-creation has a positive influence on firm performance.

The following study consists of five parts. After the Introduction, Section 2 deals with theoretical background and hypothesis development. Methodology is dissected in Section 3, covering the topics of instrumentation, data collecting, and analysis. Section 4 explains the findings in the context of Vietnam, evaluates the results, verifies the results, and stresses the mediating role of organizational creation and co-creation, the relationship between risk factors, partner compatibility, and firm performance. Section 5 of the paper discusses and summarizes our findings. In the last section, we draw conclusions about the study's findings and address their implications, limitations, and a recommended strategy for future research.

2. Literature review

This section reviews the relevant literature on the research concerns. This section reviews the literature on risk factors, partner compatibility, creativity, co-creation value and firm performance, partnerships. It then formulates research hypotheses and builds a conceptual model by reviewing past research on these areas' relationships.

2.1. Interorganizational Relations Theory (IOR)

IOR theory examines development inside and between organizations and places special emphasis on how they cooperate (Chan et al., 2008). These relationships'

origins, nature, and outcomes are central to IOR theory (Castaer and Oliveira, 2020). According to Vivek et al. (2022), collaborative partnerships can address complex issues in a coordinated manner. Collaborations allow multiple companies to solve a difficult problem more efficiently and effectively than they could alone. Collaboration can lead to new ideas, materials, and resources, the reduction of redundant services, the use of more efficient resources, the increase of power and influence, the ability to handle complex or contentious issues, and the distribution of accountability for complex or contentious issues (Eikelenboom and Marrewijk, 2023). The majority of interorganizational network literature focuses on the structural arrangements of linkages between organizations and their members (Lin et al., 2023). Therefore, Ngah et al. (2023) have developed a conceptual framework that integrates many theoretical perspectives to examine how inter-organizational ambidexterity and dynamism affect firm performance.

2.2. Risk factor, organizational creativity, value co-creation, and firm performance

One of the newest and most important competencies and contributions to an organization's competitiveness and viability is its risk factors (Cropper et al., 2011). Risk factors require identifying, valuing, and planning for risk events, their likelihood, and the firm's alternative supply sources (Alexandrova, 2015). Organizations can prepare for uncertainty by understanding risk factors (Easter et al., 2023). When evaluating worldwide suppliers in the manufacturing business, Chan et al. (2008) took into consideration uncertainty risk by using risk-oriented factors. IOR theories suggest that organizations can use partner screening for internal, external, and environmental factors to develop alternative strategies (Klindt et al., 2023). Value realization requires partners' participation in the service process, according to IOR theories (Majchrzak et al., 2015). In order to adapt to a shifting environment, incubation benefits from increased organizational compatibility brought about by uncertainty, which pushes methods across networks. According to Adam and Alarifi (2021), companies can benefit from creativity and co-creation from both internal and external sources when faced with an unpredictable environment since it encourages them to adapt to new technologies and markets. Risk factors, thus, can bring together different parts of a corporation to improve organizational innovation, value creation, and overall business success, even in a volatile setting (Mamédio et al., 2019). Consequently, we suggest the hypothesis:

H1: Risk factor has a positive influence on organizational creativity.

H2: Risk factor has a positive influence on value co- creation.

H3: Risk factor has a positive influence on firm performance.

2.3. Partner compatibility, organizational creativity, value co-creation, and firm performance

Partner compatibility refers to the capacity of company to suitable with partners to satisfy the demands of customers and the prevailing business environment. Chen et al. (2013) say successful collaboration requires resources, trust, communication, commitment, goal correspondence, compatible cultures, and competency sharing. To meet customer needs, organizations can benefit from sharing resources, talents, ideas, and information. Rosenkopf and Almeida (2003) say knowledge similarity can overcome alliance communication constraints. Furlotti and Soda (2018) found that partner compatibility improves new product performance by sharing knowledge. Partner compatibility facilitates creation and value co-creation, which boosts firm performance (Wu et al., 2020). Partner compatibility can boost a business's uniqueness and creativity (Rahman and Kavida, 2022). Many academics have agreed that partner compatibility and value creation are crucial to long-term performance and business competitiveness (Nasr et al., 2021). Partner compatibility boosts corporate performance during economic uncertainty (Vurro et al., 2023). Environmental and social awareness has led businesses to actively seek suppliers who can meet their cost, adaptability, and product excellence needs while also demonstrating a commitment to environmental preservation and the well-being of all living things, according to Govindan (2022). In an ambiguous context, partner compatibility is crucial to developing performance-enhancing strategies (Kim et al., 2019). By leveraging resources and collaborating to create value, organizations can optimize their expenditures, standards, and other unique elements, improving their competitive advantage. Hence, the compatibility between partners is associated with organizational innovation, value co-creation, and company performance. Our study tests the following hypothesis:

H4: Partner compatibility has a positive influence on organizational creativity.

H5: Partner compatibility has a positive influence on value co-creation.

H6: Partner compatibility has a positive influence on firm performance.

2.4. Organizational creation, value co-creation, and firm performance

Organizational creativity and value co-creation have been studied extensively (Kim et al., 2019). Creativity is how firms turn resources and ideas into new products, services, or procedures to advance, participate, and differentiate in the global market (Migdadi, 2019). Value co-creation in companies starts with creation (Sharma et al., 2016). To benefit more, firms can switch from creative to co-creation through interactions, talks, and cooperation (Tidd and Bessant, 2020). Creative firms can promote value co-creation, which improves organizational performance and reduces other obstacles by encouraging rational decisions (Mani

and Barua, 2015). Creation can inspire new products, services, processes, and ideas, which boosts business growth (Calderini et al., 2023). Business survival and growth depend on creative thinking to create new products and processes (Lee and Trimi, 2021). Creation is the foundation for company value co-creation and development.

Organizational creation improves business outcomes (Gomes et al., 2022). Organizational construction can be used to create value, improve performance, and manage risk (Kostadinovic and Stankovic, 2021). Creation is organizational strategic operations' operational ideology, to perform well (Verhoef et al., 2021). For competitive advantage, companies can gain an edge over competitors by combining talents and assets in novel and sustainable ways (Chowdhury, 2023). By constantly developing new products, services, and processes, companies can survive competition and enter new markets (Storey and Kahn, 2010). Tapaninaho and Heikkinen (2022) say an organization's most important part is creation. In chaotic situations, creativity improves company performance, according to El Chaarani et al. (2022). It can be stated as:

H7: Organizational creativity has a positive influence on value co-creation.

H8: Organizational creativity has a positive influence on firm performance.

2.5. Value co-creation, and firm performance

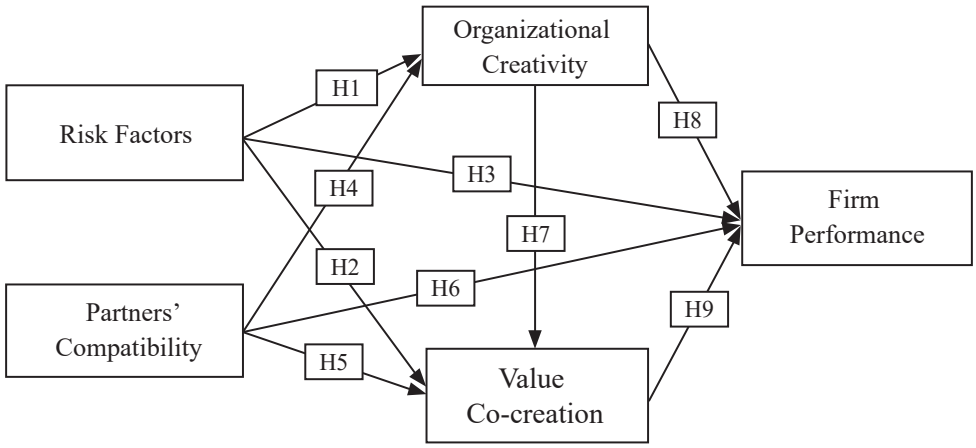
Value co-creation has been shown to improve business outcomes (Sigala, 2019). Companies may boost their bottom line with the support of value co-creation by meeting consumer needs, sharing expenses, minimizing risk and enhancing their talents (Ramaswamy and Narayanan, 2022). Value co-creation is a competitive approach for corporate success (Bartolacci et al., 2023). Khuong et al. (2023) found that when people work together to be creative, they are more likely to come up with novel goods, services, and ideas. Businesses can't survive and grow without the capacity to conceive in terms of value co-creation with their customers. It has been suggested that value co-creation can help firms boost productivity, get an edge in the market, and keep or enhance revenue and profits (De Marchi et al., 2020). Previous studies have also emphasized value co-creation as a creative technique to help enterprises fulfill rising market needs (Durugbo and Pawar, 2014) and as a tool for businesses to elicit and use customer expertise and access new resources via connections through their networks (Oe and Le, 2023). Businesses would benefit directly if they are able to pool their assets in order to meet the varying needs of their clients (Rahman and Kavida, 2022). Thus, this study is recommended:

H9: Value co-creation has a positive influence on firm performance.

2.6. Conceptual framework

This research examines the significance of risk variables, partner compatibility, organizational creativity, co-creation value, and firm performance. In addition, the role that organizational creativity and co-formation play as mediators between the influence of risk factor and partner compatibility and performance is investigated. The study's secondary objective is to develop a model that elucidates the interplay between risk factor, partner compatibility, company innovation, and value co-creation and their effect on firm performance. Figure 1 shows the conceptual framework for this proposal.

Figure 1: Conceptual framework



Source: Authors' construction

3. Methodology

This section introduces the research methodology, techniques used to assess the scales, and quantitative research that would be used to gather data and analyze the research results in the next chapter. It also offered the suggested model and research hypotheses.

3.1. Measurement of variables

This study uses four items from Nong and Ho (2019) to measure the risk factors. Six items from Dekker et al. (2016) and Pongsathornwiwat et al. (2017) are modified to measure partner compatibility. Six questions developed by Lee and Bruvold (2003)

and Boso et al. (2017) are used to measure organizational creativity. Five items from Li et al. (2020) and Ngo and O'Cass (2009) are modified to measure value co-creation. Six items for measuring business performance were adopted from Arsezen-Otamis et al. (2015). This survey evaluates each factor using the Likert scale and multiple-choice questions. The researcher will first interview academic experts from university lecturers and researchers and business professionals to get their opinions and recommendations for enhancing the assessment criteria after reviewing the literature. It makes the questionnaire more relevant and complete. The survey will be translated from English to Vietnamese. Five academics and five managers from Vietnamese SMEs evaluated our initial questionnaire using methods from previous studies. Individual semi-structured face-to-face interviews lasted 30–60 minutes. All survey items were evaluated for relevance, readability, and clarity, and respondents were asked for feedback. The questionnaire was revised after their comments. The reliability of the new questionnaire will be tested with 10 Vietnamese SMEs managers before performance to improve the questionnaire's validity and reliability and tailor it to Vietnamese SMEs.

3.2. Data collection and the sample

The study focused on Vietnamese individuals who held positions as owners, chief executives, top-level and middle-level managers, as well as other managerial roles inside SMEs in the Vietnamese context. These professionals are tasked with the responsibility of overseeing and directing operational activities, evaluating and addressing workplace conflicts, formulating internal policies, and identifying suitable company strategies. The study's validity will be upheld by the meticulousness and pertinence of the responses obtained from this particular sample.

This research employed both convenience and snowball sampling (Bernard, 2013). The time frame for this data collection was from May 2022 to August 2023. A compilation of service firms and potential responses was generated through the utilization of publicly accessible websites and personal connections inside Vietnam. In order to account for the geographical and social separation of the target group, potential participants were sent emails with hyperlinks to online self-administered surveys. In order to account for the geographical and social separation of the target group, prospective participants were sent emails with links to online self-administered questionnaires. The survey's reliability and generalizability were ensured by obtaining a total of 454 valid replies (Hair et al., 2019).

3.3. Statistical methods

The analysis of the data in this study was performed using Smart PLS 4.0. The two most common methods of analysis are structural equation modelling (SEM) and covariance-based structural equation modeling (CB-SEM). To test the reliability

and validity of a theoretical model, CB-SEM primarily evaluates how well the model predicts the covariance matrix for a set of data. Exploratory studies using PLS-SEM to advance conceptual understanding are common. This is achieved by directing attention during model testing toward the independent variables' explanatory elements. In this research, the author selected to analyze the study data using the PLS-SEM model utilizing Smart PLS 4.0 software.

4. Empirical data and analysis

This section presents the findings and outcomes of quantitative studies. To process PLS-SEM for 454 instances, SmartPLS software version 4.0 was used. Data analysis in quantitative studies begins with describing respondent characteristics, and then moves on to measurement and evaluation of structural models. Additional information on the outcomes was also given.

4.1. Sample characteristics

There are 454 people surveyed for this study. There are men accounting for 73.8% of the participants and women making up 26.2%. There are 66.1% bachelor's degree holders, 33.0% master's degree holders or higher, and 0.9% college grads and high school graduations. The department heads made up 41% of the responses, followed by the middle management at 27.8%, the owner at 22.2%, and the presidents at 9%. About 34.3 percent of the respondents worked for a joint stock firm, followed by 33.7 percent from private companies, 9.2 percent from state-owned enterprises, 8.5 percent from family businesses, and 3.3 percent from other types. The service sector has responded with 148 valid surveys, with 30 coming from the transportation sector, 81 from the food and beverage sector, 122 from the hotel sector, and 73 from the recreation sector.

4.2. Measurement model results

Every concept is examined for its validity and reliability. The indicator loadings are required to exceed a threshold of 0.70. All items in this study are greater than 0.7, except PCO4 (0.685<0.7). Therefore, to ensure reliability, this study will eliminate PCO4. Cronbach's alpha and composite reliability (CR) are employed to quantify the level of agreement between surveys. Performance is considered good if the reliability indicator value is at least 0.6. In this study, all of the items in this analysis have dependability indices of more than 0.60, ranging from 0.807 to 0.885. The CR values are above the bare minimum of 0.7, with the value from 0.870 to 0.910. As stated by Fornell and Larcker (1981), a value of 0.5 or greater is needed for items from the same set of variables to be utilized to describe the factor. Model construction components satisfied the necessary statistical constraints. A summary of the findings from testing the measurement model's validity and reliability is provided in Table 1.

Table 1: Measurement model

Variables	Outer loadings	Cronbach's alpha	rho_A	CR	AVE
Threshold (Hair et al., 2019)	≥0.7	≥0.6	≥0.7	≥0.7	≥0.5
Risk Factor (RIS)					
RIS1	0.795	0.807	0.823	0.873	0.634
RIS2	0.838				
RIS3	0.836				
RIS4	0.708				
Partner's Compatibility (PCO)					
PCO1	0.787	0.841	0.843	0.888	0.614
PCO2	0.788				
PCO3	0.771				
PCO5	0.700				
PCO6	0.863				
Organizational Creativity (CRE)					
CRE1	0.707	0.885	0.889	0.910	0.592
CRE2	0.774				
CRE3	0.819				
CRE4	0.765				
CRE5	0.756				
CRE6	0.744				
CRE7	0.813				
Value Co-creation (VCO)					
VCO1	0.722	0.820	0.824	0.870	0.527
VCO2	0.751				
VCO3	0.767				
VCO4	0.710				
VCO5	0.701				
VCO6	0.700				
Firm Performance (FIP)					
FIP1	0.719	0.860	0.862	0.896	0.590
FIP2	0.801				
FIP3	0.800				
FIP4	0.804				
FIP5	0.718				
FIP6	0.760				

Source: Author's calculation

The square root of AVE was calculated to verify that items within the same group are more comparable than those in other groups for the purpose of discriminant validity. Table 2 demonstrates that all items met the Fornell Larcker threshold of 0.70 discriminant validity. To evaluate discriminant validity, HTMT is also used. If the result on the HTMT is less than 0.90, then there is evidence of discriminant validity between the two reflective ideas being tested. The HTMT index was satisfied, indicating that the model fit the data well. Furthermore, participants adopted all characteristics with a mean value of above 3. The variables with the highest mean scores were CRE (mean 3.966), FIP (mean 3.878), RIS (mean 3.849), VCO (mean 3.700), and PCO (mean 3.642), all of which showed significant levels of agreement.

Table 2: Discriminant validity coefficients

	Mean	SD	RIS	PCO	CRE	VCO	FIP
RIS	3.849	0.789	0.796				
PCO	3.642	0.687	0.240	0.784			
CRE	3.966	0.735	0.247	0.308	0.769		
VCO	3.700	0.769	0.391	0.297	0.371	0.726	
FIP	3.878	0.789	0.409	0.326	0.342	0.512	0.768

Source: Author's calculation

4.3. Structural model evaluation

The reliability of the model was determined by calculating the R2 value (Hair et al., 2019). The R2 statistic measures the degree to which a dependent variable can be explained by a collection of independent factors. Specifically, organizational creativity, value co-creation, and company success all had respective R2 values of 0.126, 0.252, and 0.348. This result suggested that the model was not very accurate in making predictions. For Q2 values of predictive significance, the figures for organizational creativity, value co-creation, and firm performance were 0.067, 0.129, and 0.200, respectively. Therefore, the model was built with great care, since it was expected that the exogenous factors would have some bearing on the model's endogenous variables.

Table 3: Path coefficients

Hypothesis	Relationship	Path coefficient	Standard Deviation	*T*-value	*p*-value	Decision
H1	Risk Factor → Organizational Creativity	0.184	0.051	3.566	0.000*	Supported
H2	Risk Factor → Value Co-creation	0.295	0.043	6.870	0.000*	Supported
H3	Risk Factor → Firm Performance	0.212	0.046	4.631	0.000*	Supported
H4	Partners' Compatibility → Organizational Creativity	0.265	0.049	5.395	0.000*	Supported
H5	Partners' Compatibility → Value Co-creation	0.150	0.044	3.355	0.001*	Supported
H6	Partners' Compatibility → Firm Performance	0.138	0.046	2.978	0.003*	Supported
H7	Organizational Creativity → Value Co-creation	0.251	0.047	5.357	0.000*	Supported
H8	Organizational Creativity → Firm Performance	0.119	0.043	2.796	0.005**	Supported
H9	Value Co-creation → Firm Performance	0.345	0.049	7.023	0.000*	Supported

Note: level of significance .001*, level of significance .05**

Source: Author's calculation

Table 3 shows the results of these analyses. The significance of the coefficient was determined with the help of a nonparametric bootstrap method, which used bootstrap samples to derive a T-value. Risk factors positively increased organizational creativity (0.184, p 0.000), value co-creation (0.295, p 0.000), and firm performance (0.212, p 0.000). This means that H1, H2, and H3 are all highly credible. Partner compatibility has a positive impact on organizational creativity (0.265, p 0.000) exhibiting the greatest influence, followed by value co-creation (0.150, p 0.001) and firm performance (0.138, p 0.003). Thus, H4, H5, and H6 are all well-supported. In addition, the correlation between organizational creativity and value co-creation was found to be significant (0.251, p 0.000). H7 was supported by evidence that showed a correlation between creative problem-solving at work and collaborative value creation. A correlation between organizational creativity

and company performance was found. The performance of the firm was impacted by organizational creativity (0.119, p 0.005). As a result, H8 was confirmed. In addition, value co-creation was positively related to company success (r = 0.345, p 0.000). As a consequence, H9 was confirmed. Firm performance was evaluated as a function of the sum of each factor's direct and indirect impacts.

