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EXPLORING DIVERSE FRONTIERS IN ECONOMICS AND BUSINESS – EDITORIAL

Adnan Efendic, Ljiljan Veselinovic

The current issue of the South East European Journal of Economics and Business publishes ten contributions from diverse economic and business empirical studies focusing primarily on the South East European region, including the global and selected EU sample as well. We categorize published papers into a few groups to help the readers identify fields and papers of interest more easily, although these lines are sometimes challenging to establish. In doing so, we identify two papers that address the themes of labour market economics, including Obadić and Viljevac (2024) and Gashi and Adnett (2024); three papers focus on broader issues in entrepreneurship, Kostic and Zivkovic (2024), Matic (2024), and Mazrekaj (2024); income inequality is addressed in the paper by Cakal, Velagic, and Silajdzic (2024); monitoring and project performance is investigated by Ovčina and Kalajdžić (2024); financial markets and investment strategies are researched by Zaimovic, Arnaut-Berilo, and Bešlija (2024); Petreski (2024) covers the theme of crisis impact and firm adaptation. Lastly, the social acceptance of artificial intelgience in banking is explored by Turnadžić et al. (2024).

We provide a summary table with basic information on the papers published in this issue, while a more detailed overview of each contribution is below.

Authors	Unit of analysis and period	Sample
Obadić and Viljevac	Country, monthly data 2010-2022	EU countries
Kostić and Živković	Country, cross-sectional data 2019	Global sample
Matić	Managers, cross sectional data 2021	Croatia
Cakal-Velagic and Silajdzic	Country, panel country 1996-2019	Western Balkan
Ovcina and Arslanagic-Kalajdzic	Civil organizations, cross sectional data 2023	Bosnia and Herzegovina
Mazrekaj	Gender entrepreneurial behaviour, semi-systematic literature review 1956-2021	Global sample
Zaimovic, Arnaut-Berilo, and Bešlija	Country, panel data 2014-2024	28 European countries
Gashi and Adnett	Firms, cross-sectional data 2016-2023	Western Balkans countries
Petreski	Firms, cross-sectional data 2023	North Macedonia
Turnadžić et al. (2024)	Bank customers, cross-sectional data 2024	Bosnia and Herzegovina

Labour market

Obadić and Viljevac (2024) investigate the existing educational structures of selected EU member countries and their alignment with the labour market needs. To evaluate this educational mismatch, the paper explores the matching needs of employers and unemployed job seekers by using disaggregated national employment office data for the period 2010-2022. The results show that differences in education levels result in relatively small deviations from aggregate trends in the labour market.

Gashi and Adnett (2024) explore the determinants of employer-provided training in the Western Balkans, using cross-sectional data covering the period 2016-2023. The study investigates factors influencing the incidence of such training, emphasizing the role of firm size, ownership, export status, and employee readiness to acquire additional qualifications. The findings highlight that larger firms, those with foreign ownership, and exporters are more likely to provide training. Additionally, businesses perceiving skills shortages and those with optimistic business sentiments are significantly more inclined to invest in employee training. The study underscores the importance of employer-provided training in enhancing labour productivity and bridging the productivity gap with EU countries.

Entrepreneurship

Kostić and Živković (2024), in their research that covered 141 countries, explore firstly canonical correlations between domestic competition, trade openness and entrepreneurial culture. The authors find a strong, positive, statistically significant canonical correlation between these canonical variables. In the next stage, the linear regression analysis is estimated with finding that distortive effects of taxes and subsidies on competition is the most important for all dependent variables. The authors conclude that regulation of domestic competition and trade openness are supreme for entrepreneurial culture.

Matić (2024) investigates the role of stress in demonstrating adequate project leadership and ultimately achieving project success, while also respecting followers' expertise as the most important context factor. The paper uses primary data from 2021 collected from 71 project managers in Croatia. The author find that demonstrated project leadership and followers' expertise positively affect the project's success. According to the results, stress, due to its inverted U-shaped nature of effect, does not affect project success, whereas it has a negative moderation effect on demonstrated project leadership by reducing its positive effects on project success.

Mazrekaj (2024) examines the interplay of human capital composition and gender entrepreneurial behaviour through a semi-systematic literature review approach covering the period from 1956 to 2021. The study highlights the role of education and perceived abilities as key components in the entrepreneurial activities of women across different countries. By analysing data from a wide range of sources Mazrekaj identifies significant gaps in the existing literature, particularly regarding the simultaneous consideration of individual and country-level indicators, as well as structural, historical, and cultural variables. The findings underscore the necessity of a holistic view to understand how these factors collectively shape entrepreneurial identities and opportunities.

Income inequality

Cakal-Velagic and Silajdzic (2024) investigate the effects of macroeconomic indicators and financial market development on income inequality using panel data from Western Balkan countries and covering the period 1996-2019. The authors find that income per capita increases income disparities, while they do not identify significant impact of financial market development on income inequality. The obtained results bear important policy.

Project performance

Ovcina and Arslanagic-Kalajdzic (2024) explore the relationship between monitoring and evaluation, project implementation management system for financial monitoring, and project performance within the framework of the resource-based view, dynamic capabilities, and knowledge management theory. The used data are collected in 2023, they are from non-profit projects in a developing context of Bosnia and Herzegovina. The empirical analysis reveals that developmental assistance and non-profit projects have an important role in the economic performance of developing countries, ending with relevant policy implications.

Financial markets and investment strategies

Zaimovic, Arnaut-Berilo and Bešlija (2024) analyse the benefits of international portfolio diversification across 28 European stock markets, including both EU countries and the UK, over the period from 2014 to 2024. The study employs the Markowitz

mean-variance optimization model and Sharpe ratio to assess different investment strategies during stable (2014-2019) and turbulent (2019-2024) periods. Their findings reveal that actively managed portfolios outperform naively diversified ones. The research highlights that crises significantly reduce diversification benefits, although opportunities for risk reduction through international investments remain substantial.

Crisis impact and firm adaptation.

Petreski (2024) evaluates the impact of the Ukraine conflict-induced crisis (Russian invasion on Ukraine from 2022) on firms in North Macedonia, using data from a business survey conducted in 2023. The study employs descriptive statistics and probit regression analysis to assess how firms of different sizes and sectors have coped with the crisis. Findings indicate that small firms in low-wage sectors predominantly coped by raising prices of final products and services, followed by cost-cutting measures. Larger firms, on the other hand, tended to invest in self-electricity generation or energy-saving equipment. The results highlight that firms with higher energy cost shares increased final prices more but experienced decreased competitiveness, whereas firms that did not address rising costs struggled to pass these costs onto prices, impacting their overall competitiveness.

Customer behaviour - Social Acceptance of AI in Banking

Turnadžić et al. (2024) investigate the role of social factors in the acceptance of AI-based services in the banking sector of Bosnia and Herzegovina. The study focuses on perceived humanness, perceived social interactivity, and perceived social presence, finding that perceived humanness and perceived social interactivity positively affect attitudes towards and acceptance of AI-based services. This research provides solid foundation for understanding customer readiness for AI adoption in a transitional economy.

On behalf of Editorial Board

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LABOUR MARKET TIGHTNESS AND MATCHING EFFICIENCY IN DIFFERENT LABOUR MARKET SEGMENTS – DO DIFFERENCES IN EDUCATION MATTER?

Alka Obadić, Viktor Viljevac

Abstract

This paper analyses the existing educational structures of selected EU member countries and their alignment with the labour market (LM) needs. This study aims to identify potential structural mismatches between the skills taught in schools and universities and the skills and knowledge required in the workplace. To evaluate this educational mismatch, the paper explores the matching needs of employers and unemployed job seekers by using disaggregated national employment office data. The paper examines the selected group of EU countries (AT, HR, EE, SI, ES) from 2010 to 2022, using the Beveridge curves and estimating LM tightness and matching efficiency for different education groups. The results show that differences in education levels result in relatively small deviations from aggregate trends in the LM. Aggregate LM trends strongly impact all education groups in the labour market.

Keywords: *structural unemployment, Beveridge curve, matching efficiency, labour market tightness, EU countries*

JEL classification: *J21, J22, J23, J63*

1. Introduction

The existing educational structure in the EU member states may not always correspond to the labour market needs. A mismatch between the existing educational structure, skills that are acquired in schools and universities, and the skills needed in the workplace presents a serious problem. Such incompatibility is increasingly difficult to keep pace with (in the context of) the rapid technological progress and it is a key threat to economic growth and development considering that, in the long term, such a situation can result in the increase of structural unemployment. It should not be forgotten that the effectiveness of the matching process also depends on the business cycle. The main approach in such research concentrates on the matching process, which relates to matching the needs of employers and unemployed job seekers to fill vacancies. The aggregate matching efficiency moves

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over the cycle because of variations in the average characteristics of the labour market. An important feature of the labour market is its matching efficiency, i.e., the market's ability to match unemployed workers to jobs (Barnichon and Figura 2015, p. 222).

The correlation between education and better employability is indisputable and has been proven countless times in numerous social and economic research studies. The relationship between educational attainment and labour market compatibility has become particularly important during the COVID-19 pandemic. Namely, individuals with high education could keep their jobs much easier in significant unexpected situations in the labour market, such as the social distancing and "lock-down" measures in spring 2020. According to IMF research (2022), the main reason why employment remains restrained, particularly compared to the pre-crisis trend, is that disadvantaged groups – including the low-skilled, older workers, or women with young children – have yet to fully return to the labour market. The decline in immigration also seems to have amplified labour shortages among low-skilled jobs (Duval et al. 2022, p. 5). The abovementioned warrants attention and therefore in this paper, the research concentrates on the labour market matching model estimated for groups of different education levels, focusing on the interaction between unemployment and new job posts (vacancies).

As the job matching process changes over time in relation to business cycles, the best way to graphically show the matching process in the labour market is by using the Beveridge curve[2], which shows the empirical relationship between job vacancies and unemployment. The Beveridge curve is thought to be an indicator of the efficiency of the labour market functioning. A negative slope of the Beveridge curve indicates that vacancy and unemployment rates tend to move in opposite directions over the business cycle. Movements in the vacancy-unemployment space are usually related to labour market tightness and labour market efficiency (Consolo and da Silva 2019). In order to empirically evaluate the process of demand and supply matching, (the) labour market tightness and matching efficiency are estimated using the traditional aggregate matching function. The matching function relates the flow of new hires to the stock of vacancies and unemployment which are typically modelled with a Cobb-Douglas matching function.

Most of the existing research focuses on general labour market trends or the aggregate data for a specific country. Instead of focusing on general trends in the labour market, this research represents a step forward because it analyses disaggregated data. To the best of our knowledge, this selected group of countries has not been analysed using registered data disaggregated by education level groups. The research focuses on how different levels of education among workers respond to general trends in the labour market. For example, economic downturns, which lead to increases in unemployment, might be felt more severely by those groups of workers with lower education levels. Therefore, this paper seeks to answer the following research question - Do worker groups with different levels of education experience the impact of aggregate labour market trends in different ways?

In this respect, this research contributes to the existing literature by using national employment office data for five selected EU member countries (Austria, Croatia, Estonia, Slovenia, and Spain), disaggregated according to the levels of education. Due to the differences in the data collection processes, the educational levels are not uniform among the countries, since different employment offices use different methodologies. Previous research mainly used Labour Force Survey data which is not disaggregated according to all nine ISCED[1] levels of education. It is important to emphasize that this paper does not deal with the analysis of the mismatch between qualification characteristics and skills of currently employed workers. The aim of analysing the efficiency of the matching process at the aggregate level is to point out the potential existence of the problem of structural unemployment, and according to the economic theory this is accomplished by putting into a relationship the existing needs of employers, i.e. vacancies and job seekers.

The methodological approach consists of two steps. First, the Beveridge curves are constructed for the aggregate labour markets of each of the five countries in the sample – Austria, Croatia, Estonia, Slovenia, and Spain – and then for different education groups. Then, the estimates of the labour market tightness and matching efficiency for different education groups for each country are presented. The paper is structured in the following way: The first chapter provides a theoretical background regarding the different aspects of the labour market and the relationship between education and labour market outcomes, as well as focusing on both historical and recent empirical evidence of labour market developments in different countries. The second chapter focuses on the data and methodology. The third chapter presents the results, including aggregate and disaggregated Beveridge curves and the estimates of the labour market tightness and matching efficiency. The fourth chapter includes the discussion of the results and explains the main limitations of the findings, while the fifth and final chapter concludes the paper.

2. Theoretical and empirical literature review

2.1. Theoretical Background

Education forms young people's human capital by providing them with the necessary skills and knowledge to prepare them for entering the labour market. To be able to help students achieve a favourable skills match, education programmes need to both know and meet the requirements of the labour market (Bolli *et al.* 2012, p. 324). The research done by Kabát, Bojnec and Stávková (2013) shows that less educated workers benefit less from economic growth and suffer more in recessions, while workers with higher levels of education benefit more from positive economic developments. The requirements of the labour market are achieved by establishing a successful matching that focuses on the interaction between unemployment and job creation. Higher productivity increases the return to job creation and thereby increases the rate of job creation. In turn, a higher rate of job creation makes it easier for unemployed workers to find jobs and thereby reduces unemployment. This explains the observed counter-cyclical (pro-cyclical) behaviour of unemployment (job creation) (Hornstein, Krusell, and Violante 2005, p. 19).

The trade-off between unemployment and vacancies can vary depending on the strength of the labour market needs: When the labour market is strong, with low unemployment and high vacancies, unemployment is likely to be relatively unaffected by increases in job openings. This will be reflected in the Beveridge curve being quite steep. Intuitively, when lots of employers are looking to hire workers but few active job seekers are available, the process of filling job openings is slowed down by the relative scarcity of available workers and the efficiency of the functioning of the labour market decreases (Bok *et al.* 2022, p. 2).

Beyond its slope, the shifts of the Beveridge curve (when vacancies rise and unemployment does not fall or falls too slowly) may signal structural changes in the labour market (Obadić 2016, p. 235) that determine how quickly job matches occur and how long they last. The simplicity of forming job matches represents the efficiency of matching. Reduced matching between the unemployed and vacant positions i.e., reduced efficiency of the mentioned process, where there exists a simultaneous increase in the number of unemployed and vacant jobs, leads to an outward movement of the Beveridge curve. On the contrary, an inward shift of the Beveridge curve indicates improved matching efficiency. Movements along the curve, when unemployment and vacancies move in opposite directions, indicate cyclical fluctuations in economic activity (Obadić 2005, p. 91). It should be noted that heterogeneities across workers and labour markets are key aspects of unemployment fluctuations and therefore it is important to segment the labour market into diverse submarkets (Barnichon and Figura 2015).

2.2. Empirical Evidence

The Beveridge curve tends to shift over time. For example, outward shifts of the Beveridge curve can be observed almost everywhere in Europe in the early 1970s. One of the reasons for this is the increase of unemployment, with the unchanged number of vacancies due to the beginning of a recession (reduced aggregate demand), and the other resulted in reduced efficiency of the adjustment process due to structural factors, such as the existence of a more rigid labour market (Obadić 2016, p. 235). In most of the new EU member states, during the transition period, the Beveridge curve shifted outwards, which means that the number of unemployed persons increased in relation to the number of vacancies, although in some cases there was an increase in vacancies. For example, in Croatia, this trend has existed continuously since 1997, with the curve being moved the farthest from the origin in 2001 and 2002, when Croatia faced the highest number of unemployed persons in history (Obadić 2016, p. 236). Shifts of the Beveridge curve outwards indicate a reduced matching efficiency, i.e., an increase in structural unemployment or may be indicative of problems of a structural mismatch in the labour market. In their analysis of the United States between January 2001 and December 2017, Lange *et al.* (2020) find that the Beveridge curve shifted outwards during the Great Recession and this shift was also quantified by the estimated decline in matching efficiency (Lange *et al.,* 2020, p. 19).

Barrero *et al.* (2021) have investigated the outbreak of the COVID-19 pandemic. They argue that the COVID-19 recession and recovery created a reallocation shock that has necessitated unusually large movements of jobs and workers across industries. These movements are driven by persistent changes in demand patterns, such as shifts away from in-person services toward delivered goods, as well as shifts towards industries and occupations that support remote work. The pandemic has persistently pushed low-skilled and older workers out of employment but has transformed labour markets less than was generally envisaged after the first wave (Duval *et al.* 2022, p. 3). Labour markets have become tight, as indicated by a sharp rise in unfilled job vacancies (Duval *et al.* 2002,

p. 3) which create challenges for employers and workers that impede the job-matching process and cause an outward shift of the Beveridge curve. Shifting from general labour market trends to the labour market developments in specific education groups, many studies have found that the labour market mismatch in the form of over-education or over-skilling is associated with negative labour market outcomes in the form of lower wages, reduced job satisfaction and a higher labour turnover (Mavromaras *et al.* 2013).

Gavriluță *et al.* (2022) analyse the correlation between education levels and employability rates in the EU-28 during the COVID-19 economic crisis, estimating the impact of social restrictions of the pandemic in the field of employability. They found a positive relationship between tertiary education (university, post-university studies, or PhD) and high levels of employability in the EU-28 during the 2019-2021 period and observed the fact that employability rates are related to high levels of education. The results show that high levels of association between education level and employment rates are visible in Sweden, Germany, the Netherlands, and the Baltic states. In contrast, for Greece, Spain and Italy they estimated a strong association between low levels of tertiary education and low levels of employment (Gavriluță *et al.* 2022, p. 15).

Considering the existing theoretical background and the analysis of previous empirical studies, the labour market developments in different education groups are evaluated, as well as the relationship between newly created hires and current labour market conditions, i.e., unemployment and vacancies. The construction of the Beveridge curves allows for the comparison of the movements in the labour market among different education groups, as well of these movements with the aggregate labour market trends in a specific country. The calculation of labour market tightness allows for the analysis of the differences in movements in tightness amongst different education groups. By estimating different matching functions, one obtains the estimates of the success of the matching process (matching efficiency) in the selected EU countries.

Based on the initial research question and the analysis of the existing available literature, two basic research hypotheses are formed:

H1: Workers groups with different educational levels follow similar trends as the aggregate labour market.

H2: Workers groups with different education levels show similar labour market tightness and matching efficiency as the aggregate labour market.

Therefore, it is expected that the differences in education levels do not have a significant influence on labour market movements. In other words, economic downturns, which lead to increased unemployment and lower vacancies, will be felt in a similar way regardless of the differences in education levels and the same outcome is expected during expansions. Moreover, one can expect that the labour market segments with different education levels experience similar movements in labour market tightness and matching efficiency over time as well.

3. Data and methodology

3.1. Data

This analysis covers five EU countries - Austria, Croatia, Estonia, Slovenia, and Spain for which data disaggregated according to education were available. The data are monthly, from January 2010 to October 2022, and were collected and provided to us by national employment offices. The dataset includes three variables – Employed, Unemployed and Vacancies. Employed represents new hires, flows from the stock of the unemployed people into employment based on a new employment relationship (work contract) or the start of other business activities by the previously unemployed person. Unemployed is a stock variable which represents the number of unemployed persons in the records on the last day of the month. The variable Vacancies represents the stock of demanded workers that employers reported to the Employment Service during a given month.

For each of these countries, the three labour market variables are disaggregated by education according to the national employment office data collection practices. The data for Spain is disaggregated by 9 different ISCED education levels. The data for Slovenia is disaggregated in a similar way, only without the data for level 0 – Early childhood education. Austrian data is split into five categories: Compulsory education, Vocational education, High school, Higher education and Academic education. The data for Estonia is split into only three groups – Lower education, Middle level education and Higher education. Croatian data includes those without completed elementary education, those with completed elementary education, those with completed high school, and the two groups with the highest education levels – those with the first level of higher education and those with an university degree. Unfortunately, it was impossible to unify the levels of education among the countries since different national employment offices collect data in different ways, and these are often not fully comparable. Since the focus is on the developments within each country, this does not pose a problem for

testing the main hypotheses of the paper.

To construct the Beveridge curve, typically the unemployment rate is defined as the ratio of unemployed workers to the sum of employed and unemployed workers. Usually, the textbook measure of the job vacancy rate relates the number of vacancies to the size of the labour force (Obadić 2005), while statistical databases (for example, Eurostat) often provide slightly different measures and define it as the ratio of job openings to the sum of employed workers plus job openings (Shimer 2005). Both measures are commonly used, but it is of course important to be consistent when comparing job vacancy rates across regions and time. The approach to creating the Beveridge curves taken in this paper is slightly different to those two. Since the data on vacancies, unemployment and newly employed workers was obtained from different national employment offices, the disaggregated data on the stock of currently employed workers needed to calculate the unemployment and vacancy rates was not available. Unfortunately, this data does not exist disaggregated in line with the method of collecting the data on vacancies by national employment offices.

This, however, does not pose a problem for the construction of the Beveridge curves. According to the previous definitions both the unemployment and the vacancy rate have the same denominator – either the sum of employed and unemployed workers or the sum of employed workers and job openings. Therefore, dividing the numerator by the same number does not change the shape of the Beveridge curves, but only expresses values as percentages. Thus, the number of vacancies and the number of unemployed workers is used instead of vacancy and unemployment rates. Such practice can be found in different papers (Gomez-Salvador and Soudan 2022; Lange and Papageorgiou 2020, etc.).

To better explain possible compatibility between the existing offers and needs in the labour market, different matching functions for each observed country and for each educational group are estimated.

3.2. Methodology

In almost all macroeconomic models with search and matching friction, the flow of new hires to the stock of vacancies and unemployment is modelled using the aggregate matching function (Petrongolo and Pissarides 2001; Pissarides 2000; Bernstein *et al.* 2022). The matching function is used in labour market analysis to understand how the numbers of job vacancies and unemployed workers relate to one another and how changes in one variable affect the other. It is also used to estimate the number of matches in the labour market and to study the effects of different labour market policies on the matching process. One of the most common aggregate matching function models used in the labour market is the Cobb-Douglas matching function. The function is typically represented as (Blanchard and Diamond 1992; Kohlbrecher *et al.* 2014; Barnichon and Figura 2015, Lange *et al.* 2020):

$$M_t = ßU_t^{\alpha} V_t^{1-\alpha} \tag{1}$$

where M is the number of matches (hires) or the number of outflows from unemployed to employed, U is the number of unemployed workers, V is the number of vacancies, and $ß$ indicates the efficiency of the labour market matching process. Exponents α and $1\text{-}\alpha$ are parameters that reflect the responsiveness of matches to changes in vacancies and unemployment, respectively, and t stands for the time period. The matching function is strictly increasing, strictly concave, twice differentiable in both arguments and exhibits constant returns to scale (Petrongolo and Pissarides 2001). The Cobb-Douglas matching function is ubiquitous in search and matching models, even though it imposes a constant elasticity of matches with respect to vacancies that is unlikely to hold empirically (Kohlbrecher *et al.* 2014; Bernstein *et al.* 2022, p. 18).

Following Barnichon and Figura (2015, p. 225) and Consolo and da Silva (2019, p. 6), the job finding rate f_t is defined as the ratio of new hires to the stock of unemployed, $f_t = \frac{M_t}{U_t}$, so that

$$f_t = \beta \theta_t^{1-\alpha} \tag{2}$$

where $\theta = \frac{V}{U}$ represents labour market tightness. The matching function is estimated in the log-linear form

$$lnf_{i,t} = \beta_0 + (1-\alpha) * ln\theta_{i,t} + \varepsilon_{i,t} \tag{3}$$

The variable *f (the job finding rate)* represents new hires expressed as a percentage of unemployment. θ represents labour market tightness and higher tightness should result in a higher job-finding rate. $\mathcal{E}$ denotes regression residuals which measure the matching efficiency. Subscript i refers to different countries for which separate regression equations are estimated, i = Austria, Croatia, Estonia, Slovenia, and Spain. Subscript *t* refers to monthly data from February 2010 to October 2022. The equation is estimated by OLS.

The regression residuals $\mathcal{E}_{i,t}$ from equation 3 capture the efficiency of the matching process or movements in the matching efficiency for a particular education group in a specific country. The theoretical

relationship between the job-finding rate and labour market tightness is positive – higher tightness should result in a higher job-finding rate. Why is matching efficiency measured using regression residuals? If we assume that regression residuals are negative in a certain time period, it would indicate that the difference between the real (observed, empirical) job-finding rate and the job-finding rate predicted by the estimated matching function is negative. In other words, the observed job-finding rate is lower than what one would expect based on the corresponding level of the labour market tightness (the explanatory variable in the regression equation) and the estimated matching function. This means that, for some reason independent of the current level of labour market tightness, the job-finding rate decreased. This decrease is interpreted as a decrease in the matching efficiency. For example, such a trend occurred in the EU after the 2008 crisis when labour market efficiency and tightness started to move in opposite directions (Consolo and da Silva 2019). Positive residuals from the estimates of the matching function are interpreted in a similar fashion, as an increase in the matching efficiency, or a higher observed job-finding rate compared to what one would expect based on the corresponding labour market tightness level for that period.

Before calculating labour market tightness and estimating the matching functions and matching efficiency, the Beveridge curves are constructed using the data for vacancies and unemployment. As explained in the Data section, the Beveridge curves are constructed by using the total number of vacancies and unemployed workers instead of expressing them as vacancy and unemployment rates. This does not change the shapes of the Beveridge curves, therefore allowing for the analysis of the movements along the Beveridge curve, as well as the inward and outward shifts in the Beveridge curve.

4. Results

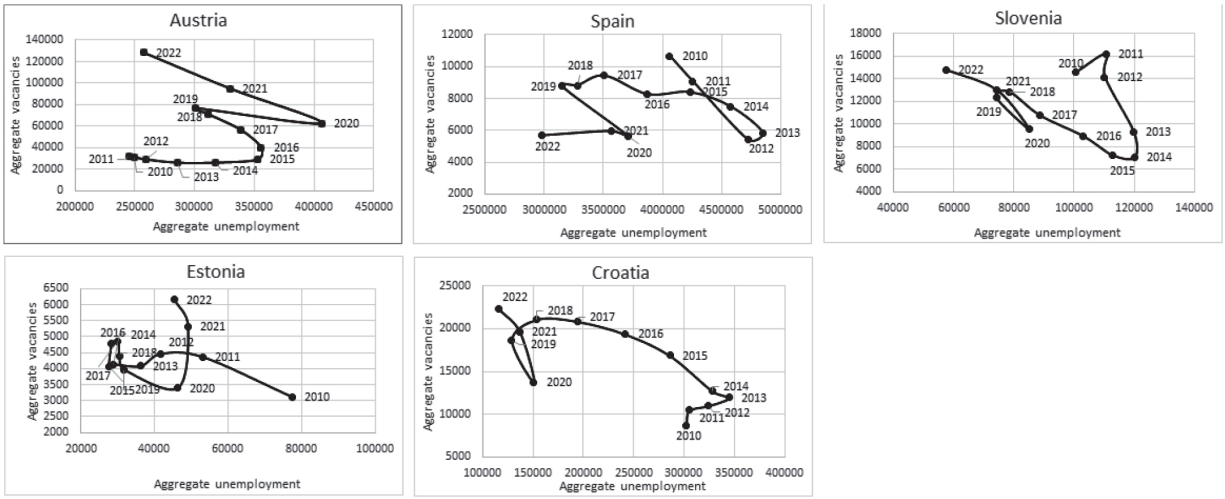
The results section is divided into three parts. First, the Beveridge curves are presented for the aggregate labour market of each observed country, as well as the Beveridge curves disaggregated by education. Secondly, the estimates of the labour market tightness and matching efficiency for different education groups for each country are presented and explained.

4.1. Beveridge curves for the aggregate labour markets

The shape and the position of the Beveridge curves provide important information about the functioning of the labour market. The aggregated Beveridge curve is a combination of different country-specific dynamics (Consolo and da Silva 2019). Therefore, the aggregate Beveridge curves (Figure 1) can shed light on the nature of the aggregate matching process and are presented for the selected five countries over the January 2010 – October 2022 period.

The aggregate Beveridge curves for Slovenia show an inward shift over time. For the same level of aggregate vacant positions available in the country, the level of aggregate unemployment almost halved when

Figure 1. The aggregate level Beveridge curves for selected countries, 2010-2022, annual averages



Source: Authors' calculation based on Public Employment Service Austria, Croatian Employment Services, Estonian Unemployment Insurance Fund, Employment Service of Slovenia and Spanish Public Employment Service data.

comparing the starting and the ending years of the 2010-2022 period. The inward shifts of the Beveridge curves indicate steady improvements in labour market conditions in Croatia, Slovenia and Spain because all three experienced a significant reduction in total unemployment, but only Slovenia managed it with approximately the same number of vacancies. Spain, on the other hand, shows both a decrease in unemployment and vacancies over time. After the period of worsening labour market conditions from 2010 to 2013, unemployment decreased significantly until 2019, along with an increase in vacancies. In 2020 there was a movement along the Beveridge curve, with unemployment increasing and vacancies decreasing. The labour market recovered in 2021 and 2022, with an inward shift of the Beveridge curve, i.e., with a simultaneous decrease in unemployment and vacancies.

The Beveridge curve for Croatia shows a typical anticlockwise movement characterised by an increase in vacancies that is faster than the decrease in unemployment during the recovery phase. This, however, does not necessarily mean that improvements in the matching process between the unemployed workers and the vacant positions are the only factor responsible for this inward shift. For example, Croatia experienced strong emigration during this period, which partially accounts for the decline in aggregate unemployment. The Austrian Beveridge curve, on the other hand, shows outward movements over time, implying a less efficient matching process. An outward shift is especially visible in 2020, after the start of the COVID-19 pandemic. The Austrian economy quickly recovered afterwards, and 2021 and 2022 saw an increase in vacancies along with a decrease in unemployment, a shift along the Beveridge curve.

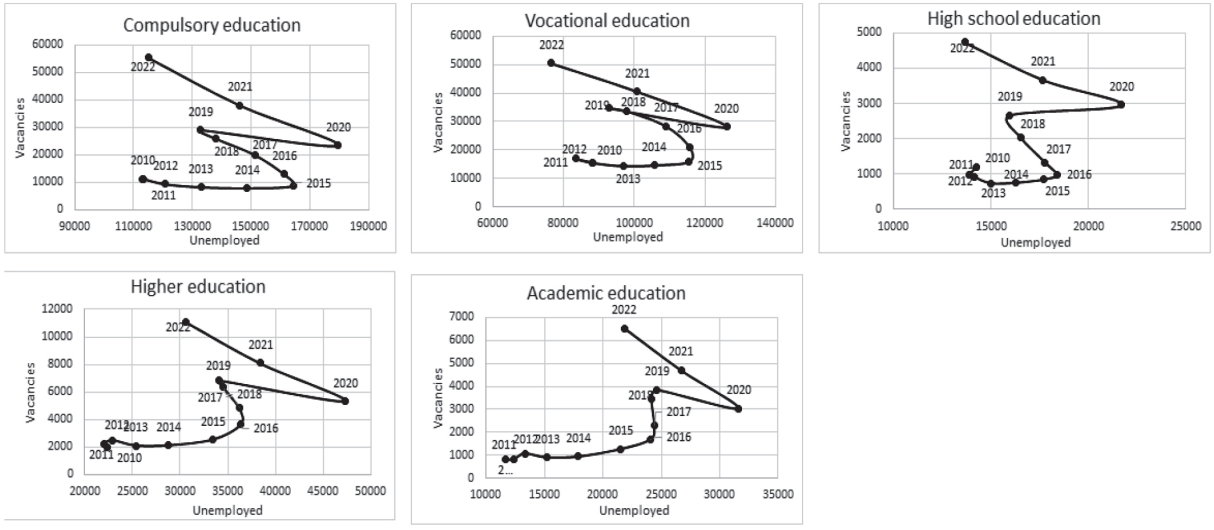
The Beveridge curve for Estonia first shows an inward shift and then a strong vertical shift to the right following the COVID-19 pandemic. Interestingly enough, Croatia, Spain and Slovenia did not record such shifts during and after the pandemic period. A relatively strong increase in the number of vacancies in Austria, Croatia and Estonia in the last two post-pandemic years is a potential indicator of strong cyclical shifts which are probably caused by labour shortages and overheating of the economy. Further analysis displays disaggregated Beveridge curves according to different levels of education.

4.2. Beveridge curves disaggregated by education levels

This section presents and analyses the Beveridge curves formed for each analysed country and for different education levels.

Beveridge curves disaggregated by education for Austria show similar and highly comparable behaviour to the aggregate Beveridge curve for Austria displayed in Figure 1. Beveridge curves for different education level groups show similar patterns, with the slight exception of the Academic education group in the initial period. This leads to the conclusion that differences in education levels do not influence the

Figure 2. Disaggregated Beveridge curves for different levels of education, Austria



Source: Authors' calculations based on Public Employment Service Austria (2022) data.

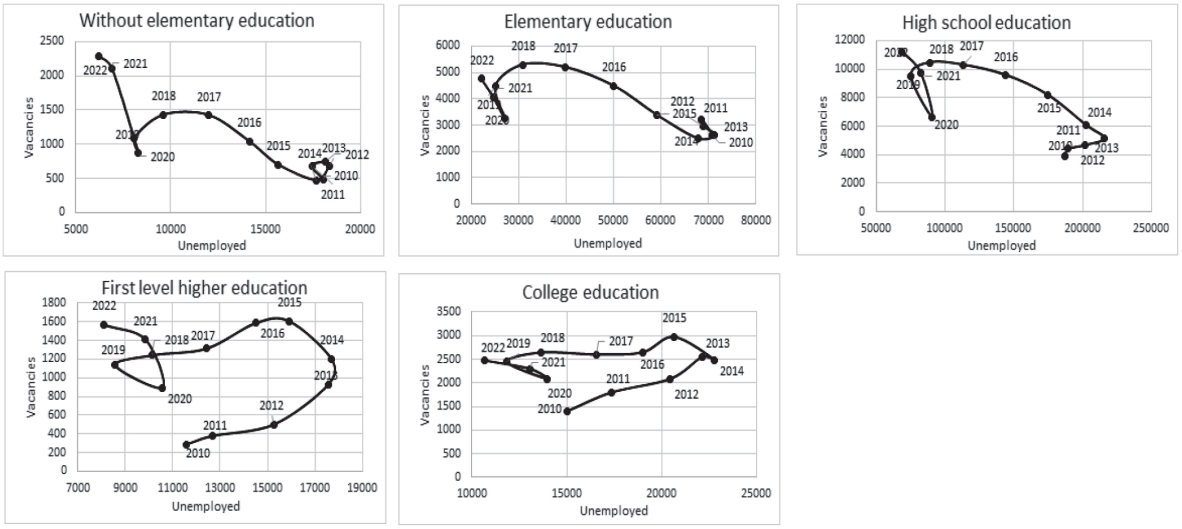
shape of the Beveridge curves for Austria, and all education groups recorded similar movements as those in the aggregate labour market.

The Beveridge curves in Croatia for categories "Without elementary education", "Elementary education" and "High school education" are relatively similar, showing a negative relationship between unemployment and vacancies, as well as the improvement in labour market conditions for the unemployed workers in 2022 when compared to 2010. "First level higher education" and "University education" groups follow similar movements but also show that the relative decrease in the number of unemployed workers from 2010 to 2022 was less pronounced compared to the other three education groups. The mentioned decrease is especially present in the last two post-pandemic years when all education groups recorded increases in the number of vacancies, pointing to labour shortages in the economy.

The Beveridge curves for all three education groups in Estonia show somewhat similar movements. An inward shift from 2010 is visible in all three education groups, and then a strong, almost vertical shift caused by a significant increase in vacancies in 2022. Such a shift is especially noticeable at the highest levels of education indicating a significantly increased demand and a strong shortage of highly educated workers. Therefore, all education groups in Estonia follow relatively similar labour market trends.

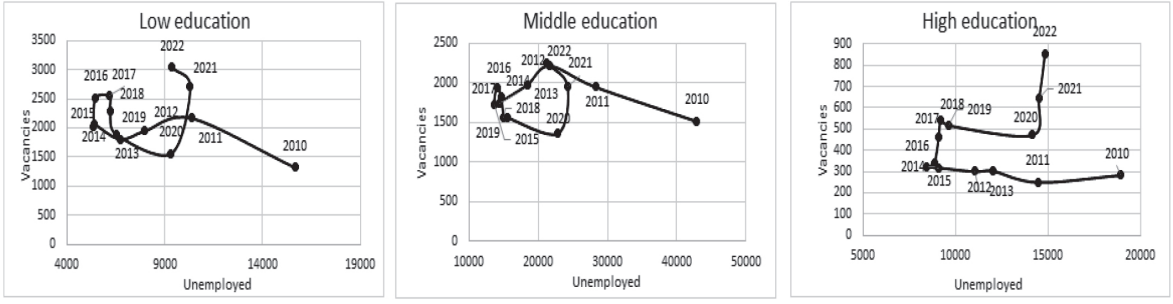
Beveridge curves disaggregated by education level for Slovenia show different behaviour over time. ISCED 6 and 7 levels clearly show the negative relationship between vacancies and unemployment. ISCED 1 and 2, as well as ISCED 4 and ISCED 5 education levels mostly resemble the aggregate Beveridge curve shape for Slovenia. The aggregate Beveridge

Figure 3. Disaggregated Beveridge curves for different levels of education, Croatia



Source: Authors' calculations based on Croatian Employment Services (2022) data.

Figure 4. Disaggregated Beveridge curves for different levels of education, Estonia

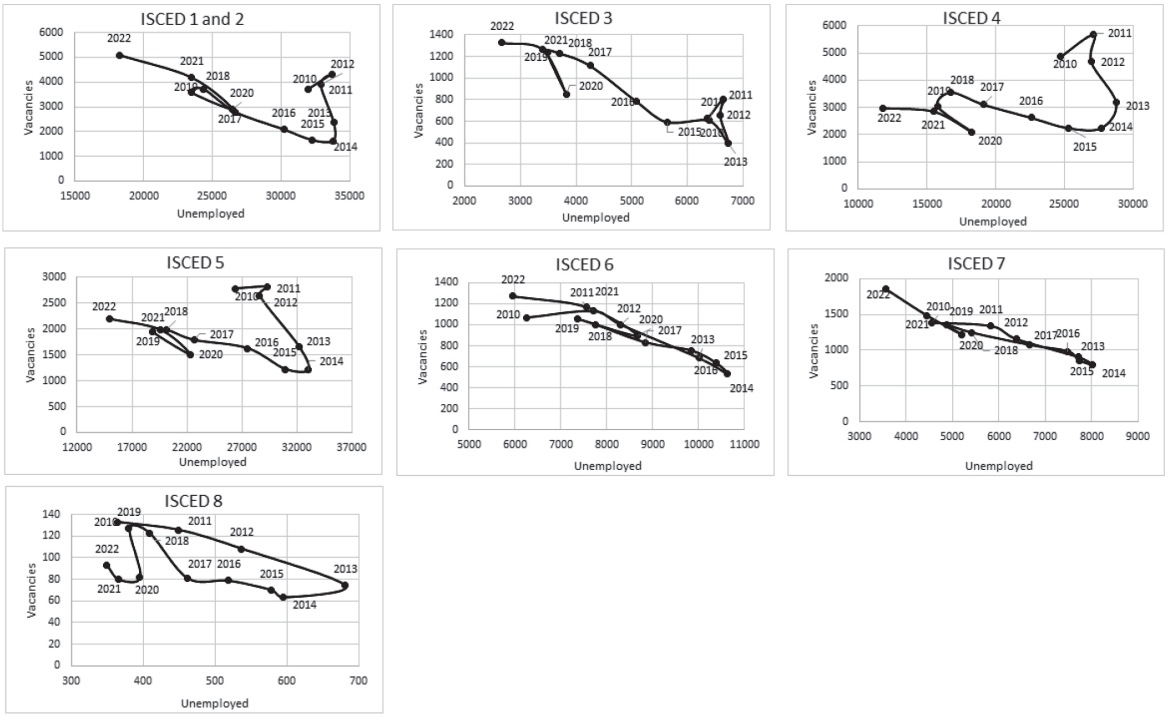


Source: Authors' calculations based on Estonian Unemployment Insurance Fund (2022) data.

curve shows a similar shape to the curves for these education levels since most unemployed workers and vacant positions belong to these education groups.

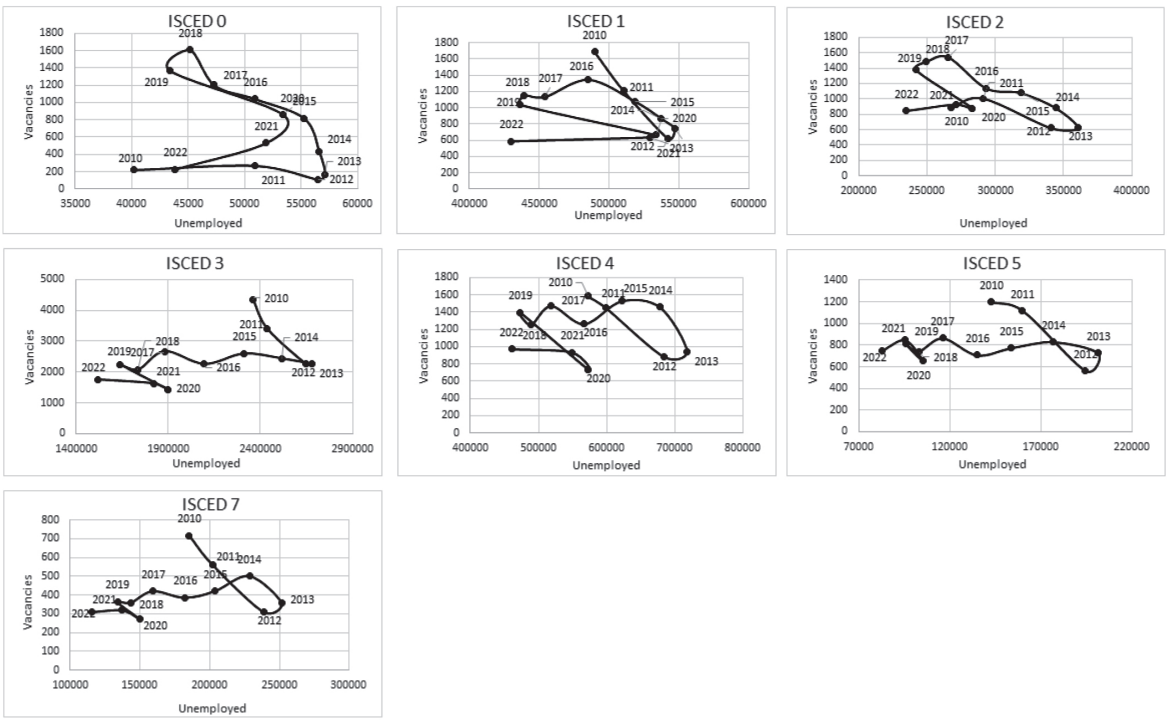
Disaggregated Beveridge curves for Spain demonstrate considerable differences in shapes. While some of the curves, for example, those for ISCED 3, 5 and 7

Figure 5. Disaggregated Beveridge curves for different levels of education, Slovenia



Source: Authors' calculations based on Employment Service of Slovenia (2022) data.

Figure 6. Disaggregated Beveridge curves for different levels of education, Spain



Source: Authors' calculations based on Spanish Public Employment Service (2022) data

educational levels have rather similar patterns to the aggregate one, the curves for ISCED 0 and 1 educational levels differ from the movement of the other education groups. In line with the aggregate Beveridge curve for Spain, most education groups recorded an inward shift of the Beveridge curve over time as Spain witnessed a strong decrease in unemployment. A smaller inward shift is noticeable for groups with lower education levels (ISCED 0, 1 and 2) compared to ISCED 5 and ISCED 7 groups. The Beveridge curve for the ISCED 6 level is not shown due to a relatively low number of observations.

The next section presents the labour market tightness and the estimates of the matching efficiency for different education groups for each country.

4.3. Empirical matching process – labour market tightness and matching efficiency

This section proceeds with the second step of the analysis to explain the level of labour market tightness and efficiency of the matching process. Therefore, the movements in labour market tightness are shown and the results of the estimation of matching efficiency in line with Equation 3 are presented. The results for different countries are presented in alphabetical order.

The results for Austria show that labour market tightness is continuously increasing throughout the period with significant growth after 2020 in all five education groups. This increase is the greatest for groups of workers with lower education levels, Compulsory and Vocational education. Matching efficiency shows similar general trends in all five education groups as

Figure 7. Tightness by education levels, Austria, January 2010 – October 2022

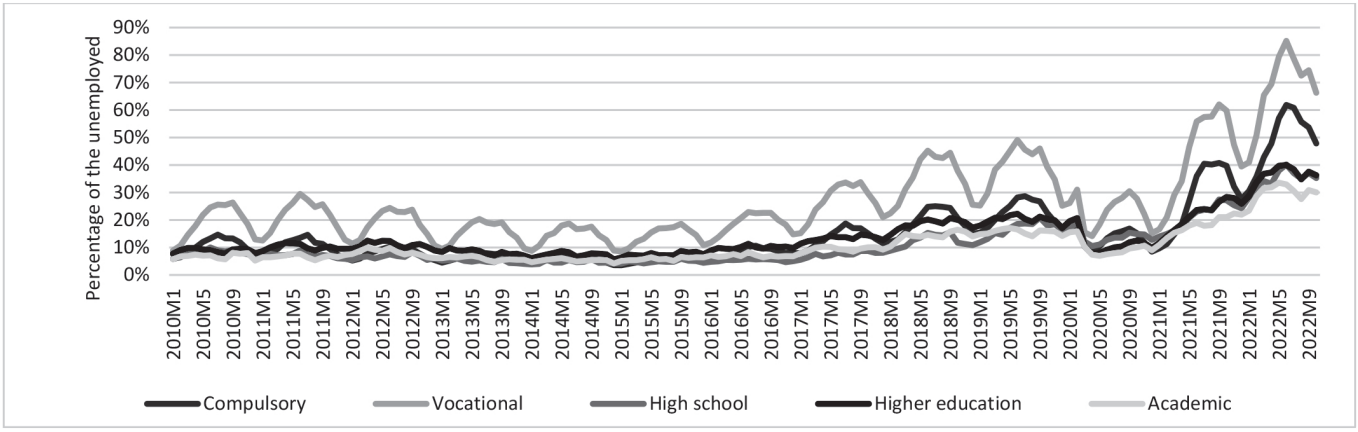
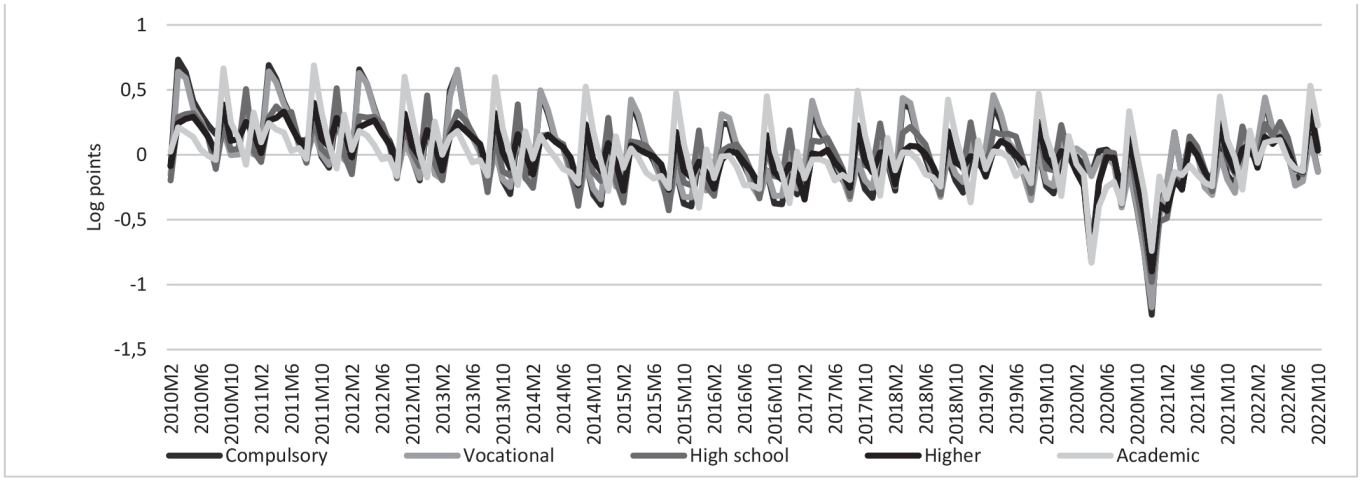


Figure 8. Matching efficiency by education levels, Austria, Feb 2010 – October 2022



Source: Authors' calculations based on Public Employment Service Austria (2022) data.

well, though some groups (for example, Academic) have higher amplitudes. Matching efficiency was, on average, higher during the early years of the period for all groups and experienced a slump in 2020 due to disruptions caused by the pandemic and lockdowns but recovered afterwards. In general, post-pandemic increases in tightness for all education groups led to improvement in the matching efficiency, pointing to the conclusion that the education and skills of Austrian workers, regardless of their education level, were in line and matched with the labour market needs. This is most evident for workers with Compulsory and Vocational education, who experienced the strongest increases in labour market tightness without a decrease in matching efficiency. Regarding the matching efficiency, a similar conclusion holds as for the Beveridge curves – all groups of workers, regardless of education levels, follow similar trends.