5. Results and discussion

The section presents the theoretical and practical consequences. According to the study's results, risk factors and partner compatibility favorably impact company creation, co-creation value, and firm performance. Numerous management implications about the ways in which organizations might effectively boost their creativity and performance are implicated by these phenomena.

5.1. Theoretical implications

This study makes a number of important theoretical advances. This research examines the impact of risk factors and partner compatibility on business performance by exploring the link between organizational creativity and value co-creation. Partner compatibility will create possibilities and conditions for your company's innovative and creative thinking during development (Bag et al., 2022). Previous studies mostly focused on developed nations, excluding other emerging economies and Vietnam. Research applies the IOR in SMEs in developing countries which is still in its infancy (Kruesi and Bazelmans, 2023). The study utilized theories and showed how partner selection, organizational innovation, and value co-creation might boost SMEs' performance in Vietnam, one of Asia's fastest-developing nations. The research found that risk and partner compatibility significantly affect firm performance. Kim and Chung (2003) found that risk concerns and partner compatibility boost creativity and company co-creation. Risk factors may also boost organizational innovation and value co-creation (Alexandrova, 2015). Businesses collaborate to share resources to overcome environmental issues and have good results (Shin and Pérez-Nordtvedt, 2020). Murthy et al. (2018) discovered that mate compatibility boosts productivity. Results also suggest that organizational innovation and value co-creation impact company performance. This research examines partner selection and organizational results from several perspectives, unlocking the *black box* of effective methods, especially under tough situations. This research integrates partner selection, company development, value co-creation, and corporate performance to advance strategic management. The study also showed that organizational creativity and co-creation increase business success by moderating the relationship between risk variables, partner compatibility, and firm performance.

These results are consistent with those found in previous studies. Fernandez-Stark and Gereffi (2019) found that creativity improves firm performance. Creativity and value-co-creation are what make a firm profitable and grow quickly. According to De Marchi et al. (2020), creativity boosts economic success in a turbulent world. This supports Niesten and Stefan (2019) that product and process creativity are equally crucial to company success. However, previous studies have generally ignored Vietnam and other emerging nations in favor of advanced economies. This research analyzed risk factors, partner compatibility, organizational innovation, value co-creation, and firm success to assist Vietnamese SMEs in an uncertain market. This expands the literature on partner selection, organizational creativity, value co-creation, and business performance, provides a platform for future study, and may help developing nation SMEs. Thus, future studies may build on present research to provide significant regional and sector comparisons, even with uncertainty.

5.2. Practical implications

Data analytics has increased business insights' importance in organizations. Businesses must use data analytics to stay ahead or risk falling behind. To determine how risk factors and the partner selection model can give businesses a competitive edge, extensive research is needed. Partner selection models that consider external factors should be prioritized in Vietnam's unpredictable market to boost organizational creativity, value co-creation, and firm performance. This research advises Vietnamese SME management executives on how to collaborate with partners to boost productivity and performance through value co-creation, especially in a volatile economy. SME managers need a partner selection criteria list to boost performance. In order to foster creation and value co-creation strategies and enhance business performance in accordance with environmental factors, they need to develop a partnership with their partner to share knowledge and capabilities, comprehend consumer demand, have suitable operational solutions, and enhance strategy in response to uncertain scenarios. This research also found clusters of risk factors and partner compatibility in partner selection that are linked to organizational creativity, value co-creation, and firm performance. Companies should work with partners to understand risk to survive uncertainty. Partnering can boost company performance, but choosing the wrong partners can lead to failure. Managers of SMEs should use these skills to improve results. Capital and resources are tight for SMEs, and managers must launch new products and services with partners. It can boost company performance and encourage learning and sharing. Matarazzo et al. (2021) say companies must increase efficiency to stay competitive and survive. Partner compatibility also helps the company succeed. The company can find good partners, but without compatibility, it will fail. Companies can't create value by sharing and learning without compatibility. Therefore, companies must consider external factors like risk and partner compatibility to sustain and grow their partnerships. Companies

must invest in efficient partnership processes to boost creativity, value co-creation, and performance and gain a competitive edge (Kano et al., 2020).

6. Conclusions

Without a doubt, partnerships play a significant role in establishing company performance, as well as in deciding organizational creation and co-creation value. The selection of partners is heavily impacted by external elements including risk factors and partner compatibility, which in turn affect organizational creation, co-creation value, and business performance. To elevate the creation process, companies must choose the suitable partners who can share resources, communicate well, commit fully, have complementary cultures, share competencies, and lower environmental risks. In addition, when it comes to Vietnamese companies, factoring in risk and ensuring compatibility with partners greatly impacts business success. Now you know why it's important for organizations to focus on external elements while trying to generate new ideas and gain competitive advantages.

The findings show that company creation and co-creativity moderate the association between risk factors, partner compatibility, and firm performance. SME managers in Vietnam can utilize partner selection to increase corporate entrepreneurship and acquire a competitive edge in a competitive, unpredictable, and complicated business environment. Thus, new insights into the expansion of existing conceptual connections emerged, contributing to current debates about comparable published findings (Bag et al., 2022). This research establishes partner selection requirements and offers a model for external business performance determinants. This is one of the first studies to examine the link between organizational creativity and value co-creation, which is seen as crucial to the success of both business performance and partner relationships. This study expands prior findings and opens the door to more research on how partner selection might help business executives succeed.

As a result, new insights into the expansion of existing conceptual connections emerged, contributing to current debates about comparable published findings (Bag et al., 2022). This study defines the requirements for partner selection in the digital age and creates a model for external factors of partner selection related to business performance. This study was one of the early mediation investigations of the idea that partner relationships need organizational creativity and value co-creation to succeed. This study not only adds to the existing body of knowledge but also paves the way for future investigations into the ways in which careful partner selection may help business leaders achieve even greater success.

The research found a lot of new information, however time, samples, literature review, and statistical analysis are still issues. The study's findings are specific to the

SMEs operating in Vietnam's unpredictable environment and cannot be extrapolated to other contexts. The completed model has to be evaluated in the context of different areas and industries in the future. Second, although the study's independent variables were limited to risk factors and partner compatibility, this offers room for future research to explore different aspects of partners' selection and their link to a wide range of organizational situations. Third, future research should gather from a wide range of manager levels and business sizes to present a comprehensive picture of Vietnamese SMEs. That information can help to improve their bottom line and financial performance. The next step is to control for managerial experience and organizational structure to see how they affect independent variable associations. In this study, executives' managers were given significant autonomy to make decisions based on their own experiences, cultural norms, and firm circumstances. Future research could examine how leaders' backgrounds and cultures affect organizational performance.

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Appendix

1: SOURCES OF MEASUREMENT SCALES

Variables	Coded	Description of statement
Risk factor	RIS1	Our company select partners who are from areas with political stability.
	RIS2	Our company select partners who are from areas with economic stability.
	RIS3	Our company select partners who have same cultural affinity.
	RIS4	Our company select partners who are from areas without terrorism and high crime rate.
Partner's Compatibility factor	PCO1	Our company select partners who has similar organizational culture.
	PCO2	Our company select partners who can communicate and coordination effectively with us.
	PCO3	Our company select partners who has symmetry in organizational size.
	PCO4	Our company select partners who we feel that we can trust these partners completely.
	PCO5	Our company select partners who has similar strategic dimensions.
	PCO6	Our company select partners who can solve conflicts together.
Creativity	CRE1	Our company select partners who is highly engaged in generating innovative and valuable concepts in the domain of product and service development.
	CRE2	Our company select partners who is dedicated to delivering a greater number of innovative and high-value products and services to our customers in comparison to our competitors.
	CRE3	Our company select partners who possesses distinctive and invaluable answers to prevalent market challenges.
	CRE4	Our company select partners who has implemented an innovation and valuable policy and operational procedure for conducting business.
	CRE5	Our company select partners who employs innovative and practical methodologies to address various challenges.
	CRE6	Our company select partners who has foster environment that is conductive to our own ability to produce novel and useful ideas.
	CRE7	Our company select partners who considers producing novel and useful ideas as important activities.

Variables	Coded	Description of statement
Co-creation	VOC1	Partners interact with our companies to have better service
	VOC2	Partners work together with our company to produce offerings that mobilize customers.
	VOC3	Partners interact with our companies to design offerings that meet customer needs.
	VOC4	Partners provide services for and in conjunction with our companies
	VOC5	Partners co-opt our company's involvement in providing services.
	VOC6	Partners provides our companies with supporting systems to help our companies get more value.
Organizational Performance	FIP1	Market share expansion accelerates has increased in comparison to competitors.
	FIP2	The net profit margin increases in comparison to competitors.
	FIP3	The rate of sales expansion accelerates in comparison to competitors.
	FIP4	Return on investment rises in comparison to competitors.
	FIP5	In general, the customers are satisfied with our company.
	FIP6	In general, our organization is successful.

Source: Authors' construction

Uloga faktora rizika, kompatibilnosti partnera, organizacijske kreativnosti i vrijednosti zajedničkog stvaranja na uspješnost tvrtke: primjer malih i srednjih poduzeća u Vijetnamu

Tran Thi Van Trang[1], *Mai Ngoc Khuong*[2]

Sažetak

Ovo istraživanje analizira kako rizik i kompatibilnost partnera utječu na organizacijsku kreativnost, vrijednost zajedničkog stvaranja i na uspješnost tvrtke u gospodarstvu u razvoju. Metoda PLS-SEM korištena je za obradu i procjenu skupa podataka koji se sastoji od 454 važeća slučaja vlasnika nekretnina, izvršnih direktora, potpredsjednika, pomoćnika i voditelja odjela malih i srednjih poduzeća u Vijetnamu. Rezultati su potvrdili veze između varijabli rizika, kompatibilnosti partnera, organizacijske kreativnosti, vrijednosti zajedničkog stvaranja i uspješnosti tvrtke. Ova studija dodatno unapređuje dosadašnju bazu znanja u području odabira partnera i pruža vrijedne uvide koji se mogu primijeniti u menadžerskom kontekstu. Tvrtke moraju uzeti u obzir vanjske čimbenike poput rizika i kompatibilnosti partnera kako bi poboljšale organizacijsku kreativnost, vrijednost zajedničkog stvaranja i učinak tvrtke. Iako su faktori rizika, kompatibilnosti partnera, organizacijske kreativnosti, vrijednosti zajedničkog stvaranja i poslovne uspješnosti privukli značajnu pozornost u akademskim krugovima na globalnoj razini, postoji manjak studija koje istražuju međuodnose između ovih pet fenomena. Ovo je istraživanje jedno od početnih istraživanja koje predstavlja cjeloviti model koji pojašnjava međusobne veze između različitih kategorija.

Ključne riječi*: faktori rizika, kompatibilnost partnera, organizacijska kreativnost, vrijednost zajedničkog stvaranja i učinak tvrtke*

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Original scientific paper
UDC: 334.722-055.2(497.4)
https://doi.org/10.18045/zbefri.2023.2.477

Social capital and woman entrepreneurs: the characteristics of social capital among woman entrepreneurs across different life stages*

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Abstract

This research examined women entrepreneurs' social capital in their different life stages.The main hypothesis is that women would have different levels and forms of social capital as they move from one stage to another in their lives in a professional cycle. We observe emotional support and encouragement from the environment, and instrumental social capital, through which the entrepreneur accesses information, business partners, and other resources relevant to her entrepreneurial process. A survey was emailed to a sample of women's businesses detected with the help of an algorithm in a business register. Finally, there were 340 fully answered questionnaires collected for the statistical analysis that utilized Levene's F-test to confirm equality of variances, followed by Tukey's post hoc test. Otherwise, Tamhane's test does not assume equality of variances. Based on the study results, we could not confirm that motherhood, which includes parenting, being a wife, and being a housewife, has different impacts on women entrepreneurs in different life stages. We also cannot support the hypothesis that there is a difference in the importance of social networks. However, our research confirmed the difference in the importance of parental influence and the influence of friends and acquaintances on their entrepreneurial journey.

Keywords: *woman entrepreneurs, female entrepreneurs' social capital, social network, motherhood*

JEL classification: *L26, J16, M54*

* Received: 07-05-2023; accepted: 18-12-2023

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1. Introduction

In this research, we follow the definition of entrepreneurship as the identification, evaluation, and exploitation of opportunities (Shane and Venkataraman, 2001). Social capital is one of the factors helping to understand why, when, and how women identify, evaluate, and decide to exploit business opportunities.

The entry into entrepreneurship of men and women is influenced by similar factors, but the intensity of their activity is different in different environments, which affects the difference between entrepreneurship of men and women (Blanchflower, 2015; Koellinger et al., 2013). Research (Koellinger et al., 2013) has shown that personal acquaintance with an entrepreneur influences the decision to become an entrepreneur, which to a certain extent also explains the gap between the number of female and male entrepreneurs, as only 31% of women, in contrast to 43% of men, know the entrepreneur personally in your vicinity.

Cultural and social norms, influences from the wider and immediate environment, which includes family and friends, shape women's attitudes towards entrepreneurship as a career choice and according to the theory of planned behaviour (Ajzen, 1991), a woman's entrepreneurial intention and behaviour will depend on her attitude towards this behaviour, in the case of entrepreneurial endeavours. A theory of entrepreneurial discovery based on the interplay of cultural values, institutions, and individual psychology (Harper, 2003) also implies the importance of social capital saying that the willingness to seize opportunities is situational, depending primarily on one's position in society. Entrepreneurial behaviour is rooted in situational positioning, which in turn depends on the economic, cultural, social, and symbolic structure in which the individual is embedded. The exploitation of entrepreneurial opportunities, therefore, depends not only on the characteristics of the individual but more on social and cultural values and norms (Harper, 2003). Social and cultural criteria that influence perception are even more important than material resources for women's entrepreneurial start-ups, as Elam's (2008) study also notes. Social capital, which comes from connections to extended family, the environment, and different organisations can compensate for deficits in education, experience, or financial capital of women (Yetim, 2008), it shapes entrepreneurs' cognitive characteristics (De Carolis et al., 2009) and is an important tool for the growth of women-owned enterprises (Roomi, 2013) Weak ties link specific knowledge that the individual and members in her network with strong ties do not possess, is extremely important for the development of the entrepreneurial process (Davidsson, 2003). An individual who acquires new knowledge and information through a network with weak ties is abler to mobilise the necessary resources to realise his entrepreneurial idea.

Social capital at the individual level, i.e., the social capital of an individual or a team, influences the social capital of society and its institutions, and vice versa. How relationships are formed within a network depends on various characteristics

of the individual, for example, on the individual's cognitive attributes and social competencies, as well as on the characteristics of the group, which are reflected, for example, by family relationships or the specificities of the founding team (Gedajlovic et al., 2013). A meta-analysis on the impact of social capital in the form of personal networks on the performance of small businesses (Stam et al., 2014) shows that the importance of social capital varies at different stages of development, in different industries and also in different economies, and therefore different networking strategies are important at different stages.

The encouragement that an entrepreneur receives from the environment and society in the form of emotional support and approval is associated with the cognitive dimension, which is the least supported in discussions of social capital (Liao and Welsch, 2003; Samuelsson and Davidsson, 2009). Nahaphiet and Ghoshal (1998) define cognitive capital as the system of values, understandings and beliefs in a particular group. Social support and security through cognitive capital are important for the development of entrepreneurship and are received by the entrepreneur who wants to break certain social norms in the process of risk-taking, which is necessary for the development of entrepreneurship (Liao and Welsch, 2003). A high level of mutual trust and expectations reduces the need for formal validation and coordination, which gives space and energy for investing in the development of the business enterprise (Liao and Welsch, 2005).

In our study, we look at social capital through two functions that are not widely studied but are summarised from the study by Samuelsson and Davidson (2009): social capital, which is manifested through (i) encouragement and emotional support, and (ii) instrumental capital. We are interested in how women entrepreneurs assess the impact of (a) parents, (b) a partner and children as factors of the immediate environment, and (c) friends and (d) wider social network as factors of the environment on these two dimensions of social capital and through them on their entrepreneurial path.

Based on the literature review, the following hypotheses are proposed:

> *H1: There is a difference in the level and form of social capital of woman entrepreneurs at different life stages.*
>
> *H1a: Woman entrepreneurs in different life stages evaluate the degree of parental influence on their entrepreneurial path differently.*
>
> *H1b: Woman entrepreneurs in different life stages evaluate the degree of influence of motherhood on their entrepreneurial path differently.*
>
> *H1c: Woman entrepreneurs in different life stages evaluate the degree of influence of friends and acquaintances on their entrepreneurial journey differently.*

H1d: Woman entrepreneurs in different life stages attribute different importance to inclusion in social networks.

After the introduction, the literature review, on which the hypotheses were proposed, is presented, followed by chapters on methodology and data analysis. Then the results are presented and discussed. In the last chapter, the conclusions and suggestions for further research are presented.

2. Literature review

Research on female entrepreneurship from the perspective of the life cycle appears mostly in a comparison of men and women and shows that entrepreneurial motives, the influence of parents, knowledge and social networks differ in different life stages (Jayawarna et al., 2011; Jayawarna et al., 2014). The life cycle of a woman entrepreneur can be viewed through three related and changing contexts: first, through the career life cycle, which is related to family background, education and work experience, which influence the choice of career and the experiences brought to entrepreneurship; second, through the family life cycle, which influences family and household roles and motivation for entrepreneurship; third, through the business life cycle, which is related to the ability to mobilize diverse resources and to business growth (Jayawarna et al., 2013). Due to the balancing of family life and work and household responsibilities, the attitude to entrepreneurial activity is also different in different life stages of men and women (Ekinsmyth, 2011). There are differences in the level and forms of social capital among different life stages of woman-owned enterprises. In our study we move from enterprise to the entrepreneur herself and propose hypothesis H1: There is a difference in the level and form of social capital of woman entrepreneurs at different life stages.

Social capital, which influences personality development and, consequently, the personality traits that condition and characterise an individual's entrepreneurial process, is acquired in the family and the immediate social environment (Coleman, 1988). Despite the large number of national programs to promote entrepreneurship in Scandinavia, which include mentoring, women entrepreneurs in Scandinavia do not find them as important as their close ties. For all women entrepreneurs, and especially for those who have expressed a stronger interest in growth, the greatest support in their entrepreneurial pursuits comes from family, relatives, and friends (Bogren et al., 2013). In pursuing their goals, individuals can benefit from what is called borrowed social capital (Burt, 2000), which in entrepreneurship means that someone from a close network provides access to a variety of resources, suppliers and information. The borrowed social capital provided by the family can be very important for women entrepreneurs and as Renzzuli et al. (2000) note, women have more connections in homogeneous networks in which several family members are

involved. This may indeed provide women with some resources, but being nested in a homogeneous network may also be a constraint on information acquisition, as they only have access to a certain number and content within that group.

The importance of parents has been recognized in several studies. Influenced by their upbringing and societal expectations, women are moving towards careers in the service sector, education, commerce, nursing and health care, but not so much into self-employed entrepreneurial occupations (Brush, 1992). Aldrich and Kim (2007) argue that the influence of parents on entrepreneurship in adulthood is insignificant, whereas parents influence their children's entrepreneurial decisions more through nurture and example in childhood and by instilling certain values in adolescence. However, Aldrich and Cliff (2003) illustrate the importance of parents and family life through values and norms in their model of a family embeddedness perspective on new venture creation. Based on the studies above, we propose H1a: Woman entrepreneurs in different life stages evaluate the degree of parental influence on their entrepreneurial path differently.

Parents, peers, school, work experience and the media influence expectations and the role of women in society. From these expectations, stereotypes, and expectations of the behaviour of girls and boys develop. It is not only the values and norms, but also the social status of the family, which depends also on the partner's income and attitudes towards entrepreneurship, that influences the decision for entrepreneurial actions (Renzzuli et al., 2000; Rønsen, 2012).

When a woman decides to become an entrepreneur, her husband is less likely to join her because of the flexibility and the possibility to work from home, given the importance of the family, but when a man decides to become an entrepreneur, his wife is more likely to join him, especially because of the greater flexibility to care for the family (Verheul et al., 2005). Recent studies (Naldi et al., 2019) show the importance of a partner's participation in childbearing and other household duties, as well as his employment status for women entering entrepreneurship.

The influence of values and norms in women's social structures is an important factor in their decision to become entrepreneurs (Lerner et al., 1997; Gupta et al., 2009; Shane, 2012)., In line with values, women in Israel choose to become entrepreneurs when their children are older and family demands are lower (Brush and Hisrich, 1999). On the other hand, another study shows that the concern for family and the desire for flexibility draws women with younger children into entrepreneurship (Rønsen, 2012). Another example of the influence of values regarding parenting is presented by Kautonen (2008) suggesting that changing cultural norms are the reason for the higher share of new woman entrepreneurs in older age. Motherhood may influence the decision to become an entrepreneur because of the desire for flexibility (Vadnjal, 2008; Sarri and Trihopoulou, 2005), as well as the decision to downsize a business because of parental care or to grow a

business to enable a better future for the family (Rouse and Kitching, 2006). Latest studies suggest that motherhood contributes to women business owners engaging with the identity of mumpreneur, which contributes to the creation of a hierarchy of entrepreneurial identities which reinforces the masculine norm (Lewis et al., 2022) Mumpreneurs have challenges that differ from country to country, but the studies show that the amount of time dedicated to business and the level of control business has over the family schedule are the issues all mumpreneurs face (Makola, 2022).

To account for the non-economic challenges that women entrepreneurs face as a result of their embeddedness in society, Brush et al. (2009) suggest a model of five building blocks that are important for any venture. They upgrade the model consisting of market, money and managerial skills with a block called motherhood, which metaphorically represents the embeddedness of each entrepreneur in family life and the obligations that can have a significant impact on entrepreneurial activity. Motherhood is not only being a mother but also a wife and a housewife. The impact of a partner, taking care of family and the impacts of children are considered in this factor. On this basis hypothesis H1b has been developed: Woman entrepreneurs in different life stages evaluate the degree of influence of motherhood on their entrepreneurial path differently.

The second block added to the 5M model (Brush et al., 2009) is the meso and macro environment, which captures the impact of cultural norms, prejudices, and expectations in our closer environment, and the functioning of different economic associations and institutions. We form strong social bonds with family, friends, neighbours, and classmates. Individuals who have parents, friends or neighbours who are entrepreneurs, and those who are encouraged by friends and family members, are more likely to embark on an entrepreneurial path themselves (Davidsson, 2003). Social structures and the norms within them influence attitudes towards entrepreneurship and hence an individual's decision whether to pursue an entrepreneurial opportunity, as these norms affect their assessment of the risks and returns of a particular entrepreneurial opportunity (De Carolis et al., 2009; Grichnik et al., 2014). In the process of changing career, family and business circumstances, the motives of women entrepreneurs also change (Jayawarna et al., 2013). In the career cycle, women reach a glass ceiling and decide to become entrepreneurs because of the impossible circumstances of their previous employment (Mallon and Cohen, 2001). Age may also be associated with greater involvement in the local community or the business community, which may influence proactive engagement in relationship building, and develop social skills and elaborated social strategies that enable them to build new business and interpersonal relationships helping them to seek new business opportunities and expand existing ones (Frese et al., 2007; König et al., 2010; Zhao et al., 2010; Hahn et al., 2012). There are differences in network connectivity and bridging social capital among different groups of women entrepreneurs (Neumeyer et al., 2019). We follow the 5M model of Brush

et al. (2009) and propose hypothesis H1c: woman entrepreneurs in different life stages evaluate the degree of influence of friends and acquaintances on their entrepreneurial journey differently, H1d: woman entrepreneurs in different life stages attribute different importance to inclusion in social networks.

In our study, we compare the social capital of women entrepreneurs according to the life cycle, in line with the career stages as proposed by O'Neil and Bilimoria (2005): (i) idealistic Achievement Phase (24 to 35 years), (ii) the Pragmatic Action Phase between the ages of 36 and 45, and (iii) the Reinvention Phase (46 to 60 years).

We observe the two dimensions of social capital, introduced by Samuelsson and Davidsson (2009): (i) emotional support and encouragement from the environment, and (ii) instrumental social capital, through which the entrepreneur accesses information, business partners and other resources relevant to her entrepreneurial process.

3. Methodology and sampling

We utilized the standard used in the US to represent women-owned businesses (WBENC 2018, 9) more accurately. A women-owned firm is one where women own, and manage at least 51% of the company. Instead of defining an individual, namely a woman entrepreneur, this definition defines a company. To identify companies where women entrepreneurs can be found, we used two criteria: (i) the company must have been founded by a woman who is also the director, and (ii) the director must also be a woman if the company was founded with a woman share of at least 30% (the same as above, but the threshold is lowered to 30%).

At Bisnode, a commercial register data analytics firm, the gender identification algorithm was created internally. The Business Register of Slovenia's database, which contains information on almost 140,000 registered businesses and sole proprietors, serves as the foundation. As a result, the database has roughly 45,000 company entities that satisfy the chosen standards for a woman-owned business. The questionnaire was distributed by email to 10,000 addresses following a second evaluation in which only email addresses with direct ownership of a person were included meaning that general-type emails like info@ were excluded from the sample. In total, 340 woman business owners answered the questionnaire completely, giving us a response rate of 3.4%.

The research instrument was compiled from a total of 18 different pieces of research (Parasuraman et al., 1996; Bird et al., 2001; Ruderman et al., 2002; Kolvereid, 2006; Carr and Sequeira, 2007; Vadnjal, 2008; Samuelsson and Davidsson, 2009; De Carolis, 2009; Patel and Fiet, 2009; Obschonka et al., 2011; Kuntarič et al.,

2012; Bosma et al., 2012; Bogren et al., 2013; Kreiser et al., 2013; Grichnik et al., 2014; Sharma et al., 2014). The questionnaire took about 30 minutes to complete. According to an analysis of the pilot survey, the question sets were statistically trustworthy, with Cronbach alpha values above 0.90 for most constructs and above 0.70 for all other cases. 200 legitimate, completed questionnaires were received one week following the start. After sending a follow-up email, we eventually received 340 filled-out questionnaires in just two weeks.

To compare the three groups of women entrepreneurs, we first utilized a chi-square test and an analysis of variance to look for any variations in the identified characteristics of human capital. The first approach is used to assess the relationship between categorical variables. The contingency table displays any age-related differences in the proportions of respondents. To make understanding easier, we have also included adjusted residuals. These inform us of how considerably the proportion (number) in each cell deviates from what is predicted when H0 holds or when the variables are uncorrelated.

In the case of numerical variables or variables measured by the agreement scale, analysis of variance was used. We looked for substantial differences in each variable's mean value between age groups. The significant differences between each pair of age categories were found using a post hoc test. Tukey's post hoc test was performed if Levene's F-test indicated that the variances were equal, else Tamhane's test, which does not make this assumption, was employed.

The number of variables in each construct varies. We converted the variables into composite variables to finally evaluate the hypotheses, yielding nine composite variables that were then the focus of the additional study. An analysis of variance was used to check whether the values of these nine composite variables varied depending on the age groups to evaluate the hypotheses. The discriminant analysis was then used to determine if the composite variables' representations of the chosen criteria adequately describe the differences between the predefined groups of women entrepreneurs.

We use questions relating to the pre-entrepreneurial period to observe the influences on the decision to become an entrepreneur, but we also include questions relating to the present moment to observe women entrepreneurs in real-time and the impact of different factors on their actual business.

The impact of four factors i.e., parents, motherhood, friends, and wider social networks, through encouragement and emotional support, and aspects of instrumental social capital, on the entrepreneurial performance of the respondents, is analysed in the first stage using chi-square statistics and analysis of variance, and then the assumptions of the model are tested further using discriminant analysis.

Hypotheses are first tested with a set of questions relating to the support from members of a network with strong ties. Women entrepreneurs first assess the strength of support from parents, a partner and friends and acquaintances (Samuelsson and Davidsson, 2009). The perceived support of family members and other members of the closest network is a subjective assessment of the individual, which shows how the women entrepreneurs themselves feel about this support (Carr and Sequeira, 2007). The criteria for the subjective assessment are taken from Kolvereid and Isaksen (2006). Women entrepreneurs answered a five-point scale on how they rate the opinion of their closest family members i.e., parents, partners, and friends, about their decision to become an entrepreneur.

Following Carr and Sequiera (2007), questions are also asked about the extent to which the opinions of those closest to her have influenced the entrepreneur. Hypotheses concerning the degree of influence of parents, motherhood and friends, acquaintances and other networks are also tested with a set of questions concerning instrumental social capital. The first set relates to the frequency of receiving entrepreneurial advice. Women entrepreneurs answer a question relating to role models in their network and assessing their level of influence on their current entrepreneurial activities (Renzulli et al., 2000; De Carolis et al., 2009; Bogren et al., 2013; Roomi, 2013; Grichnik et al., 2014).

As Jayawarna et al. (2014) note, entrepreneurship in adulthood is influenced by many childhood factors, including cultural capital acquired through parental influence. This includes not only parental entrepreneurship and the experience and attitudes towards entrepreneurship gained through it (Fairlie and Robb, 2007; Verheul et al., 2011), but also the incentive to pursue education, the number of children in the family, and the socioeconomic position of the family, which consists of income, education and occupation (Kreiser et al., 2013; Jayawarna et al., 2014; Sharma, 2014).

To measure the impact of motherhood and family involvement, we used the measures used by Ruderman et al. (2002) to measure the different roles of women managers.

4. Empirical data and analysis

The compounded values for variables (index) of social capital constructs are presented in Table 1. The compound value for the impact of parents for all groups is 2.06. It decreases with the age of the woman entrepreneurs, reaching 2.79 for the youngest group, 2.47 for the middle group and 2.16 for those aged 45+. Based on the analysis of variance and the post hoc test, it can be argued that there are statistically significant differences among women entrepreneurs of different age groups in the degree of parental influence on their entrepreneurial path ($F = 20.427$; $p = 0.000$). On this basis, we can support hypothesis H1a.

Table 1: Compounded variables (index) of social capital constructs

	Age (years)	Number	Mean Value	St. deviation	Leven F	p	F	p	Post hoc
Importance of Parents (H1a)	Under 36	82	2.79	0.68	4.155	0.007	20.427	0.000	to 35 years – other groups, 36–45 years – other groups
	36 – 45	108	2.47	0.73					
	Above 45	95	2.16	0.52					
	Total	55	2.06	0.57					
Importance of Motherhood (H1b)	Under 36	82	3.09	0.39	3.764	0.024	0.052	0.949	
	36 – 45	108	3.07	0.47					
	Above 45	150	3.08	0.54					
	Total	340	3.08	0.48					
Importance of Friends (H1c)	Under 36	82	2.65	0.64	0.201	0.818	7.086	0.001	Up to 35 years – other groups
	36 – 45	108	2.36	0.58					
	Above 45	150	2.36	0.62					
	Total	340	2.43	0.62					
Importance of wider social networks (H1d)	Under 36	82	2.39	0.45	0.234	0.792	2.075	0.127	
	36 – 45	108	2.29	0.42					
	Above 45	150	2.27	0.45					
	Total	340	2.31	0.44					

Source: Authors' calculation

The compound value for the impact of motherhood on entrepreneurship does not differ among women entrepreneurs of different life stages. The compound variable for all women entrepreneurs is 3.08, but it differs by 0.01 between groups. We cannot conclude that there are statistically significant differences in the impact of motherhood on women's entrepreneurship at different stages of life and cannot support hypothesis H1b.

The index of the influence of close friends, other relatives, and acquaintances on entrepreneurship for all women entrepreneurs is 2.43. The index is statistically significantly higher ($F = 7.086$; $p = 0.001$) for women entrepreneurs aged up to 35 years, at 2.65, while the value of the compound variable is the same for both groups of entrepreneurs aged over 35 years, at 2.36. The analysis of variance and the post hoc test provide for concluding that there are differences between women entrepreneurs of different age groups in the degree of influence of friends and acquaintances on their entrepreneurial path, and thus we can support hypothesis H1c.

The index of social network involvement is 2.31, which is the lowest (2.27) for woman entrepreneurs aged 45+, only slightly higher (2.29) for woman entrepreneurs in the middle age group and the highest for the youngest age group (2.39). The analysis of variance and the post hoc test do not confirm statistically significant differences ($F = 2.075$; $p = 0.127$) in the level of the composite variable of the importance of social network involvement for women entrepreneurs at different ages. We cannot support hypothesis H1d on this basis.

By combining the compounded variables for the four social capital constructs as presented in Table 2, we obtained a common compounded variable or social capital index, which represents the arithmetic mean of these four variables for each group of women entrepreneurs. The index of the level and form of social capital for all women entrepreneurs is 2.44 and decreases with the age of the women entrepreneurs.

Table 2: Compounded value for social capital

		Number	Mean Value	St. Deviation	Leven F	p	F	p	Post hoc
social capital	Under 36	82	2.60	0.34	0.042	0.959	11.716	0.000	Up to 35 years – other groups
	36 – 45	108	2.44	0.36					
	Above 45	150	2.36	0.35					
	Total	340	2.44	0.36					

Source: Authors' calculation

The social capital index for woman entrepreneurs up to 35 years of age is 2.60 and is statistically significantly different from the other two groups. The social capital index for woman entrepreneurs aged 35-45 is 2.44 and for female entrepreneurs aged 45+ it is 2.36. Based on the analysis of variance, it can be argued that the level and form of social capital differ statistically significantly between women entrepreneurs at different ages ($F = 11.716$; $p = 0.000$). On this basis, the composite hypothesis H1 can be supported.

5. Results and discussions

The hypothesis H1 of this research has been supported. The compounded values of social capital of women entrepreneurs in different life stages differ. Women entrepreneurs in different life stages evaluate the degree of parental influence and the degree of influence of friends and acquaintances on their entrepreneurial journey statistically differently and the hypotheses H1a and H1c are proved. However, we cannot support hypotheses H1b and H1d, as women entrepreneurs in different life stages do not evaluate the degree of influence of motherhood on their entrepreneurial path differently, and do not attribute different importance to inclusion in social networks. Two of the four social capital factors considered, i.e., parental influence and the influence of friends, differ most between the groups. Women entrepreneurs at different ages do not differ in the importance they give to their involvement in social networks and wider networks, nor in the influence of motherhood. It should be stressed that motherhood captures the whole family life involvement, including both the influence of children and the influence of life partners. The analysis of individual factors did show differences in the influence of the life partner on the entrepreneurship of the youngest woman entrepreneurs, who are much more likely than older women to emphasize both emotional support and support in the form of advice and help provided by their life partner. However, all women entrepreneurs express a strong preference for family and children but do not see them as a barrier to their entrepreneurial journey.

Parents have much more influence on younger than on older women entrepreneurs, but emotional support from parents is also important for the latter. Younger women also consider information and entrepreneurial advice from their parents as important, as well as their unpaid help in the company. The development of entrepreneurship in Slovenia in recent years is also reflected in the fact that there are much younger woman entrepreneurs having fathers who own businesses with more than 10 employees, and their mothers also own larger businesses, while the mothers of older woman entrepreneurs at most owned businesses with fewer than three employees. The importance of parents as role models, mentors and, more generally, promoters of entrepreneurship in the early stages is also highlighted by Bosma et al. (2012), who argue that this role has so far been overlooked, but that it is an important one and can

be a good alternative to some of the costly channels of government-funded support for entrepreneurs. The importance of the role of the family for children and adolescents and the formation of their social capital and consequently their achievement in different areas is also highlighted by Dufur et al. (2013) when comparing the impact of the social capital that adolescents acquire at school and in the home environment. They also suggest changes to strengthen family capital and parent-child bonds, such as more opportunities for flexible working, which would allow parents to engage with the school and talk more with their children about their activities.