When it comes to labour market tightness in Croatia, all education groups experienced an increase in tightness towards the end of the period. The tightness was relatively high in 2018 and 2019, especially for those with an university education, and experienced a temporary slump in 2020. The rebound was strong, resulting in higher than average tightness in 2022 compared to 2018 and 2019. Two groups of workers, those without elementary education and those with an university education, show the highest tightness at the end of the period.

Turning the attention to the matching efficiency, matching efficiency for all education groups in Croatia remained relatively stable and equal over time,

Figure 9. Tightness by education levels, Croatia, January 2010 – October 2022

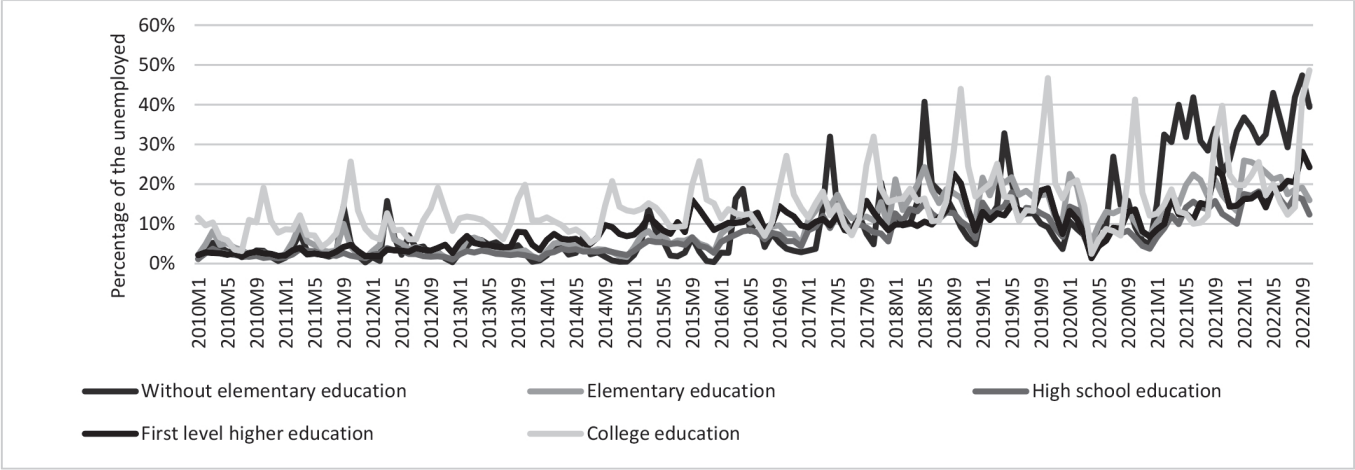
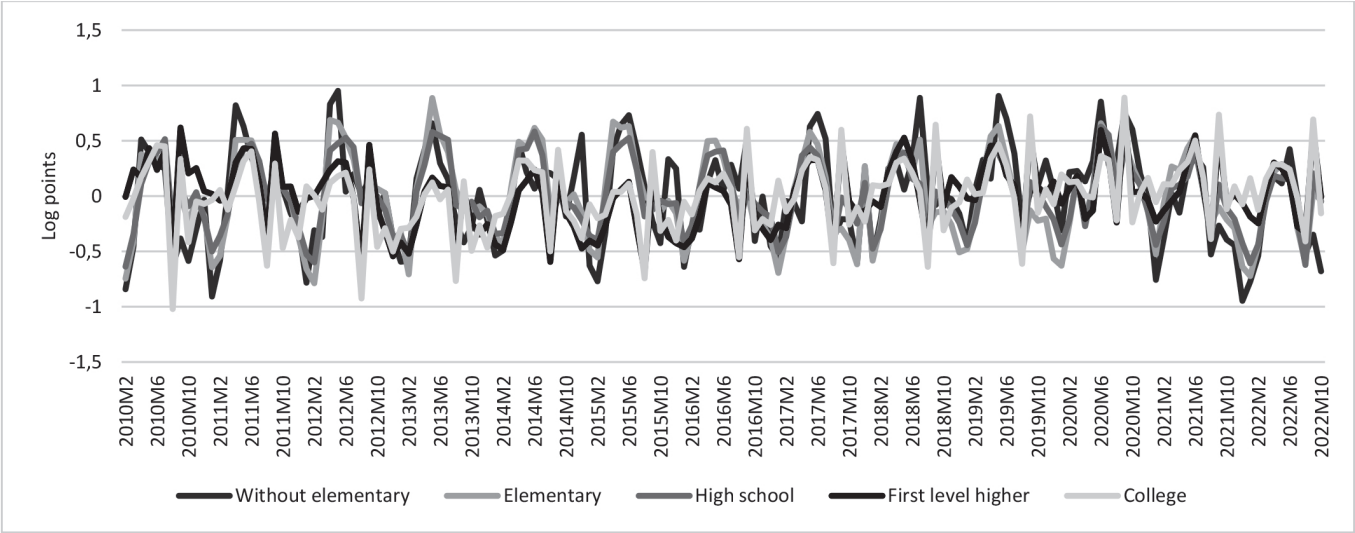


Figure 10. Matching efficiency by education levels, Croatia, February 2010 - October 2022



Source: Authors' calculations based on Croatian Employment Services (2022) data.

without periods of noticeable increases or decreases. There is, however, an obvious drop in the matching efficiency for workers without elementary education towards the end of the period, precisely when the tightness increased. This means that, during the time that the demand for workers without elementary education increased strongly, this increase in demand did not result in increases in the job finding in line with what one would expect based on the estimate of the matching function. The Croatian labour market for relatively uneducated workers was very tight in 2021 and 2022, resulting in a strong inflow of foreign workers with the same characteristics. This drop in matching efficiency can therefore be attributed to employers hiring foreign workers because they were unable to meet their needs among the pool of domestic ones. Those employed foreign workers were not previously registered with the Croatian Employment Services. Workers with an university education, on the other hand, show stable levels of matching efficiency at the end of the observed period, indicating that higher tightness didn't lead to reduced matching efficiency. Therefore, their skills and knowledge are in line with the demands of the labour market. Workers with elementary and high school education recorded a slight drop in matching efficiency during the period of increased tightness in 2021 and 2022.

Figure 11. Tightness by education levels, Estonia, January 2010 – October 2022

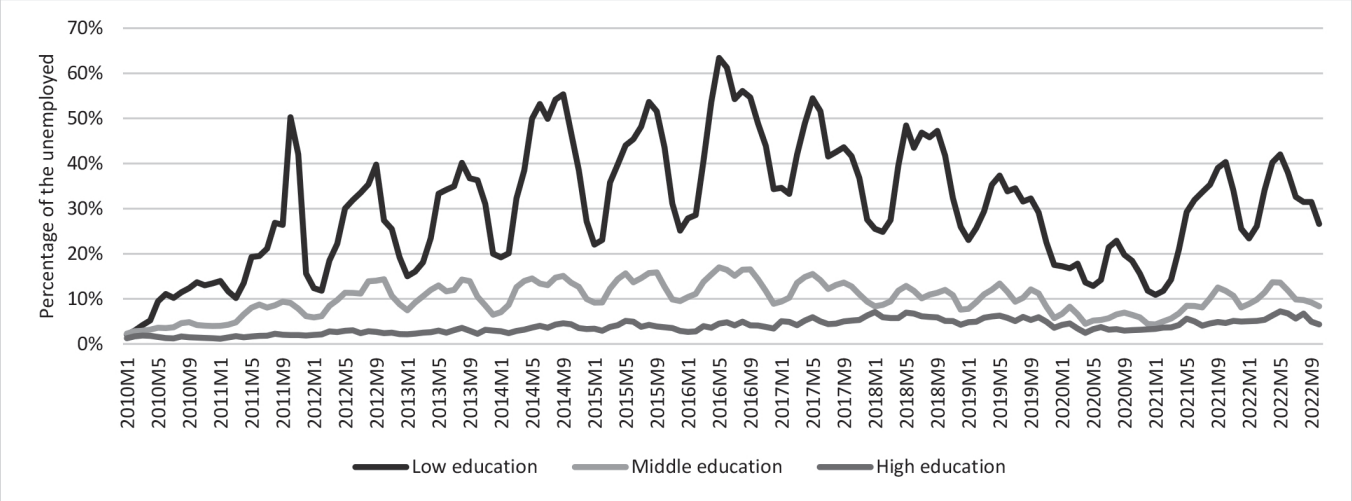
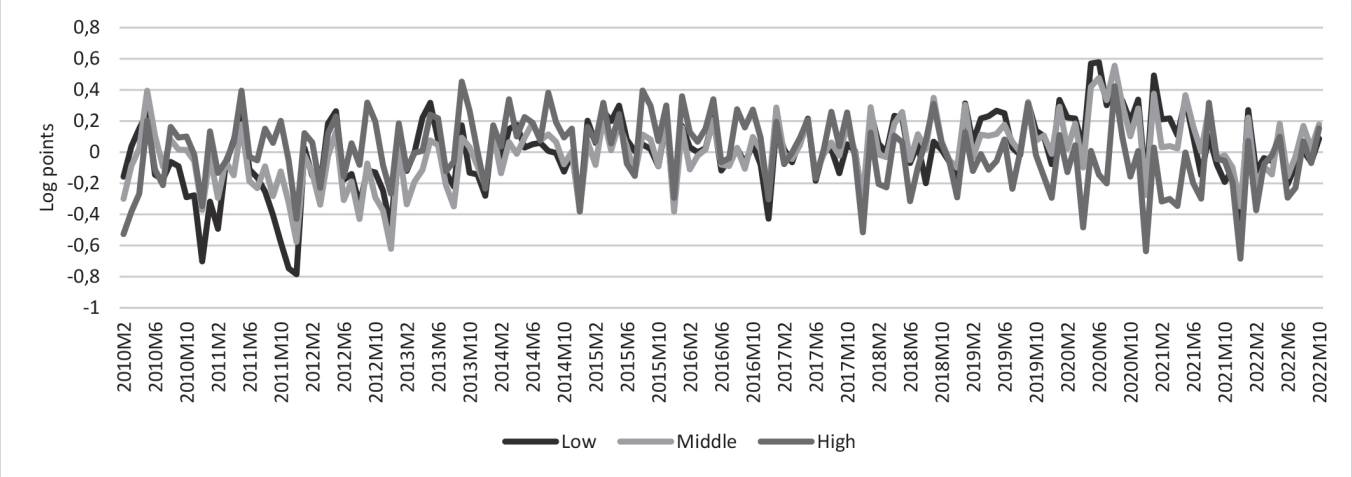


Figure 12. Matching efficiency by education levels, Estonia, Feb 2010 – October 2022



Source: Authors' calculations based on Estonian Unemployment Insurance Fund (2022) data.

The results for Estonia show that matching efficiency for workers with low and middle education increased over time, being at the lowest point during the 2010-2013 period, and surprisingly reaching a peak in 2020 after the "lockdown" period. On the contrary, workers in the „High" education group experienced a drop in matching efficiency from 2019 to 2021, with matching efficiency rebounding in 2022 and converging to the efficiency of the other two groups. All three education groups experienced a drop in labour market tightness in 2020, and a rebound to approximately previous levels of tightness afterwards. A significant difference in the levels of tightness, with the average tightness in the „Low" education group considerably higher compared to the average tightness for workers with „High" education, can perhaps be explained by the searching behaviour of employers as employers search for highly educated workers and professionals more and more through other channels aside from the national employment office.

In line with the trends in other countries, labour market tightness in Slovenia slumped in 2020 in all ISCED education groups and rebounded afterwards. The labour market was relatively tight in 2022, with the highest tightness in ISCED 7 (Master's or equivalent level) and ISCED 3 (Upper secondary education)

Figure 13. Tightness by education levels, Slovenia, January 2010 – October 2022

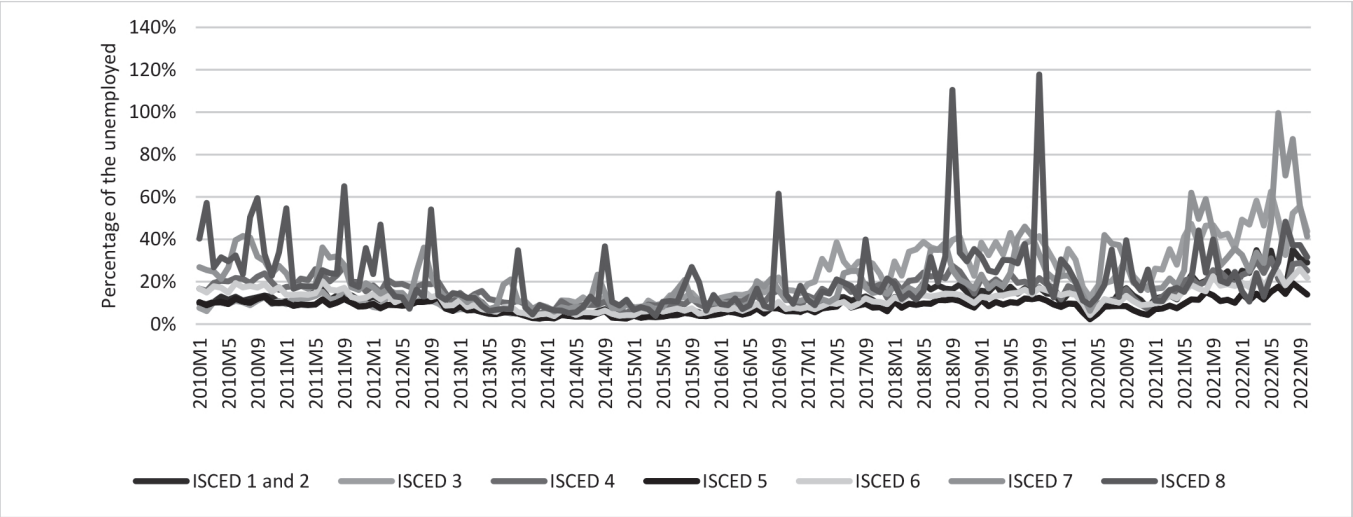
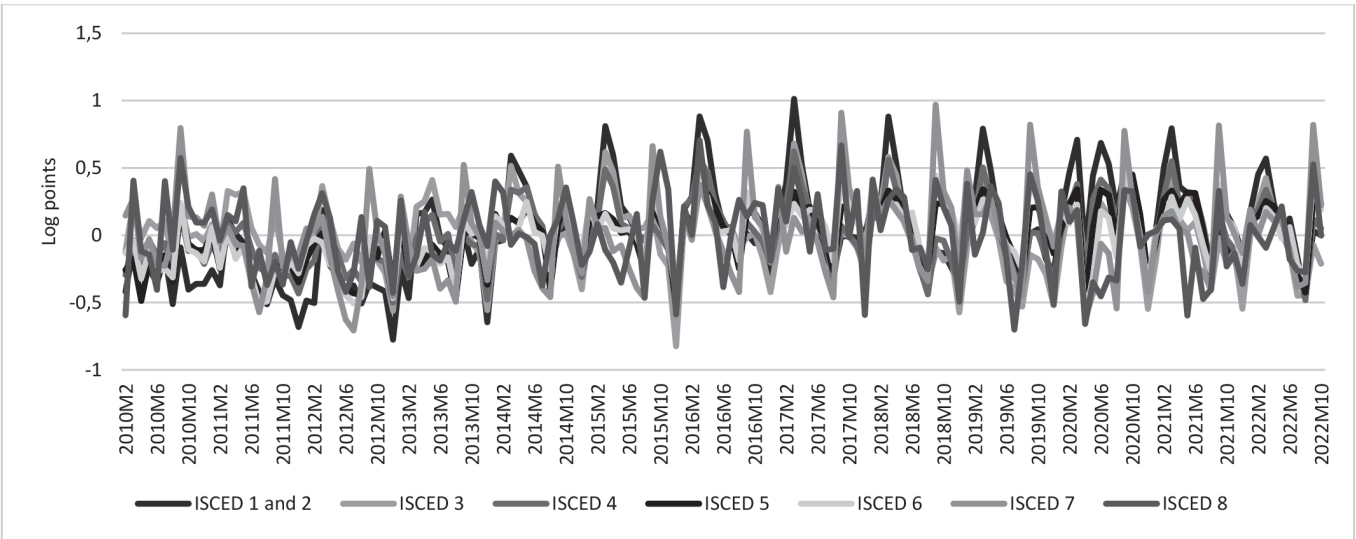


Figure 14. Matching efficiency by education levels, Slovenia, Feb 2010 - October 2022



Source: Authors' calculations based on Employment Service of Slovenia (2022) data.

groups. Matching efficiency for different education groups' movements is highly correlated, being lower than the average of the entire analysed period from 2010 to 2013, reaching relatively high levels during the 2015-2019 period, followed by a decrease in 2020. The average matching efficiency for all education groups in 2021 and 2022 remained only slightly lower compared to the 2015-2019 period peak. This, however, still points towards the conclusion that the educational structure of the labour market in Slovenia is adequately aligned with the needs of employers. Tightness increased during 2021 and 2022, especially for ISCED 7 and 8 groups, but this did not result in decreased matching efficiency, which means that a higher demand for workers (higher tightness) translated directly into more matches between the unemployed workers and vacant positions without losses in efficiency.

Regarding the labour market tightness trends in Spain, it is important to emphasize that the number of vacancies in all education groups is relatively low expressed as a percentage of unemployed workers compared to other countries, resulting in lower tightness figures. This indicates that only a minority of new workers in Spain are found through the national employment office, and most of the new matches are made through alternative channels (other private employment agencies and head-hunting agencies). Therefore, these are not visible in the official national employment office's statistics for vacancies.

Figure 15. Tightness by education levels, Spain, January 2010 – October 2022

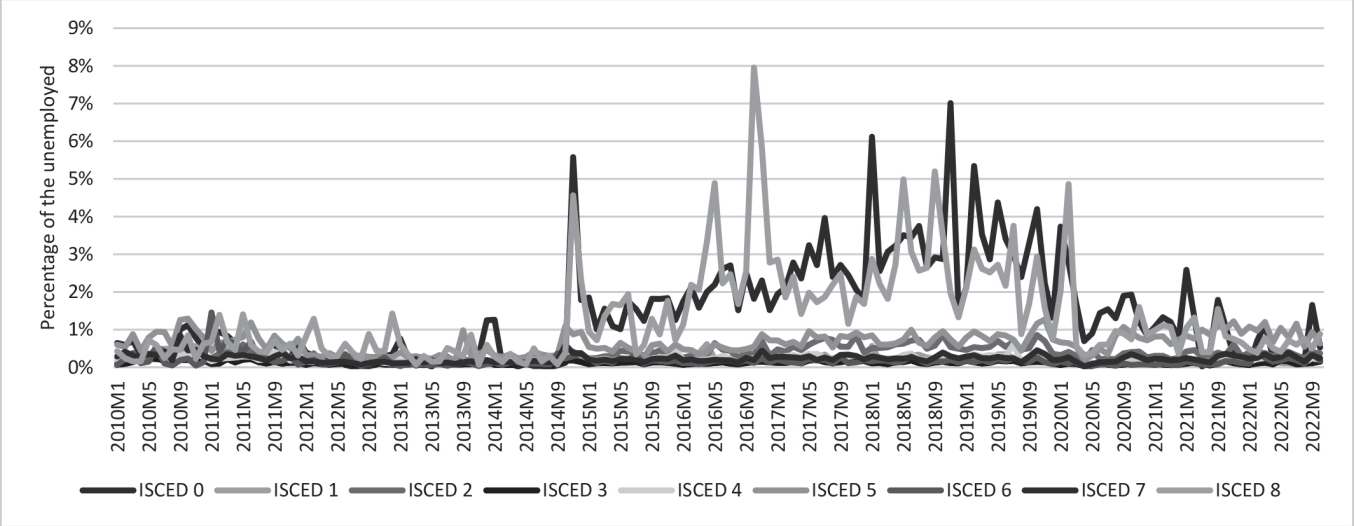
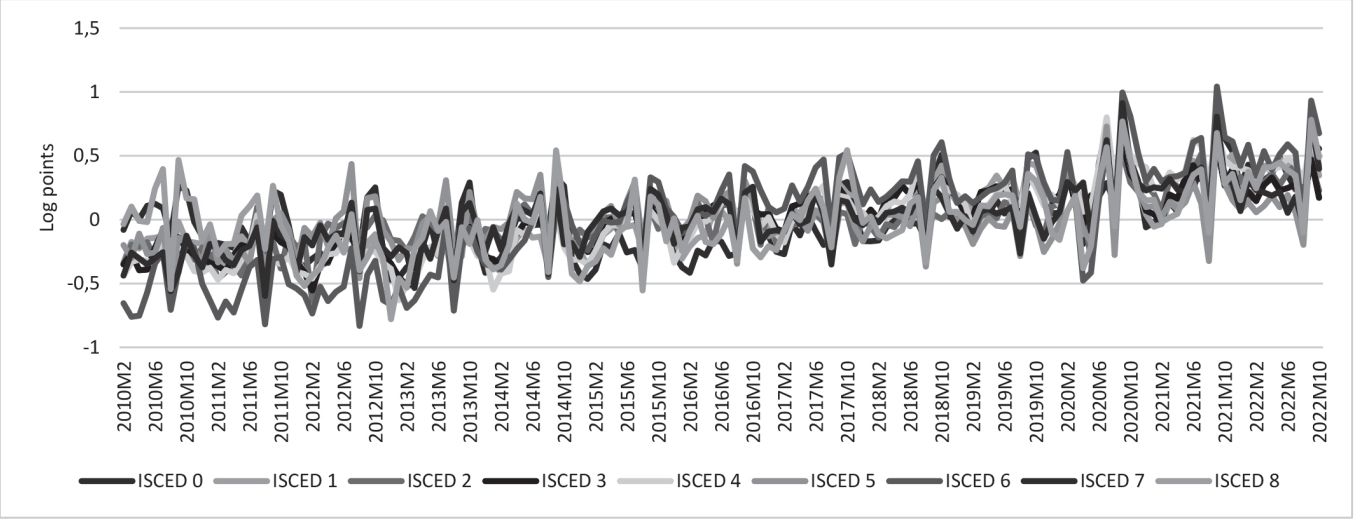


Figure 16. Matching efficiency by education levels, Spain, February 2010 – October 2022



Source: Authors' calculations based on Spanish Public Employment Service (2022) data.

All ISCED education groups for Spain show roughly similar behaviour – the matching efficiency recorded a continuous increase over time, from relatively low levels in the first half of the period to relatively high levels at the end of the observed period. Aside from ISCED 0 and ISCED 8 groups, which experienced increases in tightness from 2015 to 2020, tightness remained roughly similar throughout the entire period in all other education groups. Along with increased matching efficiency, this implies that the mismatch between education and skills of the unemployed in different education groups and the labour market needs decreased in the 2010-2022 period.

5. Discussion and limitations

In accordance with the two research hypotheses, the Beveridge curves constructed for different education groups in Austria, Croatia, Estonia, Slovenia, and Spain provide strong evidence in favour of them. Worker groups with different levels of education do indeed experience similar trends to the aggregate trends in the labour market, which is confirmed by the similar shapes of the Beveridge curves among the different education groups.

However, there are exceptions to this general pattern in some education groups. The Austrian labour market disaggregated by education shows very similar movements in the Beveridge curves. Croatian labour market groups also follow similar trends, though with exceptions in the form of slightly different shapes of the Beveridge curves for workers with higher levels of education. ISCED groups in Slovenia follow similar general patterns as well, but certain groups show their own peculiarities. Different groups in the Estonian labour market also follow relatively similar trends. The Beveridge curves for different labour market groups in Spain resemble the aggregate Beveridge curve but with their own peculiarities in groups such as ISCED 0, 1 and 2.

Despite these exceptions, the authors believe it is reliable to conclude that in the analysed period in the selected group of countries, different education groups in the labour market follow broadly similar trends in the movements of vacancies and unemployment. In some countries, this co-movement is very strong (Austria), and in others, it is weaker (Spain, though the results for Spain need to be interpreted with caution due to the relatively low number of reported vacancies, i.e. missing data).

When it comes to the second hypothesis regarding the similarities in movements in labour market tightness and matching efficiency among the different education groups, similar conclusions hold – different education groups experienced relatively similar trends in Austria, Croatia, Estonia, Slovenia, and Spain. This, though, is not valid for all groups and in all periods. For example, in Estonia, the matching efficiency for those with high education remained relatively stable in 2020, while the other two education groups experienced an increase.

Although the levels of tightness, as well as their volatility at different points in time, differ, similar general trends in tightness are observable in almost all education groups in the countries analysed in this paper. This co-movement is even stronger when it comes to matching efficiency. The trend of increasing matching efficiency over time is visible in all education groups in Slovenia and Spain. In Croatia, the matching efficiency remained relatively similar over the 2010-2022 period in all education groups except for workers without elementary and university education. Therefore, it can be concluded that the data and the results provide relatively strong support for the two hypotheses in the paper.

The results of our research can partly be compared with the findings of Lange *et al.* (2020), who find that the Beveridge curve shifted outwards during the Great Recession. That would also have happened in all selected countries, if the government did not implement special measures for preserving jobs during the COVID-19 period. Considering the analysis carried out and the increasingly uncertain economic circumstances that surround us, it is difficult to predict the future trends and needs of the labour market. It is becoming increasingly obvious that technological changes (introduction of more sophisticated robots, AI, etc.) in the labour market continue to be a significant driver of future changes but are no longer a key factor in determining the basic required skills. In addition to all mentioned, the labour markets in the EU member states already depend on other supply and demand factors, such as the ageing of the population, the level of economic transformation in each member state, and different and specific development of labour market institutions and policies.

Finally, some limitations related to the findings in this paper exist, so they should be interpreted with caution. The first is related to the different availability of data at the individual disaggregated level for the selected group of countries because many employment service offices in the EU countries do not collect the data disaggregated by all nine ISCED levels. Regardless of the fact that the public employment office in Estonia collected the data for only three educational groups while the other countries have data for a higher number of educational groups, we can still analyse the trends in each country separately. Second,

the data itself has some limitations considering different labour market legislation and different rules regarding the obligation of employers to report vacant positions to employment offices. In practice, public employment offices collect only a fraction of the job offers available on the market. The results of this analysis may therefore only hold for a certain segment of the labour market, since the distribution of job offers registered by public employment services is biased towards low-skilled jobs in comparison with the total number of vacancies in the labour market. Thus, the matching process analysed in this paper may differ from the full-scale matching taking place in the labour markets in these countries. Third, the last two analysed years (2020 and 2021) should be tentatively considered due to the period of lockdown and subsequent partial closures in the COVID-19 pandemic.

6. Conclusion

The analysis in this research includes the labour market data for Austria, Croatia, Estonia, Slovenia and Spain during the period from January 2010 to October 2022. The results obtained by the construction of Beveridge curves, and the estimation of labour market tightness and matching efficiency point toward the conclusion that different education groups in the same country experience relatively similar labour market trends in the movements of vacancies, unemployment, labour market tightness and matching efficiency. Several exceptions to this trend exist, but these general trends hold relatively strongly. The results indicate that differences according to the levels of education did not result in significant deviations from the aggregate labour market trends during the 2010-2022 period. Economic upswings and downswings during the business cycle have a strong impact on the labour market, and this impact was also transmitted to the disaggregated level in relatively similar ways.

Future research should make clear whether the results presented for the selected observed cases can be further generalized by extending the analysis to a larger set of countries. Considering the data on labour market vacancies, future research should aim to include both the official data from the national employment offices and the data from different private agencies. The data on vacancies from the aforementioned private agencies would give a more comprehensive picture of the labour market needs, especially in countries such as Spain in which the national employment office vacancy figures are relatively low. Labour market changes in some specific groups, such as IT workers and professionals, are not recorded in the national employment office unemployment figures because in many countries these groups of workers often do not seek their jobs through national employment offices.

Therefore, future studies should draw attention to the quality of national data sets and put greater focus on legislative country-specific aspects. Namely, the structure of the economy, the degree of labour market flexibility, employment protection legislation rules, and some specific regional and sectoral circumstances should also be taken into consideration. But it is certainly necessary to consider how the COVID-19 pandemic has significantly changed the general situation in the labour markets around the world in the last three years, contributing to labour market tightness at almost all levels of education. In some cases, the pandemic has led to improvements in labour market efficiency as businesses have adapted to changing market conditions. In other cases, it showed weaknesses in labour market institutions and policies that will need to be addressed to improve labour market efficiency over the long term.

Note

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Endnotes

1. International Standard Classification of Education (ISCED) based on the ISCED 2022 classification includes 9 levels: ISCED 0 = Early childhood education, ISCED 1 = Primary Education, ISCED 2 = Lower Secondary Education, ISCED 3 = Upper Secondary Education, ISCED 4 = Post-secondary non-Tertiary Education, ISCED 5 = Short-cycle tertiary education, ISCED 6 = Bachelor's degree or equivalent tertiary education level, ISCED 7 = Master's degree or equivalent tertiary education level, ISCED 8 = Doctoral degree or equivalent tertiary education level (World Bank 2022).
2. The negative relationship between unemployment and job vacancies was first identified by William Beveridge in the 1940s, and therefore the current curve bears his name. With it, he wanted to determine how far the economy is from the state of full employment (Bleakly, Fuhrer, 1997, p. 1).

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DOMESTIC COMPETITION, TRADE OPENNESS AND ENTREPRENEURIAL CULTURE: CANONICAL CORRELATION ANALYSIS

Milan Kostić, Jelena Živković

Abstract

The paper analyses canonical correlations between domestic competition, trade openness and entrepreneurial culture. The research covered 141 countries ranked by World Competitiveness Index in 2019. Canonical correlation analysis is applied to find relationship between two canonical variables. The first canonical variable includes sub-indexes from Domestic competition and Trade openness pillars. The second variable contains sub-indexes from Entrepreneurial culture pillar. The results of the analysis showed there is a strong, positive, statistically significant canonical correlation between these canonical variables with a Pearson coefficient of 0.86. The linear regression analysis is also applied. The regression analysis shows that the variable Distortive effects of taxes and subsidies on competition is the most important for all dependent variables. The extent of market dominance, Competition in services and Border clearance efficiency are important, but not as much as taxes and subsidies. It confirms that regulation of domestic competition and trade openness are supreme for entrepreneurial culture.

Keywords: *domestic competition, trade openness, entrepreneurial culture, canonical correlation analysis, linear regression*

JEL Classification: *F64, F68, L22, L26*

1. Introduction

In the system of free market economy, which prevails in the modern world, the implementation of a Competition policy is essential for the achievement of the economic and political goals. These goals are, among others: increasing the economic efficiency of entities and encouraging the innovation and development of entities, proper allocation of economic resources, establishment and preservation of equality of the conditions in the offer of goods and services on markets and strengthening competitiveness of domestic business entities in the national and international market (Đekić 2009, p. 229). A stable system of Competition policy should ensure the establishment of a market economy, the equality of market undertakings, encouraging economic efficiency, the creation of conditions for faster economic growth and the

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creation of the well-being of society as a whole and consumers in particular. In these circumstances, competition policy and free competition enable the domination of entrepreneurship. At the same time, the situation in the market changes when new undertakings from abroad enter. New undertakings can affect the market concentration and condition of competition.

The research aims to investigate the relationship between several sub-indexes of the Global competitiveness index: Domestic competition, Trade openness and Entrepreneurial culture. The paper is based on the following research questions:

- Is there a canonical correlation between the Domestic Competition and Trade Openness sub-indexes and the Entrepreneurial culture sub-index?
- Which sub-index from Domestic competition and Trade openness has the strongest impact on generating the relationship between Domestic competition, Trade openness and Entrepreneurial culture?
- Which sub-index from Entrepreneurial culture has the strongest impact on generating the relationship between Domestic competition, Trade openness and Entrepreneurial culture?

The paper contains the following sections. After the introduction, the first section is the theoretical background with a review of studies about the relationship between domestic competition, trade openness and entrepreneurial culture. The second section describes data sources, variables and applied methodology. In the third section, research results and discussion are presented in order to draw concluding remarks.

2. Theoretical Background

Entrepreneurial culture can be described as an environment where people are encouraged to take risk, innovate and create new business. It includes attitudes, values, expertise, and the influence of a group or individual working in taking risk company (Danish et al. 2019, p. 1). The entrepreneurial culture highlights behaviors that foster creativity, innovation, and a greater degree of ability or competency (Atiku and Fields 2016, p. 30). Any nation or economic region has a complex institutional environment made up of a variety of formal institutions, with a few presumably being the most significant (Potts et. al 2021, p. 84). According to Kuhlke (2017), the goal of entrepreneurial culture is to encourage the growth of entrepreneurial abilities in the creative and cultural industries so that they can make greater contributions to economic development on a theoretical, pedagogical, and practical level. Entrepreneurship and the competition it fosters can provide both immediate and long-term benefits to the business owners, potential employees, customers, rival businesses, and local communities and governments (Matusik 2016, p. 561). Individual attitudes, desires, perceived opportunities, and business endeavors are the result of a particular environment. Therefore, both environmental variables and entrepreneurial actors are crucial for promoting entrepreneurship and, consequently, economic growth (Pfeifer et al. 2021, p. 1). The entrepreneur fosters economic growth and innovation, both of which have a favorable effect on job creation (Dumitru and Dumitru 2018, p, 157). Besides, innovative entrepreneurs with novel products stimulate economic expansion through creative channels (Simionescu et al. 2021, p. 131). Fazio (2010) distinguishes between two main theories that connect entrepreneurship and competition. One is Kirzner's theory, who sees market share competition between established companies and startups as being inextricably linked to entrepreneurship. The other is Schumpeter's theory, which defines entrepreneurship as the process of using innovation to open up new markets and spurring competition among businesses that are doing so. Although there is a well-known difference of opinion between Kirzner and Schumpeter about the economic role of the entrepreneur, both of these eminent theorists seem to concur that competition is a natural part of entrepreneurial activity and that potential entrepreneurs welcome it (Urbig et al. 2020, p. 194).

There are several ways to measure entrepreneurial performance and the environment for entrepreneurship development globally. The Global Competitiveness Index is one of them because it includes indicators related to the development of entrepreneurship. Coduras and Autio (2013) compared the Global Competitiveness Index data and the national entrepreneurial context qualitative information provided by the Global Entrepreneurship Monitor. The conclusion is that the Global Competitiveness Index stands as an objective measure that can be enhanced by incorporating additional entrepreneurship indicators. Using these indexes Suchek, Fernandes, and Nascimento (2019) indicate in their study that the countries examined operate within contexts that similarly impact competitiveness and entrepreneurship. Moreover, the factors driving competitiveness also affect entrepreneurship and vice versa.

In the last two decades, the contribution of entrepreneurship to economic growth has grown in significance as a research area in economics. Alongside this recognition of the importance of entrepreneurship, governments worldwide have implemented different policies to support business development (Hartwell 2014, p. 434). Also, the relationship between

entrepreneurship and national competitiveness is confirmed based on an analysis of the connection between the Global Entrepreneurship Index and the Global Competitiveness Index (Doan 2021) in 124 countries. A positive, significant relationship between entrepreneurship and national competitiveness is found in G-20 countries (Gautam and Lal 2021). The findings of the correlation and regression analyses indicate that high levels of productive and inventive entrepreneurship as well as high levels of innovation performance can account for the high levels of national competitiveness in several EU nations (Herman 2018).

There are different empirical results about the relationship between domestic competition, competition policy and entrepreneurship. Using information about new company registrations and the Global Competition Review ranking of national competition authorities for 32 countries, Fazio (2010) found a favorable correlation. Better competition policy, however, only promotes entrepreneurship after a certain level, according to the study. This is due to a lesser difference between an average and an excellent regulatory system than between a terrible and a very bad one. For instance, Choi and Phan (2006) claim that competition has a positive and considerable impact on the creation of new enterprises, based on data from the United States from 1968 to 1993 which measure the share of major firms in the economy and the amount spent on competition policy. Moreover, Golodner (2001) contends that competition policy influences entrepreneurship in another, more intangible manner. According to him, countries with strong and effective competition policies and laws encourage and value individual initiative, enterprise and risk-taking among their citizens and entities. As a result, anti-competitive behavior cannot be discouraged in countries without effective competition policy. Norbäck et al. (2006) concluded that there is relationship between competition and entrepreneurial entrance, and innovation. The relative profitability of innovation for sale compared to innovation for entry rises as competition becomes fiercer. Entrepreneurship ideas constitute an essential part in a well-functioning market economy (Gans and Persson 2013, p. 131). On the other hand, Schaper et al. (2008) examined the correlation between competition policy and entrepreneurship using data of three existing indexes: the Global Entrepreneurship Monitor, the Global Competition Review, and the Antitrust Index. The results show that high ranking competition policy does not correlate with entrepreneurship. Poor data issues, such as using highly imprecise measurement for the data, may impact this result. They also assert that entrepreneurship may not be substantially influenced by competition policy because starting a firm is primarily influenced by a number of factors, including individual incentives, market opportunities, and access to resources. In line with these results, Capelleras et al. (2008) state that the degree of entrepreneurship in a nation is mainly fixed, meaning that legislative frameworks have little influence on this level of activity. It is more influenced by an individual's background and talents as an entrepreneur.

Regarding the link between trade openness and entrepreneurship, there is no unified view in theory about the nature of this link. The impact of trade openness on entrepreneurship is inherently unclear. On the one hand, trade openness provides new entrepreneurs with more prospects by granting them access to larger product and input markets. However, at the same time, foreign trade is more open between nations, and the level of competition increases, thus lowering incentives and raising entry barriers for potential business owners. According to Audretsch and Sanders (2007), who discussed about the nations that are integrating into the global economy, new opportunities are emerging in this process of globalization, which will make it easier to switch from "an industrial to an entrepreneurial model of production". Markusen and Venables (1997) argue that multinational entrepreneurs' entrance into the market can ultimately be advantageous for domestic competition and local entrepreneurship, primarily if entrepreneurs export growing percentages of their products to a market-wide range. Bayar et. al (2018) found the positive impact of trade openness on entrepreneurship by analysing data from 15 upper middle income and high-income countries from 2001 to 2015. Scholman et al. (2014) argued that economic openness plays a role in fostering these entrepreneurial chances connected to a country's cyclical performance because they also discover that these results only apply to highly open economies. Pinho and de Lurdes Martins (2020) investigated the impact of institutional factors and trade openness on opportunity to create a business on sample of 1771 entrepreneurs from 44 countries. The research indicates significant positive impact of the institutional factors on the potential of starting a new business. This study offered a useful perspective of the still nascent understanding that institutions and trade openness might have an important role in entrepreneurs' culture.

3. Data and Methodology

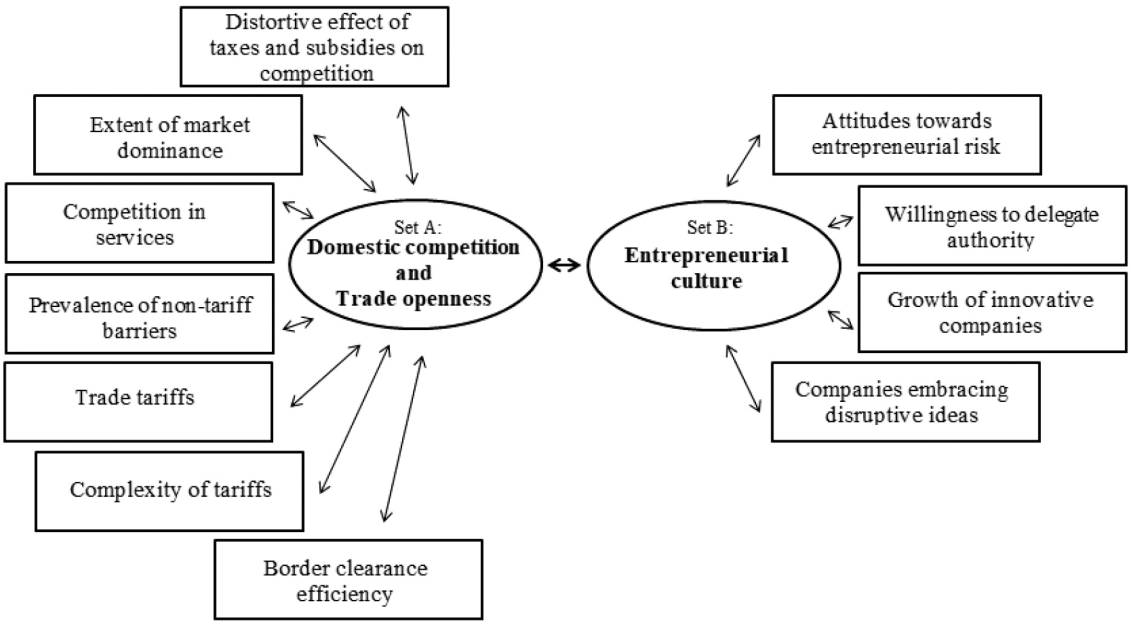
Data for this research are retrieved from Global Competitiveness Report 2019 by World Economic Forum. Global Competitiveness Report covered 141

countries in 2019. Global Competitiveness Index (GCI) is composite index for measuring national competitiveness. GCI is formed by World Economic Forum in 1979. Global Competitiveness Index 4.0 is latest version of this index launched in 2018. This modification was made because it is necessary to consider the effects of the fourth industrial revolution. In such circumstances, there are changes in the factors of competitiveness. According to the World Economic Forum (Schwab 2020), it alleviates the differences in achieving the competitiveness of countries at different levels of economic development. GCI 4.0 has 12 pillars: Institutions, Infrastructure, ICT adoption, Macroeconomic stability, Health, Skills, Product market, Labour market, Financial system, Market size, Business dynamism and Innovation capability. The index value ranges from 0 to 100.

Canonical correlation analysis (CCA) is performed if pair-wise correlation or multiple approaches, like logistic regression, are insufficient to capture the expected, multivariate relationships between variables. The ultimate level of the general linear model (GLM) is represented by canonical correlation analysis. It is a technique closely related to the Pearson correlation coefficient, which is more commonly comprehended (dos Santos and Brandi 2014; Sherry and Henson 2005; Hair et al. 2005; Rencher 2002). The canonical correlation procedure's principal goal is to find meaningful and significant connections between two sets of variables (Xia 2008). Moving from a vast set of interconnected variables to a smaller set of canonical variables is also a benefit of this technique (Kachigian 1991; Sharma 1996, Hair et al. 1998). These sets all contain a minimum of two variables. It extends beyond both multiple correlation analyses, which examine the relationship between one variable and a group of factors, as well as straightforward pair-wise correlation analysis, which tests the association between two variables. Canonical correlation was introduced by Hotelling in 1936 (Hotelling 1936). When there are several correlations between the outcome variables, CCA is helpful. According to Sherry and Henson (2005), pairs of canonical variates are constructed as orthogonal linear combinations of the variables in the two initial sets to best describe the inter- and intra-set variability. Finding the linear combination with the highest correlation is the main principle behind it. The process then continues in this fashion, starting with the initial combination and ending with the linear correlation pair that has the highest correlation among all the combinations unrelated to one another. Canonical variables are linear combination pairs, and canonical correlations are relationships between canonical variables. A set of canonical variates, or orthogonal linear combinations of the variables in each set, are identified by canonical correlation analysis as the ones that best account for variation both within and between sets.

Considering that canonical correlation analysis involves two sets of variables, the research is focused on indexes from two GCI 4.0 pillars: Product market and Business dynamism. Set A contains next sub-indexes (pillars): Domestic competition and Trade openness.

Figure 1. Canonical correlation framework



Source: Authors

Domestic competition pillar consists of next indexes: Distortive effect of taxes and subsidies on competition (X_1), Extent of market dominance (X_2), Competition in services (X_3). While, Trade openness pillar consists of next indexes: Prevalence of non-tariff barriers (X_4), Trade tariffs (X_5), Complexity of tariffs (X_6), Border clearance efficiency (X_7). Set B includes following sub-indexes of the Entrepreneurial culture pillar: Attitudes towards entrepreneurial risk (Y_1), Willingness to delegate authority (Y_2), Growth of innovative companies (Y_3), Companies embracing disruptive ideas (Y_4). The maximum number of canonical functions is equal to the smaller of the number of dependent variables (four) or the number of independent variables (seven) (Rastegar et al. 2012) Thus, four canonical functions are derived and used as the basis for the study.

For canonical correlation analysis we have two sets of variables: set A and set B. The original set of variables *t* includes variables from set A (*p*) and variables from set B (*q*). Set A include variables $X_{1...p}$ and set B includes variables $Y_{1...q}$. Canonical correlation represents combination of linear relationship between variables. Equation 1 is linear combination of variables from set A and equation 2 is linear combination of variables from set B. Canonical correlation can be presented as follow:

$$A_i = a_{ip}X_1 + \cdots + a_{ip}X_p \quad (1)$$

$$B_i = b_{iq}Y_1 + \cdots + b_{iq}Y_q \quad (2)$$

These equations can be written as follows:

$$A_i = \sum_{i=1}^{p} a_i X_i \quad (3)$$

$$B_i = \sum_{i=1}^{q} b_i Y_i \quad (4)$$

where *X* and *Y* are independent and depended variables, *a* and *b* are coefficients for linear combination. In this combination Pearson's coefficient of correlation is used.

Canonical correlation between two sets is (Andronicean et al. 2020, p. 9):

$$\varphi_i^* = \frac{cov(A_i, B_i)}{\sqrt{var(A_i)var(B_i)}} \quad (5)$$

First step in canonical correlation analysis is the evaluation whether there is a relationship between two sets of variables (A and B) by Pillai's, Hotelling's, Wilk's lambda and Roy's multivariate criteria on significant level of 0.05. Then, we generate roots and define eigenvalues and canonical correlation coefficients. Next step is the calculation of raw and standardized coefficients for dependent and independent variables. Also, it is important to determine correlations between variables and canonical variables and variance in variables explained by canonical variables. Since canonical correlation analysis does not show a causal relationship between variables, linear regression analysis for within cells error term is also applied.

4. Results and Discussion

Table 1 shows descriptive statistics for all variables. Average value of Distortive effect of taxes and subsidies on competition is 47.059. Minimum value is 14.1 for Venezuela. Maximum value is 79.8 (Singapore). Country with the best score of 80.1 for Extent of market dominance is Switzerland in 2019, and the lowest score is for Haiti (13.2). Mean value of Extent of market dominance is 46.99. Competition in services has maximum value in Hong Kong SAR (86.3). Mean value of this variable is 64.60. Prevalence of non-tariff barriers has maximum in Singapore (83.6), and mean value 57.19. The most interesting values are for Trade tariffs because it records minimum 0 in Algeria and maximum 100 in Hong Kong SAR. Hong Kong also has the maximum value of 100 for Complexity of tariffs, while Switzerland has the minimum value for Complexity of tariffs (11.3). Border clearance efficiency with mean value of 44.267 has the lowest average among all variables. Variable Attitudes towards Entrepreneurial risk has the mean value of 50.55, minimum value of 23.3 in Tajikistan, and maximum value of 82.7 in Israel. Willingness to delegate authority is the most dominant in Denmark (82.4), and the least dominant in Mauritania (28.7). Mean value of Willingness to delegate authority is 56.57. Israel has the highest score for growth of innovative companies (80.8), Haiti the lowest (24.4). Companies which embrace disruptive ideas are mostly in Israel (68.5). In Angola companies which embrace disruptive ideas are rare, and the score is 27.0.