One would expect social networks and wider networks to be more important for younger women entrepreneurs, but the survey results do not show a difference in this impact on women entrepreneurs of different age groups. Interestingly, however, parents as well as friends and acquaintances, i.e., stakeholders who form strong ties, are very influential in the development of younger women entrepreneurs. While they are less inclined to volunteer in the wider community, friends and acquaintances are an important source of information for entrepreneurship and a source of emotional support. This includes mentors and coaches, who are only identified as important by the youngest woman entrepreneurs. They are also more involved in networking than the other two groups, but this does not show a statistically significant difference. It turns out that women entrepreneurs aged 45+, i.e., in the phase of giving back and reinvention, prefer to participate in associations, volunteer, and use social networks to get information, like all others, but do not consider the opinion of friends and acquaintances and do not need their help in entrepreneurship. Combining the findings of previous research showing that entrepreneurs in Scandinavia like to work in familiar surroundings close to family and friends, and researchers suggesting that it would be a good idea to look for answers to the question of how to encourage entrepreneurship in the existing population (Dahl and Sorenson, 2009), research on older entrepreneurs (Kautonen, 2008), and research on entrepreneurship in Scandinavia (Dahl and Sorenson, 2009; Kautonen et al., 2014) and the findings of our study, we suggest that designers of entrepreneurship acceleration programs should take into account the findings that older and younger entrepreneurs differ in human capital, social capital and motives. Entrepreneurship programs should target different groups, including different groups of women. It is also important to consider the strong role of family and friends and to create conditions conducive to maximizing the entrepreneurial decision-making of both younger and older women. We propose various media campaigns, raising awareness among family and life partners of the importance of woman entrepreneurship, and encouraging networking among older women entrepreneurs who, influenced by the positive experiences of others, might also decide to pursue a career other than self-employment during the period of reinvention and return. This is primarily about promoting social entrepreneurship and the possibility for women entrepreneurs to pass on their skills to younger generations. Given the importance of mentoring, actions to promote mentoring

are welcome in actions to support younger women entrepreneurs. Given the orientations and aspirations of women entrepreneurs in the 35-45 age group, this is a group in which it is a good idea to invest resources to help accelerate the growth of their businesses. It would also be important to organize training for this group on financing and the various options for investing in their businesses and to encourage women entrepreneurs to take an interest in venture capital.

For women entrepreneurs in the idealistic phase under 35 years of age, friends, parents, and partners are important sources of instrumental and emotional capital, which, in conjunction with the findings of Grichnik (2014) who studied bootstrapping activities, suggests that for these women entrepreneurs, exploiting weak ties is the most important part of this activity. To leapfrog to a stage where these women entrepreneurs will be able to recruit more and take the business to growth, they need to take a more pragmatic approach to networking, and additional financial training will also give them insight into alternative financing options. Younger women entrepreneurs are much more educated in marketing. All women entrepreneurs show a propensity to be educated, which may also influence their propensity to grow (Manolova et al., 2007), and with education, they also compensate for the lack of instrumental social capital, which they will acquire through more focused networking activities. Therefore, it would be worth introducing incentives to educate women entrepreneurs, while at the same time developing networking activities to encourage the interweaving of weak ties that are an important determinant of propensity to grow.

6. Conclusions

We started our research on the premise that entrepreneurship can be a career choice that women make for a variety of reasons. They may have given up their career to care for their family, they may choose self-employment instead of a partial decision, or they may choose entrepreneurship when their children grow up. Entrepreneurship can be just the start of a career path for young people who do not get a regular job, it can be an experience between two jobs.

The social capital factors that statistically significantly distinguish woman entrepreneurs at different stages of life are the influence of friends and acquaintances, and the influence of parents. Those factors are considered strong ties and differentially affect both instrumental capital and the aspect of emotional and moral support in the entrepreneurial journey of women.

From the results of our study, we suggest that women entrepreneurs in the idealistic phase will need more knowledge in financing and strategic management to be even more confident and successful in their journey and to recognize the opportunities and their capacity to take their business to a growth phase. Networking and

mentoring are already recognized as important by these women entrepreneurs and if they are given more external incentives and opportunities to do so, the flow of information will be even better. Given the importance of strong ties, partners and friends, entrepreneurship must be recognized as a positive activity in wider society. The strong attachment to a life partner and his/her thinking is recognized in this group, which also leads to a reflection on the importance of the support of the closest ones, for potential women entrepreneurs, as well as for existing ones who are thinking about expansion and more ambitious plans. More information and networking, where women entrepreneurs feel safe, will also help them to think about raising additional capital and expanding their business. Coaching and mentoring towards personal development, which emphasizes independence and self-confidence, would give women entrepreneurs and potential entrepreneurs a boost in their entrepreneurial decisions.

We see women entrepreneurs in the pragmatic phase as those who have taken up entrepreneurship after a period of working elsewhere, who do not look to others and who run their business perhaps the least emotionally of the three groups of women entrepreneurs. We assess them as women entrepreneurs who, with some external encouragement, could be dynamic. It is therefore important for them to gain more knowledge and confidence in modern forms of leadership and management, marketing, and various aspects of financing. Depending on their orientation, they should be offered additional forms of networking and perhaps also training within networks.

Women entrepreneurs who are in the reinvention phase do not show much interest in growing their businesses, as pointed out by researchers who have compared two age groups of entrepreneurs (Kautonen, 2008). They are dominated by those who want to be self-employed but no longer want to be employed. They are also more likely to be interested in voluntary work, to value family, and to be the group most interested in lifelong learning and training in organized seminars and workshops. This group needs to be empowered to pass on their knowledge, to be empowered to make a good transfer of business ownership and to be given a satisfactory entrepreneurial path for as long as they wish to do so. Some of these women entrepreneurs may still be suitable to invest more in growth, but the majority are those who have a lot to contribute to the entrepreneurial community.

The first limitation of this study stems from the fact that Slovenia does not have a systemically collected register of women-owned businesses. We therefore excluded women-owned businesses from the Slovenian Business Register database using a special algorithm developed by company Bisnode who at the time was a provider of business and credit information. The database is certainly more reliable than the databases of individual associations, but it is certainly not perfect. The survey was sent to the entire database at the addresses provided to the register as official addresses.

The selected variables have already been used to study social and human capital, but not always in the context of women's entrepreneurship. Based on recommendations from various articles in the field of women's entrepreneurship, we have also included some less commonly used factors in the analysis. The statements used to measure some hypothetical phenomena were taken from research in other cultural and linguistic contexts and, when translating them into Slovene, care had to be taken regarding certain features and differences in naming and understanding, where there is always a risk that the substantive understanding, at least in undertones, may be different from the original.

A large part of the factors was measured perceptually by the subjective assessments of the respondents. To avoid errors in the empirical analysis, we used several measures for each element. Hypotheses were assessed based on 5% statistical significance and tested in three steps. Selecting different factors might have yielded different results for the analysis of the constructs under consideration.

The model of women's entrepreneurship at different stages of life presented in this paper represents only one part of the factors that influence social capital, and we suggest that in the future it should also include motivational factors, measures of entrepreneurial orientation and aspirations of women entrepreneurs, and it would be interesting to see how the effects of all these factors change over the life cycle of a woman, which would of course require a longitudinal study.

Our model introduces the life-cycle theory of women into entrepreneurship theory, bringing us closer to understanding the external influences on women's entrepreneurial aspirations and motivations at different ages. Previous research has focused on the study of the entrepreneurial population, which has been divided into groups aged 20 to 50 and over 50 (e.g., Kautonen, 2008). In our model, however, we have studied women at three life stages. Given the results of the discriminant analysis, we would suggest that researchers divide the groups for further research in line with societal evolution and increasing longevity and extend the pragmatic action phase to age 50. We suggest that the model is also tested by women's entrepreneurship researchers in other settings.

Motherhood as a metaphor for family involvement consists of the influence of children and life partners, but we have not specifically addressed another important aspect, caring for elderly parents, which is emerging as a major challenge for the so-called 'sandwich generation'. We suggest that each of these three aspects be examined individually, as the results show that Slovenian women entrepreneurs are not influenced by children as a barrier, whereas many studies suggest that women in other countries choose entrepreneurship precisely because of the flexibility associated with the challenges of childcare and family care. Given the good childcare system in Slovenia, we could even present our model as a model of good practice in terms of entrepreneurship. It would also be worth examining the system

of care and care for the elderly and its impact on the entrepreneurship of older women entrepreneurs.

The empirical data collected in the research are cross-sectional, although a longitudinal data series would be much more representative of the impact and evolution of the groups of factors studied on women's entrepreneurship. We do not know how the youngest group of women entrepreneurs today will decide and behave. And given the rapid pace of social change, we cannot expect the model we are seeing today to still be valid in a few years.

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Društveni kapital i žene u poduzetništvu: karakteristike društvenog kapitala žena-poduzetnica u različitim životnim razdobljima

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Sažetak

Ovo istraživanje bavi se društvenim kapitalom poduzetnica u različitim životnim razdobljima. Glavna je hipoteza da žene-poduzetnice prolaze kroz različite razine i oblike društvenog kapitala prelazeći iz jedne životne faze u drugu u svom profesionalnom ciklusu. Promatramo emocionalnu potporu i podršku okoline, te instrumentalni društveni kapital putem kojeg žena-poduzetnica dolazi do informacija, poslovnih partnera i drugih resursa bitnih za njezin poduzetnički proces. Anketa je poslana e-poštom uzorku ženskih tvrtki dobivenih uz pomoć algoritma u poslovnom registru. Konačno, za statističku analizu koja koristi Leveneov F-test za potvrdu jednakosti varijanci, prikupljeno je u potpunosti odgovorenih 340 upitnika, a potom slijedi Tukeyev post hoc test. Inače, Tamhaneov test ne pretpostavlja jednakost varijanci. Na temelju rezultata studije nismo mogli potvrditi da različita životna razdoblja koja uključuju majčinstvo, roditeljstvo, biti i supruga i kućanica, imaju različite utjecaje na ženu poduzetnicu. Također ne možemo podržati hipotezu da postoji razlika u važnosti društvenih mreža. Međutim, naše istraživanje potvrdilo je razliku u važnosti utjecaja roditelja i utjecaja prijatelja i poznanika na njihov poduzetnički put.

Ključne riječi: *žene-poduzetnice, društveni kapital poduzetnica, društvena mreža, majčinstvo*

JEL klasifikacija: *L26, J16, M54*

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Preliminary communication
UDC: 330.34:658.7
https://doi.org/10.18045/zbefri.2023.2.499

The role of logistics in economic growth and global competitiveness*

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Abstract

There is a rising demand to find new patterns for economic growth and development, and improving competitiveness, where the role of logistics should be considered in more detail. The main purpose of the article is to examine and compare the effects of countries' logistics performance in EU, BRICS, and ASEAN, and to test the role of individual logistics components. The research method is based on panel data using fixed effects regressions for the period 2007-2018. The results confirm the positive impact of logistics on economic growth and competitiveness in the total sample and EU countries, while logistics contributes to rising competitiveness in BRICS countries. Individual contributions of LPI components were also identified, presenting the importance of sub-indices for economic growth and national competitiveness. The research implications emphasize the role of logistics as a factor of economic growth and development and highlight its potential in rising national competitiveness. The main contribution is new evidence on the effects of logistics at the level of selected groups of countries, which highlights the importance of this sector and provides recommendations for economic policymakers.

Keywords: *logistics performance index (LPI), economic growth, global competitiveness, panel data*

JEL classification: *O110, F0, F2, L9*

* Received: 19-09-2023; accepted: 21-12-2023

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1. Introduction

The importance of logistics can be highlighted in different dimensions of economic development. From the aspect of the national economy, the system of international logistics as a non-tariff trade facilitator affects the intensity of international trade in goods (Puertas et al., 2014; Gani, 2017; Bugarčić et al., 2020; Zaninović et al., 2020), energy (Górecka et al., 2022), creating and improving the investment environment in order to attract FDI (Luttermann et al., 2020; Bugarčić et al., 2023), eliminating the negative consequences of the crisis and as support in implementing the goals of sustainable development and structural reforms (Taqi et al., 2020; Mićić and Bugarčić, 2022). Logistics benefits in reducing costs, time of transport, safety, as well as the quality of logistics services have always been an important factor in stimulating competitiveness (Persson, 1991). Management of the logistics system, from the procurement of materials, through the distribution of semi-finished products and the delivery of final goods to customers, could be the key determinant of competitive advantage. Reducing transportation costs can accelerate industrial aggregation (Krugman, 1991), which potentially leads to better competitive advantages for the region or country that makes more progress in this field. The main motive for national logistics improvement is to stimulate competitiveness and achieve additional and continuous economic growth. Viewed as an integrated system, logistics encompasses a "complete system of information, packaging, storage, and transport that meets the requirements in terms of time, quality, quantity and cost" (Puertas et al., 2014).

According to OECD studies, logistics costs are up to 15% of the total turnover and its reduction can have a positive effect on the countries' international competitiveness (Engman, 2005). The share of logistics costs in the final cost of production is approximately 11%, which presents the global average. Observing the world's largest economies, logistics costs are 14% in China, 11% in the EU, and 10% in the US and Canada (Yergaliyev and Raimbekov, 2016). The efficient development of transport and logistics systems at the national level encourages the accelerated development of related industries and sectors of the economy. Flexibility, timeliness, completeness, integrity, and security can be highlighted as important factors of logistics, especially in crisis and circumstances of economic recession (Chornopyska and Bolibrukh, 2020). The stability of the logistics sector and its improvement would enable uninterrupted and accelerated business activities within the economy and more efficient connections with foreign markets. Improving the logistics system, as a connecting factor of different industries, suppliers and consumers, can provide an equal chance for the development of all individual industries and participants in supply chains.

The logistics performance index (LPI) defined by the World Bank can be used as a key determinant in accessing the level of international trade logistics development.

LPI was developed with the aim of assessing and monitoring the quality of logistics of individual countries with the possibility of identifying space and opportunities to improve their international position. The index was developed based on a global survey of logistics professionals who assess the individual characteristics of the logistics sector in the country in which they operate, as well as in the countries with which they cooperate (World Bank, 2020). The degree of national competitiveness can be measured by the Global Competitiveness Index (GCI), which in aggregate terms contains estimates of the relevant pillars of competitiveness. The results of the GCI 4.0 report from 2019 reveal that countries are still lagging in terms of improving national competitiveness, which is why new patterns need to be found to encourage it (WEF, 2019). For this reason, the article examines the degree and strength of logistics performance impact, as a potential factor in improving global competitiveness of national economies.

Our motivation is to investigate the effects of logistics performance on economic growth and the global competitiveness of national economies and make comparisons based on sample selection. We examine the impact on the total sample and compare the effects of logistics in different regions, which represents the main novelty compared to previous literature. Additionally, results provide some evidence regarding the contribution of individual LPI sub-indices. We use OLS and fixed effects regressions based on panel data for selected countries in the period 2007-2018. In line with that, the following hypotheses are tested:

H1: A better logistics system may have a positive impact on economic growth.

H2: National competitiveness depends on the development of the logistics system.

The paper consists of the following parts: after the introduction (1), a review of the literature will be presented (2), where the results of relevant research on the connection between logistics and economic growth (2.1), as well as logistics and competitiveness (2.2), will be presented separately. After that, the research methodology and used data will be explained in detail (3). Empirical findings (4), discussion (5), and concluding remarks (6) with recommendations for policymakers and future research.

2. Literature review

The literature review is structured and divided into two parts. The first part analyses previous research in the context of logistics and economic growth, and the second part analyses logistics and competitiveness.

2.1. Logistics and economic growth

Logistics, as part of the value chain includes planning, implementation, and control of the efficiency of the flow of goods, services, and information from the place of origin to the place of consumption (De Souza et al., 2007). The related activities include transportation, storage, and packaging. Improving logistics can have positive consequences for economic growth and development in several ways, through increased demand for goods and services due to greater investment in logistics infrastructure and better logistics services (Roller and Weverman, 2001). Furthermore, better logistics infrastructure increases transport efficiency and reduces additional costs that would arise due to inadequate development of the logistics sector (Gunasekera, Anderson, and Lakshmanan, 2008). Logistics systems may be one of the most important driving forces for economic growth, regional development, investment inflow, employment, and per capita income (Cheng et al., 2010; Sezer and Abasiz, 2017). Research (Chu, 2012) shows that the contribution of investment in logistics development is especially important for less developed areas and provinces. Wang, et al. (2021) performed Granger causality tests between the logistics infrastructure and economic development indicators under the VAR and VECM frameworks. The empirical results suggest that there is a long-run relationship between the logistics infrastructure and the economic development in China. The main finding is that logistics infrastructure causes economic development and has a key role in promoting economic growth. Analogously, Lean et al. (2014) have proved that economic growth causes logistics output, implying that economic development causes more demand for logistics services and hence leads to logistics development. Better logistics infrastructure could cause economic growth, through a reduction of transportation time and increased traffic volume. Improvement in land and railway transport infrastructure initiates economic growth with a feedback effect. In this way, economic and logistics development are interrelated, where the advancement of one, leads to the progress of the other, and vice versa, so the relationship between logistics and economic development is interactive. Further economic development requires continuous improvement of the logistics industry and its progress (Zhu et al., 2008).

The development of logistics at the national level implies the improvement of four key components, namely, infrastructure, institutional environment, service providers, and shippers (Banomyong et al., 2008). To these dimensions of logistics can be added the integration of peripheral areas and the emphasis on the importance

of standardization and improvement of technology to intensify trade and strengthen the industry. Coto-Millán Fernández et al. (2016) found, using the LPI, that a 1% improvement in logistics performance contributes to a 0.59% improvement in technical efficiency. In this way, the development of logistics gives a positive impetus to the development of technology that further gives impetus to economic growth and the improvement of industrial production. Kovács and Kot (2016) point out that faster changes in the market and higher consumer demands require a greater degree of efficiency in logistics services. The authors note that modern production processes, supply chains, and transport activities are key elements that require improvement to act on economic growth and by the requirements of the new industrial revolution and Industry 4.0.

A large number of researchers pay attention to logistics as a factor of trade facilitation, which consequently, through the connection of international trade, can lead to industrial and economic development. Lai et al. (2019) proved on the example of ASEAN countries that trade liberalization and transport development are interconnected and mutually reinforce the positive effects on international trade. Trade facilitation effects have remarkable effects in developed countries, but they are particularly important for developing countries, where logistics play an important role in trade promotion and economic development (Çelebi, 2019). In addition to the direct impact, the effects of logistics on economic growth can have an indirect impact, as a mediator of the relationship between competitiveness and economic growth. At the same time, logistics acts as a reinforcing factor of the impact of GCI on GDP growth, thus contributing to a more significant positive impact of national competitiveness on economic growth and development (Civelek et al., 2015; D'Aleo and Sergi, 2017b). In other words, better logistical support, improved competitiveness and other related parameters of economic development will give better results for the country, than would be the case if the network of logistics infrastructure and services would not be at a satisfactory level. The impact of logistics performance on economic growth and development can be particularly significant for developing countries (Saidi et al., 2020; Nguyen et al., 2021) and African region (Chakamera and Pisa, 2021), where this sector can serve to initiate and accelerate the development of these countries.

2.2. Logistics and competitiveness

The future of national economies will develop around the ability to find new ways to stimulate economic growth and maintain greater competitiveness. According to D'Aleo and Sergi (2017b), global competitiveness is a correct variable to assess economic growth and it has a crucial role in economic recovery and development. Using Baron and Kenny's model, the authors came to the conclusion that logistics performances have a mediator effect on the relationship between GCI and GDP, so logistics and global competitiveness, considered together, are good predictors

of economic growth. An improvement of the logistics sector, framed in a general perspective of competitiveness and growth, could become a winning factor for national economies. The elevation of the logistics industry could force logistics as a national production factor, thereby contributing to reducing national freight costs and improving global competitiveness (Havenga, 2018). Considering the fact that the volume and nature of international trade mostly depend on changes in transport costs (Behar and Venables, 2011), logistics as a trade facilitation factor can contribute to a better competitive advantage for the economy in the sense of cost reduction and better national conditions.

One of the key competitive advantages provided by logistics is that its improvement reduces transport costs and obstacles in the form of distance, which can successfully neutralize various costs related to international trade of goods (Halaszovich and Kinra. 2020; Bugarčić et al., 2020). In this way, the improvement of logistics infrastructure and especially logistics services within an economy can consequently contribute to the improvement of the global competitiveness of the economy, especially in the field of industrial products. Logistics contribute to economic growth and development, as well as improving competitiveness by being an important factor in attracting foreign and domestic investments (Hong, 2007), which is widely regarded as an important engine of economic growth. The timeliness of delivery is a crucial factor in international trade, and this segment of logistics stands out as a key factor of competitiveness (Zaman and Shamsuddin, 2017). There is a great chance that companies, and thus the economy in which they operate, will achieve a greater competitive advantage if they perform their activities accurately, efficiently, and on time, with a certain level of security. Additionally, the human factor can play an important role in determining the level of competitiveness of the logistics sector and thus the entire economy (D'Aleo and Sergi, 2017a).

Beysenbaev and Dus (2020) emphasize the great role of logistics in the development of the country at the international level. By improving the elements of logistics, the country achieves a better position in international markets, either through the benefits of direct international trade or as an intermediary and logistics hub in international trade flows. Logistics performances play a very important role in increasing the country's competitive position at the international level, primarily through the improvement of certain logistics subcomponents: international transportation, tracking and tracing, and timeliness. This conclusion is found (Çemberci et al., 2015) by examining the moderating impact of the GCI on LPI. Evaluating logistics cluster competitiveness among Asian countries based on Porter's diamond model, Chung (2016) found that there is a big difference in logistics cluster competitiveness between the observed countries so, economic policymakers should pay more attention to this issue, especially in less developed countries. Zaninović et al. (2020) observed the effects of LPI on bilateral trade

flows in the example of European Union countries, where they concluded that new EU members must improve their logistics systems in order to move closer to developed members through better transport corridors, reduced freight times and improved shipment price competitiveness. The link between logistics performance and the level of competitiveness must also be taken into account by the specific group of countries (Sergi et al., 2021).

Tongzon (2007) suggested several areas that need to be improved in order to raise the competitiveness of logistics hubs: establishing a free trade and investment environment; increasing the number of qualified human resources and logistics specialists; increasing the degree of transparency of government industrial policies; more efficient administration and promoting mutual cooperation between government and the private sector. Certain research shows that demand for products in some areas is determined by the level of quality of logistics and demand for logistics services (Du and Yan, 2008). Therefore, the way to stimulate demand for certain products should be stimulated by improving the quality of logistics services. Efficient transport and logistics systems provide a chance for the economy to attract companies from certain industries and thus improve the country's position in the international trade and production network (Yergaliyev and Raimbekov, 2016). In order to stimulate international trade, improving logistics performance has a greater impact on exports than on imports of goods (Puertas et al., 2014). This evidence is particularly suitable for export-oriented industries that may seek a chance to increase the placement of their products in foreign markets by looking at space for improvement of logistics performance, especially logistics service competence and tracking of consignments. Andrade et al. (2014) indicate the great importance of reverse logistics as a potential for companies to improve their competitiveness, which can have positive effects on the whole economy. Reverse logistics can stimulate positive effects in the form of sustainable economic development and maximum utilization of used production resources. Another way to improve logistics performance could be through certain dimensions of global competitiveness (Ekici et al., 2019), which indicates the existence of a strong connection between these segments of the economy.

3. Methodology and data

Our main goal is to examine the impact of logistics performance on economic growth and global competitiveness in selected groups of countries. The analysis includes EU28, BRICS and ASEAN countries. We also strive to identify potential differences in these regions. Biannual panel data is used for the available period from 2007 to 2018. Among selected countries, Malta, Lao PDR and Myanmar were excluded due to missing data. We raised our models based on Chu (2012) which includes logistics performance as a proxy variable:

Model 1:

$$Growth_{it} = \beta_0 + \beta_1 LPI_{it} + GDPGrowth_{it} + CIP_{it} + lnPOP_{it} + Unemp_{it} + \\ + GOVexp_{it} + \mu_i + v_{it}$$

Model 2:

$$Competitiveness_{it} = \beta_0 + \beta_1 LPI_{it} + GDPGrowth_{it} + CIP_{it} + lnPOP_{it} + \\ + Unemp_{it} + GOVexp_{it} + \mu_i + v_{it}$$

where i indexes countries; t time, i.e. years; μ_i captures the countries fixed effects; v_{it} is the transitory error term. For the measure of economic growth, we select lnGDP per capita (World Bank, 2021), while data for GCI are taken from World Economic Forum (WEF, 2018) and used as a measure of competitiveness. The reason for choosing GDP per capita as a measure of economic growth is that it reflects and catches the changes in an economy, as opposed to the overall level that can lead to bias in assessing real effects. Previous research which includes per capita level in empirical research proved its relevance (Barro and Lee, 1993; Ozturk and Acaravci, 2010). Also, the difference compared to the initial model of Chu (2012) is the use of LPI as a measure of logistics whose data is available for shorter period. The composite index LPI is used to express the overall country-level logistics performance. As LPI, which represents the main variable of interest in our model, reflects the state of logistics for two years (the given year and the year before), we did not include the lags in our model. To avoid potential biases, we use control variables based on Chu (2012). Thus, we include IMF data for real GDP growth, lnPOP (Population), Unemp (Unemployment rate), GOVexp representing government expenditure in % of GDP and CIP index (Competitive Industrial Performance Index – (UNIDO, 2019). LPI contains the following six components (World Bank, 2020):

- Customs – efficiency of customs and cross-border procedures;
- Infrastructure – quality of physical infrastructure;
- International shipments – ease of arranging shipments with competitive prices;
- Logistics competence – logistics service quality;
- Tracking and tracing – ability to track and trace consignments;
- Timeliness – delivery at the agreed or expected time.

We conduct analysis using OLS and fixed effects and compare results. As a further step, we look at results on region level, based on included dummies. At the end, we strive to identify and compare the impact of individual logistics performance on economic growth and competitiveness, where the following models were formulated:

Model 3:

$$GROWTH_{it} = \beta_0 + \beta_1 LPIcomponents_{it} + GDPGrowth_{it} + CIP_{it} + lnPOP_{it} + \\ + Unemp_{it} + GOVexp_{it} + \mu_i + v_{it}$$

Model 4:

$$Competitiveness_{it} = \beta_0 + \beta_1 LPIcomponents_{it} + GDPGrowth_{it} + CIP_{it} + \\ + lnPOP_{it} + Unemp_{it} + GOVexp_{it} + \mu_i + v_{it}$$

In order to have robust results based on selected methodology, we applied kurtosis and skewness test, as well as Jarque Berra test and results differ through selected variable. The final judgment on the normality of the distribution for all observed variables was made based on the Shapiro–Wilk test. The results of this test confirm the normality of the distribution. VIF test is conducted for all regressions to test multicollinearity. In all cases it is less than 5 which indicates no multicollinearity problems. Additionally, equations 3 and 4 include separate regressions for each LPI component to avoid multicollinearity problems since those sub-indices are part of the same overall index. To control for heteroskedasticity we apply robust function in regressions and use fixed effects in selected model to avoid endogeneity issue. At the same time, the results of the Hausman test suggest that it is appropriate to prefer a fixed-effects model over a random-effects model. Also, Based on Pedroni panel cointegration test results ($p < 0.05$) it could be concluded that there is the existence of a robust long-run relationship between GDPpc and explanatory variables as well as for GCI and explanatory variables.

4. Empirical results

In order to avoid spurious regression and to check the stationarity of the panels, Levin-Lin-Chu unit-root tests were conducted (Levin et al., 2002). The null hypothesis of the unit-root test is *Panels contain unit roots*, the alternative is *Panels are stationary*. The test results presented in Table 1 indicate that all panels are stationary.

Table 1: Levin-Lin-Chu panel unit root test

Variable	adjusted t	p-value
LPI_Score	-58.8497	0.0000
Customs	-35.5716	0.0000
Infrastructure	-1.00E+02	0.0000
International_shipments	-33.8491	0.0000
Logistics_competence	-20.0807	0.0000
Tracking_tracing	-28.9681	0.0000
Timeliness	-52.9808	0.0000
lnGDPpc	-28.3286	0.0000
GCI	-14.0927	0.0000

Note: Number of panels: 39; Number of periods: 6; Time trend: not included; Panel means: included; ADF regressions: 1 lag

Source: Authors' calculation

Table 2 presents descriptive statistics for the LPI overall score, its sub-indices, and dependent variables. Among the observed variables, the lowest average value among the LPI components is recorded in the efficiency of customs procedures, which indicates room for improvement in this area. Also, the customs component has the lowest minimum and maximum value of the index and, in addition to infrastructure, has the highest level of standard deviation among the observed countries. According to the analyzed groups of countries, the EU-28 has the highest quality of logistics performance.

Table 2: Descriptive statistics

Total sample					EU-28	BRICS	ASEAN
Variables	Mean	Std. Dev.	Min	Max	Mean		
Independent							
LPI_Score	3.42	0.4510	2.37	4.23	3.50	3.17	3.20
Customs	3.20	0.5201	1.94	4.18	3.27	2.79	2.97
Infrastructure	3.33	0.5849	2.12	4.44	3.43	3.10	3.02
International shipments	3.33	0.3741	2.19	4.24	3.40	3.11	3.21
Logistics competence	3.39	0.4906	2.29	4.31	3.48	3.20	3.13
Tracking tracing	3.47	0.4804	2.17	4.38	3.55	3.24	3.25
Timeliness	3.82	0.4184	2.75	4.80	3.91	3.58	3.60
Dependent							
GDPpc	26,249	22,904	632	118,824	28,769	7,257	11,170
GCI	4.66	0.5115	3.48	5.70	4.68	4.41	4.55

Source: Authors' calculation

Table 3 presents the correlation matrix for LPIs and dependent variables. There is a positive correlation between all observed logistics performance and GDPpc, also in relation to GCI.

Table 3: Correlation matrix

Variables	1	2	3	4	5	6	7	8	9
LPI_Score (1)	1.0000								
Customs (2)	0.9598	1.0000							
Infrastructure (3)	0.9683	0.9343	1.0000						
International shipments (4)	0.9195	0.8578	0.8449	1.0000					
Logistics competence (5)	0.9740	0.9207	0.9484	0.8795	1.0000				
Tracking tracing (6)	0.9571	0.8887	0.9187	0.8519	0.9320	1.0000			
Timeliness (7)	0.9214	0.8547	0.8584	0.8279	0.8679	0.8653	1.0000		
GDPpc (8)	0.7155	0.7321	0.7229	0.5912	0.6909	0.6576	0.6718	1.0000	
GCI (9)	0.8487	0.8477	0.8461	0.7564	0.8505	0.7843	0.7383	0.7141	1.0000

Source: Authors' calculation

Table 4 presents regression results for the total sample and for observed country groups. The results show a positive statistically significant impact of overall logistics performance on economic growth in the total sample, and for EU28 as well, which proves the H1 hypothesis. The LPI coefficient is not significant for BRICS and ASEAN mainly due to the small number of observations in those sub-samples, where we are aware of that issue regardless of the maximum possible number of countries and years included. However, despite the limited number of observations, the richness of the data structure enables the examination of trends and patterns over country groups. Also, panel regression can capture individual dynamics and control for unit-specific characteristics through fixed effects models and even with a small number of units, understanding the effects in individual country groups over time. Still, we made our interpretations and conclusions mainly based on the total sample. Regarding results, there is no big difference depending on the estimation method on the total sample and we choose to present fixed effects results for country groups. Regarding the influence of control variables, the CIP index has a strong impact, especially for ASEAN, which justifies the role of these countries as industrial production hubs. Population has a slightly negative impact

on GDPpc, which is reasonable. Also, the unemployment rate negatively affects GDPpc except for the EU. Government expenditure shows the role of public investments in gaining economic growth.

Table 4: Logistics and economic growth: a panel data approach

	Estimation model Total sample		Country groups		
Variables	1	2	EU28	BRICS	ASEAN
LPI_score	0.714***	0.681***	1.278***	0.065	0.101
	(0.118)	(0.131)	(0.100)	(0.172)	(0.178)
GDPgrowth	-0.012	-0.013	-0.023	-0.017	0.003
	(0.013)	(0.015)	(0.015)	(0.024)	(0.023)
CIP	2.002***	2.150***	1.545***	-1.769	14.656***
	(0.546)	(0.601)	(0.533)	(4.156)	(1.577)
lnPopulation	-0.230***	-0.232***	-0.269***	-0.286	-0.055
	(0.032)	(0.032)	(0.032)	(0.243)	(0.071)
Unemployment	-0.013**	-0.011*	0.013**	-0.046***	0.105***
	(0.006)	(0.006)	(0.006)	(0.010)	(0.027)
GOVexp	0.030***	0.030***	0.004***	0.015	0.013
	(0.005)	(0.005)	(0.006)	(0.018)	(0.015)
Estimation method	OLS	Fixed effects	Fixed effects	Fixed effects	Fixed effects
R-squared	0.8352	0.8407	0.8062	0.9681	0.98
Observations	193	193	150	19	24

Note: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: Authors' calculation

Table 5 shows the effects on national competitiveness, measured through GCI, also using OLS (1) and fixed effect estimation (2) methods. The results show a significant positive impact of overall logistics performance on global competitiveness in all cases, except for ASEAN. As previously mentioned, the small number of observations for this country group is one of the limitations, but we can confirm the initial assumption that countries' national competitiveness depends on the level of logistics system development, proved by the total sample, EU28, and BRICS. Thus, H2 is confirmed. Results also show that industrial performance is key to building national competitiveness. Population has a negative sign in the total sample and EU, while unemployment is a significant and important factor for competitiveness in all cases. Government expenditure only shows the influence of BRICS, and it is negative, which raises the question of its structure for future research in this area.

Table 5: Logistics and global competitiveness: a panel data approach

	Estimation model		Country groups		
Variables	1	2	EU28	BRICS	ASEAN
LPI_score	0.821***	0.823***	0.926***	0.401***	0.234
	(0.058)	(0.062)	(0.083)	(0.103)	(0.202)
GDPgrowth	-0.005	-0.005	-0.004	0.013	0.033
	(0.007)	(0.008)	(0.010)	(0.020)	(0.022)
CIP	0.652***	0.650***	0.857***	-0.596	12.588***
	(0.239)	(0.242)	(0.284)	(4.217)	(1.548)
lnPopulation	-0.028***	-0.027***	-0.077***	-0.196	0.078
	(0.013)	(0.013)	(0.020)	(0.258)	(0.080)
Unemployment	-0.025***	-0.025***	-0.020***	-0.037***	0.112***
	(0.003)	(0.003)	(0.004)	(0.008)	(0.030)
GOVexp	-0.003	-0.003	0.001	-0.031***	0.003
	(0.003)	(0.003)	(0.004)	(0.013)	(0.021)
Estimation method	OLS	Fixed effects	Fixed effects	Fixed effects	Fixed effects
R-squared	0.7786	0.7805	0.8128	0.8741	0.9337
Observations	193	193	150	19	24

Note: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: Authors' calculation

Results presented in Table 6 seek to point out the importance of individual elements of the logistics system for economic growth and global competitiveness. The applied fixed effects methods include the same control variables as for overall LPI regressions. We present only the coefficients for LPI sub-indices because the other variables behave in the same way as in previously presented results. All coefficients are statistically significant for LPI sub-indices where infrastructure and logistics competencies have the strongest impact on economic growth. On the other side, LPI sub-indices seem to have a slightly stronger impact on competitiveness, especially the efficiency of customs procedures and logistics competencies as well. Improvement of the quality of logistics services and providers' competencies could make a positive contribution to economic development and should be considered as policy recommendations along with customs, infrastructure, and other components.

Table 6: Impact of LPI sub-indices

Variables	lnGDP_pc	GCI
Customs	0.479***	0.702***
	(0.109)	(0.055)
Infrastructure	0.638***	0.678***
	(0.099)	(0.048)
International_shipments	0.408***	0.610***
	(0.132)	(0.067)
Logistics_Competence	0.642***	0.797***
	(0.111)	(0.050)
Tracking_Tracing	0.532***	0.594***
	(0.108)	(0.058)
Timeliness	0.547***	0.545***
	(0.121)	(0.065)

Note: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: Authors' calculation

5. Discussion

The presented results are in accordance with the initial assumptions and provide a supplement to previous research. The previously emphasized indirect role of logistics in economic development (Roller and Weverman, 2001; Gunasekera et al., 2008), as well as its role as a mediator in the relationship between national competitiveness and economic growth (Civelek et al., 2015; D'Aleo and Sergi, 2017b), is now empirically confirmed through the direct impact of LPI on GDP per capita. This evidence is in accordance with Cheng et al. (2010), Kovács and Kot (2016), and Sezer and Abasiz, (2017), who note the role of logistics as one of the leading forces in achieving economic growth and development. The impact of logistics performance on economic growth has been proven in the total sample but is especially important in the EU. It proves the role of logistics as one of the factors for achieving the level of economic development in those countries.

Other country groups, especially the ASEAN countries, which include some of the world's largest exporters and production hubs obviously rely on logistics, but we did not prove the direct impact on economic growth. Logistics importance for ASEAN could be indirect through its proven impact on the intensification of international trade in this region (Wong et al., 2019). Bookbinder and Tan (2003) analyzed the differences in logistics systems in Asian and European economies, emphasizing the importance of continuous improvement of national logistics in both regions and we can make the same conclusions for the total sample. The third analyzed country

group, BRICS countries, represents large economies with a strong need to develop infrastructure and logistics services to allow easier access and a better position in international markets. However, there is no clear indication of the direct contribution of logistics to economic growth in these countries. In terms of individual components of logistics, the positive impact is recorded for all LPI sub-indices, especially for logistics competencies. Infrastructure also has a positive impact on economic growth, which justifies the efforts of developing countries to develop this area.