Table 2 shows the results of Pillai's Trace, Hotelling's Trace, Wilk's Lambda and Roy's Largest Root multivariate tests of significance and the results of tests are significant. The results show that there is a statistically significant positive linear relationship between the variables of domestic competition, trade openness and entrepreneurial culture.

Table 1. Descriptive statistics

	N	Min	Max	Mean	Std. Dev.
Distortive effect of taxes and subsidies on competition	141	14.1	79.8	47.059	12.3783
Extent of market dominance	141	13.2	80.1	46.994	12.4833
Competition in services	141	28.6	86.3	64.604	9.6230
Prevalence of non-tariff barriers	141	33.0	83.6	57.191	9.4385
Trade tariffs	141	0	100.0	59.467	28.9758
Complexity of tariffs	141	11.3	100.0	69.850	24.2697
Border clearance efficiency	141	14.3	77.3	44.267	13.8489
Attitudes towards entrepreneurial risk	141	23.3	82.7	50.549	9.7624
Willingness to delegate authority	141	28.7	82.4	56.566	11.3709
Growth of innovative companies	141	24.4	80.8	51.621	10.4301
Companies embracing disruptive ideas	141	27.0	68.5	45.238	9.2305

Source: Authors' calculation.

Table 2. Multivariate tests of significance

Test name	Value	Approx. F	Hypoth. DF	Error DF	Sig. of F
Pillai's	1.07370	6.97140	28.00	532.00	0.000
Hotelling's	3.15907	14.49786	28.00	514.00	0.000
Wilk's	0.18444	10.04311	28.00	470.14	0.000
Roy's	0.73455				

Source: Authors' calculation.

Next step in canonical correlation analysis is generating roots. In Table 3, one can see that this analysis generates four roots which rank the eigenvalues in a decreasing order. Pearson correlations between the canonical variate pairs are represented as canonical correlations. The correlation coefficient between the first pair of canonical variates is represented by the first canonical correlation, which is equal to 0.85706. According to Table 3, the total variance is indicated by the eigenvalue obtained for the pair of canonical correlation. Canonical correlation coefficients rise along with eigenvalues. It can be shown that the first function has the highest eigenvalue. Namely, 73.45% of the variation in A_1 is explained by the variation in B_1 etc. Given that the first canonical correlation is the most significant we will keep this highest value.

In Table 4, null hypothesis that all correlations associated with the roots are equal to 0 is tested. This hypothesis that no correlation exists between any pair of canonical variates is equivalent to the null hypothesis. The p value indicates that the first three test are statistically significant, but the fourth test is not significant because $p = 0.055 > 0.05$.

Further analysis requires determining raw and standardized canonical coefficient for dependent variables. Results are shown in Table 5. Raw canonical

Table 3. Eigenvalues and canonical correlations

Root No.	Eigenvalue	Pct.	Cum. Pct.	Canon Cor.	Sq. Cor
1	2.76716	87.59423	87.59423	0.85706	0.73455
2	0.21416	6.77934	94.37356	0.41999	0.17639
3	0.10625	3.36338	97.73695	0.30991	0.09605
4	0.07149	2.26305	100.00000	0.25830	0.06672

Source: Authors' calculation.

Table 4. Dimension Reduction Analysis

Roots	Wilks L.	F	Hypoth. DF	Error DF	Sig. of F
1 TO 4	0.1844	10.04311	28.00	470.14	0.000
2 TO 4	0.69483	2.83153	18.00	371.01	0.000
3 TO 4	0.84364	2.34254	10.00	264.00	0.012
4 TO 4	0.93328	2.37709	4.00	133.00	0.055

Source: Authors' calculation.

Table 5. Raw and standardized canonical coefficient for DEPENDENT variables

Variable	1	2	3	4
Raw canonical coefficients				
Y1	0.00058	0.08380	0.15337	-0.00906
Y2	-0.04634	0.04132	-0.06858	-0.13923
Y3	-0.05995	0.10693	-0.07195	0.21046
Y4	0.01228	-0.26675	0.03863	-0.06519
Standardized canonical coefficient				
Y1	0.00562	0.81807	1.49731	-0.08850
Y2	-0.52694	0.46968	-0.77986	-1.58315
Y3	-0.62533	1.11534	-0.75045	2.19510
Y4	0.11337	-2.46227	0.35661	-0.60174

Source: Authors' calculation.

coefficients can be interpreted like coefficients in the linear regression model. In that case, canonical variates are seen like outcome variables. One-unit increase in Y_1 (Attitudes towards entrepreneurial risk) leads to a 0.00058 increase in first variate of Entrepreneurial culture. Also, we can see there are some negative coefficients. It means that every increase of one-unit in Y_2 (Willingness to delegate authority) leads to -0.04634 decrease in the first variate of Entrepreneurial culture. The change score in canonical deviation in terms of standard deviation is presented by standardized canonical coefficients (Ada 2014, p. 103). Standardized canonical coefficients show the original variant's influence level on the canonical variable's development. Which variables primarily determine which canonical variables and how they influence one another can be observed by examining the correlation level and direction between canonical variables among themselves and the canonical sets. An increase of one standard deviation in variable Y_1 leads to 0.00562 standard deviation increase in the first canonical variable. The same approximation is applicable for other variables.

We can present standardized canonical coefficient for the first canonical variates through an equation as follows:

$$B_1 = 0.005621Y_1 - 0.52694Y_2 - 0.62533Y_3 + 0.11337Y_4 \quad (6)$$

In this equation we can see which variable contributes the most in generating canonical variables. In the first canonical variable, the most contribution has variable Y_4 (Companies embracing disruptive ideas). We choose the first equation for further analysis because of the results presented in Table 3 (Sq. Cor 0.73455).

Table 6 shows the results of correlation between the dependent and canonical variables. It shows that the first canonical variable for set B (Entrepreneurial culture) is strongly negatively correlated with variable Y_1 (Attitudes towards entrepreneurial risk). The same variable is dominant in other canonical variables with negative values of Pearson's coefficients. The weakest correlation between dependent and canonical variables is between variable Y_1 and canonical variables B_2 and B_4. Weak correlation is determined between variable Y_2 and all canonical variables except the first canonical variable. The same applies for variable Y_3. There is a very weak correlation between variable Y_4 and canonical variables B_3 and B_4, which is measured by Pearson's coefficient.

Table 7 shows the variance in the dependent canonical variable explained by each variable in the set and the variance among all variables in the set. Based on this result, we can see that 79.71% of variance in set B can be explained by the first dependent variable Y_1 (Attitudes towards entrepreneurial risk), 4.84% by dependent variable Y_2 (Willingness to delegate authority), 11.57% by variable Y_3 (Growth of innovative companies) and 3.87% by dependent variable Y_4 (Companies embracing disruptive ideas). Above, the first dependent variable (Attitudes towards entrepreneurial risk) can explain 58.55% of variance among all variables in set B. Other 0.85% variance among all dependent variable can be explained by variable Y_2 (Willingness to delegate authority), 1.11% by variable Y_3 (Growth of innovative companies) and 0.25% by dependent variable Y_4 (Companies embracing disruptive ideas).

Table 6. Correlations between DEPENDENT and canonical variables

Variable	1	2	3	4
Y1	-0.77050	0.06504	0.63309	-0.03610
Y2	-0.95531	0.02384	-0.02678	-0.29342
Y3	-0.95933	-0.09630	0.07132	0.25559
Y4	-0.87285	-0.42359	0.23754	0.04779

Source: Authors' calculation.

Table 7. Variance in DEPENDENT explained by canonical variables

CAN. VAR.	Pct Var DEP	Cum Pct DEP	Pct Var COV	Cum Pct COV
1	79.71164	79.71164	58.55203	58.55203
2	4.83758	84.54922	0.85329	59.40532
3	11.57568	96.12490	1.11180	60.51712
4	3.87510	100.00000	0.25855	60.77568

Source: Authors' calculation.

Table 8. Raw and specialized canonical coefficients for COVARIATES

COVARIATE	1	2	3	4
Raw coefficients				
X1	-0.01977	-0.04239	0.04034	-0.03950
X2	-0.02000	-0.03677	0.02892	0.05757
X3	-0.03938	0.08311	0.04462	0.03290
X4	-0.01230	0.10663	-0.05915	0.00781
X5	0.0037	-0.00991	0.02227	-0.03381
X6	-0.00229	-0.00645	0.02410	0.00583
X7	-0.02033	-0.04974	-0.06696	0.00096
Standardized coefficients				
X1	-0.24469	-0.52475	0.49937	-0.48898
X2	-0.24962	-0.45906	0.36103	0.71867
X3	-0.37892	0.79979	0.42936	0.31664
X4	-0.11613	1.00644	-0.55825	0.07373
X5	0.09769	-0.28704	0.64527	-0.97957
X6	-0.05563	-0.15657	0.58496	0.14161
X7	-0.28161	-0.68878	-0.92738	0.01323

Source: Authors' calculation.

The same procedure must be done for covariates (independent variables) as it was done when we determined the raw and standardized coefficients for dependent variables. One-unit increase in variable X_1 leads to a 0.01977 decrease in the first variate of Domestic competition and Trade openness. In the first variate of set A, all independent variables have negative values, except variable X_5 (Trade tariffs), but all variables have low values. This is characteristic for all coefficients.

Canonical covariates for Domestic competition and Trade openness can be written as follows:

$$A_1 = -0.24469X_1 - 0.24962X_2 - 0.37892X_3 - 0.11613X_4 + 0.09769X_5 - 0.05563X_6 - 0.28161X_7 \quad (7)$$

When we observe the correlation between covariates and canonical variables, one can see that there are mostly negative coefficients. The first canonical variable is strongly negatively dominant by all variables except X_6 whose correlation coefficient is positive but not very strong.

Results in Table 10 show what percent of variance among the covariate set can be explained by the first dependent canonical variate and the first covariate canonical variate. So, 41.19% of the variance among set A is explained by the first dependent canonical variate, and 56.07% is explained by the first covariate canonical variate. Other variates among set A cannot be explained by the first canonical variate and first covariate canonical variate because of the low value of indexes.

Based on the presented result, it can be concluded that there are strong canonical correlations between canonical covariate Domestic competition and Trade openness and canonical variate Entrepreneurial culture with the correlation coefficient of 0.857 (Table 3). Canonical coefficient shown in Table 3 is calculated according to Equation 5. Because of the most significance the first canonical variable A_1 is chosen. The same applies to the canonical variable B_1 (Table 3). The relationship between canonical variates is shown in Figure 2. In the same figure, the standardized coefficients for dependent and independent variables are shown. There are strong correlations between the dependent variables and set B. Also, there are strong correlations between independent variables and set A. The first canonical pair is observed, therefore, 73.45% of the variation in A_1 can be explained by the variation in B_1 (Table 2). Also, it is statistically significant root by Wilks Lambda test (Table 3). The strong correlation between these canonical variables implies that the increase in Domestic competition and Trade openness is followed by an increase in Entrepreneurial culture.

Table 9. Correlations between COVARIATES and canonical variables

Covariate	1	2	3	4
X1	-0.83480	-0.13998	0.20490	-0.19448
X2	-0.86889	-0.23950	0.04555	0.21280
X3	-0.87081	0.33179	0.14306	-0.02787
X4	-0.78238	0.37476	-0.18724	-0.27900
X5	-0.51332	0.02036	0.03198	-0.75436
X6	0.40781	-0.04053	0.51485	0.31743
X7	-0.81937	-0.25199	-0.42430	-0.19149

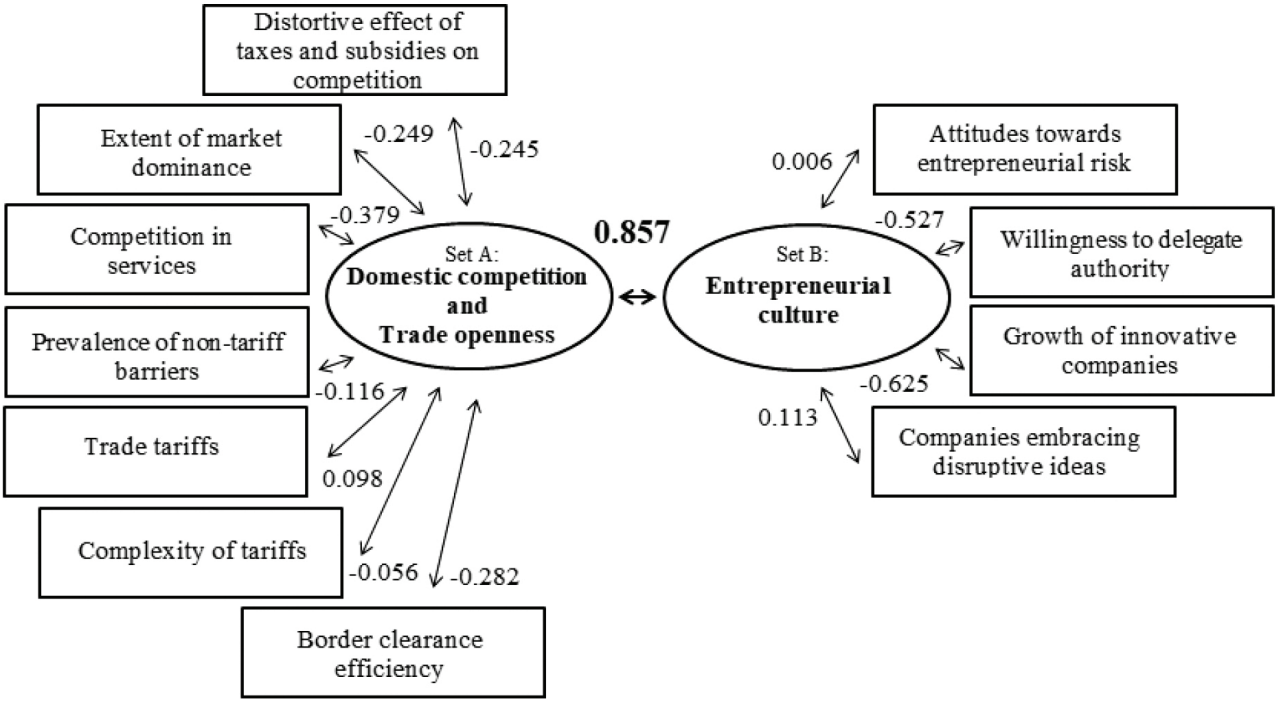
Source: Authors' calculation

Table 10. Variance in covariates explained by canonical variables

CAN. VAR	Pct Var DEP	Cum Pct DEP	Pct Var COV	Cum Pct COV
1	41.18597	41.18597	56.06980	56.06980
2	0.99038	42.17635	5.61481	61.68461
3	0.74875	42.92510	7.79570	69.48030
4	0.82754	43.75264	12.40299	81.88329

Source: Authors' calculation.

Figure 2. Canonical correlation between Domestic competition, Trade openness and Entrepreneurial culture



Source: Authors

Since the canonical correlation analysis does not show a causal relationship between variables, linear regression analysis is also applied. In the regression analysis, the movement of the dependent variable Y_1 (Attitudes towards entrepreneurial risk) can only be explained by the first and the third independent variables (Distortive effect of taxes and subsidies on competition and Competition in services). The influence of these two variables is significant and positive (Table 11). So, if there is an increase in the Distortive effect of taxes on competition for one point that will cause an increase in the Attitudes towards entrepreneurial risk for about 0.2498. An increase in the Competition in services for one point will cause an increase in Attitudes towards entrepreneurial risk for 0.3534. When we talk about the second dependent variable, Willingness to delegate authority (Y_2), there are three independent variables which have a significant, positive impact on Y_2. Those variables are: Distortive effect of taxes and subsidies on competition, Competition in services and Border clearance efficiency. The influence of those variables are: 0.2280 in the case of Distortive effect of taxes and subsidies on competition; 0.2907 in the case of Competition in services and 0.2304 in the case of Border clearance efficiency.

In the case of the third dependent variable Y_3 (Growth of innovative companies) there are four independent variables which have statistically positive impact on it. Once there is an increase in the Distortive effect of taxes and subsidies on competition, Extent of market dominance, Competition in services and Border clearance efficiency for one point, there will be an increase in the Growth of innovative companies for 0.2012; 0.2792; 0,3096 and 0.2397 points, respectively. On the fourth dependent variable, Companies embracing disruptive ideas, three independent variables have a statistically significant positive impact. An increase in the Distortive effect of taxes and subsidies on the competition for one point leads an increase of the dependent variable, Companies embracing disruptive ideas (Y_4), for 0.3071 points. An increase in the Extent of market dominance for one point leads to an increase of Y_4 for 0.3038 points and an increase in the Border clearance efficiency for one point leads to an increase of the Companies embracing disruptive ideas for 0.2651 points.

Table 11. Regression analysis for within cells error term

COV	B	Beta	Std. Err.	t-Value	Sig. of t	Lower -95%	CI- Upper
Y1 Attitudes towards entrepreneurial risk							
X1	0.1970004971	0.2497868975	0.08277	2.37999	0.019	0.03328	0.36072
X2	0.1692619242	0.2164362025	0.08619	1.96375	0.052	-0.00122	0.33975
X3	0.3584770475	0.3533565254	0.10379	3.45384	0.001	0.15318	0.56377
X4	-0.0062488564	-0.0060415413	0.11123	-0.05618	0.955	-0.022625	0.21377
X5	0.023561986	0.0633870850	0.03060	0.69789	0.486	-0.03917	0.08188
X6	0.0586908384	0.1459069416	0.03406	1.72323	0.087	-0.00868	0.12606
X7	-0.0105214792	-0.0149256507	0.07561	-0.13915	0.890	-0.16008	0.13904
Y2 Willingness to delegate authority							
X1	0.2094456554	0.2280001584	0.07574	2.76545	0.006	0.05964	0.35925
X2	0.1296377784	0.1423192586	0.07887	1.64379	0.103	-0.02635	0.28563
X3	0.3434898232	0.2906879957	0.09497	3.61695	0.000	0.15565	0.53133
X4	0.1255373864	0.1042033661	0.10177	1.23352	0.220	-0.15565	0.32684
X5	-0.0054837978	-0.0139739673	0.02800	-0.19585	0.845	-0.0776	0.04990
X6	0.0133014538	0.0283900535	0.03116	0.42683	0.670	-0.06087	0.07494
X7	0.1891510484	0.2303704050	0.06918	2.73402	0.007	0.05231	0.32599
Y3 Growth of innovative companies							
X1	0.1695027782	0.2011626775	0.06880	2.46372	0.015	0.03342	0.30559
X2	0.2333084337	0.2792346604	0.07164	3.25661	0.001	0.09160	0.37501
X3	0.3355607852	0.3095930616	0.08627	3.88973	0.000	0.16493	0.50620
X4	0.0522712707	0.0473018926	0.09245	0.56540	0.573	-0.13059	0.23513
X5	-0.0428788421	-0.1191209458	0.02544	-1.68582	0.094	-0.09319	0.00743
X6	0.0319519363	0.0743483060	0.02831	1.12870	0.261	-0.02404	0.08795
X7	0.1805844297	0.2397756235	0.06285	2.87338	0.005	0.05627	0.30489
Y4 Companies embracing disruptive ideas							
X1	0.2290248557	0.3071277052	0.06861	3.33811	0.001	0.09332	0.36473
X2	0.2246791428	0.3038557330	0.07144	3.14486	0.002	0.08337	0.36599
X3	0.1694845366	0.1766915934	0.08603	1.97007	0.051	-0.00068	0.33965
X4	-0.0129445466	-0.1323634547	0.09219	-1.40405	0.163	-0.31180	0.05291
X5	0.0042669279	0.0133944899	0.02536	0.16822	0.867	-0.04590	0.05444
X6	0.0434635864	0.1142786878	0.02823	1.53960	0.126	-0.01237	0.09930
X7	0.1766927557	0.2650997151	0.06267	2.81926	0.006	0.05273	0.30066

Source: Authors' calculation.

5. Concluding Remarks

Shaping an entrepreneurial culture is a complex process influenced by various factors. To encourage entrepreneurial activities, it is necessary to create an environment suitable for starting a business and operating small and medium-sized enterprises. The market situation is crucial for making decisions about starting businesses and creating new ideas. In this sense, the relationship between market competitors and the way in which their relationships are regulated is essential. In addition, it is critical to assess the degree of the market openness to foreign trade, because the degree of competition in the domestic market, domestic companies' competitiveness, and the risk of doing business largely depend on it. For these reasons, this study deals with the relationship between the domestic competition, trade openness, and entrepreneurial culture.

The research results showed a strong canonical correlation between domestic competition, trade openness, and entrepreneurial culture, with a Pearson coefficient of 0.857. This result indicates a statistically significant relationship between indexes concerning domestic competition, which are predominantly directed towards measures of the competition policy. It means that the role of competition laws is crucial for the formation and development of an entrepreneurial culture, because they regulate the relations and behavior of market participants. Competition in services was the most dominant independent variable in generating the first canonical variable. In this sense, regulatory bodies should focus on promoting a policy that will create a market environment without an abuse of a dominant position and equal action of taxes and subsidies, while insisting on competition in services. In this way, it is ensured that all market participants have equivalent treatment without market barriers, which can encourage entrepreneurial ideas. In this way, the development of innovations in the economy is also stimulated because the principal bearers of innovative solutions are entrepreneurs. The negative coefficient in the growth of innovative companies in the formation of the Entrepreneurial culture appears because innovative product and services bring with them a new way of doing business that changes the previous entrepreneurial culture in a certain way. Promoting a new way of doing business that is riskier and relies heavily on digital innovation is essential. This is an urgent mission for national governments and the chambers of commerce.

Regression analysis showed that factors related to domestic competition are far more significant for entrepreneurial culture than those related to trade openness. This can be explained by the fact that, when entering the market, companies are more oriented towards evaluating the current market situation in terms of domestic competitors. Variables related to trade openness are not in focus so much because entrepreneurs, at the beginning, are not oriented towards the foreign market. On the other hand, foreign companies are mainly branches of transnational companies and cannot be considered direct competitors. In this context, the recommendation for regulatory bodies is to form special programs to introduce entrepreneurs to the possible risks and ways to engage in the market competition more efficiently.

The limitation of this research is reflected in the fact that the analysis was conducted for only one year. It is impossible to form a time series because data on GCI 4.0 is only available from 2018. Otherwise, the advantage of the analysis is that it covers a large number of countries and that the canonical correlation captures the influence of a large group of variables on another large group of variables. Future research can conduct a more detailed examination of the relationship between individual sub-indexes of these pillars using other statistical methods. The results of this study can serve as a recommendation to regulatory bodies that their measures and actions should not be focused only on existing market undertakings, but should encourage the development of entrepreneurial ideas by creating an appropriate environment.

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LEADERSHIP PROFILE OF CROATIAN PROJECT MANAGERS - INVESTIGATING THE EFFECTS OF STRESS AND FOLLOWERS' EXPERTISE IN ACHIEVING PROJECT SUCCESS

Ivan Matić

Abstract

The purpose of this paper is to investigate the role of stress in demonstrating adequate project leadership and ultimately achieving project success, while also respecting followers' expertise as the most important context factor. During 2021, the empirical research was conducted on 71 project managers in the Republic of Croatia. Results obtained via SPSS Statistics 23.0 and PROCESS macro v4.0 for SPSS indicate that demonstrated project leadership and followers' expertise positively affect the project's success. According to the results, stress, due to its inverted U-shaped nature of effect, does not affect project success, whereas it has a negative moderation effect on demonstrated project leadership by reducing its positive effects on project success. In addition to these results, this paper offers other interesting insights into the relationships between demonstrated project leadership, project manager's stress, and project success, further filling the identified gap in research. A relatively small sample of project managers and its cross-sectional nature stand out as the main limitations of the empirical research presented in the paper.

Keywords: *project leadership, stress, project success, followers' expertise, moderation analysis*

JEL classification: *J24, L20, M10*

1. Introduction

The irrefutable relevance of project management to economy and society, evidenced by the 'projectification' of organizational work and increased usage of projects in organizations to achieve strategic objectives, is accompanied and supported by the immense evolution of project management discipline (McKevitt, Carbery, and Lyons 2017). Even though project management discipline is constantly advancing due to the numerous and increasing contributions by practitioners, professional bodies, and academics, many projects still fail; therefore, many studies have focused on efforts to improve project success (Anantatmula and Rad 2018). Because they are ultimately responsible for projects' success or failure (Sunindijo et al. 2007), a project manager's competence is a significant factor in the successful delivery of projects (Geoghegan and Dulewicz 2008). Although closely related, the literature on project management has seriously ignored the contributions of a project manager's competence to project success (Müller and Turner 2007). The role of project leadership, as one of project managers'

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most important and most desirable competencies, in achieving project success, especially in relation to project stress, is no exception (Crawford and Turner 2007; Flannes 2010; Jiang 2014). In this sense, due to the depersonalized focus of project management literature, oriented on processes and prescriptions, research on stress's effect on project managers' performance is lacking (Farnes 2018). Apart from the project manager's characteristics and competence, similar to the aforementioned can be said for individual project team members' expertise: coordination of it and its integration into the project's collective expertise is considered beneficial for project success (Tiwana and McLean, 2005).

Following the above, this paper aims to examine the relationship between demonstrated project managers' leadership, project managers' stress, and project success while also considering followers' expertise as an influential contextual factor. Two main research questions guided the research presented in the paper: (1) how is project leadership associated with project success, and (2) what is stress's role in demonstrating adequate project leadership and ultimately achieving project success?

2. Theoretical background and research hypotheses

2.1. Project Leadership and Project Success

Today, project success is measured against the overall objectives of the project and stakeholders' requirements, compared to the term 'project management success', which focuses more narrowly on traditional performance indicators, such as cost, time, scope, and quality (Anantatmula and Rad 2018). According to Luo et al. (2017), the contemporary view of project manager's responsibilities goes beyond the golden triangle and includes internal and external perspectives, encompassing relations, as well as cultural and stakeholder management, thus putting significantly more emphasis on project leadership, as one of the project manager's essential functions. Successful project management always involves effective leadership and although the overlap between the concepts exists, they denote different attributes and responsibilities, i.e. project management refers to planning and organizing of project activities, and decision-making processes aimed to improve the efficiency and effectiveness of a project, whereas project leadership encompasses the process of motivating and guiding people to realize their potential and achieve often tough and challenging project objectives (Anantatmula 2010). Moreover, the field's professional organizations and practice perceive a competent and successful project manager as the combination or the right mix of technical expertise (use of project management methods and techniques), leadership (behavior), and experience (accumulated lessons learned from managing and leading previous projects). In this regard, a project is successful 'if it meets the technical performance specifications and/or mission to be performed and if there is a high level of satisfaction concerning the project outcome among key people in the parent organization, key people on the project team and key users or clientele of the project effort' (Morris and Pinto 2007 in Jiang 2014, p. 53). In other words, project success consists of project product success and project management success, an important aspect of which is the quality of the project management process itself, perceived as leadership performance (Baccarini 1999; Schwalbe 2004 in Nixon, Harrington, and Parker 2012). Hence, project success is a multidimensional construct, in which project success criteria are perceived as a mixture of objective, mainly short-term (cost, time, etc.) and subjective, mainly long-term criteria (usability, acceptance, satisfaction, etc.), thereby infusing multiple stakeholders' subjectivity into the measurement of project success (Ahmed and bin Mohamad 2016; Joslin and Müller 2016). In this sense, despite influential conceptualizations of project success (e.g., Pinto and Slevin 1987, 1988; Cooke-Davies 2002; Davis 2014), Müller and Turner's (2007, 2010) conceptualization of project success criteria dominates the relevant literature. These authors proposed the measurement of project success through 10 project elements or factors: 1) project's overall performance (functionality, budget, and timing), 2) user requirements, 3) project's purpose, 4) client satisfaction with the project results, 5) reoccurring business with the client, 6) end-user satisfaction with the project's product or service, 7) suppliers' satisfaction, 8) project team's satisfaction, 9) other stakeholders' satisfaction, and 10) self-defined (project manager) success.

Although leadership is one of the most researched aspects of human behavior (Dulewicz and Higgs 2005), it has not received a corresponding amount of research attention and treatment in the project management literature due to the discipline's emphasis on efficiency rather than on behavioral, interpersonal, and competency factors (Munns and Bjeirmi 1996 in Muller and Turner 2007; Ahmed and Anantatmula 2017; Farnes 2018). In fact, the majority of their working hours project managers spend interacting with different stakeholders, striving to build better relationships. In this sense, relevant 21st-century project management literature emphasizes leadership as a

key skill area of effective project managers (Clarke 2012), who must function as visionaries, technical experts, motivators, team builders, negotiators, salespeople, and so forth (Thoms and Pinto 1999, p. 19). Defined as 'the process of influencing the activities of an individual or a group to achieve project goals in a given situation' (Hersey and Blanchard 1982 in Ahmed and Anantatmula 2017, p. 190), project leadership is more challenging compared to leadership in conventional organizations, due to the project characteristics and specificities (Podgórska and Pichlak 2019). Project leader, faced with constraints of project deadline and budget, more frequent changes, and with freer form of work, must put special emphasis on building and maintaining relations within the project team due to the temporary nature of the project and mentioned relations (p. 870).

An evident shift of focus in project management literature from project manager's technical skills to project managers' behaviors, i.e. soft skills (Leyborune 2007 in Maqbool et al. 2017), clearly emphasizes the importance of complementing pure project management expertise (process, systems, delivery) with leadership competencies of motivating people, resolving conflicts, and developing trust among project team members and stakeholders, all in order to achieve project success. Thus, following the notion that contemporary projects require not just the usage of the right tools and techniques for being successful, i.e. technically minded project manager (Müller and Turner 2010), but also a project leader, leadership, as one of the most important and most desirable project manager competencies, is crucial in all phases of a project's life cycle (DuBois et al. 2015).

An over-100-year long and rich research history and six major schools of thought on leadership-traits, behavior, contingency, visionary, emotional intelligence, and competency-have yielded commonly known conceptualization of leadership as a combination of skills, knowledge, and personal characteristics of a person (Geoghegan and Dulewicz 2008). Following this conceptualization and adopting the recent dominant paradigm in leadership research, focused on the competence of leaders (Podgórska and Pichlak 2019), contemporary project management literature is mainly oriented on developing competency models of a successful project leader. Among notable contributions such as Rees, Turner, and Tampoe (1996), Pinto and Trailer (1998), and Crawford (2007), the conceptualization developed by Dulewicz and Higgs (2003, 2005) dominates the research on project leadership the most. According to this highly influential conceptualization, project leadership is perceived as a combination of 15 leadership dimensions clustered into three areas: intellectual competencies, managerial competencies, and competencies of emotional and social awareness.

As a cornerstone of a project manager's overall competence (Crawford and Turner 2007), project leadership has been identified as a critical factor in achieving desired performance and project success (Geoghegan and Dulewicz 2008; Yang, Huang, and Wu 2011; Al Kazaz and Shibani 2016; Ahmed and Anantatmula 2017; Podgórska and Pichlak 2019; Owusu-Manu et al. 2020). Nevertheless, project leadership has rarely been considered and even ignored in most of the relevant research as a project's critical success factor (Turner and Müller 2005; Crawford and Turner 2007; Jiang 2014). One of the relevant literature's most influential studies, that of Geoghegan and Dulewicz (2008), found that a project leader's managerial and emotional competencies are highly important for project success, whereas intellectual competencies are less important. Similarly, the study of Jiang (2014) found that project leadership style, including corresponding competencies, has direct and, by improving teamwork and client communication, indirect effects on project success, findings largely supported also by the study of Larson and Gray (2014) (Novo, Landis, and Haley 2017). Additionally, these and similar studies also emphasized that project leadership does not have to be beneficial for project success in all types of projects and all project contexts, and that a number of mediating and moderating factors also play a significant role in the relationship between project leadership and project success. In his systematic review of 22 studies investigating the relationship between project leadership (focusing on style, behavior, or traits) and project success, published in the period 2000-2011, Clarke (2012) reflects on studies as being a mix of inconclusive findings since, apart from the larger number of studies where positive relationships were found, there were also some studies where both positive and negative relationships where identified. The same author also emphasizes studies' recurring findings on the importance of intervening factors in the relationship between project leadership and project success. Evidently, as the role of project leadership in project success continues to provoke debate in the relevant literature (Nixon, Harrington, and Parker 2012, p. 205), more research on project leadership's effects on a project's overall dynamics, especially project success, is necessary. Thus, building on the aforementioned contributions and research gaps, the following research hypothesis was developed:

H1 – There is a positive relationship between project leadership and project success.

2.2. Followers' Expertise and Project Success

Project management literature, although acknowledging the unquestionable importance of project team composition and performance for project success, heavily focuses on what makes a good project manager due to its pivotal role in the project, while treating the project team as a single, skilled, cooperative and committed entity and ignoring the individuals who comprise project teams, and their characteristics (Rogers 2019). Project success, among other factors, depends on the expertise of project team members who are followers of the project manager and his/her demonstrated leadership on the project. A project team member's expertise can be defined as a combination of specific knowledge, skills, abilities, and experience he/she possesses (Lindsjørn et al. 2016; Hong et al. 2019), needed to execute assigned project tasks effectively and efficiently. Thus, selecting more knowledgeable and experienced project team members strongly improves project team performance (Liu 2012) and can significantly improve project success (Scott-Young and Samson 2008). As such, project team members' competencies—personality, knowledge, and skills—amplified by gained project-related experience, are important for achieving project success, as Oh and Choi (2020) showed in their study, whereas Beleiu, Crisan, and Nistor (2015) identified competent project team members as the second-most important factor of project success. Liu and Cross (2016), in their meta-analysis of studies on project teams, published in the period 1980-2010, identified the project team's ability, i.e. knowledge, experience, and capability of project team members, as an important influential factor of project team performance and project success. Despite the well-recognized importance of the project team's expertise for project success, relevant project management literature, apart from a smaller number of studies, has been modest on this research topic. In this sense, unlike the project manager's competence, which is often discussed in the relevant literature, individual team members' competencies are rarely identified (Zdonek, Podgórska, and Hysa 2017). Moreover, Scott-Young and Samson (2008) noticed paucity in project management research, especially quantitative research, related to the effects of project team factors, including expertise, on project success. Based on the above-mentioned contributions from the relevant literature, the following hypothesis was postulated:

H2 – There is a positive relationship between followers' expertise and project success.

2.3. The Role of Project Stress in Demonstrating Project Leadership and Achieving Project Success

As dynamic and unique endeavours with related uncertainties, complex and dynamic social structure, strict limitations, high expectations, and clear responsibilities for individuals, projects are highly stressful work environments for project management professionals, especially project managers and leaders (Haynes and Love 2004; Aitken and Crawford 2007; Farnes 2018). Managing and leading a project is a highly demanding challenge and responsibility. The extreme, highly stimulating, and challenging contexts such as projects demand professional and effective leaders who can cope with stress and adequately respond to it (Kellett 2013). Apart from the more challenging task of leading a project team, compared to leading a traditional team (Podgórska and Pichlak 2019), the project's characteristics raise the complexity and difficulty of leading activities, thus igniting stress development in project leaders. Project stress, delineated as project-related objective stress, burnout, and physiological stress, is a subjective feeling of project professionals, in which project-related work exceeds the individual's belief in his or her capacity to cope (Cox 1993 in Leung, Chan, and Olomolaiye 2008, p. 644). According to Berg and Karlsen (2013, p. 52), project stress is a consequence of the interaction between external job conditions and the individual project manager's psychological responses to these conditions (Cooper 2001), thereby leading to positive (challenging, motivating) or negative (threatening, harmful) stress for project managers. Among the stressors identified in relevant research, new technology, boundary spanning, role ambiguity, role conflict, workload, job demands, job insecurity, job readjustment, decision authority, and uncertainty are most expected to affect project managers and their demonstrated leadership (Richmond and Skitmore 2006; An et al. 2019).

Stress affects the internal state of mind of a person and eventually modifies his/her behavior (Groen, Wouters, and Wilderom 2012). Recent leadership research suggests that a leader's well-being, closely related to stress (e.g., work stress, depression, anxiety, etc.), can harm his/her behavior, lead to negative manifestations of leadership, and significantly affect overall leadership effectiveness (Byrne et al. 2014; Li et al. 2018). Similarly, Harms et al. (2017, p. 184) emphasize that stress is associated with poorer and less effective leadership because it drains leaders' cognitive and emotional resources. Bearing in mind that stress

hinders managers' demonstrated leadership and job performance (Lin et al. 2022), project stress can hinder project leadership and thereby reduce project managers' overall performance, eventually affecting project success. The presence and intensity of stressors in a project impact project managers' cognitive and behavioral performance, including that of leadership, thereby requiring project managers to reduce stress to a moderate level to achieve high performance and ultimately project success (Flannes 2010; Heng 2016; An et al. 2019). Although the research on the relationship between leadership and stress and the relationship between stress and various professionals' performance is extensive, research on stress's effect on project managers' performance has been scarce (Gällstedt 2003; Leung, Chan, and Olomolaiye 2008). In this sense, following Yerkes-Dowson's (1908) and French, Kast, and Rosenzweig's (1985) contributions, researchers have hypothesized that a moderate level of stress is best for project manager's performance (Flannes 2010; Hamid and Afshar 2014; Heng 2016), so stress can, by affecting project manager, influence project success positively and negatively (Smith, Bruyns, and Evans 2011). More concretely, Darmawan and Djelani (2021), based on their and five other study findings, conclude that there is a strong relationship between project stress and project manager's performance in a way that low and moderate levels of project stress are beneficial for project manager's performance, whereas high levels of project stress will decrease mentioned project manager's performance. An et al. (2019), reflecting on relevant research in the field, emphasize that project stress is correlated with the project manager's performance, but also note that there is no unified conclusion on the nature of the relationship. Additionally, these authors (An et al. 2019) underline that different types of project stress affect project manager's performance differently, namely challenge stressors (e.g., job complexity, job demands, etc.) are positively associated with performance, opposite to hindrance stressors (e.g., role ambiguity, role conflict, etc.) that are negatively associated with performance. Considering the above-mentioned relevant literature's contributions and aiming to fill identified research gaps, especially the one emphasized by Clarke (2012) on the need to further examine the potential role of intervening (moderator and mediator) variables in the relationship between project leadership and project success, the following research hypothesis was developed:

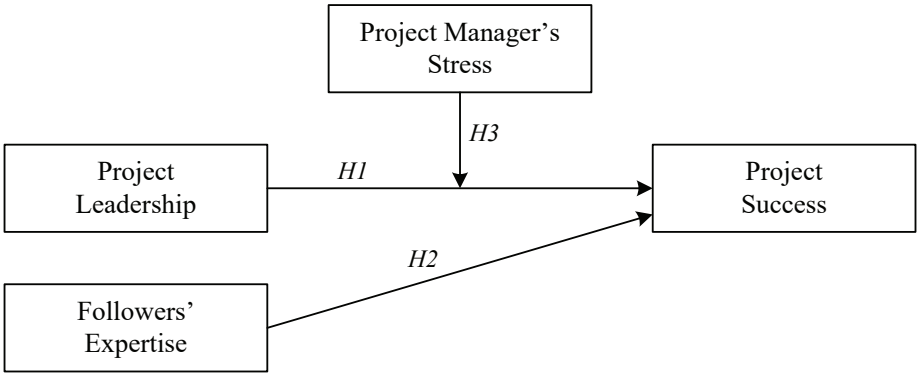
H3 – Project manager's stress plays a moderating role in the relationship between project leadership and project success, by diminishing project leadership's positive effects.

2.4. Research Model

Following the previous discussion on the main contributions of relevant literature on the relationships between project leadership, project stress, and project success, while also acknowledging the importance of the role that followers' expertise plays in project success, a conceptual research model was developed as shown in Figure 1. In accordance with formulated research hypotheses, the model assumes two direct and positive relationships, the one between project leadership and project success and the other between follower's expertise and project success, and one negative moderating role of project manager's stress in the positive relationship between project leadership and project success.

In the subsequent sections of the paper, a methodological approach with research methods is discussed, followed by research results and discussion. The paper concludes with the main contributions of the presented research, its limitations, and suggestions for future research.

Figure 1. Research model



3. Methodology

3.1. Procedure

Most of the influential research in the project management field-including Müller and Turner (2007, 2010), Geoghegan and Dulewicz (2008), Leung, Chan, and Olomolaiye (2008), Larsson et al. (2015), Luo et al. (2017), and Ahmed and Anantatmula (2017)-emphasizes the self-assessment approach through questionnaires distributed to project managers as the most appropriate way to gain insights into various aspects of managed projects, project leadership and the project manager's characteristics. To form a research sample and collect data on project manager's characteristics related to leadership, stress, and data on project success, a combination of simple random sampling and purposive sampling methods is used (Short, Ketchen, and Palmer 2002).

A self-assessment questionnaire was distributed to the respondents at their e-mail addresses through an online survey tool while guaranteeing the anonymity of the answers given. In this sense, Croatian branches of project management professional associations–PMI and IPMA-provided their membership's e-mail addresses, whereas the e-mail addresses of separately identified project managers were obtained through official contact information from the companies' websites. After performing a logical check of submitted answers and filtering out the respondents who have not performed as project managers on their current or most recent projects, 10 responses were excluded from the sample, thereby forming a final research sample of 71 Croatian project managers and an overall rate of return of 6%.

3.2. Research Measures

The respondents were asked to give opinions by reflecting on their experiences in managing the current project or in managing the last project. The questionnaire included separate sections for each research construct, and apart from the introduction section with information related to respondents and their companies, participants gave answers to all items on research constructs through a 5-point Likert continuum from 1 (*strongly disagree; significantly below*) to 5 (*strongly agree; significantly above*). Overall, the questionnaire contained 58 questions allocated to five main sections—introduction/respondent's information, project leadership, project stress, followers' expertise, and project success.

Following Müller and Turner (2007, 2010), project leadership was measured using a 15-item Leadership Dimensions Questionnaire (LDQ) originally developed by Dulewicz and Higgs (2003, 2005). The LDQ scale measures leadership through three areas—intellectual, managerial, and emotional. Its authors empirically tested for reliability, and several later management studies confirmed it. Project stress was measured as a 16-item scale with a combination of three types of stress-objective stress (Gmelch 1982), burnout (Wharton 2004), and physiological stress (Greenberg 2003)-as conceptualized and empirically tested for reliability by Leung, Chan, and Olomolaiye (2008). Apart from the burnout and physiological stress scales, which used a 5-point Likert continuum, objective stress was measured as a discrepancy between a person's expected and actual abilities to handle stressors (Gmelch 1982 in Leung, Chan, and Olomolaiye 2008). Next, building on Lindsjørn et al. (2016) and Hong et al. (2019), followers' expertise was measured as a combination of two items: project-related education and training and project-related experience. Project success was measured as a 12-item scale based on Müller and Turner's (2007, 2010) proposed 10 project success criteria, focused on dimensions of time, budget, quality, and stakeholder satisfaction. Scholars of project management such as Müller, Geraldi, and Turner (2011), Khan and Rasheed (2015), and Maqbool et al. (2017) adopted proposed success criteria and empirically tested them for reliability in subsequent studies.

3.3. Normality and the Reliability of Data

Following Nunnally and Bernstein (1994), Gliem and Gliem (2003) and Hair, Page, and Brunsveld (2020), the reliability of internal consistency estimates for the scales and subscales of research constructs in this study were as follows (Table 1):

- excellent for the project leadership scale (α = .892; 15 items), acceptable for the project leadership IQ subscale (α = .697; 3 items), good for the project leadership MQ subscale (α = .783; 5 items), good to excellent for the project leadership EQ subscale (α = .804; 7 items),
- excellent for the project stress scale (α = .830; 16 items), excellent for the objective project stress subscale (α = .811; 7 items), good to excellent for the burnout subscale (α = .801; 4 items), good for the physiological stress subscale (α = .787; 5 items),
- excellent for the project success scale (α = .899; 12 items).

Due to the assumption of multiple-item correlation, internal consistency reliability estimates were not applicable to the followers' expertise scale (Hair,

Page, and Brunsveld 2020), as this scale contains only two items.

To assess the normality of collected data, kurtosis, and skewness were performed for all research constructs and their subscales. Obtained kurtosis and skewness results are all within the range of -2 to + 2, thereby proving the normal distribution of collected data (George and Mallery 2010; Hair et al. 2010). Thus, the results of normality and reliability checks of the collected data enabled valid parametric testing and deriving subsequent conclusions regarding research constructs and their interrelationships.

3.4. Respondents

The final research sample (N = 71) of this study were project managers who are either currently members of the Croatian branches of the world's leading project management professional associations (PMI Croatia or IPMA Croatia) (53.5%) or are separately identified as managing or have recently managed projects in Croatia (46.5%). In terms of gender and age, the sample was balanced, with women project managers representing almost half of the sample (47.9%), whereas project managers with ages between 30 and 39 years (29.6%), 40 and 49 years (32.4%) and 50 and 65 years (28.2%) are almost equally represented in the sample. The majority of project managers held graduate diplomas (53.5%) and some type of professional project management certification (59.2%). Respondents with an overall length of service longer than 10 years (64.8%) and with a project-related length of service between 11 and 20 years (40.8%) dominated the sample. As for the respondent's experience in managing projects, the sample is balanced with respondents with managing experience ranging from 2 to 5 years (23.9%), 6 to 10 years (22.5%), and 11 to 20 years (33.8%). Respondents in the sample predominantly work in private domestic or foreign-owned companies (74.6%), in companies that conduct projects on a regular and frequent basis, or whose business is exclusively based on projects (85.9%). Overall, seventeen different industries were represented in the sample, from which ICT (33.8%) and construction industries (14.1%) stand out. Half of the respondents in leading and managing current or recent projects closely collaborated with six or fewer team members, on average 10 team members (M = 9.90; Mdn = 6.00). In doing so half of the respondents managed projects with 20 or fewer participants (M = 312.28; Mdn = 20.00).

4. Results

The following section is presented in three parts: descriptive statistics, correlational analysis, and moderated regression analysis for testing hypotheses.