When it comes to stimulating the level of national competitiveness, the growing importance of logistics has been proven. The research results confirm the assumption that logistics can be treated as a national production factor that contributes to reducing transport costs and improving the country's position in the global environment (Havenga, 2018). Reducing spatial barriers (Halaszovich and Kinra, 2020; Bugarčić et al., 2020) and removing barriers to international trade enables a more competitive global environment, where the success of countries' participation in international markets predominantly depends on competitive position represented through logistics quality and transportation costs. The results suggest the conclusion, which is in line with Beysenbaev and Dus (2020), that the role of logistics and its elements is one of the main instruments for a country's position in an international environment.

In terms of the individual impact of logistics determinants on improving the country's competitive position, all categories of LPI also have a positive impact on GCI, while logistics competence and the quality of logistics services stand out as the most influential factors together with customs procedures. If logistics providers are at a high-quality level, it will enable more efficient performance for all market participants. On the other side, Zaman and Shamsuddin (2017) specifically emphasize the delivery timeliness component. In the context of observed country groups, Sergi et al. (2021) indicate that different countries have different requirements in terms of the need to improve logistics performance, with the human factor being the most important element in European countries, and Asia having a great need to improve infrastructure. This also points to other segments of the logistics system.

6. Conclusion

This paper analyzes the impact of logistics performance on key dimensions of economic development, economic growth, and national competitiveness. A step forward in relation to previous research has been made in terms of testing the impact of different components of logistics, as well as in sample selection and presenting the results for the total sample and according to selected economic groups. The results indicate the validity of logistics as a determinant of economic development. The results are in line with initial assumptions and previous evidence on the total sample and provide new insights considering EU28, ASEAN, and BRICS.

The first hypothesis that assumes a positive impact of the logistics system on economic growth was confirmed in the total sample and for EU28. From individual components, the strongest impact is recorded for infrastructure and logistics competence, which can justifiably be considered the most important component of LPI in this context (Rezaei et al., 2018). The second hypothesis confirms that logistics affects the level of countries' national competitiveness, which can now be considered an important dimension of global competitiveness. The individual impact has also been confirmed for logistics competence and customs procedures efficiency with the greatest contribution to improving the country's position in international markets.

The role of logistics as a determinant of national competitiveness and economic growth can be emphasized as a theoretical implication in these areas. It can be stated as a logistics advantage in a contemporary environment. Practical implications can be reported for economic policymakers who can use logistics as an instrument for achieving development goals, especially in regions with active participation in international trade processes. The research limitations are related to the limited period of observation, due to the availability of LPI. Also, the analysis is conducted on an aggregate level and includes three regions. Future research could focus on product/industry levels in order to identify the most relevant areas for gaining competitive advantages through logistics. Also, the model should be extended to include more variables and compare the results in a longer time series.

Acknowledgment

This paper has been fully supported and funded under the project line ZIP UNIRI of the University of Rijeka, for the project "ZIP-UNIRI-2023-2".

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Uloga logistike u gospodarskom rastu i globalnoj konkurentnosti

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Sažetak

Sve je veća potražnja za iznalaženjem novih obrazaca za gospodarski rast i razvoj, te povećanje konkurentnosti, pri čemu treba detaljnije razmotriti ulogu logistike. Glavna svrha članka je ispitati i usporediti učinke logističkih performansi zemalja EU-a, BRICS-a i ASEAN-a te testirati ulogu pojedinih logističkih komponenti. Metoda istraživanja temelji se na panel podacima uz primjenu regresije fiksnih učinaka za razdoblje od 2007. do 2018.godine. Rezultati potvrđuju da logistika ima pozitivan utjecaj na gospodarski rast i konkurentnost u ukupnom uzorku i zemljama EU-a, dok logistika doprinosi rastu konkurentnosti u zemljama BRICS-a. Identificirani su i pojedinačni doprinosi komponenti LPI-a, koji pokazuju važnost pod-indeksa za gospodarski rast i nacionalnu konkurentnost. Implikacije istraživanja naglašavaju ulogu logistike kao čimbenika gospodarskog rasta i razvoja te naglašavaju njezin potencijal u povećanju nacionalne konkurentnosti. Glavni doprinos su novi dokazi o učincima logistike na razini odabranih skupina zemalja, koji ističu važnost ovog sektora i daju preporuke kreatorima ekonomske politike.

Ključne riječi: *Indeks logističkih performansi (LPI), gospodarski rast, globalna konkurentnost, panel podaci*

JEL klasifikacija: *O110, F0, F2, L9*

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Preliminary communication
UDC: 658.89:33(497.5)
https://doi.org/10.18045/zbefri.2023.2.521

Attitudes and behaviors of the young generations in the context of the sharing economy concept in Croatia*

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Abstract

Due to the growing importance of new generations in upcoming market trends, attitudes, and behaviors of the young generation (Millennials and Z generation) towards the use of the sharing economy (SE) concept in Croatia were explored. The literature that connects SE and sustainability, and the Millennials and Z generation, with economic, social, technological, and environmental SE factors, was examined. A survey on a sample of 181 respondents was also conducted. The results present the attitudes of the young generation on SE factors, which SE concepts they use, and which they intend to use. Good command of new technologies, ratings and comments on the Internet are important. SE brings benefit to individuals and the economy and helps in preserving the environment. The biggest disadvantages of SE are pricing and socialization, while the advantage is accessibility. Those who use it least often have a significantly lower perception of the safety. The Z generation values influencer recommendations in SE usage more than Millennials. Also, younger participants, those who are more of a Z generation, had a lower perception that sharing helps in waste reduction. Booking.com and Uber are most often used, and apps for food delivery and skill sharing

* Received: 14-12-2023; accepted: 22-12-2023

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have the greatest perspective. This paper provides information about the attitudes, behaviors, and motivation of young people for using certain categories of SE, for both policymakers and managers of companies involved in SE businesses.

Keywords: *sharing economy, Croatia, Generation Z, Millennials, consumer behaviour*

JEL classification: *M31, D12, L14*

1. Introduction

The sharing economy (SE) encompasses transactions on online platforms through which people can access goods and services they do not own. It is generally based on a network that connects people and communities and hence transforms the way goods today are produced (e.g., Quirky), consumed and redistributed (e.g., thredUp), funded (e.g., Zopa, SyndicateRoom, Kickstarter, and LendingClub) or learned (e.g., Coursera). Examples of SE also include service exchange (e.g., TaskRabbit, ZipJet, Instacart, and Deliveroo), circulation of goods (e.g., eBay), ride-sharing (e.g., Uber, Lyft, and BlaBlaCar), renting real estate and accommodation exchange (e.g., Airbnb, VRBO, LovwHomeSwap, and HomeAway), car sharing (e.g., GetAround, Enjoy, Zipcar, Car2Go, BMWs Drive Now), professional services (e.g., Upwork and HolterWatkin), craft marketplaces (e.g., Etsy), peer-driven production models (e.g., Ponko) and other forms of peer-to-peer exchange (e.g., Lending Club and Prosper). Botsman (2013) and Brozović et al. (2019) described these examples in more detail, classifying various SE models according to who owns the assets and controls the offering: the users or the underlying platform.

In addition to the term sharing economy, in academic sources these models also appear under the phrases peer-to-peer economy, collaborative economy, collaborative consumption, on-demand economy, gig economy and access-based consumption (Brozović et al., 2019).

SE practices often may have significant effects on reducing resource consumption and increasing sustainability (Botsman, 2013; Hamari et al., 2015; Yates, 2018). Specifically, when people share goods and services, waste is reduced, and resources are saved. For example, instead of owning a car, people can use ride-sharing services, reducing the number of cars on the road and the associated emissions. However, for the SE to contribute to sustainability, it needs to be carefully regulated and all related activities directed (PwC, 2015).

Although this concept is not new – for example, second-hand shops where people sell things they no longer use – SE models today are based on the idea of sharing the resources that people own and optimizing their use primarily through digital platforms. Technology has significantly changed the lifestyle and behavior of consumers, especially the younger generation, who are the biggest consumers of the SE (Kong et al., 2020; Chuah et al., 2021; Anaya and De La Vega, 2022; Boateng

et al., 2019; Ma et al., 2019). In addition to Millennials, there is Generation Z that will become the primary market segment in the coming decades. Therefore, the behavior of these consumers is of great importance and research interest (Abin and Krishnakumar, 2020). Many authors today claim that SE is becoming a very popular concept among younger generations, therefore, research in many countries is conducted with a focus on that generation (Kong et al., 2020; Chuah et al., 2021; Anaya and De La Vega, 2022; Boateng et al., 2019; Ma et al., 2019).

Young people are more receptive to using online platforms to share goods and services for several reasons. First, the SE provides significant potential savings and encourages social interaction and community building (García-Rodríguez et al., 2022). Certain participants in SE are motivated to participate due to sustainability issues, preserving the environment, and reducing waste and carbon emissions (Anaya and De La Vega, 2022; Jelinkova et al., 2021). Given that young people are focused on new technologies (Yeganeh, 2021; Martínez-González et al., 2021), they are also attracted by ease of use and affordability (Amaro et al., 2018). Promotional effects are also important, and the reputation of the platform and the service provider can encourage participation in the SE (Kong et al., 2020).

Much of the research described here in the theoretical background, for the aforementioned reasons, was aimed at the younger population. Thus, this research on participation in SE concepts and attitudes and behaviors in relation to them, on a sample of the younger population in Croatia, can certainly contribute to a better understanding of this business model and its perspective in Croatia and beyond. As for the global picture, Statista (2022) provides data showing that SE has been continuously growing in recent years, and a continuation of a similar trend is anticipated, estimating that the *total value of the global SE will increase to 600 billion U.S. dollars by 2027, from 113 billion U.S. dollars in 2021, with a compound annual growth (CAGR) of approximately 32 percent*.

The objective of the research was to explore the attitudes and behaviors of the young generation in the context of the use of the SE concept in Croatia. In order to achieve this objective, it was necessary to find answers to the following research questions, and hypothesis through the research of secondary sources, and then by conducting primary research through a survey. Our focus was to first get more descriptive information on attitudes and behaviors of young people in Croatia in the context of the usage of SE concepts and then a more specific analysis of relations of certain attitudes and behavioral factors (the frequency of usage of SE) and age (Millenials vs. Gen-Z).

Research questions that we wanted to discover are:

1. What are the attitudes of the young generation on certain factors/aspects/ dimensions of shared economy?

2. Which SE concepts do young people in Croatia use, and in which do they participate as service providers, and how often?

Research questions and hypothesis in more specific aspects and relationships of different attitudes and behavioral factors:

1. What is the relationship between the attitude towards the safety of SE and the frequency of using the SE models?

   H1: Participants who less frequently use SE models will show significantly lower results on the questions regarding the attitude towards the safety of SE.

2. What is the relationship between different age groups and attitudes towards the importance of influencers on the usage of SE?

   H2: Younger participants will show significantly higher results on the questions regarding the attitudes towards the importance of influencers on the usage of SE, than participants in older age groups in this sample.

3. What is the relationship between the different age groups and attitudes towards sharing in the context of the waste reduction?

   H3: Younger participants will show significantly higher results on the questions regarding the attitude towards sharing in the context of waste reduction, than participants in older age groups in this sample.

Part of the answer to these questions was obtained by researching the works of authors who have already covered certain topics related to SE in Croatia and other countries around the world, while the part related to attitudes and perceptions of the young generation in Croatia was obtained through survey research.

This paper is structured in the following way: after the *Introduction*, the second chapter presents previous research and findings within the *Literature review*. *Primary research design and sample structure* provides a general overview of the data collection and research sample, leading into Chapter 4, where the main findings are presented in the *Research Results*. Answers to the research questions can be found in Chapter 5, the *Discussion*, while explanations related to the proposed hypotheses are in the last chapter, the *Conclusion*. In the *Conclusion*, research limitations are explained, and recommendations for further research on the topic are provided.

2. Literature review

This chapter summarizes the existing literature in three parts that thematically encompass important components of this paper. The first part relates to SE research in Croatia, while the second specifically addresses SE in the context of the young

generations, and the third part connects SE and sustainability. Each of these three parts is connected to one of the previously established hypotheses.

2.1. SE research in Croatia

The SE has received significant attention in the world, and Croatia is no exception. In Croatia, research into SE has analysed its potential impact on the economy, its regulatory challenges, and its potential for entrepreneurship. The SE in Croatia is in its early stages, but it has the potential to significantly influence the economy (Dumančić and Čeh Časni, 2021; Ferjanić Hodak and Krajinović, 2020). The most popular SE services in Croatia are transport sharing, home sharing, household work, providing professional advice, financial services, and peer-to-peer lending (Brozović et al., 2019). Despite the potential benefits of the SE in Croatia, there are several regulatory challenges. Dumančić and Čeh Časni (2021) points out the need for the development of clear and consistent regulations to ensure the safety and protection of consumers and service providers in the SE. The lack of a legal framework for the SE in Croatia can lead to problems such as tax evasion and unfair market competition. The researchers also examined the potential impact of the SE on entrepreneurship in Croatia. Bejaković and Håkansson (2021) argue that SE can create new entrepreneurial opportunities and increase the flexibility of the labour market.

Advantages and disadvantages of SE in Croatia are highlighted by Brozović et al. (2019). According to this research, within SE, individuals do not have the exclusive role of consumers, but the dual function of users and service providers. The non-traditional form of business brings benefits such as more favourable prices and more flexible working hours, but it also has its disadvantages, such as the instability of workers' personal incomes and lower protection of workers' rights. The presence of SE in Croatian tourism is investigated by Zatezalo (2021), who concludes that platforms such as Uber and Airbnb are used to the greatest extent. These are used for temporary rental and use of means of transport and accommodation, and are a key factor in any tourist offer.

As for the primary research on the student population in Croatia, it showed that this population readily uses examples of the SE, but unfortunately they are still not sufficiently theoretically familiar with the concept and possibilities of SE (Rupčić, 2020). All this research pointed to the need for additional research on the attitudes and perceptions of SE of young generations in Croatia, following the example of similar research in other countries, in order to be able to answer the research questions in more detail. Also, there is a need for additional clarification of the concept of SE, which influenced the creation of a measuring instrument for this particular research. Based on earlier research on a sample of the population in Croatia that indicates deficiencies in legal frameworks and regulations, as well as a lack of theoretical familiarization with the SE, one of our research focuses was

to examine the relationship between the frequency of use of SE and the attitude about the safety of SE on a sample of the younger population residents of Croatia. This is the rationale behind formulating the hypothesis *H1: Participants who less frequently use SE models will show significantly lower results on the questions regarding the attitude towards the safety of SE.*

2.2. SE and the young generation

When we talk about young generations, we primarily mean the Millennials and the Z generation (Gen Z), i.e. the Zillennial generation, a combined term of Millennials and Gen Z used by some authors (Suresh, 2022). Millennials, also known as Generation Y, are the demographic group that precedes Generation Z. Researchers generally use the early 1980s as their starting years of birth, and the mid-1990s to early 2000s as their ending years of birth. For example, in his research, Berkup (2014) defines this generation as people born from 1980 to 2001. However, this generation often overlaps with Generation Z, also known as Z-millennials or post-millennials, for whom it is usually considered to include people born between the late 1990s and 2010s. However, the boundaries that define generational groups vary according to sources and experts. For example, in their research, Abin and Krishnakumar (2020) define Gen Z as those born between 1996 and 2010. In addition to this, the features of the specificity and uniqueness of the behaviour model of generation Z, as well as the risks associated with these features, have been investigated and described in numerous other papers (Matraeva et al., 2019; Kraidenkov and Sviridova, 2021; Malikova, 2021).

Research also shows that there are specific factors that encourage youth participation in SE platforms (Chuah et al., 2021). The economic factor was identified as one of the significant factors for participation in the SE among the younger generation. Kong et al. (2020) found that financial incentives, such as cost savings, are an important factor in the adoption of SE services. Similarly, Chuah et al. (2021) found that subjective norms, a variety of offerings, attitudes, and economic benefits are the most important factors influencing the acceptance of SE among younger generations in China.

Another significant factor that plays a key role in the participation of young generations in SE is the social factor. For example, Anaya and De La Vega (2022) found that economic benefits, enjoyment, and trust are key factors in the adoption of SE platforms. In addition, social influence, information quality, and word of mouth can also encourage the participation of younger generations in the SE (Kong et al., 2020). Finally, promotional factors were found to encourage participation in SE among younger generations. For example, Anaya and De La Vega (2022) found that trust in the platform and service provider or reputation are important factors in the adoption of SE services. In the model developed by Martínez-González et al. (2021),

trust, attitude and social norm are most notable among the significant variables that influence the intention of young generations to participate in SE in tourism. Some findings also provided empirical evidence for supporting the positive impact of interpersonal influence, e-WOM, and influencer e-marketing on behaviour and young consumers' intention to use online fashion rentals (Pham et al., 2021).

García-Rodríguez et al. (2022) found that environmental concerns are also an important factor in the adoption of SE services among younger generations. Similarly, Ma et al. (2019) found that environmental concerns were an important factor in the adoption of bike-sharing services among college students in the United States. Although the research conducted by Jelinkova et al. (2021) shows that the three most important factors (economic, social and environmental) are equally important to all generations, according to their research, the younger generation sees advantages especially in: more efficient utilization of resources, simplification of the work-life balance, unusual experiences, and environmental protection. According to Amaro et al. (2018) participation in SE is influenced by subjective norms, desire for unique accommodation and variety, attitude, and economic benefits.

Technological factors, such as increasing omnipresence of social networking and real time connectivity, ease of use and affordability, have also been identified as important in the adoption of the SE among younger generations (Yeganeh, 2021; Martínez-González et al., 2021).

Because social factors and influence play such an important role in the use of SE among younger generations, part of our research focus is also to examine the attitude towards the importance of influencer marketing on the usage of SE, among different generations (Millennials vs. Gen-Z). This is the reason for proposing the hypothesis *H2: Younger participants will show significantly higher results on the questions regarding the attitude towards the importance of influencers on the usage of SE, than participants in older age groups in this sample.*

2.3. SE and sustainability

SE and its impact on environmental sustainability have been widely researched. For example, ride-sharing services have the potential to reduce greenhouse gas emissions compared to owning a car (Amatuni et al., 2020). Another way the SE can increase sustainability is by reducing waste. Instead of buying new goods, people can share existing goods, thus reducing the need for new production and waste. There is potential for SE to reduce material consumption and conserve resources (Henry et al., 2021). For example, home-sharing services allow people to use existing housing stock, reducing the need for new construction. According to a study by the World Economic Forum (2017), home-sharing services have the potential to reduce the demand for new hotel construction.