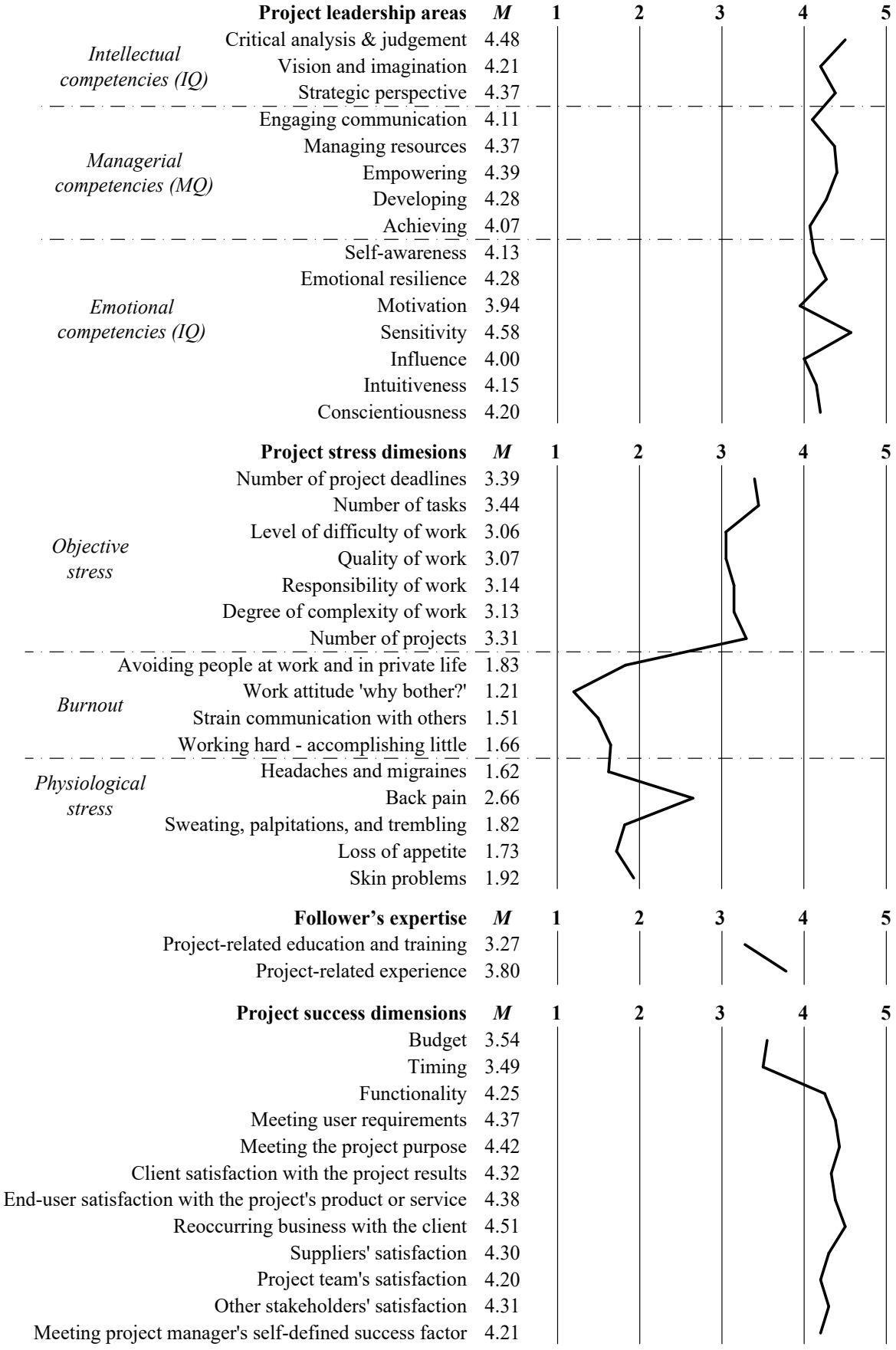
4.1. Descriptive Statistics

Leadership Profile of Project Managers. Croatian project managers demonstrate a high level of leadership competence (M = 4.24), where intellectual competencies are developed the most (M = 4.39), and emotional competencies are developed the least (M = 4.18), but still at a high level of development (Table 1). When considering specific leadership competencies across the three major areas, the competencies of motivation (M = 3.94) and influence (M = 4.00) stand out as the least developed competencies, whereas the competencies of sensitivity (M = 4.58) and critical analysis and judgment (M = 4.48) are developed the most (Figure 2). A very high level of sensitivity is an outlier among seven emotional intelligence-related competencies, the same as the competencies of achieving and engaging communication among five managerial competencies. Of all three groups of competencies, three intellectual competencies are balanced the most ($4.21 \leq M \leq 4.48$). Overall, the leadership profile of Croatian project managers indicates a relatively balanced and high level of development in leadership competencies.

Project Managers' Stress. When it comes to Croatian project managers' stress, which is generally at a low to moderate level (M = 2.41), there is an imbalance between stress factors. In this sense, objective project stress (M = 3.22) is a significantly higher factor of overall stress for project managers compared to the other two stress factors-burnout (M = 1.55) and physiological stress (M = 1.75). The number of tasks on projects assigned to them (M = 3.44) and the number of projects on which they work or which they lead (M = 3.31), combined with strict project deadlines (M = 3.39), are leading sources of stress for Croatian project managers. The burnout syndrome is not present in significant amounts in Croatian project managers ($1.21 \leq M \leq 1.83$), whereas modest level of physiological stress manifests itself primarily through back pain (M = 2.66) and skin problems such as irritations or skin disorders (M = 1.92).

Followers' Expertise. Members of the project team, as the project manager's closest colleagues and followers, possess moderate to high project-related expertise (M = 3.53). Followers' project-related

Figure 2. Descriptive statistics for main research constructs – level of individual items



Note. M stands for mean value, ranging from 1-5 in accordance with the 5-point Likert scale used in the research.

experience, in terms of months and years working on projects, is at a much higher level (M = 3.80) compared to their project-related education and training (M = 3.27). In this sense, the investigated project managers work with and lead followers who possess extensive project-related experience and moderate project education and training.

Project Success. Projects that the investigated Croatian project managers currently lead or have recently led, are achieving or have achieved high levels of success (M = 4.19). In this sense, stakeholders' aspects of project success are at a significantly higher level (M = 4.33), compared to the project's performance, namely deadlines, budget, functionality, and scope (M = 3.93). This is especially true for the project success criteria of budget and deadlines, which are at far lower achievement levels (M = 3.54; M = 3.49), thereby questioning the efficiency aspect of lead projects. On the other hand, end-user satisfaction with a project's product or service, meeting user requirements, and reoccurring business with the client are at the highest level of all 12 measured project success criteria, thus speaking in favor of high achievements in terms of a projects' effectiveness and fulfilling predefined strategic goals of projects.

4.2. Correlation Analysis

Before investigating the interrelationships between research constructs in detail, a zero-order correlation analysis was conducted to gain insights into initial relations among research constructs and their dimensions (Table 1). As is evident in the results, there is a weak to moderate (Hair, Page, and Brunsveld 2020) but definite negative relationship between project managers' stress and their project leadership (r = -.37, p < .01). This is also valid for the relationships between project leadership and the stress dimensions of burnout (r = -.38, p < .01) and physiological stress (r = -.31, p < .01), whereas the same cannot be said for the relationship between project leadership and objective project-related stress (r = -.15, p > .10). Among the three areas of project leadership, the managerial competencies of project managers has the strongest negative relationships with stress for project managers, manifested among others with the existence of weak negative relationship with objective project-related stress (r = -.22, p < .10). Project leadership and its three areas all have moderate positive relationships with project success (.42 ≤ r ≤ .57, p < .01).

Conducted correlation analyses did not identify statistically significant relationships between the project managers' stress, or its three dimensions, and

Table 1. Means, standard deviations, Cronbach alphas, and zero-order correlations for research constructs and their dimensions

Var	***M***	***SD***	1	2	3	4	5	6	7	8	9	10
1	4.24	.47	.892									
2	4.39	.57	.79***	.697								
3	4.24	.54	.90***	.68***	.783							
4	4.18	.51	.91***	.56***	.69***	.804						
5	2.41	.51	-.37***	-.27**	-.39***	-.30***	.830					
6	3.22	.58	-.15	-.09	-.22*	-.10	.70***	.811				
7	1.55	.72	-.38***	-.32***	-.34***	-.33***	.71***	.27**	.801			
8	1.75	.83	-.31***	-.23*	-.31***	-.27**	.78***	.22*	.45***	.787		
9	3.53	.84	.00	-.01	.10	-.06	.02	-.01	-.07	.10	-	
10	4.19	.56	.57***	.52***	.42***	.55***	-.13	-.07	-.17	-.06	.22*	.899

Notes. Abbreviations and symbols used in the Table are as follows: Var = variable, M = mean, SD = standard deviation; 1 = Project Leadership; 2 = Project Manager's Intellectual Competencies; 3 = Project Manager's Managerial Competencies; 4 = Project Manager's Emotional Competencies; 5 = Project Manager's Stress; 6 = Project Manager's Objective Stress; 7 = Project Manager's Burnout; 8 = Project Manager's Physiological Stress; 9 = Followers' Expertise; 10 = Project Success. Correlation coefficient (r) values are reported at the intersections between research constructs, research constructs and constructs dimensions, and the intersections between constructs dimensions, whereas Cronbach's alphas (α) values are reported underlined on the main diagonal.

***p < .01; **p < .05; *p < .10, where p stands for probability value.

project success (-.07 ≤ *r* ≤ -.17, *p* > .10). According to the results, the construct of followers' expertise has a weak but definite positive relationship with project success (*r* = .22, *p* < .10). Statistically significant relationships of this construct with the constructs of project leadership and the stress of project managers, and with their constituting dimensions, were not identified (-.07 ≤ *r* ≤ .10, *p* > .10).

4.3. Testing of Hypotheses

Hayes' (2022) PROCESS macro v4.0 for SPSS was used to conduct moderation analysis to test the hypotheses of this paper. To enhance the internal validity of the moderation model and to obtain consistent effect estimates, two control variables related to respondents' demographic characteristics - the project manager's gender and age-were introduced in the moderation model to account for confounding influence factors between independent and dependent variables (Hünermund and Louw 2020). In this sense, a final moderation model was comprised of project leadership (independent variable), followers' expertise (covariate variable), project manager's stress (moderator variable), project success (dependent variable), and the project manager's gender and age (two control variables). The moderation analysis was run with only one moderator (Model 1 in PROCESS macro v4.0 for SPSS) and covariates.

The produced moderation model (Table 2) was significant and explained 42% of variations in project success, $F(6,64) = 7.86$, $p < .001$, $R^2 = .42$. Project leadership was a significant predictor of project success, $b = .81$, $t(64) = 5.81$, $p < .001$. Followers' expertise, although not nearly as expressive as project leadership, was also found to be a significant predictor of project success, $b = .17$, $t(64) = 2.53$, $p = .014$. According to the results, the two control variables of a project manager's gender and age are not significant predictors of a project's success. The presented results suggest the relatively strong positive effect of project leadership on project success and a significant positive effect of followers' expertise on project success, thereby confirming hypotheses H1 and H2.

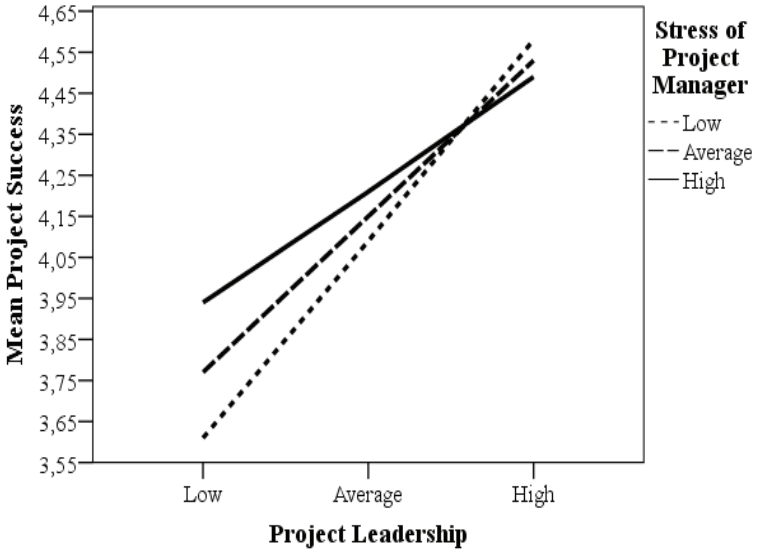
Stress of a project manager was not found to be a significant predictor of project success, $b = .12$, $t(64) = .94$, $p = .353$. Although the stress on a project manager does not directly influence project success, the interaction between project leadership and the stress on a project manager was a significant predictor of project success, $b = -.44$, $t(64) = -2.02$, $p = .048$. The addition of

Table 2. Results of moderation analysis for project stress, project leadership, and project success - main constructs' level (Process macro - Model 1)

Model	F	R^2	p			
	7.86	.42	.000			
			Project Success (Y)			
Independent variables	b	se	t	p	LLCI	ULCI
Project Leadership (X)	.81	.14	5.81	.000	.530	1.085
Project Stress (W)	.12	.13	.94	.353	-.134	.370
X × W	-.44	.22	-2.02	.048	-.881	-.005
Project Team Expertise	.17	.07	2.53	.014	.036	.303
Gender	-.06	.12	-.51	.614	-.290	.173
Age	-.07	.06	-1.14	.259	-.183	.050
Moderator (Project Stress)			**Conditional effects of X on Y**			
	b	***se***	***t***	***p***	***LLCI***	***ULCI***
Low	1.03	.21	5.02	.000	.621	1.442
Average	.81	.14	5.81	.000	.530	1.085
High	.58	.15	4.01	.000	.293	.873

Note. Symbols used in the Table are as follows: *F* = F test value; R^2 = coefficient of determination; *p* = probability value; *b* = unstandardized coefficient; *se* = standard error; *t* = t-test value; *LLCI* = lower limit confidence interval; *ULCI* = upper limit confidence interval.

Figure 3. Moderation effect of project manager's stress on the relationship between project leadership and project success - main constructs' level

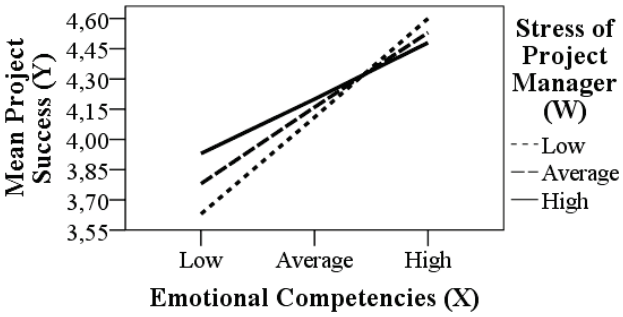


interaction between project leadership and stress on the project manager was a significant change to the model, as this interaction was responsible for 4% of variations in project success, $F(1,64) = 4.08$, $p = .048$, $\Delta R^2 = .04$. Stress on the project manager negatively moderates the relationship between project leadership and project success so that the positive effect of project leadership on project success decreases as stress on the project manager increases (Figure 3). More concretely, when the stress on the project manager is low, the positive effect of project leadership on project success is stronger (-1 *SD* below *M*, $b = 1.03$, $t(64) = 5.01$, $p < .001$) compared to the same positive effects when the stress on the project manager is average (*M* value, $b = .81$, $t(64) = 5.81$, $p < .001$), and especially when it is high (+1 *SD* above *M*, $b = .58$, $t(64) = 4.01$, $p < .001$). This moderation effect is statistically significant for 93% of values for a project manager's stress. Only when that stress increases above 3.33, the interaction between project leadership and the stress of the project manager becomes statistically insignificant for project success. Thus, the H3 hypothesis is also confirmed, assuming the existence of a moderation effect of stress on the project manager on the relationship between project leadership and project success.

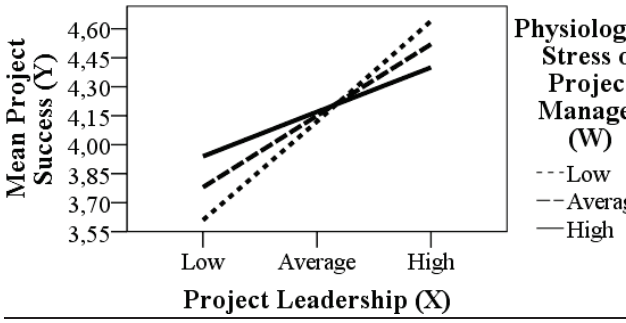
Moderation results related to the dimensions of project leadership and stress on the project manager are not so straightforward. All three areas of project leadership - intellectual competencies, managerial competencies, and emotional competencies are significant predictors of project success in run, statistically significant, moderation models. On the other hand, none of the three dimensions of stress on the project manager-project related stress, burnout, and physiological stress-are significant predictors of project success.

The area of emotional competencies has the strongest effect on project success of all three project leadership areas, and it is the most susceptible to the moderation effect of stress on the project manager in its mentioned effect on project success. (Figure 4). In effecting project success, the nature of the interaction between the area of emotional competencies and stress on the project manager is very similar to the nature of the interaction of project leadership and stress on the project manager ($b = -.40$, $t(64) = -1.81$, $p = .075$; 90% confidence). Of the three dimensions of stress on the project managers, the obtained results emphasize the very important moderating role of physiological stress in the effects of project leadership and its areas on project success. In this sense, the physiological stress on a project manager negatively moderates the relationship between project leadership and project success ($b = -.38$, $t(64) = -2.59$, $p = .012$), the intellectual competencies of project manager and project success ($b = -.23$, $t(64) = -1.92$, $p = .060$; 90% confidence), managerial competencies of project manager and project success ($b = -.27$, $t(64) = -1.89$, $p = .064$; 90% confidence), and the relationship between emotional competencies of project manager and project success ($b = -.31$, $t(64) = -2.24$, $p = .023$).

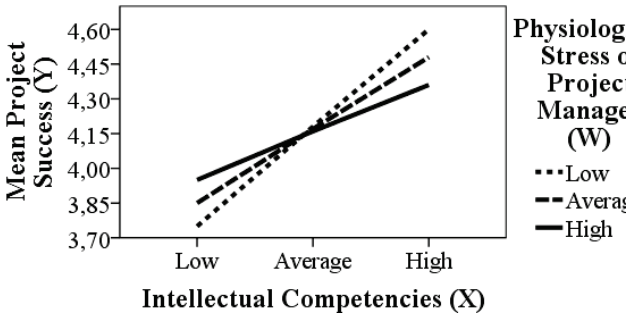
Figure 4. Notable results of moderation analyses for project stress, project leadership, and project success - specific dimensions' level (Process macro - Model 1)



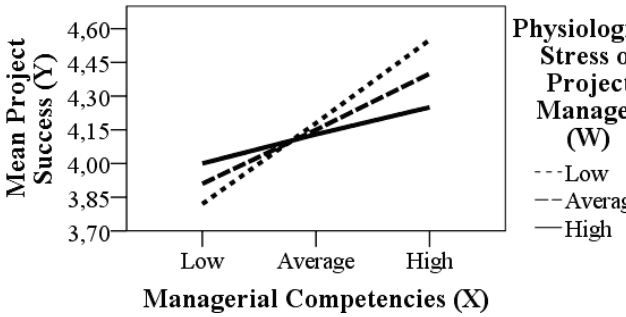
Model	*F*	R^2	*p*
	7.73	.42	.000
		Y	
Independent variables	***b***	***t***	***p***
X	.74	5.74	.000
W	.09	.68	.497
X × W	-.40	-1.81	.075
Project Team Expertise	.19	2.83	.006
Gender	-.11	-.92	.359
Age	-.09	-1.53	.132



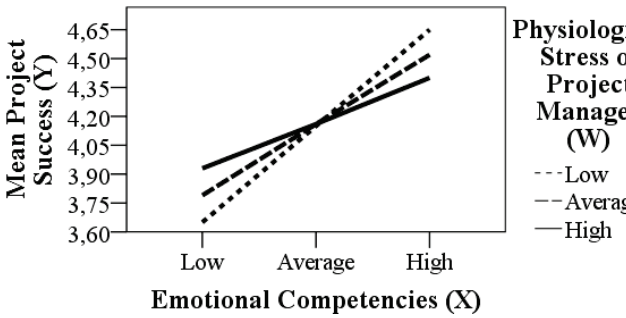
Model	*F*	R^2	*p*
	8.60	.45	.000
		Y	
Independent variables	***b***	***t***	***p***
X	.79	6.13	.000
W	.03	.36	.720
X × W	-.38	-2.59	.012
Project Team Expertise	.19	2.77	.007
Gender	-.03	-.28	.778
Age	-.07	-1.18	.244



Model	*F*	R^2	*p*
	6.12	.36	.000
		Y	
Independent variables	***b***	***t***	***p***
X	.55	5.04	.000
W	-.01	-.17	.869
X × W	-.23	-1.92	.060
Project Team Expertise	.19	2.70	.009
Gender	.085	.73	.470
Age	-.05	-.81	.418



Model	*F*	R^2	*p*
	4.07	.276	.002
		Y	
Independent variables	***b***	***t***	***p***
X	.45	3.66	.001
W	-.04	-.42	.675
X × W	-.27	-1.89	.064
Project Team Expertise	.17	2.21	.031
Gender	.10	.78	.438
Age	-.09	-1.29	.203



Model	*F*	R^2	*p*
	8.23	.44	.000
		Y	
Independent variables	***b***	***t***	***p***
X	.71	5.99	.000
W	.01	.09	.932
X × W	-.31	-2.24	.029
Project Team Expertise	.20	2.95	.004
Gender	-.09	-.74	.464
Age	-.10	-1.61	.112

Note. Symbols used in the Figure are as follows: *F* = F test value; R^2 = coefficient of determination; *p* = probability value; *b* = unstandardized coefficient; *t* = t-test value.

5. Discussion

Analysis regarding hypothesis 1 provided evidence of the relationship between project leadership and project success, offering additional empirical evidence of the importance of leadership, demonstrated by project managers, for achieving success in lead projects. The results align with the relevant literature's influential research, such as work by Geoghegan and Dulewicz (2008), Müller and Turner (2010), DuBois et al. (2015), Ahmed and Anantatmula (2017), and Podgórska and Pichlak (2019), thereby contributing to the ongoing debate in the literature on this matter (Nixon, Harrington, and Parker 2012). Each of the three project leadership areas affects project success, with emotional competencies having the strongest influence among them. Indeed, apart from intellectual and managerial capacity, emotional intelligence has been constantly identified in the literature as a required key set of managerial capabilities and of growing importance for leaders in contemporary business and project environments in particular, especially considering high project complexity and transformational style of leadership (Dulewicz and Higgs 2005; Rezvani et al. 2016). This result supports the emotional intelligence school's stance and that of its representative's, Goleman's (1995, 2020), proposition that emotional capabilities are the most important capabilities for modern leadership, especially for higher management levels. Similarly, Müller and Turner (2010) suggest that project managers, when progressing on their career development path and confronted with increasing project demands, need to enhance their emotional competencies the most to achieve successful project results. Therefore, to interact effectively with and lead their project team members and ultimately achieve project success, project managers, among others, have to possess emotional intelligence competencies, an area in which Croatian project managers are somewhat lagging compared to their highly developed intellectual and managerial competencies.

Croatian project managers lead and collaborate with project professionals who possess relatively extensive project-related experience and a moderate level of project-related education and training. Results related to hypothesis 2 suggest that followers' expertise is an important project success factor, a contextual determinant that project leaders need to take into account when aiming to lead a project successfully, as evidenced in similar research (e.g., Liu 2012; Beleiu, Crisan, and Nistor 2015; Oh and Choi 2020). Therefore, to execute all project tasks successfully, project managers should, if possible, choose project team members with a variety of competencies that are mutually complementary and with appropriate personality features, predispositions, and types of behaviors (Zdonek, Podgórska, and Hysa 2017).

Findings regarding hypothesis 3 indicate that Croatian project managers' stress does not directly influence the performance and success of projects they lead but hampers their leadership competencies. By doing so, Croatian project managers' stress diminishes their demonstrated leadership's positive effects on project success. In accordance with these findings are the conclusions of Leung, Chan, and Olomolaiye (2008), An et al. (2019), and Darmawan and Djelani (2021). Leung, Chan, and Olomolaiye (2008) emphasize that the relevant literature has not reached a definitive consensus on the relationship between stress and performance, and recognize that a majority of the research suggests that the relationship takes an inverted U-shape, in which low and high levels of stress hinder performance (understimulation and overstimulation) and moderate levels of stress enhance performance (optimum-stimulation zone). Similarly, An et al. (2019), and Darmawan and Djelani (2021) conclude that project stress affects the project manager's performance, but underline that there is no unified conclusion in the relevant literature on the nature of the relationship due to the different nature of effects of stress on the performance with regards to its levels (low, moderate, high stress) and types (challenge or hindrance stressors). By draining project managers' cognitive and emotional resources and thereby influencing their behavior and decision-making, stress hinders project managers' ability to demonstrate adequate leadership on projects (Harms et al. 2017; Lin et al. 2022). The presence of stressors in highly uncertain and demanding project environments requires project managers to cope with stress and reduce it to an acceptable or manageable level—a moderate level—to lead projects successfully (Flannes 2010; Hamid and Afshar 2014; Heng 2016). Thus, stress's effects on project success can be twofold—negative and positive—depending on the level of stress (Smith, Bruyns, and Evans 2011; Darmawan and Djelani (2021), whereas project leadership suffers from the negative influence of project-related stress. Therefore, the results regarding hypothesis 3 support the relevant literature's stance on project stress's role in demonstrating adequate leadership and ultimately achieving project success.

More detailed results on the relationships between specific areas of Croatian project managers' leadership, types of project stress, and project success reveal additional interesting and even surprising insights. Project managers' emotional competencies are additionally underlined as the most important

competency area for project success, and the area most susceptible to the negative moderation effects of project stress, especially physiological stress. These results align with Rezvani and Khosravi's (2019, p. 141) notion that stress interferes with the self-regulation of emotions, cognition, and motivation to complete a task and thereby hinders project success. Surprisingly, it seems that Croatian project managers' acute objective stress related to specific projects (deadlines, costs, scope, etc.) does not influence their capabilities needed to demonstrate adequate leadership and subsequently achieve project success, unlike the effects of the accumulated consequences of chronic and continuous stress experienced in previous projects, expressed as physiological stress (back pain, skin problems, etc.). Job stress, if not managed effectively by the project manager, over time leads to psychological stress through burnout (Leung et al. 2011 in Senaratne and Rasagopalasingam 2017) and ultimately, through accumulated chronic stress, affects project manager's physiological processes, metabolic activity, and overall health condition (Rowold and Schlotz 2009; An et al. 2019). Furthermore, underlying physiological processes can strongly influence one's leadership behavior (Waller et al. 2017), as evidenced by the results of this study, according to which physiological stress negatively moderates the effects of all three project leadership competencies' areas on project success. Indeed, stress's psychological and physiological effects associated with the leadership role negatively affect a leader's sustainability and effectiveness (Boyatzis, Smith, and Blaize 2006; Byrne et al. 2014; Li et al. 2018; An et al. 2019).

6. Conclusion

This study offered interesting insights into project managers' leadership nature and its relationship with stress and project success, all in the context of transitional, moderately developed country in Central and South Eastern Europe. The study's results suggest that project managers possess a balanced set of leadership competencies at high levels, but emotional competencies are slightly lagging behind managerial and especially intellectual competencies. On the projects they lead, confronted with moderate levels of objective project-related stress and modest levels of physiological stress, and collaborating with followers with extensive project-related experience and moderate project-related education and training, these project managers are achieving high levels of project success. Apart from descriptive insights, the study provided answers to the main research questions on the nature of the relationship between project leadership and project success and on stress's role in demonstrating adequate project leadership and ultimately achieving project success. By confirming all three research hypotheses, the study results provided additional support for the relevant literature's stance on project leadership's crucial role in achieving project success and shed light on the debated role of stress in achieving project success, especially in relation to project leadership. In this sense, the obtained results emphasize emotional competencies as the main set of leadership competencies required to achieve project success and draw attention to physiological stress as an influential barrier to demonstrating adequate project leadership and thereby achieving project success.

The results presented in this study help fill the research gaps identified in leadership and project management literature. The study offers new insights into ignored behavioral, interpersonal, and competency factors in the project management literature (Munns and Bjeirmi 1996 in Muller and Turner 2007; Ahmed and Anantatmula 2017; Farnes 2018), especially ignored contributions of project manager's competence and project leadership to project success (Müller and Turner 2007; Crawford and Turner 2007; Flannes 2010; Jiang 2014). Additionally, study results add to the lacking research on stress's effect on project managers' performance (Gällstedt 2003; Leung, Chan, and Olomolaiye 2008; Farnes 2018) and to the paucity of quantitative research on project-team factors' effects, including expertise, on project success (Tiwana and McLean 2005; Scott-Young and Samson 2008; Zdonek, Podgórska, and Hysa 2017). By examining the moderating role of project stress in the relationship between project leadership and project success, the study results' contributions to the relevant leadership and project management literature are twofold. They 1) add to the research on predictors of leadership that is lagging behind in leadership literature (Byrne et al. 2014), and also 2) answer the calls, made by literature's influential authors and papers, for more research focused on examining the potential intervening variables between project leadership and project outcomes (Clarke 2012). Finally, linking all four mentioned concepts—project leadership, project managers' stress, followers' expertise, and project success—into one conceptual model and providing empirical results into their relationships, all in the context of a transitional, moderately developed country in Central and South Eastern Europe, present additional contributions of this study to the relevant leadership and project management literature.

As in any study, the presented research has several limitations. The first is the relatively small sample of project managers. Conducting an empirical study with a larger sample by employing pure random sampling as opposed to a combination of simple random sampling and purposive sampling methods would make the presented results more valid. Additionally, this study is cross-sectional in nature whereas the results obtained from only one industry or from a longitudinal study could prove more valid. Finally, the same respondents provided answers on independent variables and the dependent variable, possibly leading to a common-method bias. Collecting the data from several sources and several hierarchical levels (project managers, followers, project stakeholders) would make the collected data more objective, especially related to the project success variable, and would decrease the issue of common-method bias.

In addition, this study's results, some of which were surprising, point to interesting future research. The debate on project leadership's role in achieving project success is still very much alive; therefore, additional research on project leadership as a project success factor is still needed. A similar conclusion is particularly valid for stress's role in shaping project leadership and directly and indirectly influencing project success. In this sense, investigating the role of emotional competencies in project success, especially in relation to the psychological and physiological effects of accumulated chronic stress, stands out as a promising research direction. Finally, given the scarcity of existing research, new empirical insights into relationships between project leadership, project success, and stress, in the contexts of moderately or less developed countries, would be welcomed.

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THE EFFECTS OF MACROECONOMIC AND FINANCIAL DEVELOPMENT ON INCOME INEQUALITY: EVIDENCE FROM THE WESTERN BALKANS

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Abstract

Using data from 1996 to 2019 covering five Western Balkan countries and applying the linear panel data estimation method, this paper examines the effect of macroeconomic indicators and financial market development on income inequality. Regression results with Driscoll-Kraay standard errors demonstrate that income per capita increases income disparities. Theoretically, there are grounds for both a positive and negative relationship between economic growth and income inequality. In addition, contrary to prevailing literature, our analysis finds no significant impact of financial market development on income inequality, while the rule of law is found to have no effect on income inequalities in these countries. We depart from previous literature by bringing new evidence on the relationship between income inequality and economic growth in the specific context of Western Balkan countries. We study this relationship in an integrated framework and rely on a larger time span, both of which are seemingly important for comprehending the income inequality-economic growth nexus. Certainly, the obtained results bear important policy implications as discussed in this paper.

Keywords*: income inequality, economic growth, financial market development, rule of law, Western Balkan countries*

1. Introduction

Income inequality, as a global phenomenon, has garnered significant attention among scholars and policymakers in both advanced and developing countries. Since Kuznets' pioneering work in 1955, numerous researchers have endeavored to analyze the determinants of inequality and its consequences within complex economic environments. Kuznets posited a long-term trend in inequality, initially characterizing it as increasing during the early stages of economic development, as societies transitioned from agricultural to industrialized economies. This trend was followed by a period of stabilization before narrowing in later phases. However, empirical studies have revealed mixed evidence regarding the relationship between income inequality and economic growth (Acemoglu and Robinson 2002, p.183). Kuznets' hypothesis, presented

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in the form of an inverted U-shaped curve, initially seemed to align well with historical data, particularly when inequality was high in the early 20th century, decreased during world wars, and then began to rise again in the 1970s. Now, it appears that inequality follows a U-shaped trajectory (Keeley 2015, p.65).

Meanwhile, transition economies in Europe and the former Soviet Union, transitioning from centrally planned to market economies, underwent a period of rapid political and economic transformation. The increase in inequalities within these transition economies significantly contributed to the overall widening of income disparities. The main components of the transition process, as defined by the IMF (2000), included the liberalization of prices and trade, macroeconomic stabilization, restructuring and privatization of state enterprises, as well as legal and institutional reforms in these countries. At the onset of the market transition, the Western Balkan (WB) countries encountered significant difficulties and constraints, experiencing hyperinflation, declining growth, and increasing unemployment. Milanovic (1998), in his book, demonstrates that prior to the transition, household income was primarily derived from the state and social transfers, resulting in a higher share of gross income compared to market economies. Consequently, the Gini coefficient was lower than that of OECD countries and countries at similar development levels.

Therefore, countries in transition are particularly vulnerable to income inequalities as they undergo deep structural transformations from state-led economies to market economies. This paper seeks to re-examine income inequality determinants in the Western Balkan countries by incorporating financial market development and institutions into the equation. Given the potential effects of income inequality on these fragile economies, understanding its determinants is crucial. We conduct an empirical analysis of the Western Balkan region using recent data spanning from 1996 to 2019. Building upon prior research highlighting the influence of economic growth on income distribution, our study develops an empirical model that also incorporates other critical factors in this relationship. By addressing this aspect, our aim is to provide a comprehensive analysis of the determinants of income distribution in Western Balkan countries. Specifically, this article focuses on the determinants of income inequality and the impact of financial market development and the rule of law on income inequality in the Western Balkan region.

Despite a large number of empirical studies on the relationship between income inequality and economic growth, the evidence remains inconclusive. The increasing income disparities, coupled with financial liberalization, have sparked further research on the finance-inequality nexus. It's important to note that this relationship is also contingent on the level of institutional quality. The literature review reveals that financial market development may have either a widening or narrowing effect on inequality. Additionally, there may exist a "threshold effect" where finance initially increases income inequality up to a certain point, beyond which its effect diminishes. By including the main determinants in our analysis and utilizing a reliable and consistent estimator that allows for a relative generalization of our findings, we aim to offer a more precise understanding of the factors contributing to income inequality in the Western Balkan countries. Specifically, in this paper, we investigate two research questions:

- What is the impact of economic growth on income inequality in the Western Balkan countries?
- What is the impact of financial market development and the rule of law on income inequality in the Western Balkan Countries?

The remainder of the paper is divided into seven parts and structured as follows.

Section 2 provides a brief review of the literature on the relationship between financial development, institutions, and income inequality.

Section 3 examines existing studies on inequality in transition countries, with specific reference to the impact of financial market development on the income inequality phenomenon in the Western Balkan region.

Section 4 presents the data and the variables. It provides information on sources of data, variable definition and presents descriptive statistics.

In section 5, we explain research methodology and the model with specific reference to methodological issues following previous research.

In section 6, we present the results of empirical models estimated and refer to main conclusions stemming from the obtained results.

Detailed discussion of the results is provided in section 7. We draw relevance from previous studies and pay attention to the specific context of investigation on which we draw important policy implications

Finally, the concluding section analyses the key findings and compares them with the existing literature on developed countries and those concerning the Western Balkan region.

2. Literature Review

Greater income inequality is widely recognized as detrimental to major socioeconomic and political objectives. The literature review demonstrates that globalization, particularly trade and financial liberalization, are significant factors driving income inequality. Additionally, technological change, redistributive policies, changes in labor market institutions, and education are identified as sources of inequality (Dabla-Norris et al. 2015, pp.18-22). According to Cornia and Court (2004, pp.14-20), it is crucial to distinguish between "traditional" causes of inequality and "new" causes. Traditional causes include factors such as arable land area, urban bias, and inequality in education. New causes are associated with liberal economic regimes and policies implemented in developing countries during the 1980s and 1990s, such as new technology, trade liberalization, financial liberalization, privatization, and changes in labor market institutions. While traditional causes are responsible for the initial level of inequality in different countries, the recent increase in inequality in some countries is attributed to the new causes corresponding to rapidly changing liberalizing economic regimes. Therefore, new causes are claimed to be responsible for the worsening situation. However, many authors have also acknowledged that the institutional framework and chosen economic policies have an impact on determining the pattern of income inequality.

Although many theoretical and empirical studies suggest that high income inequality has adverse effects on growth (Alesina and Rodrik 1994; Atem and Jones 2015; Berg and Ostry 2017), there is a widely held belief that inequality is necessary for economic growth (Li and Zou 1998; Forbes 2000; Scholl and Klasen 2019). Moreover, Davis and Hopkins (2011) argue that the inconclusive results regarding the relationship between income inequality and economic growth are due to omitted variable bias, with the key omitted variable in this relationship being the quality of institutions.

Banerjee and Duflo (2003) provide evidence for an inverted U-shaped curve, while Deininger and Squire (1998) reveal a strong negative relationship between initial inequality in asset distribution and long-term growth. Atems and Jones (2015), employing a comprehensive cross-country panel, find that a shock to the Gini coefficient leads to a permanent increase in income inequality. Panizza (1999), using regional data, confirms a negative relationship between inequality and economic growth for US states. However, Li and Zou (1998), in contrast to the research by Alesina and Rodrik (1994), show that income inequality is positively associated with growth.

Many liberal economists, echoing the view expressed by Arthur Okun (1975), argue that countries cannot achieve perfect equality and perfect efficiency simultaneously; there must be a trade-off between equality and efficiency. Proponents of this view contend that income inequality is necessary for economic growth because it fosters savings, which subsequently fuel investments. As growth increases, even those at the bottom of the income distribution will benefit, and eventually, inequality will decrease.

Alternatively, Seven and Coskun (2015, p.39), inspired by Galor and Zeira's (1993) work on capital market imperfections, argue that the financial system and institutions should operate effectively to present opportunities for growth, improve income distribution, and reduce poverty. Therefore, since the early 1990s, empirical growth literature has incorporated various factors such as financial market development, trade openness, and institutional quality into the growth equation (Cingano 2014, p.44). The increasing recognition of the importance of finance and institutions on growth and inequality has led to a plethora of research indicating how different types of institutions, through financial flows, can shape income disparities.

Studies examining the relationship between financial development and income inequality yield mixed results. A literature review reveals that while some aspects of finance decrease income inequality, other indicators can increase it, or there may be a threshold effect where, after a certain threshold level is achieved, financial development reduces income inequality. Thus, three significant theories on the link between financial development and income inequality exist.

The first claim is based on the Kuznets curve, also known as the Greenwood-Jovanovic hypothesis (1990), which suggests that estimation in nonlinear regression between financial market development and inequality may demonstrate a threshold effect. Similar to Kuznets' theoretical approach, in the early stages of economic development, financial markets grow slowly and only the wealthy have access to credit markets. As financial markets expand, aggregate savings and economic growth increase, benefiting the wealthy more. This process exacerbates disparities between the rich and the poor. Finally, in the maturity phase of development, as financial markets become accessible to lower-income individuals, income inequality begins to decrease, following an inverted U-shaped curve. Some studies confirm the nonlinear regression between financial development and income inequality (Greenwood and Jovanovic 1990; Dong-Hyeon and Shu-Cin 2011; Law, Tan, and Azman-Saini 2014; Biyase and Chisadza 2023).

The second view is based on the expectation that as financial market development increases economic growth across all segments of the population, this will lead to a decrease in income inequality. Research by Beck, Demirgüç-Kunt, and Levine (2007) confirms the importance of financial development for the poor, increasing the income of the poorest quintiles and decreasing overall income inequality. Ben Naceur and Zhang's (2016) research demonstrates that financial depth, access, efficiency, and stability significantly reduce income inequality, while domestic and external financial liberalization exacerbates it. Therefore, the ratio of private credit to GDP and the ratio of the total value of stock market trades to GDP reduce income inequality. Weychert's (2020) study suggests that financial access reduces income inequality, and the level of financial inclusion is shown to decrease income disparities (Omar and Inaba 2020; Demir et al. 2022).

The third view is related to the existence of asymmetric information and legal constraints for the poor, where they are affected by a lack of access to finance. Research by Seven and Coskun (2016) does not confirm the income-reducing hypothesis, indicating that even though financial systems have developed in terms of size and liquidity over the last two decades, the poor in emerging countries did not benefit from it. Similarly, research by Jauch and Watzka (2016) and De Haan and Sturm (2017) contradicts theoretical models suggesting that financial market development worsens income inequality.

In addition, discussions on inequality in recent years have placed a lot of emphasis on the necessity of good governance and institutions. Chong and Gradstein (2004) argue that income inequality may undermine institutions by empowering rich elites, while poor institutional quality may lead to greater income inequality. The findings suggest a strong negative relationship between institutional quality and income inequality (Davis and Hopkins 2011; Huynh and Tran 2023).

Within the institutional framework setting, Bennet and Nikolaev (2016) have investigated the Engerman-Sokoloff hypothesis, which proposes that factor endowments influence the rule of law, leading to income inequality. The authors argue that the elite class established weak legal institutions to protect their interests, while the middle class promoted stronger institutions. Their findings demonstrate that the elite's influence on the rule of law contributed to an increase in income inequality. Amendola, Essaw, and Savoia (2013) provide evidence that property rights increase income inequality in the majority of developing countries, particularly in low democracies, implying that relevant institutions in these countries favour minorities. Similarly, Perera and Lee (2014) have found that corruption, democratic accountability, and bureaucratic quality indicators are positively and statistically significantly associated with the Gini index, suggesting that improvements in these factors have worsened the income distribution in the selected developing countries.

In this context, the financial and institutional framework in the Western Balkan countries is crucial, as it impacts the gap between the rich and the poor possibly contributing to increased or decreased inequalities. Given the objectives of this research, in the sections to follow, we provide an overview of empirical literature on the relationship between income inequality, financial market development, and the rule of law in transition countries.

3. Finance-Institutions-Inequality Nexus in Transition Economies

As substantiated in the empirical literature, the initial transition period was characterized by a sharp decline in economic output and increases in inequality in Central and Eastern European (CEE) countries. Critics argue that the macroeconomic policies adopted after the fall of communism have neither produced significant growth nor balanced growth in CEE countries. Poor macroeconomic policies have been identified as the main determinant of deteriorating income growth and distribution. How macroeconomic indicators changed the pattern of inequality in the transition period has long been an issue of interest for academics and policymakers.

Aghion and Commander (1999, p.290) argue that the policies adhered to in Central Europe have led to a rapid increase in income inequality with slow growth, and discrepancies in income distribution persist among the private sector. Bartlett (2009, p.35) argues that entrepreneurs in the Western Balkan countries faced many difficulties in developing businesses, with a lack of access to finance being among the most important ones. Since loans were channelled to larger companies, small businesses needed high collateral and faced higher interest rates, which in turn enabled only a marginal number of companies to develop into competitive medium-sized companies. Moreover, Bartlett (2009, p.35) emphasizes that while large companies were linked to economic and political elites and established their monopoly positions in the

market, they also affected economic policy in a way that harmed the development of small businesses for many years in most Western Balkan countries.

Overall, a sharp increase in income inequality in Central and Eastern European countries prevailed for a long period, not only in the aftermath of communism. Comparing data from the 1987-1988 period to the 1993-1995 period, Milanovic (1998) reports that in transition countries, the average Gini coefficient rose sharply from 24 to 33. Similarly, Heyns (2005), in her review of inequality in CEE, concludes that income inequalities had increased regardless of age, education, and health status. The latest empirical evidence indicates similar patterns of income inequality and economic growth relationships in transition economies. Brzezinski's (2018) empirical research demonstrates that the main driver of inequality in CEE was falling full-time employment, while Velkovksa, Trenovski, and Kozheski (2020) find strong evidence to support the persistence of the Kuznets curve hypothesis in selected Balkan countries, attenuated by the slow growth dynamics over the last decade in these countries.

A more in-depth empirical analysis of the relationship between GDP and inequality, assessing various influencing factors such as labor market institutions, market power control of companies, social benefits, and taxes in Eastern Europe, reveals that inequality declined in countries with high taxes, strong labor rights, and effective control of market power alongside steady economic growth (Jovanovic 2015). Carvalho, Nepal, and Jamasb (2016), using the LSDVC technique, estimate how market reforms impact the human development index. Their study demonstrates that reforms in transition countries are very complex with diverse, although predominantly worsening impact on the human wellbeing. On the other hand, Bandelj and Mahutga (2010) find that privatization is an important factor of influence, strongly related to patterns of inequality growth. Precisely, the results of their research indicate that privatization has increased income inequality in post-socialist European countries. Thus, evidence from transition and emerging market economies indicates that neither banks nor stock markets reduce inequality, implying that financial market development fails to reach poor individuals (Seven and Coskun 2016). Koczan (2016) argues that the transition process has thus been more traumatic for people in the Western Balkans. Analyzing poverty perceptions on the household level, the author attempts to explain the dissatisfaction of people even in years with high growth and acknowledges subjective perception as the reason behind feeling poorer than actually being poor by definition. A recent study (Roy-Mukherjee and Udeogu 2021) concluded that in the presence of an effective institutional framework, economic growth is inversely related to income inequality in the Western Balkan countries, suggesting that improving institutional quality as well as the level of unionization seems to reduce both within-country and cross-country income inequality. However, research by Kovac and Verbic (2023) shows that there is no statistically significant relationship between government efficacy, corruption, and wealth inequality, although the long-run impact of domestic credit on wealth inequality is negative. Their sample includes worldwide statistics on wealth inequality, including transition economies.

The inconclusive results regarding the relationship between income inequality and economic growth in transition economies are noteworthy. In view of this, it is essential to reconsider and re-examine the empirical evidence on this matter. Existing literature highlights significant methodological drawbacks, mainly stemming from data constraints in transition economies. Specifically, there is a substantial lack of empirical evidence on the income inequality and economic growth relationship in the context of less developed Western Balkan countries, while the relationship between financial development and income inequality in transition countries remains fairly under-researched.

More precisely, the empirical literature is far from conclusive when it comes to examining the impact of both financial market development and institutional quality on income inequality in Western Balkans. Given the theoretical premises and the literature review, however, both factors are considered important in mitigating increasing income disparities in transition countries. The importance of these factors has been previously assessed only to a very limited extent, mainly due to insufficient data on WBs.

Overall, the impact of financial market development and institutional quality on income inequality in WB countries has been substantially under-researched, while the effects of these institutional factors have not been studied in an integrated framework. This article contributes to the existing empirical literature on income inequality in several ways. First, it examines which factors influence income inequality in the specific context of the WB region. Second, it includes data on income inequality and institutional factors covering larger time period. Third, it estimates the effects of institutional factors on income disparities in a single model covering WB countries which postulate the important and a very specific context of this research.

The WB region is unique as it reflects a group of transition economies that embarked on the course of

economic transition fairly lately compared to Central and Eastern European countries. The transition from socialism to capitalism in most WB countries has been disrupted by war, leading to physical devastation of productive resources, economic isolation, and stagnation, with far-reaching consequences on these countries' prospects for growth and integration into the European and global economic structures. The stop-and-go pattern of growth in WB countries has been associated with deep structural problems prevalent in these economies, resulting in bleak outcomes of transition reform and EU integration processes in most of these countries (Silajdzic and Mehic 2016; Silajdzic and Mehic 2022). Steady growth performance at the beginning of transition was accompanied by persistently high unemployment rates and growing income disparities. WB countries were hard hit by the outbreak of the financial crisis in 2008, from which they are still recovering. These developments have left many deprived of employment opportunities, while unbalanced growth patterns are linked to prolonged deindustrialization (Damiani and Uvalic 2014; Uvalic 2014; Bartlett and Uvalic 2022) and seemingly associated with growing income inequalities.

Nevertheless, financial market development and progress in institutional transformation in these countries have been considered important in mitigating unbalanced growth patterns. Therefore, in this analysis, an attempt is made to analyse the income inequality and economic growth relationship and investigate whether or not financial market development and the rule of law have helped in reducing income inequalities in these countries.

While previous literature analysing the impact of financial market development on economic growth suggests that financial market development underpins economic growth in Western Balkan countries, only a few papers analyse the determinants of income inequality in this region while the effect of financial market development on income inequality remains fairly under-researched. As demonstrated by the empirical literature review, data insufficiency presents a major drawback when it comes to income inequality studies covering the WB region.

In this paper, we rely on panel data with a longer time period and study the income inequality and economic growth relationship in an integrated framework. Specifically, this paper contributes to recent literature by analysing the effect of financial market development and institutional quality on income distribution among WB countries, using static panel estimators and covering a longer time period.

4. The Data

Our dataset consists of an unbalanced panel dataset for the period 1996–2019. The countries belonging to the Western Balkans are Albania, Bosnia and Herzegovina, Kosovo, Montenegro, The Republic of North Macedonia, and Serbia (European Cluster Collaboration Platform). However, due to data unavailability for certain variables, we do not include Kosovo in this study.

Consistent with most of the literature, in this study, economic growth is proxied by GDP per capita, which is calculated as gross domestic product divided by the population. We obtain the data on income per capita from the Penn World Tables (PWT - version 10.01). Although there are other measures of income inequality, the Gini coefficient is the most widely used in the literature and is available for a longer time period. The data on the Gini coefficient we use here are new and improved high-quality data taken from the Standardized World Income Inequality Database (SWIID) prepared by Frederick Solt (2020) version 9.1.

Following previous literature on the matter (Beck, Demirgüç-Kunt, and Levine 2007; Huang, Lin, and Yeh 2009; Ben Naceur and Zhang 2016; Seven and Coskun 2016; Jauch and Watzka 2016; De Haan and Sturm 2017; Weychert 2020), we use domestic credit to the private sector by banks (% of GDP) as a proxy for financial market development. The data on this indicator are obtained from the Development Indicators Database of the World Bank, which is available from 1996.

Following earlier literature and conceptual propositions on the importance of institutional quality in comprehending the income inequality and economic growth relationship, we use the rule of law as a proxy for institutional quality (Greenwood and Jovanovic 1990; Chong and Gradstein 2004; Law, Tan, and Azman-Saini 2014; Bennet and Nikolaev 2016). Data for the rule of law is sourced from the Worldwide Governance Indicators compiled at the World Bank. The definition of the rule of law (Kaufmann, Kraay, and Mastruzzi 2010, p.4) is given as "capturing perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence."

Variable definitions, measurements, and sources of data for each of the variables are provided in Table 1.

The summary statistics for the non-logarithmic forms of the dependent and explanatory variables of the unbalanced panel covering the period 1996-2019

are presented in Table 2. It demonstrates the wide range and significant discrepancies of per capita income levels in the sample, ranging from just over $1464 (Albania in 1997) to about $7684 (Montenegro in 2019). The overall sample mean is approximately $4345.

Regarding inequality, the mean of the Gini coefficient equals 50.06, with the maximum value (above

Table 1. Variable definitions, measurements and sources

Variable	Definition of Variable	Measurement	Source
GDP per capita	Real GDP at constant national prices, obtained from national accounts data for each country divided by population	Real GDP at constant 2017 national prices (in mil. 2017US$) divided by population.	Penn World Tables (PWT - version 10.01)
GINI	The Gini coefficient measures income inequality; min is 0; max is 100 percent, or 1.0	Gini index of inequality in equivalized household (pre-tax and pre-transfer) income.	SWIID (2020) version 9.1.
CREDIT	Domestic credit to private sector by banks (% of GDP)	Financial resources provided to the private sector by other depository corporations such as through loans, purchases of nonequity securities, and trade credits and other accounts receivable, that establish a claim for repayment.	IMF, International Financial Statistics and data files, and World Bank and OECD GDP estimates.
LAW	Rule of Law captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.	Measure is constructed from diverse views on governance of many stakeholders worldwide, including tens of thousands survey respondents and experts. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.	World Bank (Worldwide Governance Indicators)
GOV	Government consumption of a country (% of GDP)	Government consumption at constant national 2017 prices/GDP at constant national 2017 price	Penn World Tables (PWT - version 10.01)
UNEMPL	Unemployment, total (% of total labour force)	Modelled ILO estimate	World Bank
AGRI	Agricultural land (% of land area)	The share of land area that is arable, under permanent crops, and under permanent pastures.	World Bank
NATRES	Total natural resources rents (% of GDP)	The sum of oil rents, natural gas rents, coal rents (hard and soft), mineral rents, and forest rents.	World Bank

Table 2. Descriptive statistics

Variable	Obs.	Mean	Std.	Min	Max
GINI	101	50.06	2.74	46.1	55.3
GDP	129	4345.09	1371.13	1464.29	7684.18
CREDIT	117	37.36	17.05	3.26	86.45
LAW	114	-0.36	0.29	-1.27	0.32
GOV	122	18.05	4.52	9.45	29.94
UNEMPL	130	21.77	7.27	9.01	38.8
AGRI	125	41.02	6.99	16.59	52.46
NATRES	121	1.34	17.05	3.26	86.45

Source: Author's own calculation.

55.3) corresponding to Macedonia, and the minimum (below 46.1) corresponding to Albania in 1996. Given the substantial discrepancies in income inequality and economic growth levels across time and among countries included in the sample, we consider and examine alternative models while carefully considering the goodness of fit of individual models estimated.

5. The Model and Methodology

Our measure of income inequality is expected to be a direct function of income per capita, domestic credit to the private sector by banks (% of GDP), rule of law, and a vector of factors (Z) commonly examined in the income inequality literature:

$$GINI = f(GDP, CREDIT, LAW, Z)$$

To avoid inefficient estimators, stationarity is checked for each variable. All variables except unemployment are stationary. While the unemployment variable is not stationary, the difference of this variable is stationary.

Our estimation strategy utilizes linear static panel data models where all explanatory variables are dated contemporaneously with income per capita and the Gini coefficient variables. In order to assess the effect of financial development and institutions on income inequality, fixed effects and random effects models are utilized.

Initially, income inequality is regressed on GDP per capita and related indicators. Then, control variables are included in regression models. Extended model for income inequality takes the following form:

$$lGINI_{it} = \beta_1 + \beta_2 lGDP_{it} + \beta_3 lCREDIT_{it} + \beta_4 lLAW_{it}$$
$$+ \beta_5 llAGRI_{it} + \beta_6 D.UNEMPL_{it} + \beta_7 lNATRES_{it} + u_{it}$$

All variables are in natural logarithmic forms where *i* denote country and *t* stands for time. $GINI_{it}$ denotes the Gini coefficient, $CREDIT_{it}$ is proxy for financial development, GDP_{it} is GDP per capita (constant 2017 US$) and LAW_{it} is proxy for quality of institutions.

The set of control variables is added following commonly accepted cross-country income inequality literature. Control variables are taken from the World Bank Development Indicators Database. Since data on wealth inequality and land Gini are not available for countries in our sample, we use agricultural land (% of land area) data, which refers to the share of land that is arable. This variable may serve as a determinant in the inequality equation since increasing inequality promotes agricultural expansion. Thus, government consumption shares in GDP, agricultural land, unemployment, and natural resources (% rent) are considered as control variables.

Most of the cross-section studies use OLS, while studies using panel data employ estimators such as fixed effects, random effects, GMM, etc. Although the GMM estimator has been employed to handle endogeneity issues, Hansen (2008, p.1) states that GMM is a large sample estimator and thus is not suitable for our small sample dataset with only five units.It is important to control for unobserved heterogeneity or individual-specific effects to get valid parameters. Hsiao (2007, p.10) states that individual-specific effects can be random or fixed.

6. Empirical Analysis

In this section, we present the empirical results of the research, with a focus on estimation results and model diagnostics. We estimate the model where income inequality is the dependent variable and start with a baseline model. First, we estimate the effect of GDP per capita, the rule of law, and credit on income inequality. Table 3 presents the results of the empirical estimation of five different model specifications, each with the Gini coefficient as the dependent variable. Each model specification consists of a given set of explanatory variables for credit and the rule of law, along with a given set of control explanatory variables for the analyzed time frame.

In the first model specification (Model 1), income per capita, credit, and the rule of law variables are included. The poolability test obtained by comparing fixed effect estimates and pooled regression rejects the null hypothesis that all fixed effects are jointly 0, indicating that country effects are present. A Hausman test is performed to decide whether fixed or random effects models fit better. Estimation of the model takes into account the results of the assumption tests of heteroscedasticity, autocorrelation, and cross-sectional dependence. Utilizing a one-way random effects Driscoll-Kraay model using Stata 17 statistical software package, we find that income per capita and the rule of law are significant. The estimated coefficient of credit has a negative sign; however, it is insignificant.

In the second model specification, agricultural land (% of land area) data is added as a control variable. In line with diagnostic tests, as the Hausman test suggests, we use a one-way error component model with fixed effects. Suspecting heteroscedasticity, cross-sectional dependence, and autocorrelation in the data, a one-way fixed effects model with standard

Table 3. The estimation of models with FE and RE (Dependent variable lGINI)

	Model (1)	Model (2)	Model (3)	Model (4)	Model(5)
GDP	0.091***	0.069***	0.091***	0.085***	0.062***
	(0.017)	(0.020)	(0.016)	(0.015)	(0.009)
CREDIT	-0.007	-0.001	-0.007	-0.005	0.002
	(0.004)	(0.004)	(0.004)	(0.003)	(0.002)
LAW	-0.029**	-0.015	-0.029*	-0.020	-0.007
	(0.012)	(0.013)	(0.014)	(0.015)	(0.012)
AGRI		-0.039***			-0.038***
		(0.008)			(0.005)
GOV			0.003		0.004
			(0.009)		(0.001)
UNEMPL				0.002***	0.001***
				(0.001)	(0.001)
NATRES					0.006***
					(0.001)
Constant	3.100***	3.424***	3.089***	3.145***	3.476***
	(0.165)	(0.178)	(0.115)	(0.123)	(0.098)
Obs.	91	91	91	89	89
Groups	5	5	5	5	5
R-squared	0.217	0.763	0.646	0.655	0.832

***, ** and * denote significance at 1%, 5% and 10% respectively.

errors is used. Results reveal that indicators for financial development and institutional quality are insignificant. On the other hand, the estimated coefficient for agricultural land is significantly negative at the 5% level. We re-run the analysis by substituting the control variable of government expenditure. The effect of the size and type of government spending is important in determining the relationship between income inequality and government expenditure. However, the results summarized in Table 3 demonstrate that while income per capita and the rule of law are significant, credit and government expenditure variables are not significant.

Considering the importance of assessing the impact of employment patterns on income inequality, Model 4 includes unemployment as a variable. Results clearly demonstrate that the rule of law and credit have a negative sign but are not statistically significant. While the coefficient estimate of unemployment has a positive sign, its impact is small.In the extended Model 5, which integrates natural resources (% of rent), we check for the previously tested determinants. The regression parameter indicates a significant positive relationship between the Gini coefficient and income per capita. Agricultural land is found to have a significant negative impact on income inequality. The positive effects of unemployment and natural resources suggest that they contribute to the suggested growing income disparities in the Western Balkan countries. Lastly, the obtained coefficient of the credit variable is negative, although not significant at the 5% level. Hence, its negative impact on the Gini coefficient has no significant effect. The rule of law indicator has a statistically significant and negative effect on income inequality in the Western Balkan countries in the first and third models. However, it is important to note that this finding is not consistently robust across the various models employed in this study. Moreover, the statistically significant effect of the rule of law variable in the first model need be interpreted with caution taking into consideration the random effect method of estimation applied in the first model, as well as the low level of R squared and the low goodness of fit obtained for the first model. Last but not least, in the third model the estimated coefficient of the rule of low variable is significant only at the 10% level, which seems noteworthy given the small sample size. In view of these, we conclude that improvements in financial market development and in the rule of low have not been associated with decreasing income inequalities in WB countries.

7. Discussion of Results

The findings based on the application of panel data regression in five different equations consistently reveal a positive and highly significant parameter of income per capita. Increases in economic growth underpin income inequality in the countries of the Western Balkans, indicating that economic growth plays a major role in the rise of income inequality. We find that, despite differences in specification of the estimated models, we obtain stable and consistent results when it comes to examining the relationship between economic growth and income inequality. The differences in models or methods of estimations used do not affect the sign, significance or the magnitude of the main variable of interest. This result is consistent with previous research claiming a positive relationship between economic growth and income inequality (Li and Zou 1998; Forbes 2000; Scholl and Klasen 2019). Thus, the suggested positive impact of economic growth on income inequality is in line with theoretical proposition suggesting that economic growth and income inequality go hand in hand, bringing further empirical evidence that support the proposition that income inequality is an inherent weakness of the free-market system. In other words, improvements in economic efficiency are not necessarily associated with improvements in social equity. The theoretically proposed 'trickle- down effect' of economic growth on income inequality seems loose. Essentially, the results of this research highlight the importance of structural weaknesses of the economy that underpin income disparities. Economic policy leading to more balanced growth both in terms of sectoral as well as spatial distribution seems essential for more fair and just distribution of income and wealth. This is to say that the negative impact of economic growth on income inequality is conditional. Income disparities may rise even in times of steady and persistent growth and even over long time span, as seems to be the case of Western Balkan countries. Hence, many economists posit the view that countries simply choose economic growth over fairness in view of the substantiated trade-off between equity and efficiency in the economic literature.

Effect of financial markets development on the Gini coefficient is suggested to be negative in all models. However, the obtained coefficient on this variable is not statistically significant. Similarly, the rule of law variable appears to have no mitigating effect on income inequality in Western Balkans. As noted earlier, the significant coefficient is obtained only in certain models, but this finding is not consistently robust across all models and highlights the need for further research.

Regarding control variables, agricultural land is found to have a significant negative impact on the Gini coefficient across various models, while the value of the regression parameter for government expenditure is not statistically significant. Unemployment and natural resources (% rent) significantly contribute to income disparities in the Western Balkan countries. With regard to the latter variable, the positive impact of unemployment rate on income inequality has been a priori expected. However, given the slow dynamics of employment growth in WB countries over the course of transition, the obtained result seems particularly worrying.

An important policy implication stemming from this analysis is that rising inequality is an inherent component of GDP per capita growth in the Western Balkans. Despite the acknowledged importance of financial market development and institutional framework for growth, the study did not find significant evidence suggesting that these important market and institutional developments play a role in reducing income inequalities in the region. This underscores the need for further investigation into the structural weaknesses of these economies. Understanding the underlying reasons behind the obtained statistically insignificant results is complex phenomenon and is beyond the scope of this research. It seems plausible to conclude that problems in transition countries need to be understood before we draw any conclusions pointing to the sources of income inequality growth in the Western Balkans region.

8. Conclusion

In summary, determining the factors influencing income inequality in the Western Balkan countries is a complex task, and the direction and strength of these determinants may vary depending on several factors. Regression results with Driscoll-Kraay standard errors demonstrate that income per capita increases income disparities. Based on the results obtained from different models, it can be concluded that income per capita underpins income inequality in the WB countries. This result aligns with theoretical expectations, as there is no trickle-down effect, particularly in economies characterized by high unemployment, low competitiveness, and sectoral imbalances, as is the case for most WB countries. Considering the depth and the complexity of the structural weaknesses associated with these economies as demonstrated by the previous literature reviewed in this paper, it comes as no surprise that this research finds that economic growth feeds income inequality.

Financial market development, proxied by domestic credit to the private sector by banks, has a negative sign; however, the estimated parameters are not statistically significant at the 5% level. Therefore, caution is warranted in interpreting these results, given the sample size and degrees of freedom. Contrary to prevailing literature, our analysis finds no significant impact of financial development on income inequality in these countries. This finding raises concerns as it suggests that financial instruments may not be effectively used to reduce income disparities.

The strong implication resulting from this research is that the character of up-to-date financial market developments seems ineffective, and additional and alternative financial instruments need to be developed to better serve the interests of the poor and vulnerable segments within these societies. Likewise, institutional quality may play a more prominent role in shaping income inequality in the Western Balkan countries.

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THE ROLE OF MONITORING AND EVALUATION AND PROJECT IMPLEMENTATION MANAGEMENT SYSTEM FOR NON-PROFIT PROJECT PERFORMANCE IN DEVELOPING COUNTRIES

Adnan Ovcina, Maja Arslanagic-Kalajdzic

Abstract

This study examines the relationship between monitoring and evaluation (M&E), project implementation management system (PIMS) for financial monitoring, and project performance within the framework of the resource-based view (RBV), dynamic capabilities, and knowledge management theory. It focuses on non-profit projects in a developing context, particularly in countries such as Bosnia and Herzegovina (BiH). Developmental assistance and non-profit projects have an important role to play in the economic performance of developing countries. The research highlights the significance of understanding factors influencing project performance in non-profit projects in developing countries such as BiH. The findings indicate that both M&E and PIMS for financial monitoring significantly influence three key knowledge management processes - knowledge internalization, knowledge accumulation, and knowledge transfer and integration, which in turn positively influence project performance. The study underscores the importance of synergy between M&E, PIMS, and knowledge management for enhancing project performance, offering valuable insights for policymakers, donors, the international community, and academia.

Keywords: *Monitoring & Evaluation, Project Implementation Management System, Knowledge Management, Resource Based View, Dynamic Capabilities, Structural Equation Modeling*

JEL Classification: *D83, H43, M42, L31*

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1. Introduction

According to the OECD (2023) in 2021, 185.9 billion USD was provided in the form of Official Development Assistance (ODA) to developing countries. The total sum awarded shows that development assistance is an important aspect in support of the economic performance of developing countries. The overall success of developmental projects in such countries significantly influences their socioeconomic performance (Khang Ba and Mo Lin 2008). The level of assistance to developing countries provides a compelling argument for the need to increase efficiency and effectiveness in delivering developmental aid. Monitoring and evaluation (M&E) and project implementation management

system (PIMS) are designed to address both efficiency and effectiveness in terms of delivering developmental aid.

While monitoring is interested in whether project activities are completed in accordance with the project plan, and is a management-driven tool, evaluation is used to analyze project achievement in terms of project outcomes. Evaluation is designed to show whether implemented project activities lead to the achievement of desired project outcomes. Evaluation has a much broader scope compared to monitoring and is an essential tool for strengthening organizational learning. Monitoring, on the other hand, includes two distinct aspects: (1) tracking indicators designed to measure the ability of the project to meet project deadlines and targets and (2) financial monitoring, mainly done through the project implementation management system (PIMS).

Our goal is to understand the relationship between the use of PIMS and project performance in the non-profit sector in developing countries. However, we specifically focus on the use of PIMS from the perspective of its role in financial monitoring. M&E teams usually track the implementation of project activities with the use of various tools designed for tracking purposes which are usually project specific i.e., tailor-made for the project to enable project staff to effectively track indicators designed to assess project progress. On the other hand, financial monitoring is almost exclusively done through PIMS established on an organizational level.

One concept that is closely aligned with M&E is knowledge management. Knowledge management is established at both the project and organizational level to enable both organizational and project staff to share information, know-how, and lessons learned with the aim of strengthening organizational effectiveness. Markić et al. (2022, p. 34) argue that "knowledge management in organizations has become imperative for their development and achieving the predefined organizational goals". In the dynamic and resource-constrained environment of non-profit organizations today, the integration of M&E and PIMS is not just a strategic asset but a necessity. This paper seeks to explore the multifaceted role of these systems in transforming the landscape of non-profit projects and knowledge management. Consequently, we are exploring the role of knowledge management in project performance, and we argue that M&E and PIMS for financial monitoring are key tools for obtaining inputs for organizational knowledge management systems. Knowledge management enables non-profit organizations to disseminate project knowledge vertically and horizontally, and subsequently, as we show in our paper, increase project performance.

The theoretical framework that we utilize to analyze the role of M&E in terms of project performance in a non-profit context is the resource-based view (RBV) and the closely related dynamic capabilities which are concerned with the ability of companies to "integrate, build, and reconfigure internal and external competencies to address rapidly changing environments" (Teece et al. 1997, p. 516). In our article, dynamic capabilities refer to the ability of non-profit organizations to create more effective and efficient designs relating to project interventions by utilizing data collected through M&E and PIMS for financial monitoring. Non-profit organizations are highly dependent on scarce donor resources for running their operations. Consequently, by improving the design of their project interventions through the utilization of M&E data, and incorporating lessons learned from previous project interventions, non-profit organizations can significantly improve their performance and efficiency.

Non-profit organizations typically undertake projects within intricate social settings, involving a complex network of stakeholders in the design and implementation of such projects. Most of the studies that we managed to identify are concerned with project performance in the context of for-profit organizations. Our study seeks to fill the gap in the literature by showing how the perception of M&E and the perception of the quality of PIMS for financial monitoring can improve project performance in the non-profit sector. We show that such aspects influence three knowledge management (KM) processes: (1) knowledge acquisition, (2) knowledge internalization, and (3) knowledge transfer and integration.

We focus on perception to show that the level of efficiency of M&E and PIMS for financial monitoring are highly impacted by the perception of project staff. Organizations can invest vast resources in the development of M&E and PIMS and fail to add to organizational performance. If staff do not have a positive perception of M&E and PIMS they will most likely avoid using and relying on them. As a result, staff will not provide critical input for KM systems. We argue that the quality of such systems depends on the quality of information, and M&E and PIMS are key tools for the collection of the necessary data. Consequently, these dimensions and processes are interrelated, and ultimately influence project performance.

The intended contribution of this study is threefold. First, we extend the literature on project management and KM by applying RBV theory in the non-profit

context. Second, we aim to demonstrate how the perception of M&E shapes the dynamic capabilities of non-profit organizations through the three KM processes. Finally, we aim to extend the RBV theory and dynamic capabilities framework by introducing the quality of PIMS for financial monitoring to our model and determining its relationship with the three KM processes. Ultimately, this study has important practical implications for the civil society organizations (CSOs) sector and for donors, since it illustrates the importance of developing an effective M&E system and PIMS for financial monitoring in order to support KM processes, and subsequently to increase the efficiency and effectiveness of project implementation.

2. Literature Review and Hypotheses Development

According to the United Nations Evaluation Group (2016), evaluation is described as a systematic and impartial assessment of various entities such as activities, projects, programs, strategies, policies, topics, themes, sectors, operational areas, or institutional performances. As per the PMBOK Guide (2021), the monitoring and controlling process encompasses the necessary procedures needed to monitor, review, and regulate the advancement and performance of a project. It involves identifying any areas requiring changes to the plan and instigating corresponding modifications. In terms of defining evaluation, the PMBOK Guide (2021) describes it as an event occurring at the conclusion of a phase or project. Its purpose is to assess the current status, evaluate the delivered value, and ascertain whether or not the project is prepared to advance to a subsequent phase or transition into operational stages. Crawford and Bryce (2003) characterize evaluation as a recurring assessment process aimed at facilitating learning, while monitoring is depicted as a continual collection of data and an analysis process designed for control purposes.

The development of M&E is closely related to the proliferation of the concept of audit in many different sectors and industries around the world. The objective of an audit, including M&E, is to reduce risks, ultimately benefiting principals by deterring actions on the part of agents that could diminish value (Power 1997). According to Blalock (1999) in the 90s, there were two movements that aimed to improve accountability and policies for delivering services. These were the performance management movement and the evaluation research movement, i.e. the Results-Based Monitoring (RBM) movement.

According to Kogen (2018), in 2005 and 2008, RBM became the most important framework for determining the efficiency and effectiveness of non-profit organizations, mainly because it was endorsed by the Organization for Economic Cooperation and Development (OECD). The OECD organized the Paris and Accra High-Level Forums on Aid Effectiveness in 2005 and 2008 respectively. In The Paris Declaration on Aid Effectiveness and the Accra Agenda for Action signed by 138 countries (OECD 2008, p. 1), it was stated that "aid effectiveness must increase significantly" to address concerns related to the accountability of organizations funded by the donor community to deliver services and developmental aid. Vähämäki et al. (2011) argue that RBM is endorsed by most major donors and that it has indicated that evaluation should focus on accountability.

According to Blalock (1999), performance management monitoring can help project teams track the level of compliance with government regulations or show the level of outcomes that a project has managed to achieve. However, monitoring fails to provide an overview of the net impact achieved by project intervention, i.e., the level of achievement resulting from the implementation of project activities. Blalock (1999) proposes periodic evaluations that can help project teams to capture the net impact of project interventions. Bjornholt and Larsen (2014) and Heinrich (2002) argue that evaluation results are perceived to provide valuable information to stakeholders and, when needed, evaluation findings can change donors' attitudes and behaviors toward project interventions that they are funding.

In their studies, Desouza and Evaristo (2006), Koskinen (2004), and Huang and Newell (2003) discuss negative consequences resulting from repetitive project-related errors that are mostly the result of a lack of lessons learned from previously implemented projects. M&E enables project teams to be more efficient in their work by providing lessons leading to learning, and know-how which is integrated into organizational knowledge management systems. Helfat and Peteraf (2003) show how important for the organization it is that lessons learned through M&E become part of organizational memory. Data collected through M&E enables project managers to make informed decisions, and subsequently to revise project design in response to changes in the environment in which they are operating.

In her study Rocco (2021) provides an analysis of the importance of design for the performance of for-profit companies. As outlined by Rocco (2021), strategic design empowers project managers to grasp the

broader perspective, encompassing all aspects of a complex issue, and to achieve sustainability and provide solutions for change over the long term. Inputs from M&E units enable projects to achieve higher levels of performance in a two-fold manner: a) in the process of the design of intervention by providing key inputs from lessons learned and b) in the process of project implementation by enabling project managers to have a clear overview of achieved level vs. desired level of progress, and to steer the direction of project implementation to enable the achievement of the project goal.

In the scope of the RBV theoretical framework, organizational financial and non-financial resources are considered to significantly contribute to organizational competitive advantage (Barnett et al. 1994). Organizational knowledge is recognized as the most valuable non-tangible resource. According to Barney (1986) and Peteraf (1993), companies have two types of resources at their disposal: dynamic and static. Static resources are those that have expiration dates and can be used for a fixed period, while dynamic resources such as organizational learning exist in terms of organizational capabilities and are able to be utilized in such a way as to create new opportunities over time (Lockett et al. 2009).

Itami (1987) emphasized that although tangible assets such as financial capital, machines, and buildings are necessary for organizational operations, intangible assets such as organizational culture, human capital, knowledge, reputation, and management skills are the key source of the organization's competitive success. However, even though organizations can produce knowledge, it is their learning capability that determines the impact of such generated knowledge on overall organizational effectiveness. Cohen and Levinthal (1990) consider learning capability from the perspective of organizational procedures that positively impact organizational performance through the generation of competitive advantage over competitors. As per the RBV, organizations possessing distinctive resources such as organizational knowledge gain a competitive edge over rivals, rendering them more resilient to fluctuations and capable of achieving heightened effectiveness in their overall performance (Almarri and Gardiner 2014; Lin and Wu 2014). CSOs involved in developmental, humanitarian, and aid projects are knowledge-intensive organizations, hence organizational learning can significantly boost their performance in delivering quality services. In the context of the RBV, organizational knowledge can be a key determinant of organizational competitiveness if it is effectively leveraged.

Markić et al. (2022) describe human resources and technology as being key segments of effective knowledge management system, and in our paper, in the context of non-profit organizations, we add M&E as the most important tool for the collection of inputs that are fed into such knowledge management systems. According to Preskill and Torres (1999) and Torres and Preskill (2002), for quite a while after the field became widespread among scholars and others, M&E wasn't seen as being related to organizational learning. Oswald and Taylor (2010) argue that the development of the concept of evaluative inquiry has influenced the change in the understanding of the role of M&E. Arthur et al. (2001) argue that two main measures of project success are project performance and project learning. Choundry (2013) argues that knowledge is one of the most important segments of projects implemented by non-profit organizations.

Through the lens of the RBV, M&E serves as tools that a firm can use to pinpoint key organizational resources and capabilities, as well as to evaluate organizational strengths and weaknesses. M&E empowers CSOs to monitor the performance of project teams, thereby identifying consistently high-performing team members and units, as well as pinpointing areas for improvement in terms of processes, procedures, or units to enhance project performance and effectiveness. Moreover, M&E enables project managers to make well-informed decisions concerning resource allocation, and for prioritizing support for project components that require enhancement. Knowledge gained through M&E in the form of know-how and lessons learned can be utilized to reconfigure organizational resources in a way that enables a higher level of efficiency in project performance. The positive effect of KM on organizational performance is confirmed by Markić et al. (2022). Walsh and Lannon (2020) assert that international non-governmental organizations (INGOs) conducting projects in developing countries such as BiH play a crucial role in knowledge creation and sharing. They serve as intermediaries between donors and local actors, highlighting the significance of knowledge generation.

Understanding the project-oriented nature of non-profit organizations and their reliance on donor funding is crucial before analyzing them through the RBV framework. Unlike for-profit entities that can showcase financial data to potential investors, non-profits must articulate to donors how their project interventions address intricate social issues. To present their interventions effectively, project teams must demonstrate their past engagement in addressing such issues, provide comprehensive information

about target communities, showcase organizational capacities to deliver services within budgetary constraints, outline plans for sustaining project outcomes post-implementation, and illustrate broad stakeholder support. To demonstrate their past behavior effectively, non-profit organizations must be able to effectively utilize their KM system.

For organizations to effectively utilize lessons learned and knowledge acquired through M&E, it is critical that both project and organizational staff have a positive perception of M&E. Insights and expertise are gathered from organizational staff, and if they harbor negative views towards M&E, they are less likely to willingly share information that forms a crucial aspect of lessons learned and expertise. Given that M&E alongside PIMS for financial monitoring serve as pivotal tools for KM, the inability of M&E to gather high-quality information from project staff will consequently lead to a limited quality of knowledge products produced through organizational KM systems. Therefore, we hypothesize:

H1: Perception of M&E is positively related to knowledge accumulation (KA).

H2: Perception of M&E is positively related to knowledge internalization (KI).

PIMS is part of the IT solutions existing on the organizational and project level. Turulja and Bajgoric (2018) discuss how IT is the driver of all changes that are taking place in businesses around the world in the digital era, while knowledge and human resources are regarded as key factors driving the competitive advantage of companies in complex business environments. IT organizational solutions are the most important tools for the effective implementation of KM because they enable effective creation, digitalization, and the dissemination of knowledge across the organization (Wang et al. 2007).

Information technology is an organizational resource that contributes to sustainable competitive advantage through its interaction with other resources (Smith et al. 1996, p. 48). Seleim and Khalil (2007) argue that IT is a key enabler of KM processes, and that IT technologies through KM enhance organizational performance. To show how KM and IT are dependent on each other, Pérez-López and Alegre (2012) argue that companies are not faced with the dilemma of whether to utilize IT for the development of KM, but rather how to utilize it. For example, Lee and Choi (2003) show how IT solutions offer virtual spaces to organizations, and subsequently enable a higher level of interaction between project staff. IT collaboration platforms such as Zoom, MS Teams, etc., have enabled non-profit organizations to continue the implementation of their project activities during the COVID-19 outbreak by providing them with the tool to interact with project beneficiaries and project stakeholders.

According to RBV, organizational performance depends on organizational resources, particularly dynamic resources such as organizational knowledge. According to Smith et al. (1996), the effect of organizational resources when combined should be higher than the effect of each individual resource when it comes to adding to the competitive advantage of the company. IT enables organizations to identify resources that can be combined in such a way as to increase the competitive advantage of the company. Cerchione and Esposito (2017) argue that effective IT solutions at the organizational level are the most important factor for the development of an effective KM system.

Lee et al. (2005) argue that KM systems are a subset of information systems used to facilitate knowledge management processes on the organizational level. KM organizational systems include the internet, intranet, data warehouses, organizational software solutions, etc. (Lee et al. 2005). The indirect effect of IT on KM results from digital tools that are not designed to support KM systems. However, data collected through them can be transformed into organizational knowledge products. Likewise, akin to M&E, the effectiveness of PIMS for financial monitoring on project performance relies on how the end users perceive the overall quality of PIMS outputs and their comfort level while interacting with the system. Should the PIMS system be overly complex, or if its outputs are perceived as lacking in quality by organizational staff, it is conceivable that they may exhibit a tendency to avoid using it. This, in turn, may restrict the quality of information integrated into the KM system in subsequent stages. Considering that in our model we are exploring the role of PIMS in project performance from the perspective of financial monitoring, we hypothesize:

H3: Perceived quality of PIMS for financial monitoring is positively related to knowledge accumulation (KA).

H4: Perceived quality of PIMS for financial monitoring is positively related to knowledge internalization (KI).

Resources essentially refer to the available assets, whether tangible or intangible, possessed or controlled by companies and organizations, while capabilities denote the ability of such companies or organizations to utilize these resources through organizational processes in such a way as to achieve a specific objective (Amit and Schoemaker 1993). Smith et al. (1996)

suggest that since both organizational learning and resource-based theory aim to establish and maintain competitive advantage, it is reasonable to recognize organizational learning as a strategic resource within the RBV. Non-profit organizations, particularly bigger ones, are knowledge-intensive organizations, hence organizational learning can significantly improve their project performance. Arya and Lin (2007) contend that for non-profit organizations to thrive, they need to cultivate capabilities and competencies not only for providing services, but also for securing funding.

Dynamic environments and challenges emerging in volatile times have led many organizations to realize that they must use their knowledge base to sustain their competitive advantage and to increase their organizational performance (Valaei et al. 2017). Aralica et al. (2018) show that higher level institutional capacities have a positive impact on performance in the case of for-profit companies, and the same argument can be applied to non-profit organizations. More importantly, Aralica et al. (2018) argue that countries such as BiH, while transitioning from a planned to a market economy, are characterized by weak institutions. To cope with pressure arising from such a situation, non-profit organizations must rely on their internal capacities and generate new knowledge. De Bem Machado et al. (2022) argue that for organizations to deal with dynamic changes it is of the utmost importance that they generate new knowledge. Grant (1996) contends that knowledge constitutes a critical asset for organizations, highlighting its primary function in incorporating the specialized knowledge possessed by individuals into the development of goods and services. Arik (2016) argues that organizations that possess the ability to share the right information with the right people at the right time, can create and sustain a competitive advantage over their competitors.

For-profit companies and non-profit organizations need to possess high levels of learning capability to be able to utilize their organizational knowledge as source of competitive advantage. Learning capability can be perceived as the ability of organizations to utilize their learning mechanism to absorb external information as well as resources (Lin and Wu 2014). If organizations have low levels of learning capability, they will not be able to utilize their KM systems to improve organizational performance. By capturing and disseminating knowledge, non-profit organizations are enabling continuous organizational learning and development, which is the highest level of project management maturity (Todorović et al. 2015).

According to Liao and Chi-chuan (2009), KM processes include knowledge accumulation, knowledge internalization (i.e., knowledge conversion), and knowledge application. As stated by Jimenez-Jimenez and Sanz-Valle (2013), knowledge accumulation refers to the procedure by which a company acquires new information and knowledge. Liao and Chi-chuan (2009) consider knowledge accumulation to be the process of actively seeking and acquiring new knowledge or generating novel insights from existing knowledge through collaborative efforts on the part of individuals and business partners. Both definitions point to the generation of new knowledge as a key segment of the process of knowledge accumulation. Following definitions from Liao and Chi-chuan (2009) and Jimenez-Jimenez and Sanz-Valle (2013) we hypothesize:

H5: Knowledge accumulation (KA) is positively related to knowledge transfer and integration (KTI).

Lee et al. (2005) describe the process of knowledge internalization as the process that can occur in situations when an individual staff member discovers relevant knowledge, obtains it, and then finally applies it when performing a job task. Internalization, as described by Lee et al. (2005), may lead to the generation of new knowledge; consequently, KA and KI are intertwined processes. In the scope of our research, we offer the following hypothesis:

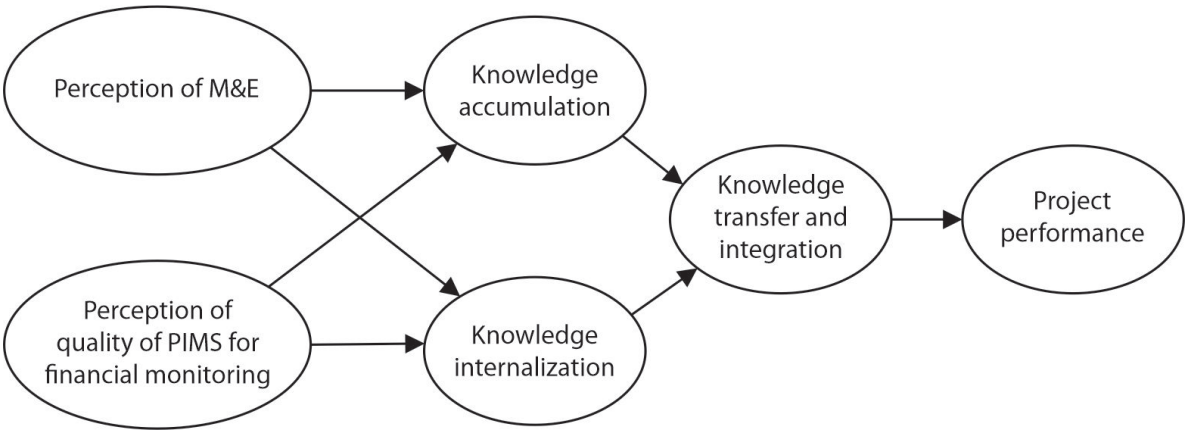
H6: Knowledge internalization (KI) is positively related to knowledge transfer and integration (KTI).

Accumulated and internalized organizational knowledge can only increase organizational performance if organizations are able to transfer and integrate knowledge across the organization. Without the ability to transfer and integrate organization knowledge, a KM system will have limited influence on organization performance. In the scope of our research, we hypothesize:

H7: Knowledge transfer and integration (KTI) is positively related to project performance.

The conceptual framework of our research is outlined in Figure 1 below. As can be seen we do not hypothesize the direct influence of positive perception of M&E and the perception of quality of PIMS for financial monitoring on project performance. We consider M&E and PIMS for financial monitoring as key tools of the organizational KM system. The KM process of knowledge transfer and integration is considered to have a direct influence on project performance. It is this which we consider to be a novel approach to the analysis of project performance in a non-profit context.

Figure 1: Conceptual framework of this study



3. Methodology

To empirically test the conceptual framework presented in the previous section, we conducted a quantitative study focusing on CSOs that were or are currently implementing projects in Bosnia and Herzegovina. BiH represents a relevant context for this study, since it is a developing country where multiple donors and aid organizations are operating with the aim to support the country in developing its capacities related to migration management, economic development, EU integration, etc. BiH is a country that has a very complex administrative setting, and CSOs are stepping in to provide assistance and expertise to government on all administrative levels. There are many active international and local CSOs that are implementing various projects, all with the aim of supporting BiH in developing its capacities and increasing the economic performance of the country.

We developed a database of organizations, based on the register of civil society associations and foundations developed and maintained by the BiH Ministry of Justice, in cooperation with the European Union (BiH Ministry of Justice n.d.). We filtered out all CSOs from the register for which we were unable to find an official website. For the remaining CSOs, we relied on input from CSO experts who had been actively working in the CSO sector for a minimum of ten years. We obtained information from them to determine whether the CSO from the list is implementing a humanitarian, developmental, or aid project, or if it had been established for a different purpose. The result was the list of 90 CSOs. For all these CSOs, we collected contact information (i.e. email addresses) from their web pages, or by reaching out over the phone and asking for a contact email to which we could send an online survey. Out of the 90 CSOs, we received 104 filled questionaries from 40 different organizations, a response rate of 44%.

Survey questions were developed as 7-point Likert scale questions. In the survey, there was a question - *Do any of the projects you were working on or the project you are currently working on have an M&E component and project management information system established on the project or organizational level?* If the respondent answered with 'No', he or she was redirected to the end of the survey.

Items used for measuring the perception of M&E were adapted from Bettabia et al. (2016). Bettabia and colleagues developed a scale for the analysis of audit committee diligence. As M&E units in CSOs play a similar role to internal audit units in for-profit companies, we decided to use items developed by Bettabia et al. (2016) and contextualize them for the needs of this study. To measure the quality of PIMS for financial monitoring we adapted a scale for measuring user acceptance of information systems (Davis 1989). For measuring knowledge accumulation, knowledge internalization, and knowledge transfer and integration we used a scale developed by Lee et al. (2005). Finally, for measuring project performance we used subjective performance indicators, through items adapted from a scale developed by Raymond and Bergeron (2008).

4. Results

The first step of the quantitative analysis was the assessment of the validity and reliability of the measures used. To do this, Confirmatory Factor Analysis (CFA) was conducted (Anderson and Gerbing 1988),

Table 1. Overview of the model results

Construct	Items	λ	AVE	CR
Perception of M&E	M&E team responds to identified risks and performs risk-based analysis	0.65	0.551	0.861
	M&E team instills trust and credibility	0.69		
	M&E findings and recommendations for improvement are practical	0.78		
	M&E team is providing quality internal reports	0.90		
	Findings, reports, and communication lead to a decrease in information asymmetry between the project and organization management	0.67		
Perception of quality of PIMS for financial monitoring	Using information system in my job enables me to monitor budget expenditures easily	0.95	0.870	0.963
	Using information system is improving my job performance by enabling me to monitor budget expenditures easily	0.98		
	Using information systems is enhancing my effectiveness on the job by enabling me to monitor budget expenditures easily	0.97		
	I find project management information systems for financial monitoring to be useful in my job	0.81		
Knowledge accumulation	I consult organizational or project databases before processing project tasks	0.82	0.656	0.852
	I extensively search through project and organizational databases to obtain the knowledge necessary for the tasks	0.85		
	I am able to systematically administer knowledge necessary for the tasks and store it for further organizational and project usage	0.74		
Knowledge internalization	Professional knowledge such as knowledge about beneficiaries and demand forecasting is managed systematically	0.74	0.704	0.873
	Employees are given educational opportunities to improve their adaptability to project tasks.	0.90		
	Organization-wide knowledge and information are updated regularly and maintained well	0.85		
Knowledge Transfer and Integration	Errors and failures are always discussed and analyzed on the project level.	0.81	0.675	0.859
	The project has a feedback mechanism that enables employees to share new ideas, and insights relevant for the project	0.88		
	The project has instruments (manuals, databases, etc.) that enable efficient digitalization of existing knowledge and lessons learned	0.75		
Project performance	This project is able to achieve outputs within agreed deadlines	0.96	0.836	0.937
	This project is able to achieve outputs within planned budget resources	0.86		
	This project is able to achieve targets in line with agreed project deadlines	0.92		
Model fit: $\chi^2 = 258.180$; df = 174; RMSEA = 0.068; CFI = 0.953 ; TLI = 0.944 ; NNFI = 0.944; SRMR = 0.059;				

Notes: λ = standardized loadings; CR = Composite Reliability; All loadings are significant;

by using the lavaan package in R. Table 1 outlines standardized item loadings, the Average Variance Extracted (AVE) and the Composite Reliability index (CR). In the presented CFA solution, all loadings were significant and larger than 0.65, all variances extracted for latent constructs were higher than 50% (0.5) and the composite reliability indices were 0.85 and higher, which is acceptable according to Hair et al. (2019). The model fit for this CFA was good ($\chi2 = 258.180$; df = 174; RMSEA = 0.068; CFI = 0.954; TLI = 0.944; NNFI = 0.944; SRMR = 0.059) hence the solution was acceptable.

Composite reliability values were calculated by using the semTools package from R. For the calculation of Composite Reliability, semTools uses three different formulas, but in the table above we use only values calculated by utilizing the formula developed

Table 2. Discriminant validity

#	Construct	1	2	3	4	5	6
1	Perception of M&E	**0.742**					
2	Perception of quality of PIMS for fin. monitoring	0.379***	**0.932**				
3	Knowledge Acquisition	0.562***	0.419***	**0.810**			
4	Knowledge Internalization	0.606***	0.282**	0.342***	**0.839**		
5	Knowledge Transfer and Integration	0.616***	0.361***	0.208**	0.824***	**0.822**	
6	Project performance	0.563***	0.123	0.205**	0.556***	0.680***	**0.914**

Notes: Square-root AVEs are on the diagonal in bold; Correlations are below the diagonal; ** - $p < 0.05$; *** - $p < 0.001$

by Green and Yang (2009). We proceed with the assessment of discriminant validity (Fornell and Larcker 1981) by assessing and comparing correlations between latent variables (see Table 2).

We observe that almost all correlations are low to medium, apart from the correlation between KI and KTI which is 0.824. This correlation, although high, is deemed acceptable due to the fact that those are the two dimensions of knowledge management. In this regard, discriminant validity is achieved in all cases apart from the one noted previously. As shown in Table 2, the square-root Average Variance Extracted (AVE) values are higher than the correlations in all cases, except for the two mentioned dimensions of knowledge management. However, even in these cases, the difference is marginal (0.01 and 0.02). Consequently, we proceeded with the analysis.

After assessing the validity and reliability, we proceeded to the next step – assessment of the structural model. This step further represents a test for the hypotheses posed. Model findings are reported in Table 3 below. A path diagram (see Figure 2) was produced using the lavaan package lavaanPlot function.

The model results show that the perception of M&E is positively related to KA ($\beta = 0.46$, $p < .001$). Hence, the model indicates that Hypothesis 1 is supported. The model shows that the perception of M&E is also positively influencing on KI with $\beta = 0.61$, $p < .001$. Consequently, the model indicates that Hypothesis 2 is confirmed.

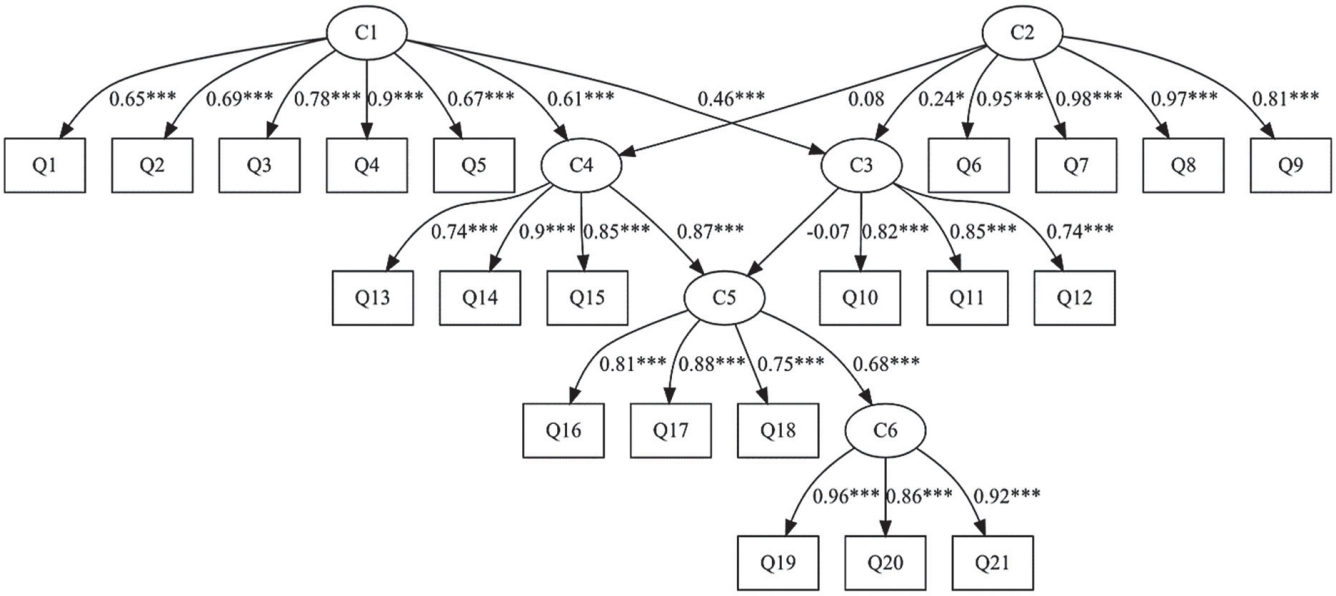
The quality of the project implementation management system for financial monitoring has a positive influence on KA, with $\beta = 0.24$, $p = 0.016$. Consequently, the model indicates that Hypothesis 3 is also supported. The model results show that if staff do not perceive PIMS as being of high quality that can help them to be more efficient in financial management, they will be reluctant to utilize it in their everyday work.

Table 3. Model results

Relationship	β	p-value
Perception of M&E is positively related to KA	0.46	< 0.001
Perception of M&E is positively related to KI	0.61	< 0.001
Quality of PIMS for financial monitoring is positively related to KA	0.24	0.016
Quality of PIMS for financial monitoring is positively related to KI	0.08	0.383
Knowledge accumulation (KA) is positively related to Knowledge transfer and integration (KTI)	-0.07	0.410
Knowledge internalization (KI) is positively related to Knowledge transfer and integration (KTI)	0.87	< 0.001
Knowledge transfer and integration (KTI) is positively related to project performance	0.68	< 0.001

Model fit: $\chi^2 = 279.226$; df = 181; RMSEA = 0.072 ; CFI = 0.946 ; NNFI = 0.937; SRMR = 0.073;

Figure 2: Path diagram



Notes: *** - p < 0.001, ** - p < 0.01, * - p < 0.05

According to the model results, the quality of PIMS for financial monitoring is not significantly related to KI ($\beta = 0.08$, $p = 0.383$). PIMS for financial monitoring is an organizational tool utilized by a limited number of staff responsible for financial management and project management. Consequently, this is probably the reason why the model shows statistically insignificant results. As a result, the model indicates that Hypothesis 4 is not supported.

The model results show that KA does not have a statistically significant influence on KTI with ($\beta = -0.07$, $p = 0.410$). The KTI process takes place after the internalization of acquired knowledge and its convergence into the existing knowledge base. Only when knowledge is converged does the process of knowledge transfer and integration start. This is probably the main reason why KA does not have a statistically significant influence on KTI. Hence, the model indicates that Hypothesis 5 is not supported. KI has a statistically significant positive influence on the process of KTI with $\beta = 0.87$, $p < .001$. Hence, the model indicates that Hypothesis 6 is supported. Finally, KTI has a statistically significant positive influence on project performance with $\beta = 0.68$, $p < .001$. Consequently, the model indicates that Hypothesis 7 is supported.