Despite the potential benefits of the SE for sustainability, there are also concerns that it could lead to over-consumption and an increased use of resources (Diao et al., 2021). For example, people are more likely to use ride-sharing services instead of public transport or active modes of transport, leading to increased emissions. Additionally, the convenience of the SE can encourage people to spend more than they need, leading to increased resource use. All these issues highlight the need for high-quality management of SE concepts. The concepts of social responsibility and sustainability are feasible and effective providing all stakeholders, including consumers, participate in them. Therefore, for example, research was conducted in the Czech Republic with the aim of assessing the extent to which the new group of consumers, known as Generation Z, is ready to support it financially, for what reasons and/or under what conditions. The results showed exceptional propensity for, and a very high willingness of the new generation of consumers, to support these concepts (MacGregor Pelikánová and MacGregor, 2020). A similar study was conducted in India where Thomas (2022) investigated the willingness of generation Z to pay a higher price for luxury hotels that look after sustainability and whose image is highly socially responsible. The study showed a close connection between perceived CSR, green image of a hotel brand, and customers' willingness to pay a higher price.

The findings so far indicate that SE models are perceived as a dominantly positive phenomenon for sustainability and the environment, but some reports indicate contrary results. Because of this, one of the research focuses in this study was to examine the difference in the attitude towards the benefits of SE on the environment between different generations of young people in Croatia. Specifically, we wanted to investigate one of the main aspects od SE, that is *sharing* and their relationship on waste reduction, and this is also the rationale behind setting up the third hypothesis *H3: Younger participants will show significantly higher results on the questions regarding the attitude towards sharing in the context of waste reduction, than participants in older age groups in this sample.*

3. Primary research design and sample structure

In the research methodology section of the paper, it is explained how the measurement instrument was created, how the research was conducted, the sample used, and the methods employed in processing the results.

3.1. Research methodology

In order to obtain answers to all research questions, a measuring instrument was created for the collection of primary data, a questionnaire with questions taken from previously conducted research. Most of the questions in the questionnaire

were taken from Kaputa et al. (2021), while the parts related to motivation and sustainability were taken from Abin and Krishnakumar (2020). The parts related to the importance of referral were taken from Pham et al. (2021).

In accordance with the objective of the research – attitudes and behaviors of the young generation in the context of the use of the SE concept in Croatia – a purposive sample of participants, Millennials and Generation Z, was taken. The questionnaire was posted on the SurveyMonkey online platform and distributed to the public via e-mail and social networks. The research was conducted in April and May 2023.

At the beginning of the survey, a question related to age was asked, partly as a selection and partly as an elimination question, considering the various age subgroups and the generally required age of the respondents (18-33 years). This was followed by a multiple-choice question about the SE models in which the participants participated. This question was also educational because, considering the findings of research previously conducted in Croatia (Rupčić, 2020), it was assumed that most of the respondents were not familiar with the term *sharing economy* which is used in the rest of the questionnaire. This assumption turned out to be fully justified. Namely, the results show that, after an initial insight into the well-known models, all respondents successfully answered the questions about the sharing economy. They also gave oral feedback on the usefulness of the questionnaire in the form of familiarization with a term unknown to them up to that moment.

Attitudes were assessed using the semantic differential (7-point rating scale). Specifically, 13 antonyms were selected that emphasized the differences of certain aspects of SE which were then evaluated by the respondents. In order to assess the frequency of use of various SE models, to determine the degree of agreement with statements concerning various aspects of SE, as well as to determine the intention/willingness to use the relevant SE concepts in the future, a 5-point Likert-type scale was used. At the end of the questionnaire, demographic questions were asked in the form of multiple-choice questions.

The analysis was done using SPSS ver. 24 programme. Methods used for the analysis are univariate statistics and analysis of variance.

3.2. Sample structure

Table 1 shows the demographic structure of the sample of a total of 181 respondents who took part in the survey.

Table 1: Demography of respondents (n=181)

Sex	Percentage (%)
Women	62.7
Men	37.3
Age	Percentage (%)
18-22 years old	26.5
23-27 years old	44.8
28-33 years old	22.1
34+ years old	6.6*
Residence	Percentage (%)
Pannonia part of Croatia	8.3
City of Zagreb	71.6
North Croatia	5.3
Adriatic part of Croatia	14.8
Residence – number of residents	Percentage (%)
Less than 2.000	5.3
2.000 – 50.000	14.8
50.001 – 100.000	10.7
100.001 – 200.000	2.96
More than 200.000	66.3
Social status	Percentage (%)
Pupils	0.6
Students	50.3
Unemployed	4.1
Employed	44.97

Note: *results from these participants are not included in any further descriptive analysis, tables and figures

Source: Author's calculation

Of the 181 respondents, 62.7% were women and 37.3% were men. Based on age, respondents were categorized into three groups, 23-27 years being the largest (44.8%). In terms of geographical categorization, most respondents come from the City of Zagreb (71.6%), while in terms of the size of the city they live in, most come from cities with more than 200 thousand inhabitants (66.3%). Based on age groups in the focus of this research, in the continuation of the research we took 169 respondent results, all from the age group 18-33 years.

4. Research results

Table 2 shows the results of the shared economy concept the respondents use, both in terms of being a service user or a service provider. The results indicate that most participants in the SE participate as users of a service or product. In the context of using a particular service, *Booking.com* as a site for lodging reservation services and *Uber* and *Bolt* as taxi transportation systems are most often used. Furthermore, applications that enable ordering food from restaurants (*Wolt, Glovo* and *Bolt Food*) are also very popular. Other results include *Airbnb*, another lodging reservation service, and *BlaBlaCar* used for sharing long-distance transportation. Furthermore, when it comes to providing services, the most popular are *Swap Parties* and the *Booking.com* website.

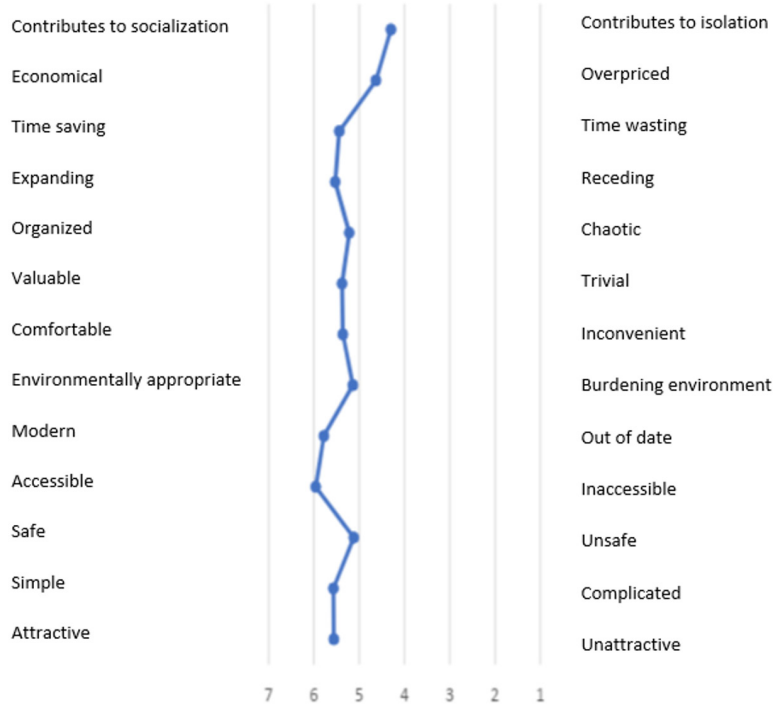
Table 2: Respondents' use of individual shared economy concepts (n=169)

	User (%)	Provider (%)
Airbnb	63.9	5.9
Booking.com	86.4	14.2
eBay	60.4	2.4
BlaBlaCar	48.5	5.9
Uber	91.1	0
Wolt	87	1.2
Glovo	88.8	0.6
Bolt	86.4	0
Bolt Food	58	0
Carpooling	10	0
Wish	30.2	0
AliExpress Croatia	49	0
Swap Party	4.7	1.2
Second-hand stores	37.9	3.6
Timeshare	7.7	0.6
Easy car club	3	0
HomeExchange	2.4	0
Uber Boat	3	0
Liquid Space	1.8	0
Regus.com	2.4	0
TaskRabbit	1.8	0

Source: Author's calculation

To measure the connotative meaning of the shared economy concept semantic, a differential was designed. Figure 1 shows the arithmetic means (with 13 antonyms) that show expressed attitudes on certain aspects of the shared economy. The participants responded on a scale ranging from -3 to 3; however, for data analysis, the data were recorded on a scale from 1 to 7. Most of the reported measures show a greater positive attitude toward a shared economy with the *overpriced* – economic attitude and *contributes to isolation*, with *contributes to socialization* being the lowest. Those two items show an approx. 1 point lower mean result than other scales, being around 5 or 6 on average. The highest rating showed to be the attitude toward *accessibility*. In general, the sample of young people in Croatia tends to have a more positive attitude towards the shared economy, but they have concerns when it comes to *price* and the *context of socialization*.

Figure 1: Evaluation of individual SE aspects by the semantic differential (n=169)

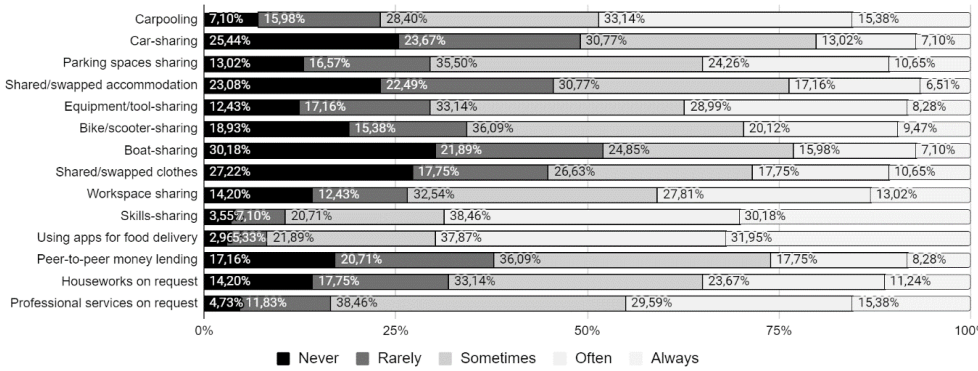


Source: Author's construction

In the context of potentially using certain aspects of the SE in the future (shown in Figure 2), participants overwhelmingly indicated that they would always consider using different food delivery apps, as well as skills sharing. Also, they would often use carpooling, professional services on request, workspace, equipment/tool, and

parking spaces in the future. What most do not consider in the future is car and boat sharing, accommodation and clothing exchange. In general, the results are partially consistent with the results of the frequency of current use of certain already defined SE systems, as shown in Table 2.

Figure 2: Intended use of individual SE aspects in the future (n=169)



Source: Author's calculation

Furthermore, in addition to the general attitude about the SE and the frequency of use and plans for future use, in order to answer the researcher's questions, the respondents also assessed the importance of reputation and recommendations in the SE, through four questions, on a scale from 1 to 5, where 1 indicates – I strongly disagree, and 5 – I strongly agree. When researching individual factors/aspects of SE, it was concluded that previous research in other countries shows that, within the social factor, the importance of reputation and recommendation is significant for such concepts (subchapter 2.2).

Almost 40% of the participants strongly agree with the statement: *In the SE, the rating of the person involved is extremely important,* while almost 50% of them agree with this statement. Furthermore, 43% of participants strongly agreed with the statement *In the SE, positive or negative comments on the Internet are extremely important*, while 46% of them agreed with this statement. Only 18% of participants believe that the recommendation of famous people is extremely important in the SE. To the smallest extent, they find that they strongly agree with the importance of an influencer's recommendation (only 5%).

In addition to questions related to recommendation and reputation, through questions on a Likert-type scale, the participants also assessed their attitudes in the context of individual important SE-related factors (economic, technological and environmental) (Table 3). Specifically, within the framework of secondary sources,

i.e. research on the younger generation (subchapter 2.2), it was observed that the mentioned factors are significant for that population in the countries where research has already been conducted.

Most participants (almost 74%) agree or strongly agree with the statement that SE is a good source of income if the person involved acts as a service provider. Furthermore, a large number of participants (68%) agree or strongly agree that the SE contributes to employment and creates new jobs. The majority of participants (63%) would agree or strongly agree that the SE is good for the overall economy of the country.

Furthermore, the majority of participants (72%) believe that for participating in SE, it is crucial to have a good command of new technologies, which indicates their belief that technology is an important element of the SE and their interaction is inevitable for anyone who wants to engage in it.

In the context of sustainability, most respondents (61%) believe that the SE helps preserve the environment. Also, half of them (52%) would agree or strongly agree that the amount of waste is reduced through the SE. Again, almost half or more of the respondents have a positive attitude towards the SE in the context of ecological sustainability, while among those who would not agree, the largest number is those who neither agree nor disagree, which indicates potentially that in this particular context they still do not have enough information to form an attitude.

Table 3: Respondents' attitudes in the context of important SE-related factors

	1 I strongly disagree	2 I disagree	3 Neither agree, nor disagree	4 I agree	5 I strongly agree	M
The SE is a good source of income for those who engage in it.	0.59%	4.14%	21.30%	56.80%	17.16%	3.86
To participate in the SE, a person must have a good command of new technologies.	0.59%	8.88%	18.34%	52.66%	19.53%	3.82
Sharing resources among people helps preserve the environment.	0.00%	4.14%	34.91%	41.42%	19.53%	3.76
Sharing reduces waste.	1.18%	14.20%	31.95%	34.91%	17.75%	3.54
The SE contributes to a higher level of employment and creates new jobs.	1.18%	7.10%	23.67%	55.62%	12.43%	3.71
The SE is good for a country's economy.	1.18%	6.51%	28.99%	51.48%	11.83%	3.66
The SE is a revolutionary model that brings great changes in the future.	0.59%	5.92%	25.44%	52.66%	15.38%	3.76

Source: Author's calculation

4.1. ANOVA results

In this study, one of the research questions was to examine the effect of the frequency of using the SE on the attitude about the safety of the SE. To investigate this, we conducted a one-way analysis of variance (ANOVA) to compare the means of the four groups.

As a measure of the attitude about the safety of the SE, the question was used on which the participants evaluated on a scale from -3 (Not safe) to +3 (Safe) in the context of the general attitude towards the SE. As a measure of the frequency of use, the question was used in which the participants in the categories *Daily*, *Several times a week*, *Several times a month*, *Several times a year* and *Neve* evaluated their

frequency of use. In order to examine the relationship between these two variables, participants who answered *Never* were excluded from this analysis, in order to examine this relationship on participants who use SE systems at least to some extent.

The total number of participants whose results were used in ANOVA was N=166. Table 4 shows the descriptive data for each group of the independent variable (frequency of use) and the average values of each of these groups on the dependent variable (attitude about safety).

Table 4: Descriptives

Categories	N	Mean	Std. Deviation
Daily	19	5.1053	1.19697
Several times a week	57	5.5965	1.17807
Several times a month	67	5.1343	1.17931
Several times a year	23	4.0870	1.27611
Total	166	5.1446	0.27572

Source: Author's calculation

A one-way ANOVA was conducted to compare the mean of perception of safety across the four groups as an independent variable. The assumption of homogenity of variances was tested using Levene's test, and no significant violations were detected ($p > 0.05$). Additionally, the Shapiro-Wilk test indicated that the assumption of normality was met ($p > 0.05$).

The overall ANOVA test revealed a significant effect of frequency of use on attitude about safety ($F(3,162) = 8.74$, $p < 0.001$) (Table 5).

Table 5: ANOVA results

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	37.404	3	12.468	8.739	0.000
Within Groups	231.126	162	1.427		
Total	268.530	165			

Source: Author's calculation

Post-hoc analyses using Hotchberg's GT2 test were conducted to examine pairwise differences between the groups.

The pairwise comparisons showed that the *Several times a year* group (M = 4.09, SD = 1.28) had significantly lower perception of safety values compared to the *Several times a month* group (M = 5.14, SD = 1.18), the *Several times a week* group (M = 5.6, SD = 1.18) and the *Daily* group (M = 5.1, SD = 1.2) ($p < 0.05$ for all comparisons).

However, there were no significant differences between the *Several times per month*, *Several times per week*, and *Daily* groups ($p > 0.05$ for all comparisons).

These results indicate that those who use SE *Several times a year* have significantly lower perception of *safety* compared to those who use it more often. However, those who use it *Several times a month*, *Several times a week* or *Daily* do not have significant differences in their perception of safety.

We calculated partial eta-squared (η^2p) as an effect size measure to quantify the observed differences. The effect size for the overall ANOVA was $\eta^2p = 0.14$, indicating a medium-sized effect according to conventional guidelines.

Furthermore, one of the research questions was to examine the effect of age on the attitude about the importance of influencers on the usage of SE. To investigate this, we conducted a one-way analysis of variance (ANOVA) to compare the means of the three age groups.

As a measure of the attitude about the importance of the influencers in the context of the usage of the SE, the question was used on which the participants evaluated on a scale from 1 (Strongly disagree) to 5 (Strongly agree. As a measure of age, the question was used in which the participants in the categories *18-22*, *23-27*, *Several times a month* and *28-33* marked their age.

The total number of participants whose results were used in ANOVA was N=166. Table 6 shows the descriptive data for each independent variable group (age) and the average values of each group on the dependent variable (attitude towards importance of influencers on the usage od).

Table 6: Descriptives

Categories	N	Mean	Std. Deviation
18-22	49	5.1053	1.19697
23-27	72	5.5965	1.17807
28-33	45	5.1343	1.17931
Total	166	4.0870	1.27611

Source: Author's calculation

The assumption of homogeneity of variances was tested using Levene's test, and no significant violations were detected ($p > 0.05$). Additionally, the Shapiro-Wilk test indicated that the normality assumption was met ($p > 0.05$).

The overall ANOVA test revealed a significant effect of age on attitude about influencers in the context of usage of SE ($F(2,163) = 4.22$, $p < 0.05$) (Table 7).

Table 7: ANOVA results

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	10.09	2	5.059	4.213	0.017
Within Groups	176.195	163	1.199		
Total	186.293	165			

Source: Author's calculation

Post-hoc analyses using Hotchberg's GT2 test examined pairwise differences between the groups.