5. Discussion and Conclusions

The purpose of this study was to demonstrate how the perception of M&E and PIMS for financial monitoring can improve project performance in the non-profit sector, by utilizing the RBV and dynamic capabilities framework, as well as knowledge management theory. It is important to highlight that the research findings are limited to developing countries such as Bosnia and Herzegovina, which are distinguished by their aspirations to join the EU, a thriving civil society sector, and a notable presence of international organizations and donors. We argue that the functioning of the civil society sector is greatly influenced by the specific context of the country in which it operates.

We contribute to the broad literature of project management in the non-profit sector by showing that RBV provides excellent tools for the analysis of project and organizational performance in the context of non-profit organizations. RBV posits that organizational performance depends on the level of resources that organizations possess. Knowledge is perceived as a resource that can significantly increase the dynamic capabilities of organizations and enable them to cope with rising pressures emerging from dynamic changes in the environments in which they operate. Dynamic capabilities perceive knowledge as a resource that enables organizations to sustain or increase their competitive advantage in volatile times.

Our study extends RBV theory by showing that M&E is the main tool available to non-profit organizations to generate knowledge. The perception of M&E is positively related to how non-profits acquire knowledge as well as to how they internalize it. Knowledge is a strategic organizational resource mainly due to its heterogeneity and uniqueness. As Markić et al. (2022, p. 35) argue, the economic value of knowledge "directly depends on the time of its appearance and is most valuable when it is inaccessible to others." Furthermore, Markić et al. (2022) argue that organizations should strive to prevent their competitors from being able to copy their knowledge management to achieve long-term benefits. Knowledge is a unique organizational resource, and this is why many authors argue that knowledge is one of the most important strategic organizational resources.

Furthermore, we extend the RBV theory and dynamic capabilities framework by introducing the quality of PIMS for financial monitoring in the context of knowledge management processes. Namely, PIMS for financial monitoring provides a relevant tool for knowledge management systems without which knowledge management processes could not be implemented. This is what we demonstrate by proving that the quality of PIMS is positively related to knowledge acquisition. However, interestingly, we fail to confirm the relationship between the quality of PIMS for financial monitoring and knowledge internalization. This opens an avenue for further discussions and research, since it is necessary to understand why this tool does not translate into internalization. In the case of the BiH CSOs and the context of the present study, we can argue that the extent of the usage of PIMS, and the acceptance of information systems by project managers may be the key answer to why project managers and employees still do not internalize it.

Ultimately, this study has important practical implications for the CSO sector and for donors since it illustrates the importance of developing effective M&E system and PIMS for financial monitoring with the purpose of supporting KM processes and subsequently increasing efficiency and effectiveness with regard to project implementation. That is, it indicates to donors the necessity of emphasizing the significance of M&E and PIMS in project implementation. Furthermore, it involves educating CSO representatives with regard to comprehending M&E, fostering their perception of it, offering examples demonstrating the effectiveness of PIMS utilization, and disseminating knowledge about existing IT tools designed to streamline project management. This is of great interest to donors since we show in our study that those aspects not only improve the knowledge management processes of CSOs and hence develop CSOs further, but also contribute to improved project performance, which is the ultimate goal of all stakeholders. Project managers and employees of CSOs in the context of developing countries need to change their position and understanding of M&E and PIMS processes, since this study shows that those processes act as enablers of knowledge management dimensions and processes.

This study is not without its limitations. First, the sample used in the study is limited in size due to the prerequisites that organizations need to have M&E departments and PIMS. This immediately makes the sampling processes a matter of convenience rather than of randomization, as most of the data were collected from high-profile non-profit organizations that have M&E departments and PIMS. Hair et al. (2019) shows that for the normality of data, the sample size is very important, i.e. the larger the sample the less we need to be concerned about normality distributions in our variables. The sample size for our research consisted of 104 completed surveys which can be considered a small sample considering the number of items used in our model. Consequently, this limits the generalizability of our research findings. Only high-profile non-profit organizations were targeted as they have the financial resources needed for M&E units and the development and maintenance of PIMS compared to smaller non-profit organizations. However, as the main research goal is to analyze the role of M&E in project performance it was a rational decision to target only organizations that have M&E units and PIMS.

Future research could explore the mediation effect between positive perceptions of M&E and KM processes, and quality of PIMS for financial monitoring and KM processes. Furthermore, future research could also distinguish between project performance and performance of project management in their model to check the influence of positive perceptions of M&E and PIMS for financial monitoring on both separately. The country context is also very important, and future research could be implemented in countries with similar levels of development to that of BiH with its vibrant non-profit sector, to explore the generalizability of the proposed model, that is, if positive perception of M&E and KM processes, and quality of PIMS for financial monitoring and KM processes will have same influence on project performance in countries with different administrative settings.

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GENDER ENTREPRENEURIAL BEHAVIOUR: A SSLR (SEMI-SYSTEMATIC LITERATURE REVIEW) APPROACH

Leonita Mazrekaj

Abstract

Gender-related entrepreneurship research remains essential for analyzing various socioeconomic, cultural, and socio-family abstractions of human capital that are distinct to gender. This study provides a comprehensive review of the literature about the theoretical foundations, results, assessment, and research that considers specifically composition of human capital as a moderator in the structure of gender entrepreneurial behavior. In this review study course, the SSLR (Semi-Systematic Research Review) approach is utilized to develop future research outlines. The key findings state that studies on female entrepreneurs that concentrate specifically on education and perceived abilities have a number of shortcomings. This includes failing to grasp the importance of simultaneously addressing individual and country-level indicators, as well as structural, historical, and cultural variables. The findings thus reinforce the importance of viewing the structure of female entrepreneurs as part of a holistic interdependent system, highlighting how the interaction of factors at various levels shapes identities, career choices, and perceptions of entrepreneurial opportunities and constraints. Finally, findings indicated that there is a need for a new approach to gender and economic inclusion methods, such as life histories, longitudinal empirical analysis, narrative analysis, approaches with in-depth interviews, or discourse analyses. At the end an agenda for future research is developed based on the review, with implications for entrepreneurship educational attainment and perceived abilities being highlighted.

JEL Classification: *M21, D91, E71, F01, I21, J01, J16, J24*

Keywords: *Gender entrepreneurial behavior, human capital, semi-systematic literature review (SSLR), individual perceptual and macroeconomic indicators, gender research*

1. Introduction

One of the biggest obstacles impeding women's development in society and economic growth is the gender gap in entrepreneurship. This issue has sparked much debate but has failed to capture the attention of policymakers around the world. Women are perceived as being different in the context of the gender gap, particularly when it comes to business-related matters (Sullivan et al. 2003). As they point out, this perception lies with the assumption that they don't satisfy the requirements for having a sufficient level of training or job experience, that they lack prior entrepreneurial

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experience, and that their major responsibilities are more closely tied to those of their families and homes. Overall, women's self-perceived abilities are often lower than men's when it comes to entrepreneurial behavior, as illustrated by the recent study conducted by Jennings et al. (2022). Thus, the goal of this study is to provide research evidence on educational attainment and economic development level, to see if they have a mediating influence that might increase women's self-perceived abilities and, in turn, increase their degree of involvement in entrepreneurial activities. Further, women are already at a disadvantage because of the significant gender inequalities in educational achievement that persist for postsecondary education and the wide variances that exist between nations (Evans et al. 2021). In this regard, as far as current research is concerned, no particular studies have been conducted in the context of literature reviews that particularly address the human capital composition as a mediator of gender entrepreneurial behavior. Overall, it is thought that women are less likely than men to be motivated to participate in the business activities under consideration because they believe they are less risk-takers, have fewer entrepreneurship skills, and are less likely to engage in high-growth businesses (Elam et. al 2021). But as research has demonstrated, many of these judgments are founded on dubious cultural and societal assumptions (Alonso et.al 2019), and it is still vital to consider how institutional regulations in a particular nation affect gender-related economic operations (Shane 2009). As a result, the discernible distinctions shown by the multiple-level lenses reveal fundamental variations in the motives and objectives of each gender as well as their entrepreneurial actions, however mostly rely on work-family conflict (Thébaud 2015).

Consequently, as entrepreneurship is essential to economic advancement and is a generator of innovation and knowledge (Schumpeter 1934), it is imperative to look into ways to support female entrepreneurs to the fullest extent possible. It is evident that research on gender and entrepreneurship has advanced to some degree, contributing to a better understanding of all the aspects that account for the obstacles and challenges women face when pursuing an entrepreneurial career. However, little attention is paid to the individual level of self-perceived abilities in conjunction with educational attainment and their nation's economic development. Further, there is a lack of use of various techniques, approaches, and research in multidisciplinary contexts, which could provide a more comprehensive picture and identify more reflective issues that need to be addressed (Zahra and Wright 2014). There are some studies explaining the low rate of women entrepreneurs associated with a greater fear of failure, little confidence in their skills, and perception of poor support from social networks (Dawson and Henley 2012). However, there hasn't been much research on how to combine micro- and macro-level factors (using quantitative and qualitative methodologies), which have a significant impact on how well women perform in entrepreneurship. As a result, the contribution of this paper is to provide a review of the study on researchers' scant attention, which can have a significant influence on the streams of gender research that are now in existence, reflect on them, and create a framework for further gender study investigations. Baker et al. (1997) have argued that academic groups have been ignoring contextual female entrepreneurship for years because of androcentrism, which presumes that the male-centred business model is the standard model or method of conducting business.

Additionally, a lot of other authors—including Mason and Brown (2017)—are emphasising how important it is to comprehend gender as a multilayer system. This array of perspectives includes roles and identities (attitudes, perceived skills, and their distribution in human capital) at the micro level as well as social norms and cultural beliefs. It also includes distributions of resources (stage of economic development, policy support, access to education, etc.) at the macro level, behavioral patterns at the interactional level, and social norms and cultural beliefs (Elam et.al 2019). Regarding the study of female entrepreneurs, there is also a misguided methodology. In a meta-analysis of "gender entrepreneurship," for instance, Sullivan and Meek (2012) and De Bruin et al. (2007) demonstrate a general individualistic approach to the study of self-employed or female business owners. They highlight how, despite the recognition of institutional and cultural impediments, the majority of research recommendations propose that women as a class must "fix" themselves in order to overcome these obstacles and avoid bias in the environment. In this vein, if we consider the case of some south east European countries (i.e. Albania, Kosovo, and North Macedonia), as postulated by V. Ramadani et al. (2015), barriers that primarily hinder the female entrepreneurial engagement in this region are due to: a lack of confidence, the ability to balance work and family obligations, inadequate training, and poor network quality, and this situation is typically apparent in most developing countries. In light of these contradictions and divergences in gender entrepreneurial behaviour, this study tries to synthesise and uncover this particular aspect from a recent slew of gender entrepreneurial studies using an SSLR technique. This literature review aims to address

the following research questions:

a) What is the research stream on gender gap in entrepreneurship?
b) What are key clusters explaining the interlinkage of human capital composition (i.e. educational attainment and self-perceived abilities) which moderates the structure of gender gap in entrepreneurial behaviour?
c) What are the key micro and macro indicators influencing gender gap in entrepreneurial behaviour?

The rest of the paper is organized as follows: a) description of the methodology, b) evidence of a research stream on gender gaps in entrepreneurship; c) clusters explaining the sequence of multidimensional indicators in gender entrepreneurial behaviour-implication of human capital composition; d) A Matrix of Synthesis Studies on the Gender Gap in Entrepreneurial Behavior- Macro – and Micro Indicators

2. Methodology

The SSLR approach (semi-systematic literature review), which is employed in this review study course, seeks to recognise and comprehend all conceivably pertinent study contexts and mindsets that may have an impact on gender-related entrepreneurial behaviours through the use of meta-narrative explanations. Wong et al. (2013) assert that understanding the real stream of the study area is a crucial element from which various theoretical frameworks and conceptual model-building may be formed. It employs data from the Scopus Bibliometrics Source from 1956 to 2021 (together with data from other registry sources) to precisely illustrate the results, which are further supported by statistical graphs for in-depth visualization. The Scopus data source is particularly valuable for performing research review research since the data may be extracted using a matrix of exact criteria based on previous accepted theories. There are two stages to the selection of the core literature used in this paper.

The first stage comprises generic research using the Boolean Connector with the keyword "gender entrepreneurship," which led to n = 2545 papers on this research subject surfacing, but only in the Scopus database (not including other register sources). It is important to empathize that in this process, instead of concentrating solely on the papers that were ultimately chosen for in-depth analysis (i.e. focus on the human capital composition, taken in this paper: educational attainment and perceived abilities), the analysis first reflects the findings of all the papers that were initially screened based on initial keywords in order to provide a general analysis of the focus on gender in entrepreneurship. Further, using the exclusion automation tool, several records that were marked as ineligible throughout the selection process at the subject, source, and document type levels emerged. The records outside of an economic context were requested to be removed based on those criteria, leaving only the set of journals linked to gender entrepreneurship, totaling 879 articles. With the exception of the emphasis on the most cited and high impact articles, other register ratings followed the same pattern (i.e., Google Scholar).

The second stage, to narrow the search field with the focus on topical research with core specifications, using Boolean Connector for main keywords (i.e., ABS-Title-KEY), (i.e., gender entrepreneurship, gender gap, human capital, perceived capabilities, culture, institutions, and economic development), is further included. This process included analysis of the articles that explicitly relate to educational attainment along with perceived abilities and its interlinkage to gender entrepreneurship research. The saturation process, where no recent pertinent material has been found in the study of the articles, is another criterion in use. By reviewing each abstract and removing any that were obviously not about female entrepreneurs, with a concentration on the human capital area, the irrelevant articles were identified and excluded. Such a stream produced n = 58 items for examination, representing the literature that was most semantically rich. The method for choosing the core literature is provided in full in Table 1.

Besides, using the two-stage approach to make as clear as possible the selection of core papers, the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) method's rules are also adhered to in order to reduce the subjective component and any attribution errors. (Liberati et al. 2009). The PRISMA process provides a clear picture of the semi-systematic approach, (see checklist) which is widely used to improve the transparency in systematic reviews. An evidence-based minimum set of elements for reporting in systematic reviews and meta-analyses is provided by this methodology. The diagram flow (Figure 1) shows a process where all articles pass through a filter, and at the end it provides the total amount of semantic literature that has been included for critical analysis It is critical to emphasize, however that the limitations of this approach, may rely on not considering other databases and other register sources available outside the Scopus area.

Given the volume of material, it would be impossible to cover all of it in a single paper. For future

Table1. The 2-Stage process of final Inclusion criteria

Stage I	**Criteria for Literature Exclusion and Inclusion**
Year	– 1956-2021
Author	– All
Subject area	– Business, Management and Accounting – Economics, Econometrics and Finance – Social Sciences – Decision Sciences – Psychology
Document Type	– Article – Review
Source Title	– All journal that had at least one articles published in the field of gender and entrepreneurship
Open Access	– Only open access Articles
Stage II	**Criteria for Literature Exclusion and Inclusion**
Boolean connector - Main Keyword (ABS-TITLE-KEY)	– Gender entrepreneurship, Gender Gap, Human capital, Perceived capabilities Culture, Institutions, economic development
Not explicitly related to gender entrepreneurship research	– Only papers that were subject to studying gender entrepreneurship with focus on the keywords provided
Saturation process	– i.e., if the same finding has been repeated across many studies
Other Register Source Scopus Source	– Google scholar (m ost cited, and high impact articles related to gender entrepreneurship studies (n=24, selected), Organizational Reports i.e. GEM, WB, OECD, European Union (n=4), total n = 28 – Scopus (n=30)
Total articles from Scopus and other register sources, included for detailed analysis:	– n = 58

Source: Authors elaboration

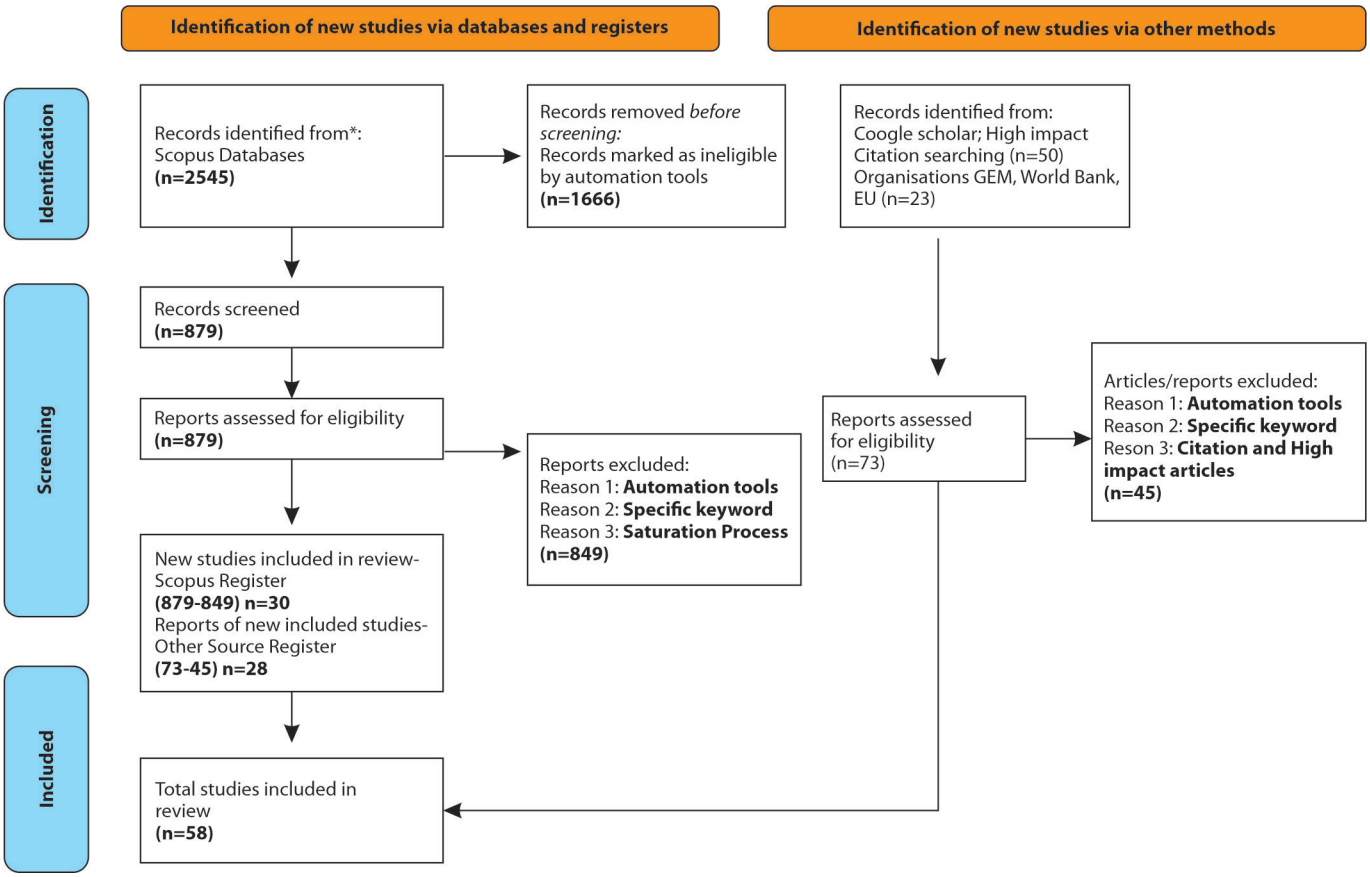
enriching the literature, in order to compound and highlight the gaps where more study is required, it might be crucial to leverage different databases to broaden the body of literature and draw attention to the variations and similarities within the literature review stream.

3. Evidence of Research Stream on gender Gap in Entrepreneurship

When compared to men, the research stream on women's entrepreneurship has many limitations. Throughout the year, entrepreneurship has been viewed primarily as a masculine field, ignoring the importance of women's participation in boosting economic development (Kelley et al. 2017). However, as this review paper and the analysis of other researchers demonstrate, there has been a sharp rise in the study of women entrepreneurs over the past ten years, which highlights the influence of this gender-balanced research's reverberating effects. For the purpose of this paper, to show the research stream and provide evidence in statistical context, all papers selected in the first place are considered, without being filtered in the specific focus such as educational and self-perceived abilities. The findings in this study show that, a small number of scholars have applied an explicitly feminist lens to the study of entrepreneurship (Ahl 2006; Ahl and Marlow 2012; Muntean and Okazanç-Pan 2015), and there are very few articles that apply a female theoretical approach that have been published in the top entrepreneurship journals (Brush et al. 2009). The very little financial assistance provided to the study of gender and entrepreneurship in compared to other areas of the discipline, according to Jennings and Brush (2013), is one of the major barriers in this approach.

The current study addresses these persistent issues as gender academics' research on entrepreneurship gives way to analysis, critique, and new lines of inquiry. According to Knowlton et al. (2015), researchers can shed light on how the historical and cultural positioning of women as primarily caring for others and being in charge of undervalued, unappreciated, and underpaid domestic work poses obstacles to bridging the gender gap in entrepreneurship. Furthermore, Minniti and Naudé (2010) contend that

Figure 1. PRISMA flow diagram for semi-systematic reviews which included searches of databases, registers and other sources- Gender and Entrepreneurship Research Review



Source: Authors own work

there is a strong need for systematic analysis, particularly in developing nations, which could lead to a "greater understanding of how the distinctive characteristics of female entrepreneurship are accounted for by the existing models of economic growth". Below, the paper includes a metrics-analysis that highlights the field of gender entrepreneurship studies in an effort to provide a current perspective on this area. The insights given in this section are twofold: a) show the stream of gender-related study to date; and b) reveal, what has largely gone untraced in the subdomain of gender entrepreneurship studies. This section adapts the SSLR approach, using the Scopus Bibliometrics source (along with other sources, depicted above).

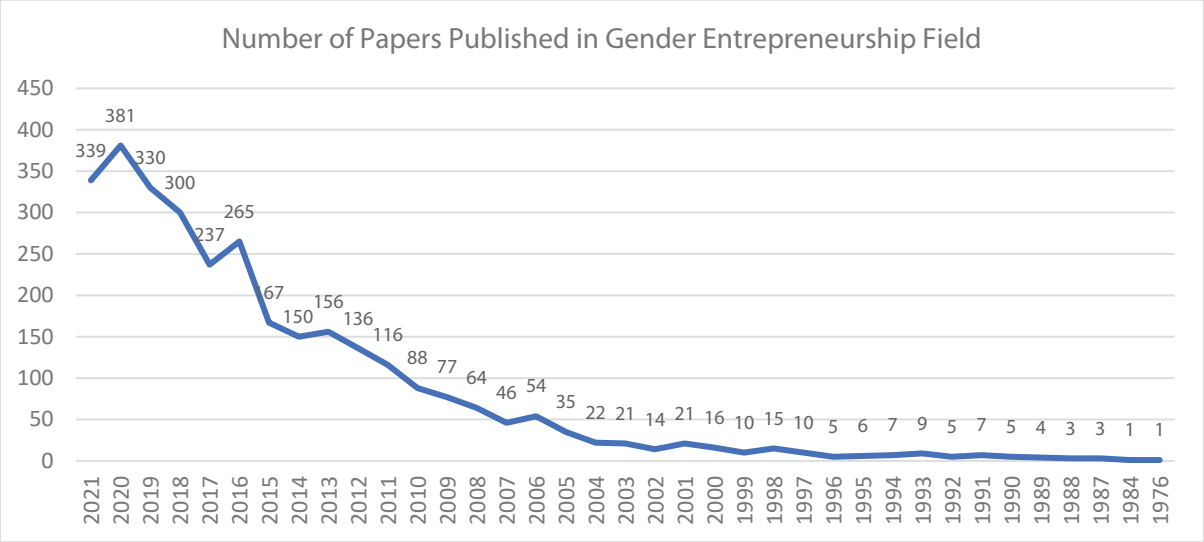
Evidence shows that, here is a growing corpus of study in this field since women may make major contributions to entrepreneurship and have a positive influence on eradicating poverty and social inequality (Langowitz and Minniti 2007; Rae 2015). As shown in figure 2, only recently has the research on gender in entrepreneurship studies reached its pinnacles.

In particular, in 2021, out of the total number of articles published (n=2545), n=381 papers were devoted to gender and entrepreneurship research, with a broader inclusion of structural research implications. In contrast to the earlier studies, only one publication (n=1) discussing the differences between the pursuit of commercial activities by men and women appeared in 1976.

Figure 3 further shows that the structural level of women's participation in business has only lately gained prominence in many topic areas, based on the total number of researches screened (n=1610). According to the frequency appearance, using the statistical graphs for visualization and analysis, Business Management and Accounting (n=1704), followed by Social Sciences (n=1200), Economic, Econometrics, and Finance (n=1033), is one of the most subject areas where the gender entrepreneurship was given space for publication. Other topics covered in publications from 1976 to 2021 include Decision Science (n=115), Psychology (n=115), Arts and Humanities, and Computer Sciences. With an average of n=20 publications, mathematics, medicine, and chemistry had the lowest number.

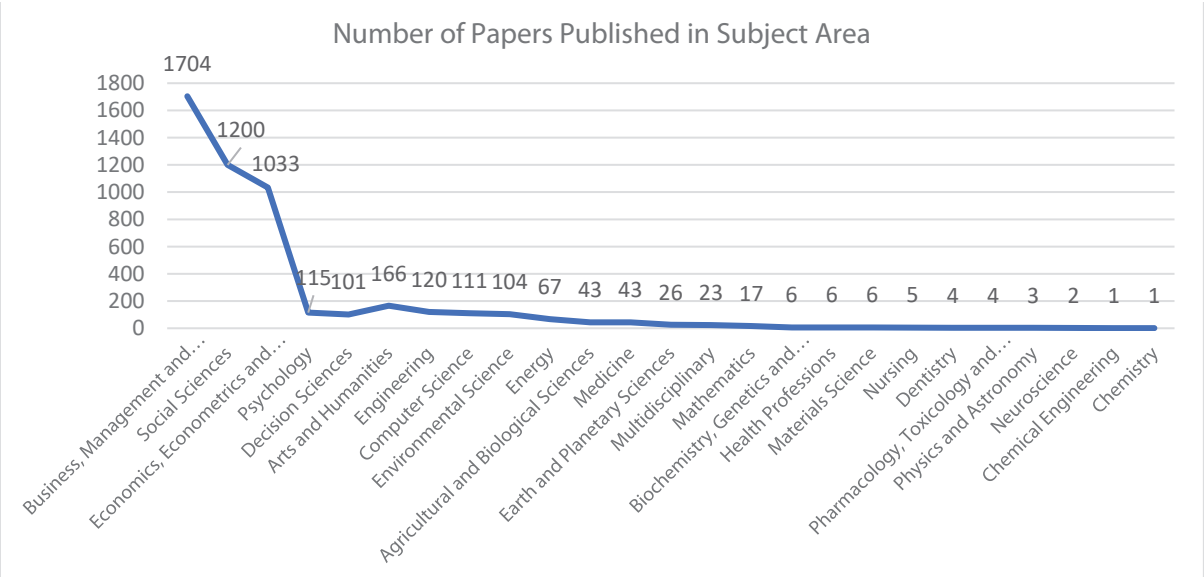
These results suggest that the study of gender in

Figure 2. Number of papers published in Gender Entrepreneurship Field 1976-2021



Source: Authors own elaboration 2021

Figure 3. Number of Papers in Subject Area (1976-2021)



Source: Authors own elaboration 2021

entrepreneurship has mostly focused on the economic level, while ignoring other areas like computer sciences and chemistry. According to Brush and Edelman (2000), studies have been silent when it comes to capturing other determinants, out of women's individualistic components (as mentioned in the phrase; women need to be "fixed"), and publications in the top entrepreneurship journals infrequently take a critical approach to investigating the structural barriers and making direct recommendations for cultural social norms, political, and institutional change to remove them. The results of this study also imply that there is a severe neglect of structural indicators that are inclusive and influence decision-making, such as personality traits and perceived abilities that are derived from the environment and surrounding circumstances. These factors include active engagement and recognition of entrepreneurship. According to empirical research by Ahl (2006), a woman's socio-cultural background influences her decision to launch a business.

Despite being unexpected, according to this logic, men and women still differ when it comes to starting a business among nations with comparable economic situations (Dheer et al. 2019), which has prompted

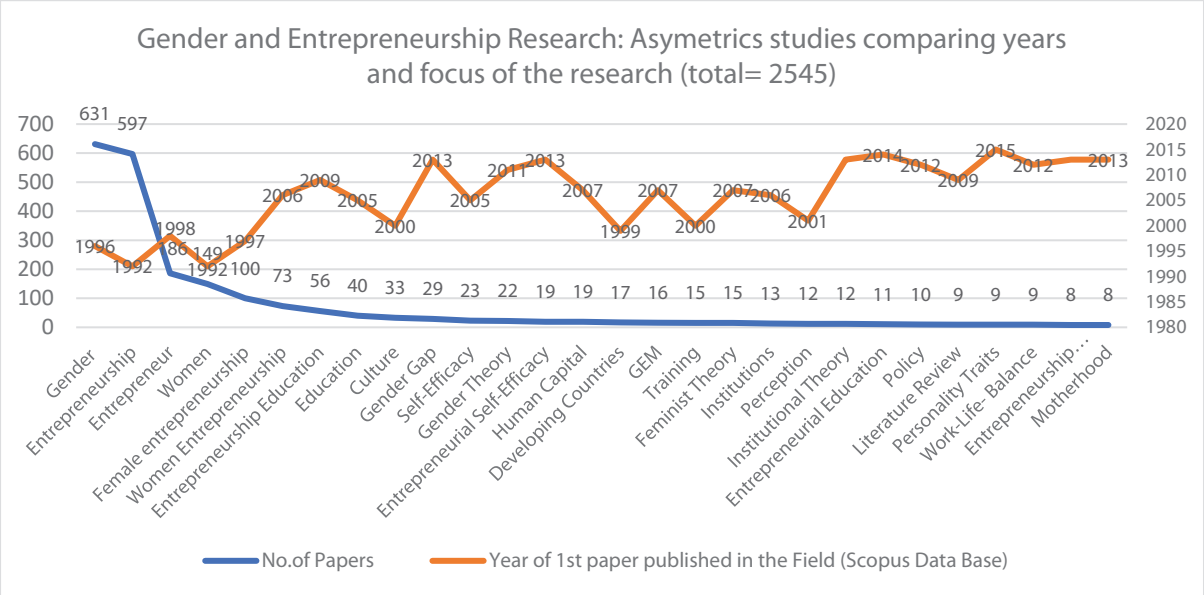
requests to expand the scope of those illustrative characteristics (McGowan et al. 2015). However, an intriguing result of our assessment revealed that the majority of significant terms used in earlier studies on women and entrepreneurship are becoming less common.

The majority of the key indicators examined are further shown, based on the initial year of keyword occurrence of the systematic research (i.e. "gender" has initially occurred in 1996, while "motherhood" in initially in 2013), retrieved from the metrics utilized. In this scope, all initial years of keyword occurrence available in the Scopus data are included, as shown in figure 4 below. Analyzing all articles, it appears that in relation to gender entrepreneurship studies, the focus dominated to "gender entrepreneurship" differences in pursuing business activities, along with "women", "culture" and "education". Another evident keyword appearing in gender entrepreneurship research is, though with less appearance is "GEM" (Global Entrepreneurship Monitor), which is recognized the most influenced annual report, raising voice on the gender economic inclusion, by providing statistics and showing barriers women face around the world.

The minimal quantity of word occurrence in the multiverse dimension is what comes to mind while looking at this image. For instance, the cognitive, personality, and social norms dimensions are given less attention by academics, as evidenced by the relatively low inclusion of the term's "motherhood" and "work-life balance". One more derogatory term is depicted in the specific "gender entrepreneurial education" and "personality treats", which consider gender dimension and its particular impact on the final entrepreneurial behavior. Finally, the emphasis given to gender and business studies' "research review" focus is quite low. As was already mentioned, it is crucial to compile and summarize the current research field by presenting theories and recommendations from a systematic point of view in order to provide the necessary policy at the national level to support and discourage female entrepreneurship across countries based on local ecosystem-implications.

Further it is relevant to show and compare the initially occurrence of keyword with focus studies across years (i.e. initially years captured by this study are from 1996-2013) in relation to the focus of the research stream among gender entrepreneurial studies. In this stream, it is discovered that, keywords such as "gender", 'gender entrepreneurship", "women and entrepreneurship, along with "female entrepreneurship", have been a typical focus of the academia in initial years of gender entrepreneurship research *(i.e.,1996),* accounting for the highest number *(n=631)* in gender related studies, whereas the lowest in this top score occurrence is "gender entrepreneurship education" *(n=100)*. But, over the following years the interest research of structural female entrepreneurship has increased rapidly, especially in the last decade. As the figure shows, there is an asymmetry path of the research, when comparing keywords occurrence and the stream of years.

Figure 4. Keywords occurrence on Gender and Entrepreneurship Research (1996-2021)



Source: Authors own elaboration 2021

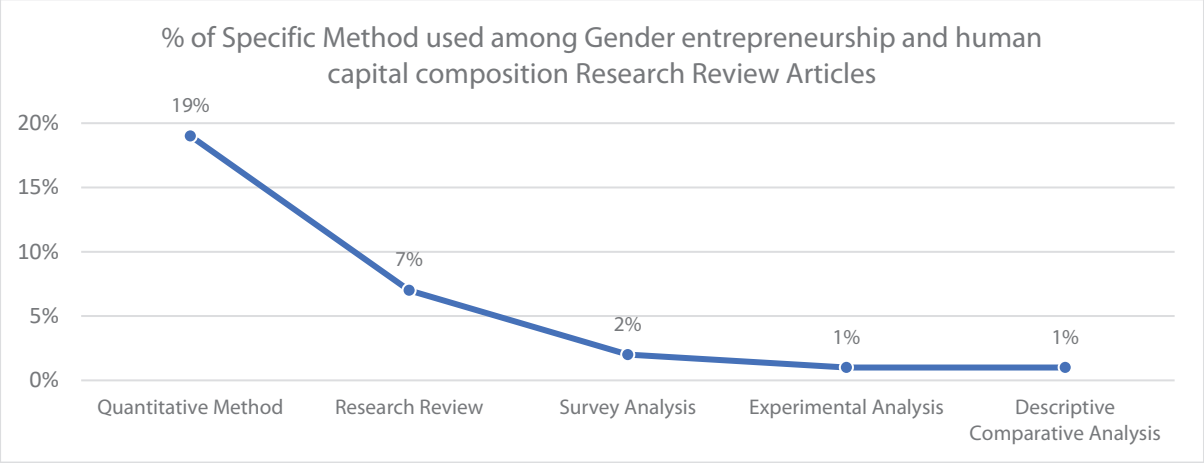
For example, the term "motherhood" in conjunction with educational attainment and perceived-abilities, according to Scopus data-base, initially occurs only in 2013, as a research stream and with only few papers published on this topic *(n=8),* but in previous years, there were zero papers published on this topic. Along with that, the same appears to be with the topics, as it is "Entrepreneurship and Education" as well with only *n=8* papers in 2013, appearing initially as a study focus. Similar research has started on "work-life balance" along with "personality traits", both have only *n=9* papers published, respectively on 2012, and the latter 2015. While "policy implication" research, according to this data-base, has attracted more attention starting from 2012. However, "culture" and "education" are found somehow in the middle of the research path, as this research area, has started two decades ago, namely on 2000, with *n=33* papers for culture, and "education" in 2005, with *n=40* papers published. Hereby, this trend tells that, while the number of studies in gender and business-related activities was very low, in initial years, along with the increase of the research field, more sensitive and structural issues have been traced only recently, thereby, expanding the scope of literature, and bringing to surface new challenges, in attempt to uncover new solutions and bringing closer the gender gap.

Although research on gender and entrepreneurship has moved away from purely descriptive explorations and toward a clear effort to embed research within highly informed conceptual frameworks, a number of methodological weaknesses have been noted. Statistics about methods used so far in gender entrepreneurship studies are presented below in the figure 5. The quantitative method is by far the most widely utilized in studies that consider how the interaction of human capital impacts gender entrepreneurial activity, according to the research's statistics. This approach is used to test hypotheses and make predictions by applying both basic and sophisticated econometric techniques. Larger datasets are also used to produce multivariate, factor, or regression analyses that are more complex. The topic of endogeneity has also received greater attention recently, as it is well recognized that final predictions are susceptible to a variety of contextual factors. In general, this problem is well-known in economics when discussing the composition of human capital, but until recently it has not been addressed in studies of gender entrepreneurship.

However, other methods continue to be used less frequently, such as research review and survey analysis (which are mostly employed at the national level). According to the study's findings, experimental analysis and descriptive analysis are the two least frequently used methods.

While there has been a transition in the study on gender and entrepreneurship from purely descriptive inquiries to a clear effort to anchor research within highly informed conceptual frameworks, some methodological flaws have been observed (De Bruin et al. 2007). It is established that research on women entrepreneurs has a number of constraints, as was already mentioned above and is regularly backed by several authors. The abandoning of structural, historical, and cultural variables, as well as the usage of male-gendered measuring equipment as Moore described generations ago, are a few examples (Gatewood, Carter, Brush, Greene, and Hart 2003).

Figure 5. % of Research Methods used in human capital and gender entrepreneurship (1976-2021)



Source: Authors elaboration 2021

4. Clusters Explaining the Sequence of Multidimensional Indicators in Gender Entrepreneurial Behaviour - Implication of Human Capital Composition

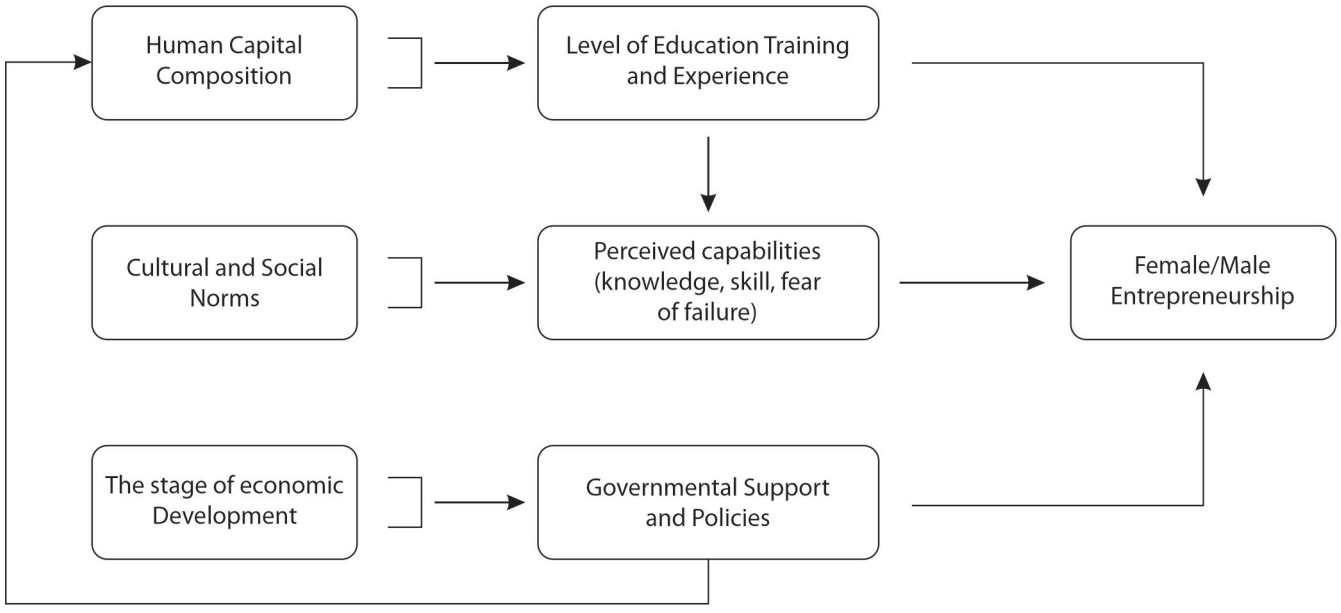
The knowledge economy is built on the pillar of intellectual capital, and as knowledge grows, so do the commercial opportunities. Given this significance and in light of the review's findings, a more comprehensive analysis of the composition of the human capital and its effects on gender-specific entrepreneurial behaviour will be offered in this section. In particular, the interrelationship between the human capital component—which includes the level of education, experience, and training—as well as perceived abilities and skills—drives the purpose to conduct business in the setting of gender structural inequality. This study indicates that these factors have been the focus of gender-related research, but it has been relatively narrow in that not much was explored when considering individual perceptions, their relationship to educational attainment, and the macrolevel at the same time. In addition, the cross-country study has received relatively little attention up to this point, and this issue was only recently brought up.

Findings from this research path are intriguing. Using the same inclusion/exclusion criteria that were used to select core studies—namely, the saturation effect—when examining the implications of human capital composition related to gender entrepreneurship behavior in conjunction with multilevel lenses, only *n = 18* documents were determined to be relevant for inclusion in the Scopus data source. This finding illustrates how gender entrepreneurship studies usually underestimate the importance of studying human capital, both subjectively and objectively, while also considering the influence of endogeneity. As a result, a novel approach to clusters that explains the progression of multi-level indicators of gender entrepreneurial behaviour is addressed in this section. Several important issues that contribute to a clear picture have been highlighted by the SSLR approach utilized in this study, which sought to identify the main clusters that impact the disparities in gender entrepreneurship.

The results of this review research thus demonstrate the interaction between internal and external variables, which are grouped as follows: *a) human capital composition; b) cultural and social norms; and c) the stage of economic development.* Considered also from Ettl and Welter (2009), a person's pursuit of human capital is embedded at the micro-level in his or her social network and at the macro-level in the culture and societal policy. The lack of such contextualization necessitates additional research in order to synthesize and provide the key lines that academics have neglected. Accordingly, in line with the findings, this study offers a unique perspective on the intersection of gender and entrepreneurship. It does so by posing various drivers, such as the individual/collective dimension, at various ecosystem situations, depending on different stages of economic development.

This study offers detailed review evidence of the

Figure 6. Interlinkage of multi-level indicators in the gender entrepreneurial research- human capital composition



Source: Authors Elaboration (findings of intercorrelation of clusters in gender entrepreneurship domain)

interactions and outputs that result from the endogeneity of such indicators, in contrast to the cluster that have been described in the overall research. First, it is demonstrated that the composition of ***human capital*** is influenced by economic growth stages. Such observation is supported by the study of Langowitz and Allen (2011), who indicate that there is a gender disparity in the development of human capital and career success. Additionally, it is a recognized fact that fewer women than men pursue higher education and entrepreneurial training either during or after school (Haus et al. 2013) and that fewer women than men intend to launch or run a firm worldwide (Kelley et.al 2014). The formation of human capital, on the other hand, is a cycle that incorporates individual perceptions of the total process, according to the findings of this assessment of the literature, in addition to the impact of schooling indicated above. This was highlighted in 1991 by Ajzen, who evaluated the efficacy of entrepreneurship programs using the idea of planned behavior. Given that women's perceptions and locus of control are lower, this impact is more profound and unstable for them. Additionally, Fayolle (2005) offered evidence that such educational programs have a beneficial effect on people's perceptions of their conduct, which is also a sign of self-efficacy and, to some extent, affects entrepreneurial inclinations (Krueger and Carsrud 1993). In their study of how education affects people's perceptions of their entrepreneurial ability, Choudhury et.al. (2019) found a gender interaction, with women placing a larger value on education. Furthermore, according to study by Brush, Greene, and Kelley (2017), equality in entrepreneurship - specifically social perceptual dimensions - have a more essential role than merely schooling in closing the gender gap. This adds to the overall good impact of human capital in entrepreneurship.

Second, ***cultural and social norms*** affect gender education levels as well as governmental support and policy levels. It might be challenging for women to further their education and, as a result, increase their self-efficacy to engage in economic activities in some cultures where culture values males more as breadwinners and women as homemakers. Shinnar et al. (2012) made a significant contribution to illuminating the fact that culture has a significant impact on how entrepreneurs develop their business initiatives. They specifically mentioned prejudices, social roles, and a stereotypical view of gender that contribute to a men-centered view of entrepreneurship. Hoyt and Murphy's (2016) concluded that gender stereotypes are to blame for the biases women encounter in the workplace and that as a result, their self-esteem and efforts to participate in business-related skill acquisition are negatively impacted by this reflects this. The main reason why gender roles are seen as some sort of status quo supported by entrepreneurship researchers is because society and the media regularly promote societal gender standards without being challenged by the mainstream of research. It is still believed that women are logically less ambitious and so bring the accommodation to their socially imposed responsibilities as primary caregivers (Brush 2009). Regardless of the level of economic growth, stereotypes, idealizations, and preconceptions about male breadwinners and stay-at-home mothers still exist, according to Watson and Robb (2012).

The ***stage of economic development***, which results in legislation and governmental backing, is the final topic addressed in the gender entrepreneurship literature, and it is presented third in this overview of the literature. In this regard, it is made clear that institutions and policy rules offer the norms by which all economic agents must abide. In addition, these rules either impose limitations on or permit a variety of economic behaviours, which in turn affects economic decisions. Individual-institutional interaction changes identities and limits or empowers job opportunities (Abbott 1988, Hughes 1958). Using institutional theory as a guide, Scott (1995) identifies the salient regulative and normative pillars of institutions that, by ensuring that people follow written laws, encourage stability and predictability in social conduct. In terms of female entrepreneurship, Welter et al. (2003) claim that the normative pillar is particularly apparent in the way that career decisions are clearly influenced by what society deems desirable and appropriate for gender and that many societies (Achtenhagen and Welter 2003) continue to define women through roles associated with caring for family members. In order to address the "demand-side" issues that specific women face, (Langowitz and Minniti 2007) propose that educational strategies and governmental initiatives abandon gender-neutral presumptions. As a result, they suggest supportive government programs that must be created to effectively address the gendered self-efficacy and confidence gaps, as these issues are caused by societally constructed gender norms, implicit biases, and subjective perceptions of women's less strong personal entrepreneurial abilities. On the other hand, Alsos et al. (2006) gave structural barriers a high priority over individual characteristics, including gendered roles in the home and the division of labor, which can be addressed by national equality programs meant to reduce the gender gap in equity funding and growth trajectories.This evidence is further supported by a study by Shah and Saurabh (2015), which found that in developed nations, a variety of factors, including

self-fulfilment, creative abilities, a desire for independence, a desire for wealth and power, and social status, all contribute to the rise of women entrepreneurs.

Further, studies show that in developing nations, the majority of cases of women starting their own businesses are driven by economic and social conditions like low income, poverty, and a high unemployment rate in order to meet their basic needs or to support their families. However, in most countries, women entrepreneurs have very low success rates due to a lack of adequate knowledge, training, experience, and education (Farrukh et al. 2018), primarily because they spend the majority of their free time doing unpaid work at home.

5. A Matrix of Synthesis Studies and Prepositions on the Gender Gap in Entrepreneurial Behavior

Considering the aforementioned clusters, the goal of this research review is to draw attention to the reasons that govern the emergence of the gender gap in entrepreneurship, in the form of multi-level factors. Several variables contribute to the existence of the gender gap, as well as some other factors that help to close it. The reasons for the increase in women's entrepreneurship may be attributed to changes in demographic variables such as a change in lifestyle, postponement of childbearing, an overall increase in social stress, or higher levels of emotional satisfaction and wellbeing (Kutanis, Bayraktaroglu 2003). According to the findings of this study, scholars point out various reasons for the emergence of a gender gap in entrepreneurship in various sources of literature. Some authors (Alsos et.al. 2006) explain low female entrepreneurship participation as a result of limited financing options, while others (Malaya 2006) explain low female entrepreneurship participation as a result of different value systems. Women, for example, do not enter business solely for financial gain (McClelland, Swail and Bell 2005), and economic success may not be as important as personal fulfilment and other non-financial goals (Buttner and Moore 1997). The main clusters in explaining the gender gap in entrepreneurship will be elaborated in the table below. This disparity is captured in a multi-dimensional manner showed in table 3, so that each category provides insights on women's barriers as well as the fields where the reasons for their underperformance are present.

According to the findings of this study, the ***first cluster indicators***, in the aggregate level, gender gap in entrepreneurship can be indicated from four

Table 2. Indicators influencing Gender Gap in Entrepreneurship

Aggregate Indicators Influencing Gender Gap	***Factors Impacting Gender Gap Entrepreneurship***	**Ultimate and Proximate Explanations of interlinked Indicators**	**Authors**
	Women's and men's engagement in entrepreneurial activity	The gender gap in entrepreneurship is most visible in the middle-income and transitional countries where men are 75% more likely than women to start a business. In high income countries, the gender gap is relatively small and men are 33% more likely to start a business whereas in developing countries it is 41%.	Miniti and Noude (2010), Global Entrepreneurship Monitor (GEM,) Women's Report, Kelley, Brush, Greene, and Litovsky (2011).
	Gender differences in motives: opportunity or necessity entrepreneurs-Push and Pull Factors	Women entrepreneurship motives differ, due to "pull" factors (i.e. making money, becoming independent), instead of "push" factors (poverty, need to support family income, etc.)	Kirkwood (2009); Minniti (2009); Ahl (2006); Moore and Buttner (1997); Eversole (2004), Patterson and Mavin (2009).
	Industry choice and entrepreneurial orientation	Women entrepreneurs dominate the consumer sector and retail business. Men operate more frequently in manufacturing, construction and the business services sector, especially in the more developed and high-income countries.	Thompson, Jones-Evans, and Kwong (2009); Loscocco and Robinson (1991); Hisrich and Brush (1984).
	Business performance and growth expectation	Women have been criticized for limiting the growth of their businesses but the combination of undercapitalization and family obligations conspire to keep their businesses small.	Nordman and Vaillant (2014); Kantis, Angelelli, and Koenig (2005); De Mel, McKenzie, and Woodruff (2009); Armstrong (2002); Brush et al. (2004); Carter, Brush, Greene, Gatewood, and Hart (2003).

Table 2. ***Continued***

Macro-economic Factors	*Access to Finance*	Funding gap for woman entrepreneurs; access to financial capital; availability of financial capital; Start-up capital, general distrust and discrimination towards women entrepreneurs by bankers.	Brush, Carter, Gatewood, Greene, and Hart (2004); Zhu.et al. (2015); Jamali (2009).
	Policies related to Work-family Interface	Role overloading and role conflicts as wife, mother, and business owner; motherhood; lack of time and energy. The policy regulation addressing the motherhood is an important indication in reducing gender gap in entrepreneurship.	Halkias et.al. (2011); Maden (2015); Jennings et.al. (2007); Brush, de Bruin, and Welter (2009).
	Access to Entrepreneurship training and education	Lack of access to training on managing finance. Lack of experience and skills impact women entrepreneurs' preference in industry. Absence of technological know-how and access to technology and ICTs poses a challenge for women entrepreneurs.	Kitching and Woldie (2004); Davis (2012); Gurmeet and Belwal (2008).
	Culture and Normative Environment	Lack of societal support, socioeconomic and normative context- a reflection of assigned gender roles.	Mueller (2004); Acs et al. (2005), Mueller (2004); Elam (2008); Gupta et al. (2009); Jamali (2009); Baughn et al (2006); Brush (2002); Brush, de Bruin, and Welter (2009); Vaillant (2005).
	Institutional and policy regulations	Explicit regulations pertaining to small business creation. Rules are prescribed, define appropriate attitudes and tell (men and women) how to behave. "When such normative expectations and attitudes are wide spread, broadly diffused and deeply rooted: they take on a 'rule-like' status in social thought and action". public policy and governance can and do shape entrepreneurial behavior we ought to be conscious of their consequences and improve them to the extent possible.	Baughn, Chua and Neupert (2006); Baughn et al. (2006); Foss, Henry. and Ahl, 2014, Hart (2003).
	Technology	Women are less likely than men to operate businesses in high-technology sectors.	Loscocco and Robinson (1991); Anna et al. (1999); Verheul, Van Stel, and Thurik (2006).
	Economic Transition and Unemployment	During the transition process small firms start replacing the larger industrial businesses and there is a shift away from unskilled, labor-intensive production towards capital-, technology- and skill-intensive production.	Brunner (1993), Hisrich and O 'Brien (1982); M. Minniti (2003).
Micro-economic Factors	*Self – efficacy, perceived skills*	Normative constraints and societal attitudes based on cultural and religious beliefs in some countries are not supportive of the work of women in general or that of women in entrepreneurship in particular. Perceptions are mostly based on the association of entrepreneurship with traditional male stereotypes.	Jamali, (2009); Baughn et al. (2006); Aidis et al. (2007); Bird and Brush (2002).
	Opportunity Recognition	Women are less entrepreneurial because they are risk-averse and lack the necessary skills, attitude and education for entrepreneurship, therefore less inclined to opportunity recognition.	Ahl, (2006); Eckhardt and Shane (2003); Anna et al. (2000).
	Networking Behavior	Behavioral norms at the level of society and norms of appropriate female behavior in social networking can bring to bear on the success of women entrepreneurs.	Minniti (2009) and Jennings and McDougald (2007); Brush, de Bruin, and Welter (2009).
	Lack of Industry Experience	Women are absent or under-represented in certain sectors and industries because society beliefs in certain masculine and feminine industries. These normative perceptions thus affect the types of enterprises in which women and men can engage. A society might perceive women as 'better care takers or men as 'physically stronger'.	Aidis, Welter, Smallbone, and Isakova (2003); Drine and Grach (2010); Sarasvathy (2001).
	Motivation, Psychological Traits, past experience	The desire of woman to be economically independent; social structures, social networks, family and organized work-life balance.	Verheul and Thurik (2001); Brush and Hisrich (1999); Minniti (2003), Mukhtar (1998).

Source: Authors findings from Review process

Table 3. Key Prepositions Derived from SSLR

1 .SED's are important on women business activities	**Women in developed countries:** – Higher level of education – are more likely to find suitable jobs,therefore more opportunity - driven entreprenrushp higher institutional support in terms starting a new busines. **Women in developing countries:** – lack of institutional support – lack of education, experience and training opportunities – lack of self-confidence and an excess of insecurity – poor access to resources (financing, education,etc).
2. Human Capital Resources are key to help women entrepreneuresh in the initial phase	**High levels of human capital are positively related to:** – Opportunity recoginition and – Venture performance – Entrepreneurial education has a greater impact on the development of entrepreneurial self-efficacy – High levels of entrepreneurial self-efficacy is related to a higher probability of developing a business activity. – Countries with greater gender equality in science education are characterized by higher entrepreneurial activity in knowledge-intensive sectors and high-growth aspirations. – Whether female entrepreneurs are pulled by opportunity or pushed by necessity depends on their level of education. – The education effect that separates workers into self-employment and wage employment is stronger for women, possibly stronger in urban areas, and also stronger in the least developed economies, where agriculture is more dominant and literacy rates are lower. – Educational and training characteristics do not play a relevant role as regards a firm's survival time, (study in Spain, 2007)). – Specific entrepreneurship education in Italy results to negatively affect the starting-up decisions (study in Italy, 2017).
3. Country's different perceptions of the role of women in society, explain that the differences concern attitudes toward entrepreneurship	**Psychological traits influence entrepreneurial intention, more for men compared to women, related to:** – higher levels of self-efficacy, – self-confidence, – independence, – risk appetite, and autonomy in men compared to women
4. There is a complex relationship between culture and gender differences in different countries	**Different cultural values can convey:** – different attitudes, – expectations, and – behaviors – not only between men and women, but also between different nations.
5. Gendered institutions have significant influences on the relative levels of female entrepreneurial activity	Only regulative and cognitive gendered institutions are significantly related to the absolute level of female entrepreneurship. Specifically, regulative gendered institutions have negative impacts, while cognitive gendered institutions have positive impacts. This implyies that, policies that boost education give more incentives twoward entrepreneurship, through the mediation effect of self perception, thus orienting more on entrepenrushiip rather labor market.

Source: Literature review findings 2021

perspectives, such as; *a) Women's and men's engagement in entrepreneurial activity*, (i.e. Consistent with this cluster findings, the gender gap in Entrepreneurial activities follows an S-shaped curve, as proposed by Porter (1990), which coincides with the stage of economic development. The level of potential opportunities in relation to the level of economic development, however considering the structural indicators, there is variation in the gender context, in relation to final entrepreneurial behavior). *b) Gender differences in motives: opportunity or necessity entrepreneurs-Push and Pull Factors, c) Industry choice and entrepreneurial orientation*, (i.e. women entrepreneurs dominate the consumer sector and retail business. Men operate more frequently in manufacturing, construction) and *c) Business performance and growth expectation* (i.e. this deems from combination of undercapitalization and family obligations which conspire to keep their businesses small).

The ***second cluster of indicators*** exhibits macroeconomic indicators such as finance, policies, access to education, cultural and social norms, and technology, among others. The ***third cluster of indicators,*** on the other hand, provides individual-level factors such as perceived abilities, networking behaviour, motivation, psychological traits, past experience, and so on (please rerefer to the following table). Overall, in this literature review investigation, many arguments appear to be crucial and superficially investigated in the majority of the literature, demonstrating once again an interconnection of the entire indicators studied thus far. Arenius and Minniti (2005), for example, propose categorizing macro-level influencing factors on entrepreneurship into two categories: socioeconomic factors and contextual factors, and supplementing those with micro-level perceptual factors. Verheul et al. (2006) recently investigated macro-level determinants of entrepreneurship such as technological development, economic factors, demographic factors, government intervention, and cultural factors, demonstrating the significant effects of per capita income on entrepreneurial activity. In recent literature, institutional environments, along with human capital composition and cross-country analysis, have thus received more systematic attention.

With a focus on developing countries, it is demonstrated that the influence of religion, the lack of basic business skills training and difficulties in gaining access to business support systems, social segregation, and a lack of societal legitimacy to act as an entrepreneur all appear to be the issues that most influence women's participation in entrepreneurship and their performance. In some developing countries, for example, women may not face internal family constraints, but they are affected by external labour market constraints. This brings up the rigid challenges that women face in various countries, considering culture, macroeconomic indicators, policy support, as well as legal and social norms. According to Baughn et al. (2006), social norms and culture prescribe appropriate attitudes and tell us (men and women) how to behave, "when such normative expectations and attitudes are widely distributed, broadly diffused, and deeply rooted: they take on a 'rule-like' status in social thought and action." As described by Itani et al. (2011), women in some Muslim countries face challenges due to traditional beliefs, but the external economy is supportive of business.

Another example comes from Singer et al. (Global Monitor Report 2018), who show that across 52 economies around the world, regardless of level of development, men are more likely to be involved in entrepreneurial activities than women, reflecting differences and the interplay of culture, designed and implemented governmental policies, and self-perceptions regarding female participation in economic activities. This trajectory does not reflect the individual characteristics (such as level of education or self-efficacy) and motivations of women as a tool for their business engagement. According to many research indications, this cluster is mostly visible in all gender entrepreneurship research, because women have been reported to have a variety of motivations for becoming entrepreneurs. According to Gatewood et al. (2003), such a stream includes the desire for balance between work and personal responsibilities, greater job satisfaction or personal fulfilment, greater independence and autonomy, better control, greater recognition or equality, and the desire to be financially successful, all of which are known as "pull factors". Furthermore, external factors "push" women into entrepreneurship. Following Morris et al. (2006), women choose to engage in entrepreneurial activities due to economic necessity, unemployment, and the glass-ceiling barrier. Nonetheless, it should be outlined that, the same influence can become a push factor for one individual, but may be a pull factor for another (Buaghn et al. 2006, Orhan and Scott 2001), which can be subject of a country's stage of economic development, and other country's specific characteristics. When entrepreneurship is heavily influenced by traditional male stereotypes and attitudes (Themudo 2009), there is little room for society to encourage women to pursue such a career or compete on equal terms with their male counterparts. In general, women appear to be more motivated toward social goals than men, whose attitudes are more focused on economic and material concerns (Dorado and Ventresca 2013). According to

the literature (Hechevarra et al. 2012), social enterprises are better suited to the social role of women.

All of the dimensions explained are covered within the confines of the multi-level lenses, and the findings bring to the following key prepositions, which are presented in table 3. These prepositions adhere to the multi-dimensional model derived from the findings of this study. The majority of studies confirmed that SEDs are related to the level of human capital, implying a greater impact for women. Human capital composition, on the other hand, has a positive impact on entrepreneurial activities if the surrounding eco-system is favourable. The perception of women's roles in society is the most prevalent cluster mentioned, which limits women's economic inclusion, followed by gendered institutions. Only regulatory and cognitive gendered institutions are significantly related to the absolute level of entrepreneurial activity. In other words, the promising conditions that promote work-life balance increase their economic inclusion. The following findings confirm that human capital composition, operating in a structural and contextual framework, is one of the most influential factors in gender business behavior.

However, these findings also confirm the fact that there is no conclusive evidence, such as, while education theoretically raises perceived across gender, it does not always correlate positively to the outcome of entrepreneurship intention, as evidenced by a research from Spain and Italy in this research review. Gender entrepreneurial behavior is thought to be very complex, depending on psychological traits as well as the overall eco-system. This demonstrates the ongoing need to investigate these specific and multifaceted issues in order to properly address the closing gender gap issue.

6. Conclusions

Despite the obvious low presence of women in business, a semi-systematic approach to gender studies has shown that women's economic engagement in business activities offers a road to enhancing economic growth. As the main preposition makes clear, the SEDs play a critical role in determining the gender gap in entrepreneurship, particularly when it comes to opportunity or necessity-driven initiatives.

Further evidence demonstrates that this phenomenon is caused by the contextual, structural, and psychological factors that distinguish female entrepreneurship from that of men. While, institutional policies and culture support the entire ecosystem by fostering female entrepreneurship, which leads to increased wellbeing and social empowerment for women. This study concludes that there are some gaps in the literature on women entrepreneurs, including the exclusion of structural, historical, and cultural factors, according to several authors. Finally, the results demonstrate that gender identities must be acknowledged and that there are differences in the outcomes of perceived gender abilities and educational achievement across economic levels. Women entrepreneurs are not a homogeneous group, in other words, female entrepreneurs are not unique; they simply approach entrepreneurship differently and, as a result, contribute significantly and valuable to the global economy.

7. Policy Implication and Future Research Outline

This paper provides recommendations for legislative actions and educational initiatives targeted at encouraging women's entrepreneurial tendencies, which is in line with the findings of Hmieleski and Sheppard (2019). Political and educational initiatives can effectively nurture women-led businesses, and in the process, they may also improve their perception of their own strengths in relation to entrepreneurship. This might result in a more culturally educated environment that supports the growth of female entrepreneurs. Moreover, Bullough et al. (2014) suggest that creating an encouraging environment and tools could inspire women to adopt an entrepreneurial mindset. Therefore, to promote gender equality and women's rights, governmental and institutional frameworks should include programs and courses that encourage women to start and expand businesses.

In addition, there are several areas where the results seem to be well-supported by several investigations, allowing for preliminary generalizations and repeating research methodologies and conclusions across time. Hence, it would be wise to focus future study on women, especially in regards to work/family balance, career choice, and opportunity identification, all of which are dependent on the composition of human capital development. Additionally, findings indicated that there is a need for a new approach to gender and economic inclusion methods, such as life histories, narrative analysis, in-depth case studies, approaches with in-depth interviews, or discourse analyses. Nonetheless, contingency and comparative studies, which adapt longitudinal studies of contextual factors by taking the same picture at regular intervals over an extended time period and comparing changes over time, will provide a much better understanding of the conditions for women's entrepreneurship.

Similarly, the growing availability of large data sets enables us to better understand potential disadvantages among various groups of female entrepreneurs (Fairlie and Robb 2008).

Furthermore, the study might look into the extent of the digital skill gap between men and women in emerging as well as developed countries, as this is expected to affect both groups' future labor market outcomes. There is a reaffirmation of the need for academics to work harder to critically analyze and improve current theories on entrepreneurship. Yet, in line with Wilson and Tagg (2010), it can be helpful in developing more specific and useful theories that consider the institutional practices, culture, and composition of human capital at various income levels, as well as how these interplay with gender issues.

Lastly, it should be noted that within the scope of this research, it was impossible to grasp all semantic research with a focus on the same topic, so it is recommended to broaden the data source, when using a literature review, so that other important findings can be sampled and provide a different perspective on this area.

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INTERNATIONAL PORTFOLIO DIVERSIFICATION BENEFITS: AN EMPIRICAL INVESTIGATION OF THE 28 EUROPEAN STOCK MARKETS DURING THE PERIOD 2014–2024

Azra Zaimovic, Almira Arnaut-Berilo, Rijad Bešlija

Abstract

This study investigates the benefits of international diversification in the stock markets of the 28 European countries (the EU and the UK) over two five-year periods: a stable period from 2014 to 2019 and a turbulent period from 2019 to 2024. The analysis draws on the Markowitz mean-variance, Sharpe reward-to-variability, and naive diversification models, based on which different investment strategies were developed and implemented. We find that actively managed portfolios perform significantly better than naively diversified portfolios. The analyzed markets exhibit positive short-term associations, with an average correlation coefficient of 0.29 in the first period and 0.46 in the second period. However, these markets do not show long-term cointegration.

Recent crises have reduced diversification benefits, yet significant opportunities for diversification remain. Diversification benefits are almost halved in the second period: average single-market standard deviation can be reduced by 60.5% with investments in 20-indices portfolios in the stable period, and only by 33.7% with the same portfolio size in the turbulent period.

Keywords: *International Diversification, Systematic Risk, Crisis, Covid-19 Pandemic, EU and UK Stock markets, Sharpe Ratio, Markowitz Portfolio Theory, Naive Diversification, Investment Strategies*

JEL Classification: *G11, G15*

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1. Introduction

Investors prefer to hold portfolios of securities because of a risk-reducing effect called risk diversification. The concept of risk diversification is fundamental in finance. Rational investors share the same goal of spreading all diversifiable risks and achieving the best possible risk-return ratio given their level of risk aversion when they choose to invest in securities. Most of the world's stock markets tend to move together in the same direction, implying positive correlation. The increasing association

between developed and emerging markets has limited opportunities for international diversification (Srivastava 2007; Kizys and Pierdzioch 2008). Additionally, there is evidence that crises tend to increase association between markets and reduce diversification opportunities (Samitas et al. 2021).

Financial markets play an increasingly important role in financing the economy. For firms, cross-border ownership means access to a larger pool of investors and potentially more stable sources of financing. Conversely, through international investment, portfolio investors seek more diversified portfolios to hedge country-specific risks and take advantage of the development potential of different economies around the world. This study aims to determine whether international investments in the 28 European stock markets (the EU and the UK) offer better portfolio performance and higher diversification opportunities than investments in standalone stock markets in two distinct five-year periods. For the majority of the observed period, the UK was a member of the EU, so we included the UK in our analysis.

The bank-oriented European system needs to be strengthened by further developing and integrating capital markets. Enhanced integration of capital markets in the EU can help mitigate shocks in different parts of the euro area and enhance the resilience of the entire euro area. Financial integration, in general, benefits from the harmonization of financial market data standards (European Central Bank 2016). Conversely, the Capital Market Union represents the EU's policy response to the sovereign debt crisis from 2010–2013 and other negative trends resulting from the 2007–2008 financial crisis (Quaglia, Howarth, and Liebe 2016). The European investment fund industry plays a crucial role in facilitating cross-border integration within the EU. Additionally, investment and pension funds have been the fastest-growing types of non-bank intermediaries in the euro area in recent years (European Central Bank 2020). Investment funds enable investors to diversify their investments across countries and achieve better portfolio diversification than holding assets directly, thereby enhancing private financial risk-sharing in the EU.

The aim of our research is to analyse the performance and diversification potential of international portfolio management in the context of the EU and the UK, assuming that the analysed national stock market indices can be obtained through an index replication strategy. The topic of diversification potential becomes even more significant when considering the growing positive association among stock markets, especially during crises. We analyse and compare the results of different asset allocation methods, represented by the mean-variance optimization method, Sharpe ratio maximization, and naive diversification. Based on almost 10 years of historical data from 28 European national stock market indices, we aim to answer the question about the extent of international diversification benefits in the analysed markets, in two periods.

In our analysis, we utilize data from 28 stock market indices spanning two five-year periods: from September 2014 to August 2019 and from February 2019 to January 2024. The first sample excludes the potential impact of the Global Financial Crisis of 2007–2008 and the sovereign debt crisis (2010–2013), representing a relatively stable market period. In contrast, the second period encompasses turbulence caused by the Covid-19 recession (2020–2022) and the Russian invasion of Ukraine (2022–present).

Our primary methodology is based on Markowitz's (1952) portfolio mean-variance optimization method and Sharpe's (1966) investment performance measure, which assesses the reward-to-variability ratio. These methods form the basis for our sophisticated active investment strategy, alongside the naive diversification approach or the method of equal weights.

The main contribution of our research lies in the design, implementation, and performance measurement of an active investment strategy that proves superior to a simple naive diversification method in the analysed markets and periods. We create and compare the performance of randomly formed international portfolios of different sizes in three different scenarios and in two five-year periods. While the analysed European markets demonstrate short-term integration, there is no evidence of long-term cointegration. Additionally, our results show that an increase in the size of actively managed international portfolios leads to significantly better performance. Actively managed portfolios statistically outperform equally weighted portfolios, while the performance of the active investment strategy could be enhanced by short selling. However, diversification benefits are significantly lowered in the unstable period from 2019 to 2024, and crises do reduce risk diversification possibilities.

The paper commences with a theoretical background and literature review on risk diversification, followed by the methodology, data, and analysis and results sections. The discussion and conclusion sections underscore the practical implications and contribution of the study, including limitations and directions for further research.

2. Theoretical background with literature review

Risk diversification and financial market integration have been studied extensively over the last several decades, especially during stock market crises such as the October 1987 crash, the global financial crisis of 2007–2008 and the current turmoil of the Covid-19 pandemic. International market integration can be defined as assets with similar levels of risk producing similar expected returns, or national stock market indices moving together over the long term, even though there may be short-term divergence. This integration reduces the opportunities for risk diversification among international investors. Understanding these relationships is fundamental to modern portfolio theory, which advocates cross-border diversification of assets when stock returns are not perfectly correlated. There are several methodological approaches to evaluating financial integration and diversification opportunities. The most important and commonly used approaches include Markowitz's modern portfolio theory model, correlation analysis, as well as the Johansen cointegration test and Granger causality test.

The mean-variance optimization framework is most effective for analysing the risk-return trade-off and maximizing diversification benefits (Kim et al. 2021). Efficient mean-variance diversification involves combining securities with low correlation or inverse returns. Markowitz (1952) introduced the efficient mean-variance portfolio, which aims to minimize the variance for a given expected return or maximize the expected return for a given variance. Portfolio decisions are based on the standard deviation of assets and the correlation between returns. To benefit from diversification, investors avoid perfectly positively correlated assets; the lower the correlation, the greater the diversification effect. Although Markowitz's concept is primarily theoretical and its success depends on the assumptions of the model, which are often not fulfilled, numerous portfolio strategies have been developed that are based precisely on the mean-variance model due to their simplicity and comprehensibility (Hoe, Hafizah, and Zaidi 2010).

Fletcher and Marshall (2005) examined the advantages of international diversification for UK investors on the basis of the mean-variance strategy and Sharpe performance measures. They demonstrated significant diversification benefits compared to a domestic mean-variance strategy, but also showed that the degree of risk aversion and international confidence affect the extent of these benefits. Similarly, Chiou, Lee, and Chang (2009) conducted a comprehensive analysis of the benefits of international diversification over time and showed that despite the increasing integration of financial markets, international diversification continues to be beneficial. In their out-of-sample analysis, they showed that the Markowitz model reduces risk, although it does not necessarily increase mean-variance efficiency.

The Markowitz model has been criticized not only for its unrealistic assumptions, but also for its use of standard deviation as a symmetric measure of risk. In this context, the concept of downside risk measures or risk measures using quintile measures is gaining popularity. For example, Hunjra et al. (2020) compare the mean variance, the semi-variance, the mean absolute deviation, and the CVaR as risk measures and show that the CVaR provides the best results in the scenarios examined. Sikalo, Arnaut-Berilo, and Delalic (2023) problematize the concept of comparing different models due to the fact that each model is dominant in its own risk space. Based on a multi-criteria analysis, they show that the minmax model dominates, but also gives naive diversification an advantage over maximizing the Sharpe ratio in the mean-variance space.

Despite the development of risk diversification models, investors still use very simple rules for their asset allocation, so-called naive diversification. Naive diversification means equally weighted portfolios, i.e. $1/n, i = \overline{1,n}$. Its main advantage is that it is very easy to implement. Taljaard and Mar´e (2021) found that equally weighted portfolios perform better than capital-weighted portfolios. DeMiguel, Garlappi, and Uppal (2009) shows that optimal diversification only outperforms naive diversification when unsystematic risks are high. In contrast, Platanakis, Sutcliffe, and Ye (2021) found only minimal differences between naive diversification and optimal diversification. Their study highlights the two stages of the investment process where mean variance analysis proves superior in asset allocation, while simple diversification outperforms mean variance in stock selection.

A study by Alexeev and Tapon (2012) found that holding a relatively small number of stocks can help investors reduce extreme risk, with specific thresholds identified for each of the five developed economies studied. The research findings suggest that regardless of the risk measurement method used, developed financial markets generally require a larger number of stocks for a well-diversified portfolio than emerging markets. For European countries, De Keyzer, De Schaepmeester, and Inghelbrecht (2014) found that investors generally need around 14 shares for PIIGS countries and slightly more for better performing

countries, noting that the required number of shares decreases in times of crisis. Regarding the required number of stocks for a well-diversified portfolio, Zaimovic, Omanovic, and Arnaut-Berilo (2021) in their systematic literature review highlighted several important points: (1) today's portfolios require more stocks than in the past, (2) fewer stocks are needed in emerging markets than in developed markets, and (3) higher stock correlations with the market reduce the required number of stocks for individual investors.

Correlation analysis is a widely used method for measuring associations that is known for its simplicity and ease of interpretation. Studies such as those by Goetzmann, Li, and Rouwenhorst (2005) and Quinn and Voth (2008) utilize the average correlation coefficients between pairs of countries to summarize market movements. Pan, Liu, and Roth (2010) find strong correlations within European markets, with the weakest correlation between Europe and Japan, while the correlation between Europe and the US remains almost the same. They emphasize the importance of investment horizons and warn against short-term perspectives for effective diversification. Kizys and Pierdzioch (2008) show that correlations between major markets have increased after the 1990s, reducing diversification effects, and Samitas et al. (2021) point out that the Covid-19 pandemic has increased market correlations, reducing diversification opportunities. Emerging markets such as the BRICS countries offer diversification opportunities due to their relatively low correlation (Liu, Hammoudeh, and Thompson 2013; Syriopoulos 2007). You and Daigler (2010) show different diversification benefits over time, while Forbes and Rigobon (2002) question correlation's adequacy in measuring market integration, and Pukthuanthong and Roll (2009) illustrate that two markets can be perfectly integrated but imperfectly correlated. In contrast, a study by Billio et al. (2017) examines various measures of market integration, with all measures showing similar long-term patterns. It is shown that standard correlation analysis explains fluctuations in diversification benefits as well or better than more complex measures, and the results are robust. The results also confirm that increasing financial integration leads to decreasing benefits from international portfolio diversification.

Granger and Johansen's cointegration methods can be found in numerous studies. Marimuthu (2010) analyzed the long-term and short-term relationships between composite indices of five countries (Malaysia, India, China, USA and United Kingdom) over a decade (1997–2007). The results indicate a long-term relationship between the regional stock markets that can only be decoupled in the short term. Lupu and Horobet (2009) documented rapid market reactions to new information in eight European countries in the period 2003 – 2007. Nedunchezhian and Sakthia (2019) analyzed the movements of the major global stock markets (New York Stock Exchange, NASDAQ, Japan Exchange Group, Shanghai Stock Exchange and European Stock Exchange based on market capitalization) from 2009 to 2018. They found no long-term co-integration between the selected stock markets. Cheng, Jahan-Parvar, and Rothman (2010) and Nardo, Ossola, and Papanagiotou (2021) suggest that regional market integration limits diversification opportunities, especially after the financial crisis. Meric, Ratner, and Meric (2008) found that diversification benefits vary depending on market conditions. Coudert and Gex (2006) suggest that financial crises typically coincide with periods of increased risk aversion.

Due to the increasing integration of markets, in this study we investigate the diversification opportunities between 28 European stock markets and the performance of active investment strategy compared to naively diversified portfolios. Our study is based on Markowitz's efficient diversification methodology (1952, 1991), Sharpe's reward to variability ratio (1966), Sharpe's random diversification (1964, 1970), and the naive diversification approach.

3. Methodology

In our study, we adopted the methodology of Markowitz (1952) to analyse diversification opportunities in 28 European stock markets. Efficient portfolios lie between the minimum variance portfolio and the maximum expected return (mean return) portfolio, regardless of the number of securities analysed. The expected return (1) and the portfolio variance (2) are determined by the classic Markowitz portfolio model

$$\bar{R}_P = \sum_{i=1}^{n} \bar{R}_i \, x_i \tag{1}$$

$$\sigma_p{}^2 = \sum_{j=1}^{n} \sum_{i=1}^{n} x_j \, x_i Cov(R_i, R_j) \tag{2}$$

with portfolio investments constraints

$$\sum_{i=1}^{n} x_i = 1 \tag{3}$$

and, if short selling is not allowed we add additional constraints

$$x_i \geq 0, \qquad i = \overline{1,n} \tag{4}$$

where, $\overline{R_i}$ represent expected return of assets, *i,n* is the number of different assets, and x_i share of total investment in assets *i*.

To evaluate the performance of different mean-variance portfolios, we use the reward to variability ratio. This ratio was developed by Sharpe (1966) and measures the average return above the risk-free rate per unit of standard deviation or total risk. When we subtract the risk-free rate from the expected return, investors can better isolate the risk premium associated with risk-exposed assets. The model can be summarized as follows:

$$Max\ Sharpe\ ratio\ = \frac{\bar{R}_p - r_f}{\sigma_p} \tag{5}$$

subject to constraints (1), (2) and (3). In case when short selling is not allowed, additional non-negativity constraints (4) was added.

When the risk-free rate is set equal to zero in objective function (5) we obtain the adopted Sharpe ratio, which should be maximized. This measure represents also the inverse coefficient of variation. A portfolio with the maximized adopted Sharpe ratio is the portfolio with the highest expected return per unit standard deviation. If short selling is not allowed, the sum of all investment weights should equal 1 (100%). If short selling is allowed, the weights can be negative.

Naive diversification means that investors invest the same amount of money in all *n* assets in their portfolios:

$$x_i = \frac{1}{n}, \qquad i\ = \overline{1,n} \tag{6}$$

Naive diversification does not aim to reduce risk and does not rely on past or historical data; it focuses on investing in a large number of assets with equal weights.

To test the integration of the European markets, we use Pearson correlation tests to estimate short-term integration and Johansen cointegration tests (Johansen 1988) for long-term integration. The simplest form of the test can be expressed by equation (7), where ΔY_t represents the differenced stationary data series, Γ_i the matrices of short-term correction coefficients, p the number of lags, ε_t the residual in the current period and Π the matrix of cointegration coefficients to measure the long-run relationships between the time series.

$$\Delta Y_t = \Pi Y_{t-p} + \Gamma_1 \Delta Y_{t-1} + \Gamma_2 \Delta Y_{t-2} + \cdots + \Gamma_{p-1} \Delta Y_{t-p+1} + \varepsilon_t \tag{7}$$

This equation models the dynamics of the cointegrating relationship between time series, taking into account the short-term correction between them. The rank of the matrix Π determines the number of cointegrating vectors and can be between 0 and the number of variables minus one. The Johansen cointegration test can be performed with two statistical tests: the trace statistic and the maximum eigenvalue statistic.

4. Data

To investigate diversification opportunities and asset behaviour in 28 European stock markets, we identified and analysed random mean-variance efficient portfolios and random equal-weighted portfolios constructed from stock market indices, i.e. based on complex and simple asset allocation approaches. The input data for our mean-variance analysis are the weekly values of 28 stock market indices, which provide a good measure of the performance of national markets. They were observed over two five-year periods, from September 2014 to August 2019, and February 2019 to January 2024, totalling 260 weeks in each sample and resulting in approximately 14,000 input data. These two periods are overlapping for 7 months in 2019. Larger markets such as United Kingdom[1], Germany and France are represented by broader stock market indices, while smaller stock markets such as Malta, Slovenia and Luxembourg are represented by narrower indices due to their market size. The MSCI Europe Index, as one of the best representatives of the European market, was used as a benchmark index in the analysis. It includes 439 stocks and covers 85% of the free float-adjusted market capitalization of the 15 developed markets in Europe[2]. The input data is obtained from the official websites of the 28 European national stock exchanges and from the website Yahoo Finance.

Since the risk-free rates are country-level statistics, while our analysis covers 28 stock markets, we adopted the Sharpe ratio by setting the risk-free rate equal to zero in model (5), i.e. we calculated the inverse coefficient of variation ratio, as a measure of portfolio performance. This measure indicates how much the mean return changes relative to the standard deviation. It therefore measures relative variability and allows us to measure risk-adjusted returns. Our analysis is conducted with full (nominal) returns, not excess returns. Country-specific risk, which is included in the country risk premium, is not subject of our analysis. Our analysis is not about predicting returns, but about comparing portfolio performance. Therefore, the inverse coefficient of variation, i.e. the adopted Sharpe ratio, is used as an appropriate measure of portfolio performance (further mostly

Table 1. Descriptive statistics of indices returns and unit root test results

Country (Index)	Period 2014 to 2019				Period 2019 to 2024			
	Mean	Standard Deviation	Adopted Sharpe ratio[1]	Dickey-Fuller test for first difference	Mean	Standard Deviation	Adopted Sharpe ratio[1]	Dickey-Fuller test for first difference
Austria (ATX)	0.001087	0.023516	0.046215	-16.25 ***	0.001188	0.034456	0.034491	-13.25 ***
Belgium (BFX)	0.000611	0.020642	0.029591	-16.39 ***	0.000603	0.029556	0.020388	-15.63 ***
Bulgaria (SOFIX)	0.000164	0.013502	0.012168	-14.39 ***	0.001344	0.018290	0.073479	-12.05 ***
Croatia (CROBEX)	0.000136	0.011957	0.011414	-13.79 ***	0.001799	0.018896	0.095209	-12.74 ***
Cyprus (CYFT)	-0.000912	0.019975	-0.045648	-16.36 ***	0.003511	0.026286	0.133573	-12.93 ***
Czech Rep. (PX)	0.000297	0.017039	0.017437	-15.47 ***	0.001575	0.024361	0.064661	-13.75 ***
Denmark (OMXC20)	0.001543	0.022810	0.067632	-15.94 ***	0.004034	0.027085	0.148926	-17.59 ***
Estonia (OMXTGI)	0.001928	0.012052	0.159946	-14.49 ***	0.001660	0.021221	0.078206	-14.04 ***
Finland (OMXH25)	0.001201	0.022188	0.054124	-18.24 ***	0.000787	0.028241	0.027874	-15.56 ***
France (CAC 40)	0.001033	0.022931	0.045043	-16.92 ***	0.002087	0.029610	0.070485	-16.08 ***
Germany (HDAX)	0.001365	0.023304	0.058556	-16.93 ***	0.001981	0.029477	0.067201	-15.61 ***
Greece (ATHEX)	0.024048	0.462322	0.052016	-18.83 ***	0.003241	0.036762	0.088157	-14.19 ***
Hungary (BUX)	0.003129	0.019959	0.156762	-16.69 ***	0.002363	0.029575	0.079895	-15.47 ***
Ireland (ISEQ 20)	0.000946	0.021417	0.044177	-16.09 ***	0.002265	0.032774	0.069123	-16.83 ***
Italy (FTSE MIB)	0.000334	0.026316	0.012679	-15.35 ***	0.002311	0.032029	0.072162	-14.77 ***
Latvia (OMXRGI)	0.003534	0.020279	0.174262	-16.91 ***	0.001495	0.021523	0.069455	-16.52 ***
Lithuania(OMXVGI)	0.001658	0.011919	0.139076	-18.41 ***	0.001663	0.015875	0.104753	-13.03 ***
Luxembourg (LUTX)	-0.000543	0.028698	-0.018911	-18.14 ***	0.000978	0.038503	0.025414	-16.84 ***
Malta (MSE)	0.001415	0.009086	0.155722	-14.69 ***	-0.000525	0.015987	-0.032843	-13.58 ***
Netherlands (AEX)	0.001316	0.021463	0.061333	-16.06 ***	0.002077	0.026853	0.077341	-15.81 ***
Poland (WIG 30)	-0.000174	0.021477	-0.008121	-17.05 ***	0.000885	0.033565	0.026379	-14.75 ***
Portugal (PSI 20)	-0.000538	0.023907	-0.022491	-16.09 ***	0.001146	0.026234	0.043684	-14.76 ***
Romania (BET)	0.001254	0.022203	0.056477	-17.08 ***	0.003124	0.025077	0.124582	-16.94 ***
Slovakia (SAX)	0.002188	0.021632	0.101136	-22.15 ***	-0.000123	0.018982	-0.006495	-17.34 ***
Slovenia (SBITOP)	0.000323	0.013671	0.023615	-15.82 ***	0.002054	0.022365	0.091834	-13.47 ***
Spain (IBEX 35)	-0.000603	0.024550	-0.024542	-16.45 ***	0.000957	0.030175	0.031709	-15.07 ***
Sweden (OMX 30)	0.000727	0.021776	0.033394	-17.11 ***	0.002069	0.027391	0.075531	-16.19 ***
UK (FTSE 100)	0.000361	0.018366	0.019665	-16.67 ***	0.000580	0.023982	0.024175	-16.31 ***
EU (MSCI EUROPE)	-0.000157	0.019293	-0.008130	-16.55 ***	0.001411	0.029959	0.047102	-16.31 ***

***significant compared with 1% Critical value -3.459

[1] Risk-free rate assumed to be equal to zero.

referred just as Sharpe ratio for simplicity). Table 1 showcases descriptive statistics for the returns of selected stock indices for both periods.

The ADF test, utilized as a unit root test, assessed the stationarity of indices returns. The findings suggest that all indices values are integrated of order one, I(1), thereby implying that the first differences of the index value display stationarity.

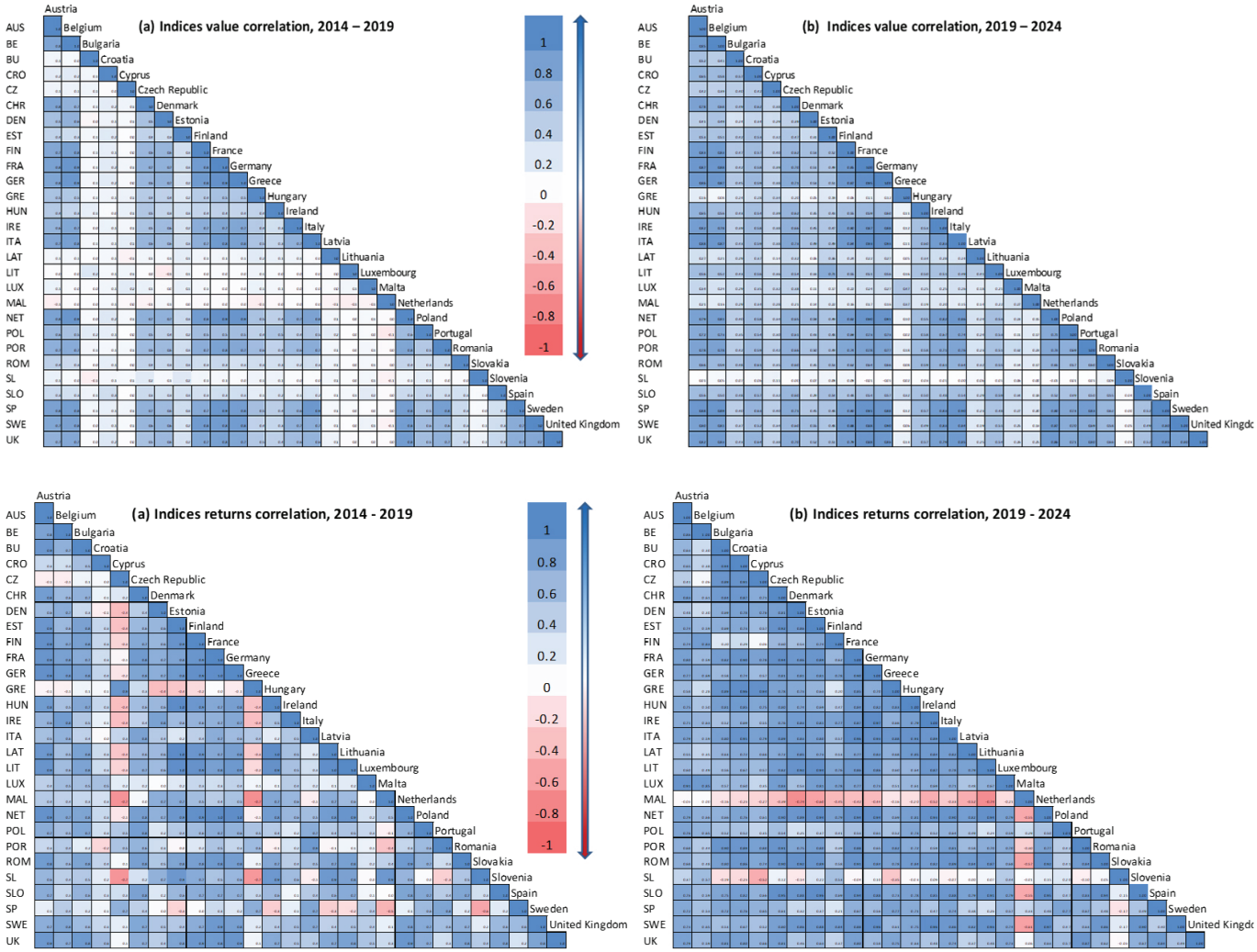
5. Analysis and results

To analyse the impact of international diversification on portfolio performance within the analysed European stock markets, we formed unique 200 international portfolios consisting of varying numbers of randomly selected stock indices, along with one portfolio comprising of 28 indices, across

three different scenarios, and for two periods. In total approximately 1,200 portfolios of different sizes have been created, comprising from one to 28 assets each. A random selection of subsets, consisting of 5, 10, 15 or 20 indices from a set of 28 observed indices, was made using a random number generator in Excel (pseudo-random numbers). Each index was assigned a randomly generated value. The 5, 10, 15 or 20 smallest random numbers were then selected and the corresponding indices were included in the mean-variance portfolio optimization model. The scenarios are three portfolio creation approaches, i.e. without short selling (Scenario 1), with short selling (Scenario 2), and with a simple, naive diversification with equal weights (Scenario 3). We aimed to assess whether greater international diversification contributes to improved portfolio performance by analysing randomly created index portfolios of different sizes in these scenarios across two distinct periods. The variance-covariance matrix serves as the foundation for crafting an optimal portfolio in Scenario 1 and Scenario 2. Utilizing this matrix we computed each portfolio's mean, variance, and Sharpe ratio. The contribution of each index within the portfolio was adjusted to maximize the Sharpe ratio.

The importance of diversification potential increases notably with the ongoing integration of the EU market. According to economic theory, diversification is possible when markets are not fully integrated, distinguishing between short-term and long-term integration. We wanted to find out whether the diversification opportunities are consistent with theory and whether the observed markets are integrated. Given that many authors use price (value) or return correlation as a measure of short-term integration (Goetzmann, Li, and Rouwenhorst 2005, Quinn and Voth 2008, Pan, Liu, and Roth 2010, Billio et al. 2017) and aware of the criticism of this way of measuring integration (Forbes and Rigobon 2002, Bekaert, Hodrick, and Zhang 2009, Pukthuanthong

Figure 1. Pearson's correlation matrix for indices values and returns in both periods



and Roll 2009), we report the values of the correlation matrix in both periods, Figure 1, for both indices values and indices returns. It can be seen that the blue colour predominates, indicating the unidirectional movement of most indices. When we compare the correlation matrices of the two periods, we find that the right hand matrices associated with the period of market turbulence have many more blue cells indicating a positive relationship with higher correlation coefficients, which is consistent with the previous findings (Kizys and Pierdzioch 2008, Tai 2018, Samitas et al. 2021). Additionally, the average coefficient of correlation among 28 national stock market indices is 0.29 during the period 2014-2019, and it increases to 0.46 during the period 2019-2024. Indeed, stock markets do correlate more in crises, indicating increased short-term association.

The time series under observation exhibit integration of order I(1). The presence of long-term cointegration in both time periods was assessed using the Johansen cointegration test, Table 2. Due to the number of variables involved, we only report the value of the trace statistic for the Johansen test. Since Johansen tests are sensitive to the choice of lag length, we selected the appropriate lag length based on the final prediction error (FPE), the Akaike information criteria, the Schwarz criteria and the Hannah-Quin criteria, which are listed in Table 2.

Based on the findings, we deduce the absence of any cointegration equations in either period, indicating a lack of long-term integration among the observed financial markets in Europe. Although European markets do show short-term integration, the long-term cointegration is not evident.

To examine the performance and diversification possibilities of the observed markets, we create 50 randomly generated portfolios consisting of 5, 10, 15, and 20 indices, and one portfolio comprising of 28 indices, based on mean-variance and naive diversification approach. The average Sharpe ratio for all three scenarios and all portfolio sizes in both time periods has been calculated. We analyse obtained ratios (1) within each scenario and (2) between different scenarios.

Table 2. Optimal Lag-Lengths and Johansen Cointegration test

Period 2014 to 2019						
Lag	**LL**	**LR**	**FPE**	**AIC**	HQIC	SBIC
0	-34427.4		7.2e+86	268.104	268.238	268.436
1	-28482.4	11890	5.2e+68*	226.322*	229.654*	234.608*
2	-28050.3	864.23	1.8e+69	227.442	233.973	243.682
3	-27591.1	918.27	5.8e+69	228.351	238.081	252.546
4	-271707	968.23*	2.1e+70	229.066	241.995	261.215
Johansen Cointegration test						
H0: No cointegration vector		H1: At least one cointegration vector			Trace statistics:1901.6519*[3]	
Period 2019 to 2024						
Lag	**LL**	**LR**	**FPE**	**AIC**	HQIC	SBIC
0	-35886.1		6.1e+91	279.456	279.589	279.787
1	-30268.8	11235	5.7e+74*	240.224*	243.556*	248.51*
2	-29738.9	1059.8	9.0e+74	240.583	247.144	256.823
3	-29246	985.83	2.3e+75	241.229	25.959	265.424
4	-28750	991.96*	7.3e+75	241.852	254.781	274.001
Johansen Cointegration test						
H0: No cointegration vector		H1: At least one cointegration vector			Trace statistics: 1892.8942*	

* Null hypothesis cannot be rejected.

Figure 2 represents the resulting Sharpe ratios, and it is evident that increasing the portfolio size leads to a better performance in terms of Sharpe ratio for both composite investment strategies, Scenario 1 and Scenario 2. Sharpe ratio values are lower in the second period in both scenarios. The second period is a period of turbulence in the economy and in the stock markets accompanied by high variability, so the risk-return ratio is lower. These results are in line with previous results from Danielsson, Valenzuela, and Zer (2018). Finally, average Sharpe ratios are obviously higher in Scenario 1 and 2, compared to Scenario 3.

Statistically significant differences in the Sharpe ratio between portfolios of different sizes across all three scenarios, considering both size and time, are presented in Table 3. Choice of tests used depended on the normality of returns tested by Shapiro-Wilk test.

Results from Table 3 show statistically significant increase in the Sharpe ratio at 1% level in all cases of actively managed mean-variance efficient portfolios, Scenario 1 and Scenario 2, in both periods. Significance of Sharpe ratio increase with respect to size is not so consistent in Scenario 3, and it is not even evident in the second period, except in one case. With naive diversification, the diversification effect is exhausted with 5 assets, and further increase of number of assets does not have a significant impact.