The pairwise comparisons showed that the *28-33* group ($M = 2.77$, $SD = 1.12$) had significantly lower results on the question regarding the importance of influencers on the usage of SE than *23-27* group ($M = 2.89$, $SD = 1.11$) and the *18-22* ($M = 2.89$, $SD = 1.11$) group ($p < 0.05$ for all comparisons).

However, there were no significant differences between the *18-22* and *23-27* ($p > 0.05$). These results indicate that older participants (28-33 years old) have a significantly lower perception that recommendations from influencers have an impact on choosing to use SE than younger participants. But participants in age groups 18-22 and 23-27, do not differ in their attitude towards the importance of influencers on usage of SE.

We calculated partial eta-squared (η^2p) as an effect size measure to quantify the observed differences. The effect size for the overall ANOVA was $\eta^2p = 0.13$, indicating a medium-sized effect according to conventional guidelines.

Another research question that we wanted to investigate was the effect of age on the attitude about the importance of sharing on waste reduction. To investigate this, we conducted a one-way analysis of variance (ANOVA) to compare the means of the three age groups.

As a measure of the attitude about the importance of sharing on waste reduction, the question was used on which the participants evaluated on a scale from 1 (Strongly disagree) to 5 (Strongly agree. As a measure of age, the question was used in which the participants in the categories *18-22*, *23-27*, *Several times a month* and *28-33* marked their age.

The total number of participants whose results were used in ANOVA was N=166. Table 8 shows the descriptive data for each independent variable group (age) and the average values of each group on the dependent variable (attitude towards the importance of influencers on the usage of SE).

Table 8: Descriptives

Categories	N	Mean	Std. Deviation
18-22	49	3.0732	1.03417
23-27	72	3.5972	0.89851
28-33	45	3.8919	0.93642
Total	166	3.5267	0.98782

Source: Author's calculation

The assumption of homogeneity of variances was tested using Levene's test, and no significant violations were detected ($p > 0.05$). Additionally, the Shapiro-Wilk test indicated that the normality assumption was met ($p > 0.05$).

The overall ANOVA test revealed a significant effect of age on attitude about influencers in the context of usage of SE ($F(2,163) = 7.66$, $p < 0.05$) (Table 9).

Table 9: ANOVA results

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	13.726	2	5.059	7.662	0.001
Within Groups	131.667	163	1.199		
Total	145.393	165			

Source: Author's calculation

Post-hoc analyses using Hotchberg's GT2 test examined pairwise differences between the groups.

The pairwise comparisons showed that the *18-22* group ($M = 3.07$, $SD = 1.03$) had significantly lower results on the question regarding the importance of sharing on the waste reduction than *23-27* group ($M = 3.60$ $SD = 0.89$) and the *28-33* ($M = 3.89$, $SD = 0.94$) group ($p < 0.05$ for all comparisons). However, there were no significant differences between the *23-27* and *28-33* groups ($p > 0.05$).

These results indicate that younger participants (18-22 years old) have a significantly lower perception that sharing can influence waste reduction than older participants. But participants in age groups 23-27 and 28-33, do not differ in their attitude towards the importance of sharing on waste reduction.

We calculated partial eta-squared (η^2p) as an effect size measure to quantify the observed differences. The effect size for the overall ANOVA was $\eta^2p = 0.12$, indicating a medium-sized effect according to conventional guidelines.

5. Discussion

Through the research of secondary sources, the answer to the research question about what are the important factors/aspects/dimensions of SE was obtained. Previous research showed that the adoption of SE by younger generations is closely related to their social values, such as sustainability, community building, and social responsibility (Anaya and De La Vega, 2022; Jelinkova et al., 2021). Younger generations are more environmentally conscious and socially engaged than previous generations (García-Rodríguez et al., 2022). In addition to the very important connection between SE and sustainability, and the significant environmental factor, there is also the social factor and values that promote resource sharing, collaboration, and community building (Anaya and De La Vega, 2022; Jelinkova et al., 2021). In addition, the key factors for the further development of the SE are the creation of added value, trust, good experience, and reputation (Kong et al., 2020). Technological and economic factors stand out as extremely important. Specifically, younger generations are more likely to adopt new technologies and participate in SE because of their familiarity with digital platforms and social media. Understanding their attitudes, behaviours, and future motivations toward SE can provide valuable insights to companies, policymakers, and academics. The SE today provides new earning opportunities. Understanding the factors driving the adoption of SE services by younger generations can provide insight into the changing nature of consumer behaviour and preferences, as well as implications for traditional businesses and industries. However, there are some regulatory challenges, and clear and consistent regulations are needed to ensure the safety and protection of consumers and service providers (Dumančić and Čeh Časni, 2021).

The answer to the question of what are the attitudes of the young generation on certain factors/aspects/dimensions of the shared economy was obtained through primary research on a sample of the younger generation of respondents in Croatia. The importance of reputation and recommendation in the SE was especially evaluated, and the results showed that the rating of the person dealing with SE is extremely important for the respondents. Also, positive or negative comments on the Internet from other users, similar to them, are important. Famous people and influencers determine their attitude and intention to use a particular service/product to a much lesser extent. Possible reasons arise from the fact that individuals value the opinion of those similar to them (such as other users of the service) more than famous people and influencers, with whom they either identify less or assume that their promotion is pre-arranged with a particular provider.

In the context of other important SE-related factors (economical, technological, and environmental), through questions that examine the attitude on the economic dimension, the majority of participants take a positive or extremely positive attitude and see benefits for the economy of their community, both at the individual level and at the level of the country. The vast majority of respondents think that SE is a good source of income if the person involved acts as a service provider, contributes to employment, and creates new jobs and it is good for the economy of the entire country. It is also important to have a good command of new technologies to participate in SE.

In the context of sustainability, respondents think that the SE helps preserve the environment and reduces waste. More than half of the respondents have a positive attitude towards the SE in the context of environmental sustainability. Since those who would not agree with this have the largest number of those who *neither agree nor disagree*, it can be concluded that they still do not have enough information to form an opinion. In general, the population that has an undefined attitude has the greatest potential for attitude change.

By conducting research through a survey, an answer to the question was also found about which SE concepts young people in Croatia use, in which they participate as service providers, and how often.

It was to be expected that the majority of participants in SE participated in the role of users, as confirmed by the research. In this context, they most often use Booking.com, Uber, Bolt, Wolt, Glovo, Bolt Food, Airbnb, and BlaBlaCar. This is partially in line with the research done by Brozović and authors (2019) when they also determined that the most popular SE services in Croatia are transport and home sharing, but ordering food was not highlighted, and now it is proving to be significant. However, the popularity of household work, providing professional advice, financial services, and peer-to-peer lending was not confirmed here. The differences probably stem from the fact that the younger generation is very specific in this regard and differs from the general population.

The general shortcomings of SE that stand out in the papers of Croatian authors are regulatory challenges, safety and protection, instability of workers' personal income, and lower protection of workers' rights (Dumančić and Čeh Časni, 2021). Among the advantages, the impact of SE on entrepreneurship in Croatia, more favourable prices and more flexible working hours stand out the most. In our primary research, the sample of young people in Croatia tends to have a more positive attitude towards shared economy, but has concerns when it comes to *price* and the *context of socialization*. The respondents showed the most positive attitude regarding *accessibility*. Interestingly, the younger generations in Croatia highlight the price aspect and socialization as the biggest disadvantages of SE, which in several secondary data sources, related to research in other countries, stand out as advantages of SE.

Young people's attitudes towards the use of certain aspects of SE in the future show that potentially the most promising are different applications for food delivery, as well as the use of sharing skills, followed by carpooling, professional services on request, workspace, equipment/tool, and parking spaces. In general, the results are partially in line with the results of the frequency of current use of certain already defined systems of the SE. Specifically, the categories that are currently most frequently used, the participants plan to use to a greater extent in the future. By observing the current level of use, the category of sharing skills was not represented to the extent that the participants plan to use it in the future.

6. Conclusion

While the literature review and our descriptive data gave us valuable insights into the attitudes and behaviors of young people in Croatia in the context of SE, we wanted to investigate further some of the relations between attitudes and behavioural factors. Firstly, because previous research on SE in Croatia (Dumančić and Čeh Časni, 2021) showed the need for the development of clear and consistent regulations to ensure the safety and protection of consumers and service providers in the SE, we wanted to investigate attitudes towards the safety of SE and its relation to the frequency of use of SE (H1). Our data showed significant differences in different sub-groups by the frequency of SE, mainly those who use it several times a year, compared to those who use it more often. This type of data analysis doesn't give us a clear view of the cause-effect aspect this data can show, two different, but equally important conclusions. Firstly, those who use SE less often, do so because they realize that it is not safe enough. Secondly, those who use SE less often do so because they primarily thought it was not safe and did not even consider using it more often. From both points of view, these results have a clear influence on attitudes toward safety. They can be valuable facts for further investigation of this relationship and for policymakers and providers of co-creation SE services. Combining the literature review and this data, it can be beneficial to look more into aspects of SE in the context of regulations that can have an influence on attitudes towards SE and behavioral intentions.

Another relationship that we wanted to investigate was age and attitude toward the importance of influencer recommendations on the usage of SE (H2). Based on previous research, we hypothesized that those age groups that we would consider to be Gen-Z would find those recommendations more important than those age groups that would be Millenials. Our results showed exactly that. Considering that Gen-Z is the next biggest segment of consumers (Abin and Krishnakumar, 2020) it is valuable to understand their attitude toward influencers. These results showed that SE providers should consider influencer marketing for future campaigns to keep up with the changing consumer pool.

Furthermore, younger generations also find sustainability important in their decisions to engage in certain products or services (García-Rodríguez et al., 2022). For this reason, we wanted to investigate their attitude towards the main aspect of SE, that is, sharing, and their impact on waste reduction (H3). We chose this question because it is directly linked to two main aspects of SE – sharing and reducing the dissipation of resources. In addition, we were motivated to do so because some reports show SE to complement over-consumption and over-production, which proved to be contradictory. Again, we used age as an independent variable because we wanted to see if there is a difference among Gen-Z and Millenials, as earlier mentioned it is important to understand Gen-Z's attitudes and behavioral intents, given their future role of the primary consumer group. Our results showed statistically significant differences among different age groups. However, it showed that younger participants, those who are more of a Gen-Z, had a lower perception that sharing helps in waste reduction. This data is more in line with what the research points out, that SE can be paradoxically disadvantageous for environmental concerns. Also, this data could be used to investigate further why Gen-Z has this attitude and more importantly, act on it, because when it comes to their values as consumers, sustainability, co-creation, and environmental concerns, cannot be overlooked.

If we look at the connection between the frequency of use of SE concepts and the perception of safety, the findings obtained in this research may also indicate that by using SE, people become more aware of its safety. On the other hand, it can also indicate that those who very rarely use such models do so because they think they are not safe enough. Furthermore, when we talk about different generations of young people in Croatia (Gen-Z vs. Millenials), there can be significantly different attitudes in certain aspects of SE. Firstly, Gen-Z finds influencer recommendations important, so it can imply using this marketing strategy for this generation in the context of promoting SE. Also, Gen-Z finds sharing not to be beneficial to waste reduction. As Gen-Z finds this aspect important, this implies further investigation of these attitudes, primarily by quantitative research designs, to get more data behind these attitudes.

Also, considering the observed differences in the acceptance of SE services in urban and rural areas in some papers (Hamari et al., 2015; Altura et al., 2021), it would be advisable in subsequent research to determine whether SE is used more in certain areas of the Republic of Croatia, and whether there are any significant differences related to differences in digitalization levels or other factors. Also, future studies should explore how digital inequalities affect participation in SE platforms. In this research, although data was collected in the regions from which the respondents came, an adequate quota part of the sample was not collected for a more detailed analysis on this particular topic.

Considering the non-probabilistic sample used in this study, it is imperative to acknowledge that the limitation concerning the generalizability of the results

is particularly noteworthy, and caution should be exercised when applying these findings beyond the scope of our specific sample.

This research can serve as a solid framework for some similar research in other countries because comparative analyses in some papers show great differences in attitudes towards SE of respondents from different countries. For example, the finding of the qualitative study indicates that the Indian Generation Z is showing active response while the Swedish Generation Z is exhibiting passive participation towards sharing platforms (Abin and Krishnakumar, 2020).

Finally, businesses that are globalized and have brought competition to an international level, today should research these rapidly changing generations and need to find ways to keep motivation high learn their characteristics, and act according to them. Younger generations are often under-represented in academic research and policymaking, despite being a significant and influential demographic segment. Conducting further research on their use of the SE can help fill additional knowledge gaps and inform policies and practices that better reflect their needs and preferences.

Acknowledgment

This paper has been supported by the University of Rijeka for project ZIP-UNIRI-2023-20.

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Stavovi i ponašanje mladih generacija u kontekstu koncepta ekonomije dijeljenja (ED) u Hrvatskoj

Maja Martinović[1], *Zoran Barac*[2], *Valentina Pirić*[3]

Sažetak

Zbog rastuće važnosti koju nove generacije imaju u nadolazećim tržišnim trendovima, istraženi su stavovi i ponašanje mladih generacija (mijenijalaca i generacije Z) prema korištenju koncepta ekonomije dijeljenja (ED) u Hrvatskoj. Proučena je literatura koja povezuje ED i održivost, te mijenijalce i generaciju Z s ekonomskim, društvenim, tehnološkim i okolišnim faktorima ED-a. Također je provedena anketa na uzorku od 181 ispitanika. Rezultati prikazuju stavove mlade generacije o faktorima ED-a, koje ED koncepte koriste i koje namjeravaju koristiti. Dobro vladanje novim tehnologijama, ocjene i komentari na internetu su im važni. ED donosi korist pojedincima i ekonomiji te pomaže u očuvanju okoliša. Najveći nedostaci ED-a su cijene i socijalizacija, dok je prednost dostupnost. Oni koji najmanje koriste ED često imaju značajno niže poimanje sigurnosti. Generacija Z više vrednuje preporuke influencera u korištenju ED-a nego mijenijalci. Također, mlađi sudionici, oni koji su više povezani s generacijom Z, manje su uvjereni da dijeljenje doprinosi smanjenju otpada. Booking.com i Uber se najčešće koriste, a aplikacije za dostavu hrane i dijeljenje vještina imaju najveću perspektivu. Ovaj rad pruža informacije o stavovima, ponašanjima i motivaciji mladih za korištenje određenih kategorija ED-a, kako za donositelje politika, tako i za menadžere tvrtki uključenih u poslove ED-a.

Ključne riječi: *ekonomija dijeljenja, Hrvatska, Generacija Z, Milenijalci, ponašanje potrošača*

JEL klasifikacija: *M31, D12, L14*

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---------- (1994) "Exploiting cross Section Variation for Unit Root Inference in Dynamic Data", *Economics Letters*, Vol. 44, No. 1-2, pp. 9–19.

---------- (1996a) "Empirics for Economic Growth and Convergence", *European Economic Review*, Vol. 40, No. 6, pp. 951–958.

---------- (1996b) "Regional Convergence Clusters across Europe", *European Economic Review*, Vol. 40, No. 6, pp. 951–958.

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- *Pregled literature*
- *Metodologija/metoda/model/koncepcija analize* (treće poglavlje)
- *Empirijski podaci (dokumentacijska podloga) i analiza* (četvrto poglavlje)
- *Rezultati i diskusija* (peto poglavlje)
- *Zaključci* (šesto poglavlje).

(2) Sadržaj pojedinih dijelova prezentirane građe:

a. Sažetak – ispisuje se u 100-250 riječi, a obvezno treba sadržavati:

- utvrđeni cilj istraživanja,
- metodu/model/koncepciju analize,
- glavni rezultat istraživanja (analize),
- temeljni zaključak istraživanja.

Sažetak se ne smije pisati u odlomcima!

b. Ključne riječi – moraju odražavati suštinu sadržaja rada, a navodi se do pet takvih riječi.

c. JEL klasifikacija – autor svoju temu mora razvrstati sukladno kodu časopisa The Journal of Economic Literature (JEL).

d. Uvod – sadrži definiranje problema i predmeta istraživanja s pozivom na recentnu literaturu odnosno rezultate istraživanja. Taj se dio može istaknuti i u posebnom, tj. 2., poglavlju kao *Literature review*. Pri kraju uvodnog dijela treba utvrditi radnu pretpostavku (hipotezu) istraživanja o kojoj se treba očitovati (kasnije) na početku poglavlja *Zaključak*. *Uvod* treba završiti s naznakom organizacije teksta.

e. Pregled literature – prethodi istraživačkom dijelu, a pruža čitateljima pregled referentne literature s ključnim točkama dosadašnjih spoznaja

temeljenih na relevantnim rezultatima aktualnih istraživanja. Pregled literature ne smije biti taksativno navođenje prethodnog znanstvenog doprinosa, već autori trebaju izvršiti sintezu dosadašnjih istraživanja kako bi dokazali opravdanost teorijskog i empirijskog doprinosa vlastitog rada.

f. Metodologija/Metoda/Model/Koncepcija – obično se prezentira u trećem poglavlju; metoda/model/koncepcija analize mora biti transparentno istaknuta radi eventualnog ponavljanja testiranja rezultata od strane zainteresiranih istraživača (to je jedno od temeljnih pravila znanstvene metodologije).

g. Empirijski podaci i analiza – sadržavaju dokumentacijsku podlogu i rezultate empirijske analize. Potrebno je opisati i prikazati uzorak podataka korišten u analizi te prezentirati i objasniti statistička te ekonometrijska obilježja dobivenih rezultata uz tumačenje njihova ekonomskog sadržaja.

h. Rezultati i rasprava – autor objašnjava rezultate, osobito njihovo ekonomsko značenje i poruke. U ovom dijelu očekuje se argumentacija znanstvenog doprinosa, povezivanje rezultata rada s rezultatima te zaključcima dosadašnjih empirijskih istraživanja te preporuke za promjene javnih i drugih politika.

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- ocjenu rezultata istraživanja/analize, novine, te koji je doprinos znanosti;
- osvrt na ograničenja i probleme u istraživanju;
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- utvrđivanje institucionalno-sustavnih implikacija dobivenih rezultata istraživanja (kao npr. prijedlozi za promjene u ekonomskom sustavu, ekonomsko-financijskoj i razvojnoj politici, instrumenti, mjere i sl.).

Preporuka je da se Zaključak ne piše u odlomcima.

(3) Literatura – navesti samo one naslove (izvore) koji su korišteni u tekstu!

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---------- (1996a) "Empirics for Economic Growth and Convergence", *European Economic Review*, Vol. 40, No. 6, pp. 951–958.

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