The mean-variance efficient portfolios from Scenario 2 are the best-performing portfolios for all sizes, followed by the mean-variance efficient portfolios from Scenario 1. In contrast, the simply managed portfolios from Scenario 3 have the worst performance, as shown in Table 4. Active portfolio management based on the Markowitz model of mean-variance efficient diversification, combined with the maximization of the Sharpe ratio, is clearly beneficial and can be further enhanced by short selling.

We have plotted the portfolios created to maximize the Sharpe ratio in Scenario 1 and Scenario 2, alongside the European national stock market indices and the MSCI Europe Index for both periods, as shown in Figure 3. As the size of the portfolio increases, the portfolios move upwards and to the left, indicating higher efficiency, consistent with our analysis. It is interesting to note that the randomly generated mean-variance efficient portfolios of different sizes form the familiar cloud of possible portfolios described by modern portfolio theory (Markowitz 1952). Figure 3 demonstrates that both the 15-indices and 20-indices portfolios offer a better risk-return trade-off compared to all national indices and the MSCI Europe Index. In the second period, the portfolio cloud shifts to the right for Scenario 1 and even further to the right for Scenario 2 with a higher upper bound, indicating a significant increase in risk along with the potential for substantially higher returns.

Figure 2. Average Sharpe ratio for mean-variance optimal portfolio (without and with short selling allowed) and equally-weighted portfolio

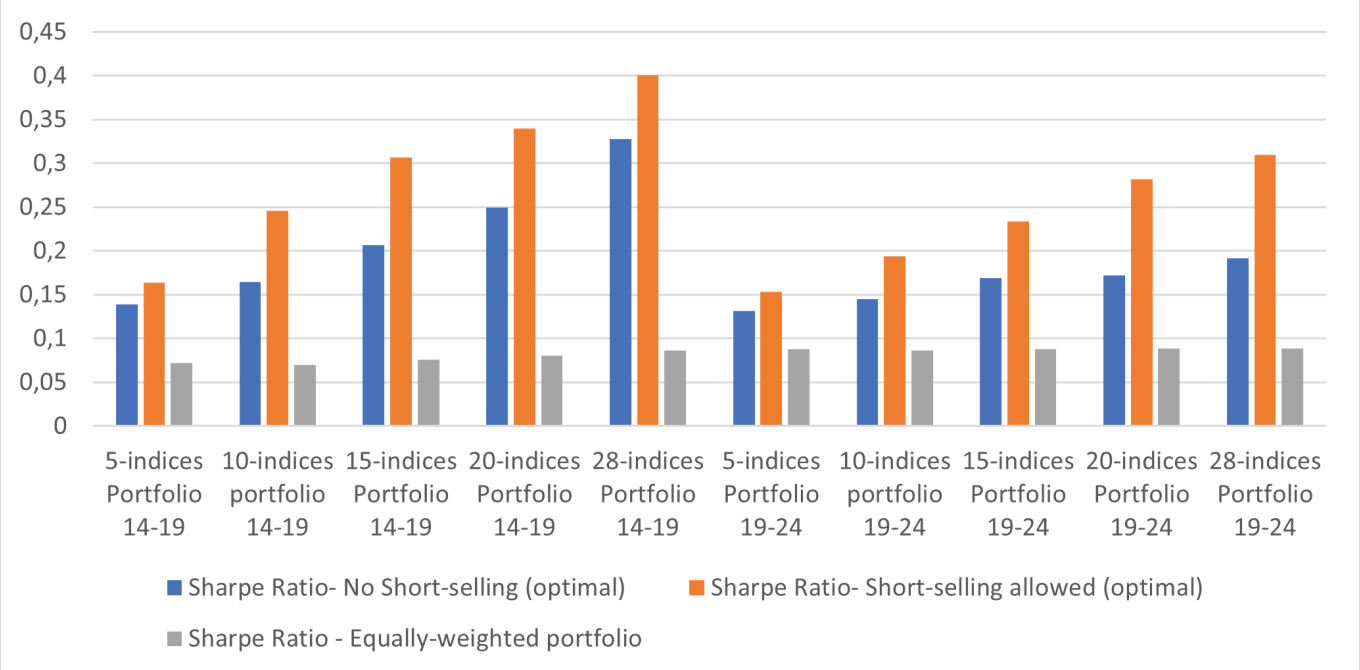


Table 3. Statistical tests for Sharpe ratio value distribution and differences within each scenario

	Scenario 1: No Short selling			Scenario 2: Short Selling allowed			Scenario 3: Naive diversification		
2014 - 2019	mean	z	Prob >z	mean	z	Prob >z	mean	z	Prob >z
One index	0.048434	2.040	0.021	0.048434	2.040	0.021	0.048434	2.040	0.021
Portfolio 5	0.140813	1.715	0.043	0.164064	2.129	0.017	0.071969	3.110	0.001
Portfolio 10	0.204709	0.427	0.335	0.245932	2.405	0.000	0.070108	3.671	0.000
Portfolio 15	0.254165	-0.206	0.581	0.306697	0.236	0.407	0.075809	2.605	0.005
Portfolio 20	0.282122	0.727	0.234	0.339623	1.787	0.037	0.080088	-1.073	0.858
H0: There is no difference between portfolios	Kruskal-Wallis	Chi2 =180.48,df=4 Prob =0.0001***		Kruskal-Wallis	Chi2 = 154.31, df=4 Prob =0.0001		Kruskal-Wallis	Chi2 =43.152, df=4 Prob =0.0001	
	Post Hoc Mann-Whitney 1 vs 5: z= -6.042, p=0.000*** 5 vs 10: z=5.846, p=0.000*** 10 vs 15: z= -6.542, p=0.000*** 15 vs 20: z= -4.605, p=0.000***			Post Hoc Mann-Whitney 1 vs 5: z= -5.523, p=0.000*** 5 vs 10: z=4.712; p=0.000*** 10 vs 15: z= -4.978, p=0.000*** 15 vs 20: z= -3.775, p=0.000***			Post Hoc Mann-Whitney 1 vs 5: z=-2.37, p=0.017** 5 vs 10: z=1.655; p=0.098* 10 vs 15: z=-3.185, p=0.001*** 15 vs 20: z=-2.902, p=0.003***		
	Scenario 1: No Short selling			Scenario 2: Short Selling allowed			Scenario 3: Naive diversification		
2019 - 2024	mean	z	Prob >z	mean	z	Prob >z	mean	z	Prob >z
One index	0.026727	-0.804	0.78932	0.0267272	-0.804	0.78932	0.026727	-0.804	0.78932
Portfolio 5	0.120718	0.036	0.48565	0.141360	-0.568	0.71501	0.087815	-0.249	0.59844
Portfolio 10	0.145342	0.706	0.24008	0.193573	-0.786	0.78421	0.086616	0.479	0.31594
Portfolio 15	0.165471	2.214	0.01341	0.270567	1.537	0.06210	0.088073	-0.916	0.82008
Portfolio 20	0.172482	2.607	0.00457	0.306697	1.295	0.09767	0.088596	0.026	0.48977
H0: There is no difference between portfolios	Kruskal-Wallis	Chi2 =79.59 p = 0.000		ANOVA	F(4, 222) = 525.60 p = 0.000		ANOVA	F(4, 224) = 112.88 p = 0.000	
	Post Hoc Mann-Whitney 1 vs 5: z=-7.35, p=0.000*** 5 vs 10: z=4.29; p=0.000*** 10 vs 15: z=-4.00, p=0.000*** 15vs 20: z=-1.71, p=0.007***			Post Hoc Bonferoni 1 vs 5: p=0.000*** 5 vs 10: p=0.000*** 10 vs 15: p=0.000*** 15 vs 20: p=0.000***			Post Hoc Bonferoni 1 vs 5: p=0.000*** 5 vs 10: p=1.000 10 vs 15: p=1.000 15 vs 20: p=1.000		

*** Indicates significance at the 1% level; ** Indicates significance at the 5% level; * Indicates significance at the 10% level.

Figure 3. Efficiency and risk-return trade-off analysis: created portfolios vs. national stock market indices in mean-variance space

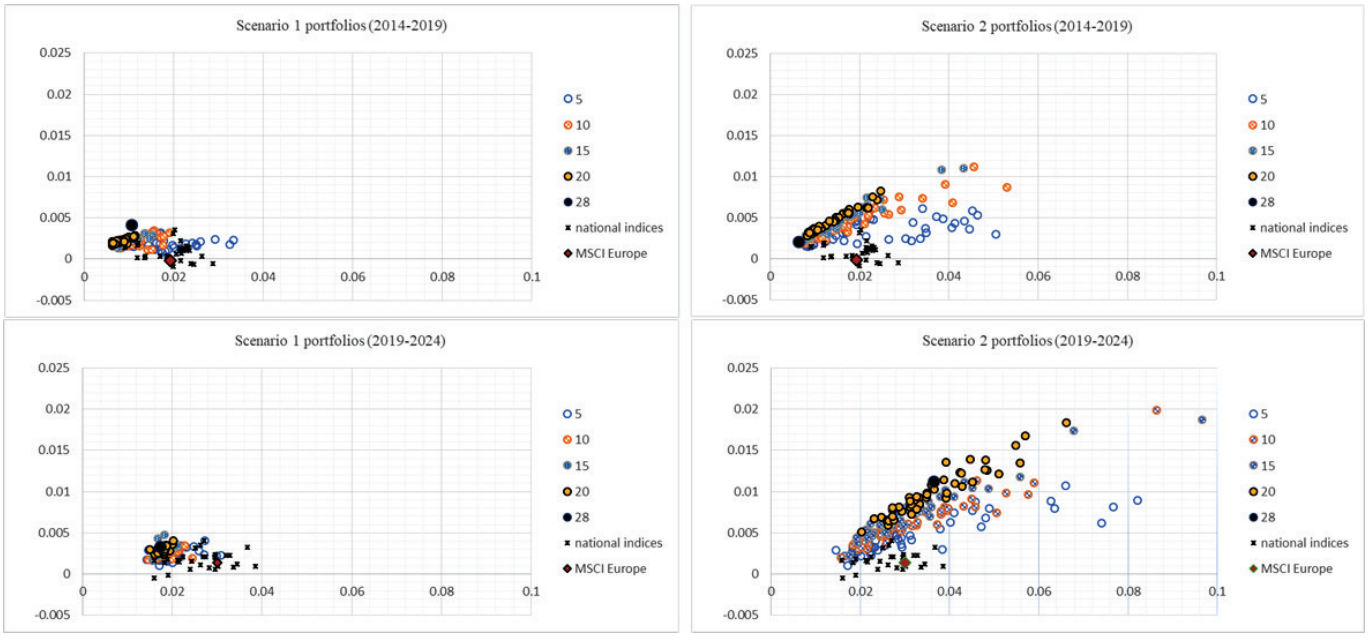


Table 4. Statistical tests for Sharpe ratio value differences between scenarios

2014 - 2019	**Scenario 3: Naive diversification**	**Scenario 1: No Short selling**	**Scenario 2: Short Selling allowed**
5 indices	Mean = 0.0719687	Mean = 0.140813	Mean = 0.164064
Equality of means	Scenario 3 vs. Scenario 1 t = -5.8888; df=85.06; p = 0.000***	Scenario 1 vs. Scenario 2 t = -1.7338; df=98; p = 0.086*	
10 indices	Mean = 0.0701077	Mean = 0.2047091	Mean = 0.2459324
Equality of means	Scenario 3 vs. Scenario 1 t = -17.9114; df=62.38; p = 0.000***	Scenario 1 vs. Scenario 2 t = -4.5207; df=98; p = 0.000***	
15 indices	Mean = 0.075809	Mean = 0.2541647	Mean = 0.3066974
Equality of means	Scenario 3 vs. Scenario 1 t = -32.0052; df=59.44; p = 0.000***	Scenario 1 vs. Scenario 2 t = -7.3715; df=98; p = 0.000****	
20 indices	Mean = 0.0800881	Mean = 0.2821223	Mean = 0.3396231
Equality of means	Scenario 3 vs. Scenario 1 t = -45.0717; df=52.62; p = 0.000***	Scenario 1 vs. Scenario 2 t = -10.6689; df=98; p = 0.000***	
2019- 2024	**Scenario 3: Naive diversification**	**Scenario 1: No Short selling**	**Scenario 2: Short Selling allowed**
5 indices	Mean = 0.075809	Mean = 0.1207176	Mean = 0.1413599
Equality of means	Scenario 3 vs. Scenario 1 t = -5.8584; df=90.46; p = 0.000***	Scenario 1 vs. Scenario 2 t = -3.2046; df=96; p = 0.002**	
10 indices	Mean = 0.075809	Mean = 0.1453416	Mean = 0.1935716
Equality of means	Scenario 3 vs. Scenario 1 t = -14.7960; df=78.96; p = 0.000***	Scenario 1 vs. Scenario 2 t = -9.5863; df=98; p = 0.000***	
15 indices	Mean = 0.075809	Mean = 0.1654707	Mean = 0.2355147
Equality of means	Scenario 3 vs. Scenario 1 t = -25.6434; df=74.11; p = 0.000***	Scenario 1 vs. Scenario 2 t = -16.6991; df=98; p = 0.000***	
20 indices	Mean = 0.075809	Mean = 0.1724821	Mean = 0.2705666
Equality of means	Scenario 3 vs. Scenario 1 t = -31.3326; df=65.50; p = 0.000***	Scenario 1 vs. Scenario 2 t = -23.3283; df=98; p = 0.000***	

*** Indicates significance at the 1% level; ** Indicates significance at the 5% level; * Indicates significance at the 10% level.

In Scenario 1, many indices underperformed and were not included in the calculated mean-variance portfolios due to the superior performance of other indices. However, in Scenario 2, where negative asset holdings are also possible, the performance of portfolios of all sizes improves significantly. The efficient portfolios expand and move upward. The primary advantage of Scenario 2 portfolios lies in the potential for higher returns rather than simply lower standard deviation compared to Scenario 1. Undoubtedly, larger portfolios contribute to a better risk-return trade-off.

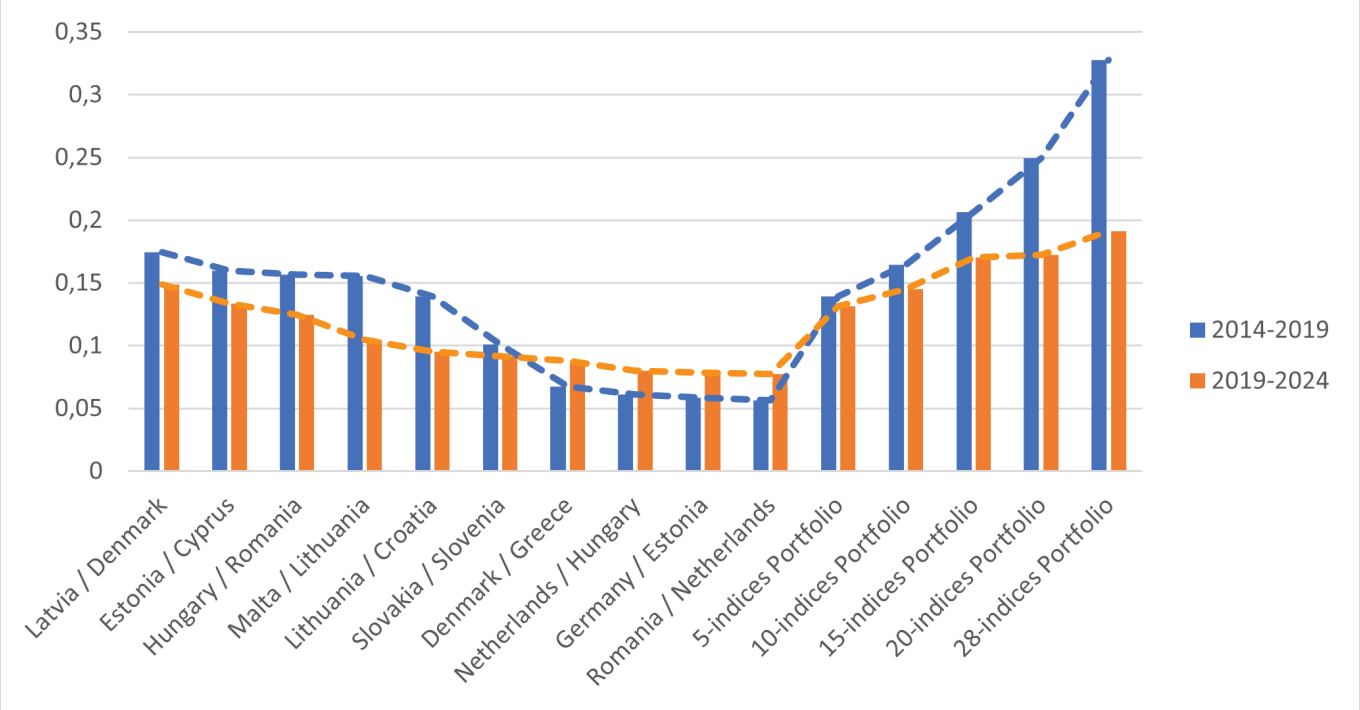
We conducted a comparative analysis between the comprehensive portfolio, comprising all 28 indices, and the benchmark, MSCI Europe Index, to gain insights into broader market performance. Remarkably, the MSCI Europe Index, which exhibited a negative Sharpe ratio, was consistently outperformed by all six 28-index portfolios, as shown in Table 5. Moreover, the standard deviation of portfolios in Scenarios 1 and 2 is notably lower compared to that of the benchmark MSCI Europe Index in the first period. Interestingly, the equally weighted 28-indices portfolio demonstrated nearly identical standard deviation to the MSCI Europe Index. However, during the second period, the standard deviation of the MSCI Europe Index increased significantly, indicating higher risk compared to both the Scenario 1 and Scenario 3 portfolios. Additionally, the mean return of the MSCI Europe Index also increased compared to the first period, but not sufficiently, as the MSCI Europe Index once again performed the worst in terms of the Sharpe ratio.

Next, we compared the performance of single-index and efficient mean-variance portfolios of different sizes from Scenario 1 to demonstrate the

Table 5. 28-indices portfolio and MSCI Europe Index

	2014-2019			2019-2024		
	St. dev.	Return	SR	St. dev.	Return	SR
Scenario 1	0.010566	0.004232	0.40053	0.01723	0.003297	0.191352293
Scenario 2	0.006349	0.002079	0.32745314	0.036428	0.011294	0.310036236
Scenario 3	0.019773	0.000157	0.00794012	0.018936	0.001683	0.088878327
MSCI Europe	0.019293	-0.000157	-0.00813767	0.029959	0.001411	0.0470977

Figure 4. Comparison of the Sharpe ratio of investments at the national and international levels



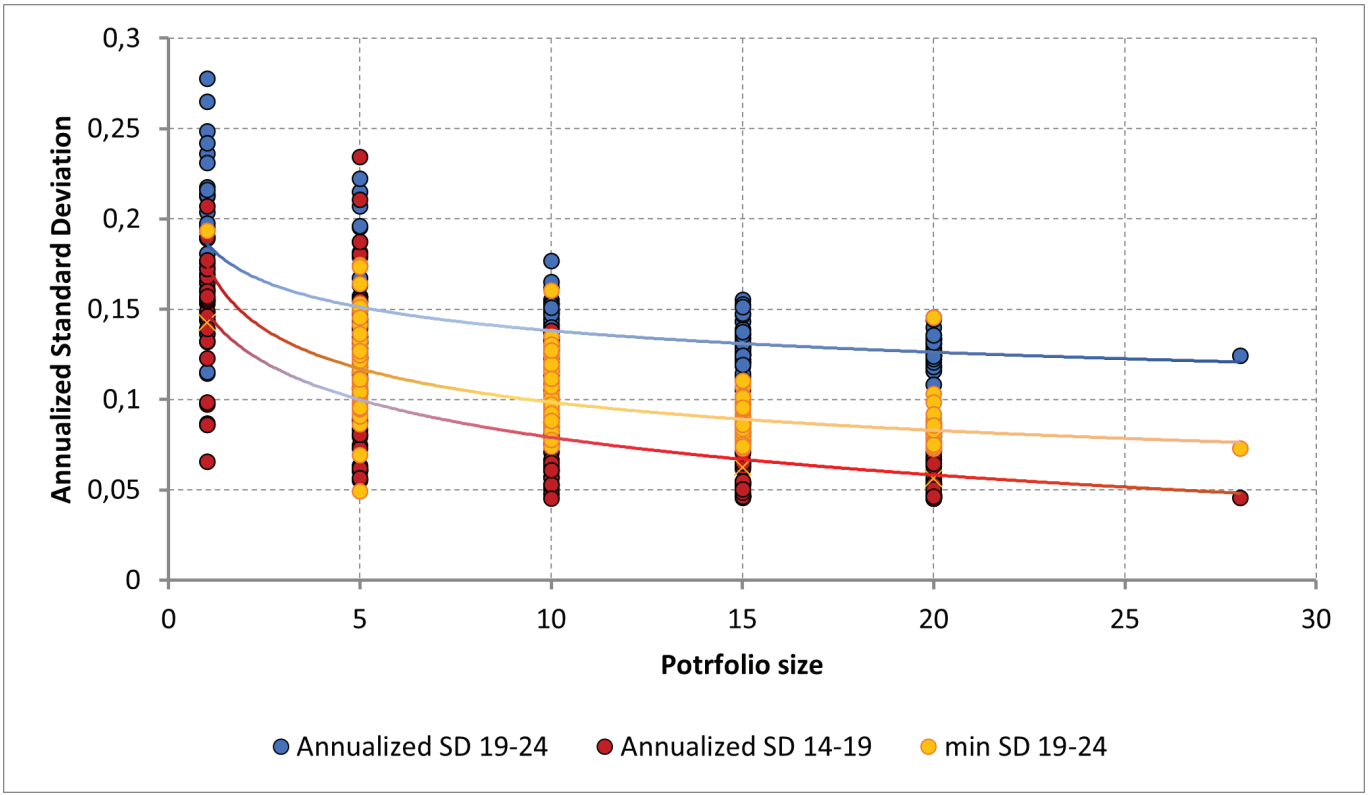
positive effect of international investments compared to the national level investments. Figure 4 includes only the top 10 individual indices ranked by the Sharpe ratio. Accordingly, the average Sharpe ratio value of a 10-indices portfolio outperforms the individual stock market indices, with the exception of Latvia. We find that investments in a 15-indices portfolio outperform all investments at the national level. Nevertheless, even the average 5-indices portfolio can be sufficient in most cases, with only 4 national indices outperforming a portfolio of this size (Latvia, Estonia, Hungary, and Malta).

Once again, we return to the fundamental concept of diversification, where a sufficiently large portfolio (even 10 or 15 indices in the case of the analysed 28 stock markets) consistently leads to improved performance. In the second period, this contribution remains evident and 15-assets portfolio outperforms the leading index (Denmark). Furthermore, in the second period, the increase in the Sharpe ratio as a measure of portfolio performance has diminished, indicating that the contribution from diversification is reduced during this period, as suggested by the entire analysis.

Our final analysis of the risk reduction opportunities in 28 European stock markets involves examining the impact of increasing portfolio size on the annualized standard deviation (SD) of portfolios in Scenario 1, where short selling is not allowed. This analysis considers two aspects: (1) maximized Sharpe ratio and (2) minimized standard deviation, from mean-variance model.

While an average stock has a standard deviation of about 35% (Brigham and Daves, 2012), the average standard deviation of the single European national stock market indices (excluding Greece as outlier)[4] was

Figure 5. Diversification effects in the European stock markets, Scenario 1 - short selling not allowed, during the periods 2014–2019 and 2019–2024



14.2% in the first observed period and 19.2% in the second period (the first dataset from the left in Figure 5). With an increase in portfolio size, formed based on the Sharpe ration maximization, the reduction in standard deviation is as follows:

- 5-indices portfolios: reduced SD to 11.1%, or for 22.3% (14.4%, or for 25.2% in the second period),
- 10-indices portfolios: reduced SD to 8.3%, or for 42% (13.7%, or for 28.7% in the second period),
- 15-indices portfolios: reduced SD to 6.2%, or for 56.3% (13%, or for 32.2% in the second period),
- 20-indices portfolios: reduced SD to 5.6%, or for 60.5% (12.7%, or for 33.7% in the second period),
- 28-indices portfolios: reduced SD to 4.6%, or for 67.9% (12.4% or for 35.3% in the second period).

Moreover, Figure 5 showcases the lower limit for the standard deviation reduction during the period 2019 – 2024, calculated based on the minimum standard deviation values by the mean-variance model. The yellow line, min SD 19-24, represents the lowest possible risk level of the analysed stock markets during the second period, with the following distinct average values displayed in Figure 5 (from left to right): 19.2%, 11.8%, 10.4%, 8.7%, 8.4%, and 7.3%. A substantial rise in risk within the same markets across these two distinct periods is evident. The annualized SD 14-19 line is still below the min SD 19-24, indicating that portfolios formed based on Sharpe ratio maximization criteria during the first period have lower risk not only than equivalent portfolios from the second period but also than portfolios that minimize standard deviation by the mean-variance model from the second period.

Diversification effects are evident in both periods, as we have demonstrated that increasing the number of indices in a portfolio significantly reduces risk. However, risk measured by standard deviation is higher, and diversification opportunities are substantially reduced in the second period (almost to the half, i.e. 67.9% vs. 35.3% for 28-asset portfolios).

6. Discussion

Our study shows positive short-term correlations among 28 European stock markets, which is consistent with the previous research of Pan, Liu, and Roth (2010). The analysis reveals that the average correlation in these markets increased by 57.8%, from 0.29 to 0.46, between the stable period of 2014–2019 and the period characterized by the COVID-19 recession and Russian aggression in Ukraine, 2019–2024, resulting in fewer diversification possibilities. Similarly, Samitas et al. (2021) found increased market

correlations and reduced diversification during the COVID-19 pandemic. We found no evidence of long-term relationships between the analysed markets, as measured by Johansen's cointegration equations, in either period, in line to previous research (Nedunchezhian and Sakthia 2019). In addition, our analysis supports previous findings regarding the role of correlation analysis in explaining fluctuations in diversification benefits (Billio et al. 2017). Increased correlation between the analysed indices leads to reduced diversification, and correlation coefficients effectively explain diversification possibilities. Thus, the analysed European stock markets are positively associated in the short run but are not integrated in the long run.

As expected from Markowitz (1952) and Sharpe theory (1964, 1970), we find that larger portfolios dominate smaller portfolios. We find that portfolio performance, measured by the adopted Sharpe ratio (inverse coefficient of variation), increases significantly with portfolio size for both active investment strategies based on the mean-variance method (both without and with short selling). On the other hand, the diversification benefits are limited in the case of naive diversification, and they are exhausted with only 5 assets during the turbulent period of 2019–2024, so further increases in portfolio size do not significantly improve portfolio performance. Our contribution is the finding that increasing portfolio size based on naive diversification has a very limited effect on portfolio performance, i.e., the reward-to-variability ratio, in turbulent times. The adopted Sharpe ratio does not change significantly.

In terms of the reward-to-variability ratio, the best-performing portfolios across all sizes are the mean-variance efficient portfolios with short-selling (Scenario 2), mainly due to their higher returns rather than lower risk, followed by the mean-variance efficient portfolios without short selling (Scenario 1). Simply managed portfolios, i.e., equally weighted portfolios (Scenario 3), have the worst performance among all three investment strategies. In contrast to our findings, DeMiguel, Garlappi, and Uppal (2009) suggests that optimal diversification outperforms naive diversification only when unsystematic risks are high, while Platanakis, Sutcliffe, and Ye (2021) find only minimal differences between optimal and naive diversification.

With the increase in portfolio size of actively managed portfolios, the Sharpe ratio does increase, even in the turbulent period. However, the Sharpe ratio increases at lower rates during crises compared to stable periods, confirming reduced diversification opportunities during the period 2019-2024. This finding aligns with previous research by Chiou, Lee, and Chang (2009), who found benefits of international diversification despite the increasing integration of financial markets. You and Daigler (2010) also found different diversification benefits over time, while Meric, Ratner, and Meric (2008) suggest that diversification benefits very depending on market conditions.

The average annualized standard deviation of the single European national stock market indices has increased from 14.2% in the period 2014–2019 to 19.2% in the period 2019–2024. These levels of standard deviation can be seen as proxies for average market or systematic risk of a well-diversified portfolios in the analysed countries and observed periods, what is a practical implication of our study. If an average stock has a standard deviation of 35% (Brigham and Daves 2012), our findings based on stable period data show that, on average, 59.4% of that risk was diversifiable or unsystematic risk, while 40.6% accounted for un-diversifiable or systematic risk. These diversification benefits are somewhat better than results from financial theory, where portfolio expansion reduced an average single-stock standard deviation of 35% to about 20%, representing a 42.9% reduction in risk (Brigham and Daves 2012). However our somewhat better results might be accounted to active investment strategies based on mean-variance model and the adopted Sharpe ratio maximization. In the second period, the volatility of stock returns increased, as did the level of systematic risk. Still further risk reduction is possible through international diversification.

Increasing portfolio size by spreading investments across other markets, where portfolios are formed based on Sharpe ratio maximization criteria, enables additional reduction in portfolio standard deviation. In the first period, international 20-indices portfolios diversify 60.5% of the average systematic risk in analysed markets, whereas in the second period, they diversify only 33.7% of the systematic risk. Turbulent times, such as those from 2019–2024, significantly reduce risk diversification possibilities, almost halving them compared to the stable period of 2014–2019.

In the second period, the standard deviation could be lowered to 7.3% with a minimum standard deviation portfolio generated from all 28 indices based on the mean-variance model. However, this portfolio would require investments in six country indices with belonging weights (e.g. Exchange Traded Funds): Bulgarian SOFIX (8.3%), Denmark's OMXC20 (3.8%), Latvian OMXRGI (8.3%), Lithuanian OMXVGI (22.7%), Malta's MSE (30.1%), and Slovakia's SAX (26.8%).

7. Conclusion

Our analysis has demonstrated the existence of a diversification effect in the 27 EU and the UK stock markets, albeit less pronounced in turbulent market conditions. While we did not detect a pattern of long-term relationships, nor did the Johansen test indicate the presence of long-term relationships between the markets in both periods observed, short-term correlations showed a greater association during unstable market periods, which is directly related to the smaller diversification effect measured. Additionally, the comparative analysis of the different time periods revealed higher risk during turbulent periods, with even the lowest possible risk, measured by the standard deviation of the portfolio, in the second period being significantly higher than the risk that could be achieved under relatively stable market conditions.

The main contribution of this study lies in the design, implementation, and performance measurement of the complex investment strategy, which was found to be superior to the basic investment strategy of portfolio equal weighting, in the analysed markets and periods. In times of crises and recession, the same number of assets in a portfolio results in fewer diversification effects. Additionally, increasing the portfolio size reduces portfolio risk more slowly than during stable periods. Hereby, we contribute to the discussion on the number of assets needed to diversify risk in an international context.

Our results support the idea of international investment within the 28 European countries. Risk can be reduced below the level of national systematic risk, which is the fundamental concept of the international diversification process. We can conclude that the stock markets of the 28 European countries are not fully integrated; assets with the same risk do not offer the same expected returns, and there are significant diversification opportunities in the markets analysed. Diversification opportunities are greater when short selling is allowed and lower in turbulent times.

This study has several limitations. We utilized national stock indices as proxies for national stock portfolios, but other criteria could be employed to construct portfolios, and different investment strategies could be used to explore diversification benefits further. We measured portfolio performance using the adopted Sharpe ratio or inverse coefficient of variation; however, including the risk-free rate in the analysis and employing other measures of portfolio performance, such as the Treynor ratio and Jensen alpha, could provide additional insights. Standard deviation served as a measure of portfolio risk, but other measures like semi-variance, the mean absolute deviation, or CVaR could also be considered. We did not consider the costs associated with investing, such as transaction costs and management fees, particularly important when implementing active investment strategies. Further research could focus on addressing the limitations identified in this study.

Investors can select investment strategies and tailor their investments based on the findings of this study, aligning them with their investment goals and their level of risk aversion. Our results have implications beyond investors, portfolio managers and mutual fund managers; they are also relevant for policymakers in the EU and the UK. By measuring the potential for diversification between the analysed stock markets in two distinct periods, one of which was characterized by the Covid-19 recession and Russian aggression in Ukraine, our findings offer valuable insights into market integration and dynamics, and risk management strategies.

Endnotes

1 In the observed period from 2014 till 2019 the UK was a EU member state. The UK left the EU on 31st January 2020. We kept the UK in our sample in both analysed periods.

2 15 Developed Markets countries in Europe covered by MSCI Europe include 12 leading EU countries, the UK, Norway and Switzerland.

3 Although our data set includes 28 variables, the used software packages do not provide critical values for the trace statistics for more than 12 variables. Results indicate the rank size with an asterisk (*), which means that the null hypothesis cannot be rejected.

4 The national index of Greece was excluded from the dataset presented in first column of Figure 5 as outlier, with extreme value of the annualised standard deviation of 333%. However, it was included in all other datasets presented in Figure 5.

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THE DETERMINANTS OF THE INCIDENCE OF EMPLOYER-PROVIDED TRAINING IN THE WESTERN BALKANS

Ardiana Gashi and Nick J. Adnett

Abstract

If the standards of living in the Western Balkans are to converge on those in the EU then the current productivity gap needs eliminating. A significant portion of that gap would ideally be eliminated through the expansion of employer-provided training. However, survey data indicate that since 2016 training incidence has been rising in only two of the six countries of the Western Balkans. The main contribution of this paper is to investigate this disappointing performance. A model of the determinants of the incidence of employer-provided training is developed based on theory and investigations in other countries. It is found that in the Western Balkans firms with foreign owners, those who export and those who report that their employees are eager to access training are more likely to provide training, whilst micro and small firms are less likely to provide training. Sentiments regarding the firm's and economy's current performance and their prospects are also significant determinants. The policy implications of these findings are addressed in the concluding section.

Keywords: *Employer-provided training, Western Balkans.*

JEL Classification: *J24, D22, E24, N34.*

1. Introduction

Employer-provided training provides a vehicle for raising labour productivity and in the context of the Western Balkans (Albania, Bosnia and Herzegovina, Kosovo, Montenegro, Northern Macedonia and Serbia) it provides a potential means for closing the productivity gap with the EU Member States. Little is known about the actual level of employer-provided training in these countries and the determinants of its incidence. To address this limitation, in this paper data from the annual Balkan Barometer Business Opinion Survey published by the Regional Cooperation Council (RCC) is used to provide insights into the provision of employer-provided training in these six Western Balkan Countries (hereafter WB6). Data from 2016 to 2023 is analysed and trends in the incidence of training are identified and compared across the WB6. A review of

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theory and empirical studies is then used to develop and test a model of the determinants of whether a firm in this region provide training. A novel element of this investigation is that a measure of the sentiments of businesses regarding their present and future assessment of the performance of their economy's and their own business is included in the model. Given the availability of longitudinal data on training incidence in this region, a secondary objective of this study is to analyse whether the advent of the COVID pandemic had any impact on firm behaviour. To investigate this objective empirical analysis is undertaken using pooled data from year 2020 and 2023.

The paper is organised as follows. The next section briefly reviews the economic analysis of training decisions and notes the limitations of the dominant human capital approach. This is followed by a review of the literature which seeks to explain the persisting large differences in the incidence of employer-provided training across countries. The fourth section introduces the data from RCC's Balkan Barometer Business Opinion Survey and explains the chosen empirical methodology. This is followed by a section which identifies the main findings of the empirical analysis. The concluding section identifies the main contribution to knowledge of the analysis and examines their implications for the future economic development of the WB6.

2. The economics of training

As the nature of work changes, firm-provided training becomes a more critical determinant of economic performance (Dostie 2020). As the speed of technological change increases, employer-provided training is likely to play an increasingly important role in raising labour productivity in the WB6. The COVID pandemic crisis is also likely to have created opportunities for firms to invest in the skills their employees need to adapt to remote working (Martins 2021). Black et al. (2023) estimate that in developed economies firm-provided training accounts for a larger share of an economy's human capital stock than does formal schooling. They argue that in total, society spends more time and resources on training than on formal schooling. However, these authors note that the literature on the economics of education vastly exceeds that on the economic analysis of firm-provided training. This imbalance they largely attribute to the quality of the data available, more specifically the large measurement errors associated with both workers' and employers' levels of reported training, and the problems in agreeing appropriate definitions of what constitutes employer-provided training.

The economic analysis of training has long been dominated by Mincer (1962) and Becker's (1964) human capital approach. Firms and workers in competitive and frictionless markets have an incentive to invest in training where the marginal benefits exceed the marginal costs of undertaking training. This approach makes a key distinction between general and specific training. The former develops skills which are transferable between employers and the latter develops skills which raise a worker's productivity only with a specific employer. Only the latter training will be financed by employers since the wage premium earned by those with completed general training creates an incentive for workers to fund such training voluntarily. The Becker-Mincer approach views poaching benignly, since employers only fund specific training costs, and such training does not raise a workers' productivity outside of their current employment. However, Picchio and van Ours (2011) and Brunello and Wruuck (2020) argue that in the presence of monopsony a poaching externality leads to under-investment in training.

In practice it has been difficult to make a clear distinction between these two categories of training and firms frequently seem to contribute to the costs of what appears to be general training (Brunello and Wruuck 2020). Acemoglu and Pischke (1999) identify reasons why firms may fund even general training. They explain how the presence of search, informational asymmetries, efficiency wages, minimum wages, trade unions and complementarities between general and specific training may give rise to employers funding general training. Black et al. (2023) bemoan the failure of economists to develop models which systematically address these weaknesses of the Mincer and Becker approaches. They argue that more attention needs to be placed on firm behaviour in imperfectly competitive labour markets, the impact of growing worker multi-dimensional skills and the interactions between search, hiring and training in the labour market.

3. Explaining cross-country differences in the incidence of training

Data from the OECD (2023a) suggest that around 40 per cent of workers participate in some form of firm-sponsored, employer-provided training in a year. Even if the simplest measure of the extent of firm training is taken, the incidence, different sources provide very different estimates of its prevalence. Within Europe the European Community Household Panel

(ECHP) and the Continuing Vocational Training Survey (CVTS) report very large national differences in the incidence of firm-provided training. Whilst the incidence of employer-provided training has been rising since 2005, there are only weak signs of convergence across countries (Brunello and Wruuck 2020). In Latvia, Lithuania and Romania firms report less than 10 per cent of their employees received training in the previous twelve months, with that ratio rising above 50 per cent in the Nordic countries and the UK.

Bassanini et al. (2007) investigated the causes of these large differences in training incidence in Europe. They hypothesised that countries with a high proportion of highly-educated workers and with high rates of investment in research and development would have a higher incidence of employer-provided training. Brunello and Wruuck (2020) point out that Eastern Europe has a smaller share of firms that provide no training than Southern Europe, even though they had similar average educational attainments and similar investments in research and development. This they speculate may be because Eastern European countries have lower levels of employment protection, lower average tenure and have been growing faster in recent years. Brunello and Wruuck also provide evidence that financially constrained firms in Europe invest significantly less in training. Pouliakas and Wruuck (2022) investigate the impact of COVID-19 on employer-provided training in Europe. They note that the European Investment Bank Investment Survey (EIBIS) indicates that the percentage of European firms investing in training had reached 67.5% of respondents by 2018/19, only to fall back to 54% in 2020/21. Until the emergence of COVID-19, all waves of the EIBIS had found that a shortage of appropriate skilled labour had been the most common impediment to investment cited by firms. However, in 2019/20 uncertainty about the future became temporarily the most cited impediment. Overall, Pouliakas and Wruuck found the impact of the pandemic on employer-provided training to have been uneven across firms and European countries, hence threatening the weak convergence process.

Researchers largely agree on the key determinants of employer-provided training. Large firms provide more training than small ones, which is commonly explained by the greater informational or credit constraints faced by the latter (Dostie 2020). For smaller firms learning-by-doing, usually not categorized as training, may be a close substitute for on-the-job training. Businesses in the WB6 who are partly or wholly foreign-owned are expected to be less credit constrained, and are more likely to introduce new working practices and new technologies requiring the re-training of workers (Carstensen and Toubal 2004). Whilst those businesses who export are more likely to have to provide training to reflect differing requirements regarding their products' quality, marketing and packaging. Firms based in urban areas providing less training than those in rural areas, reflecting the latter generally facing more problems in recruiting skilled workers. There are strong industry effects. The amount of firm-provided training also reflects on how well the schooling system prepares students for future employment. The observed large returns to experience and smaller returns to tenure suggests that general training dominates specific training (Black et al. 2023). Workers on flexible contracts and those without contracts are less likely to receive training (ILO 2016). Worker characteristics also influence the provision of training with a strong negative worker age effect. More educated workers and those in more skilled employment are more likely to receive employer-provided training (Dostie 2020). Surveys of empirical studies by Dostie (2020) and Martins (2022) indicate typically large benefits to firms providing training in the form of higher productivity and increased innovation.

Nazarov and Akhmedjonov (2012) using data from the 2002 and 2005 waves of the Business Environment and Enterprise Performance Survey (BEEPS) found that firms in Eastern Europe who provided training were more likely to innovate. Gashi and Adnett (2012) using the same data found that around half of firms in the Western Balkans had provided some training opportunities in the previous twelve months, with the incidence generally increasing over time. They also found that firms in the Western Balkans who innovated were more likely to provide training.

The above reviews of theory and empirical research inform the construction of the model developed below of the determinants of firm-based training in the Western Balkans. However, as is common in this field of study, data availability severely limits what analysis is feasible. The following investigation is limited to an analysis of training incidence, since no data is available on training intensity.

4. Data and methodology

To examine the determinants of training incidence, data is extracted from the RCCs Balkan Barometer Business Opinion Survey for the years 2020 and 2023, which are then pooled for regression analysis. The Survey has been carried out in the WB6 since 2015, collecting information on business perceptions and attitudes across a wide array of social, economic and environmental factors. However, differences in

the specific question asked and in the classification of responses limit analysis to data from the 2020 and 2023 surveys. Since the 2020 Survey was carried out before the arrival of the COVID-19 pandemic in the WB6 countries it is possible to analyse the impact of the pandemic on training incidence.

Table 1 provides an outline of the share of sampled businesses that funded or arranged any training and development for staff in the previous twelve months, including any informal on-the-job training, in all Business Opinion Surveys from 2016-2023. Training incidence appears to be very volatile in the WB6, this variability may in part reflect some changes across surveys of the wording of question asked businesses about their provision of training. The survey data shows very large year-on-year changes in and between the six countries. Comparing across countries, only Albania and Kosovo had increasing training incidence over this period.

Concentrating on the impact of the COVID 19 pandemic, the data indicates that in 2023 nearly 35% of businesses in the WB6 reported to have provided training, marking an increase by seven percentage points compared to pre-COVID 19 in 2020, but a fifteen percentage points fall from the peak incidence recorded in 2017. The largest shift since 2020 is noted in Kosovo with an increase from 22.5 to 54.4% and Albania with an increase from 17 to 41%, and the smallest increase is noted among businesses in Serbia (six percentage points).

The pooled sample size is 2,042 businesses. Probit regression commonly used when modelling binary outcomes and for predicting the probability of an event, is adopted to analyse the pooled dataset. The Probit model is estimated, to investigate the probability (Pr) of businesses funding or arranging training for their employees:

$$\Pr(Y = 1|X_i) = \Phi(\beta_i X_i)$$

where the dependent variable, Y, is equal to one 1 for companies that have funded or arranged any training and development for employees in the previous twelve months, including any informal on-the-job training and 0 for those that have not funded or arranged training and development for their employees; Φ is the Cumulative Distribution Function of the standard normal distribution and βi are the parameters of the explanatory variables X_i that will be estimated by maximum likelihood.

The above review of theory and previous empirical analyses suggests that the explanatory variables should be divided into three main groups: characteristics of businesses, labour supply related factors and firms' assessment of the current and future economic and business situation. In addition, year and country dummies are included.

Table 1. Training incidence- share of Western Balkan businesses that funded or arranged any training and development for staff in the previous twelve months: 2016 to 2023

	2016	2017	2018	2019	2020	2021	2022	2023
Albania	37.5	33.1	36.3	37.5	17.0	26.8	38.3	41.0
Sample size	117	124	160	221	163	200	162	162
Bosnia and Herzegovina	64.5	70.0	57.1	37.9	50.0	30.2	33.6	43.0
Sample size	162	172	228	208	218	200	217	216
Kosovo	27.7	31.0	23.5	22.7	22.5	21.7	70.2	54.4
Sample size	200	69	90	208	86	200	85	206
Montenegro	34.8	45.0	48.3	35.2	36.5	43.1	24.0	19.2
Sample size	39	42	59	227	61	200	59	59
North Macedonia	39.7	31.0	24.3	25.4	22.0	18.5	16.2	21.1
Sample size	91	109	147	205	137	200	136	135
Serbia	37.5	38.0	34.0	36.4	21.4	19.5	22.3	27.5
Sample size	410	394	516	202	550	200	544	544
All	40.4	50.0	37.5	32.6	28.3	26.5	29.3	34.6
Sample size	1,019	910	1,200	1,271	1,215	1,200	1,203	1,322

Source: RCC, Balkan Barometer Business Opinion Survey 2016 to 2023. Authors' calculations

Business characteristics

Two dummies are included to control for the impact of size of the businesses, the dummies for micro and for small businesses. To assess whether experience influences the training incidence a variable measuring the age of businesses is included. A binary variable is included to differentiate between manufacturing and other economic activities (equal to one for companies operating in the manufacturing sector and zero otherwise). Companies whose largest owner was foreign are allocated one in the ownership variable and zero otherwise. A variable is set to one if a business has exported goods or services in the last 12 months and zero if it did not export.

Labour supply related factors

In the surveys businesses were asked about whether the skills taught in the educational system currently meet the needs of the company, from which question a dummy variable is created set to 1 if a business responded that skills taught in the educational system did not meet the needs of the company and zero if it met their needs. A binary variable is included equal to 1 if a business indicated that skills and education of available workers is a major or a moderate obstacle for the operation and growth of their business and zero if it is a minor or not an obstacle. In the 2023 Survey, companies were asked if the brain drain is an obstacle for the operation and growth of their business, from which question a dummy is one if the company stated that the brain drain is a major or a moderate obstacle and zero if it is a minor or not an obstacle. In 2020 this question did not mention the brain drain specifically, rather it asked businesses if the migration crisis is an obstacle to the operation and growth of their business: a dichotomous variable equalling 1 if companies responded that migrations crisis is a major or a moderate obstacle and zero if migration crisis is a minor or not an obstacle. The training literature now recognises that the risk of poaching may deter employer-provided training, accordingly the analysis includes a dummy set to 1 for companies that responded that their workers are often poached or sometimes and zero if rarely or never. Employees' readiness to a acquire additional qualifications to get promoted are expected to influence employers' training provision, which is assessed through a dummy variable equalling one for businesses that responded that their employees are ready to acquire additional qualifications and zero otherwise.

Business perceptions

The Balkan Barometer Business Opinion dataset includes three Business Sentiment Indices. These aim to capture business sentiments and optimism regarding the present sand future situation. The indices are expressed on a scale of 0 to 100. The Balkan Barometer Business Opinion Index - present situation index is constructed from the following questions: how has your business situation developed over the past 12 months (deteriorated, remained unchanged or improved); how has demand for your company's products/services changed over the past 12 months (deteriorated, remained unchanged or improved); how has the general economic situation in your place of living changed over the past 12 (deteriorated, remained unchanged or improved). The Balkan Barometer Business Opinion Index is derived from the following two questions: 1) How do you expect the demand for your company's products/services to change over the next 12 months (will it decline, remain mostly unchanged or increase); and 2) how do you expect the general economic situation in your place of living to develop over the next 12 months (will it mostly deteriorate, remain unchanged or improve).

The indices are created from the weighted responses to these questions, with each first answer (satisfied, improved or increase) scoring 100 points, the second (neither satisfied or dissatisfied or remain the same) 50 points and the final answer scoring zero. After the answers were the recoded, the average value is calculated for the whole WB region, as well as for each country separately. The index takes a value between 0 and 100, with higher values indicating an improvement. In the specification below, the overall business sentiment (BBSI) is used being constructed from the average of the present and expected indices.

To examine any impact of the COVID pandemic on firm behaviour a year dummy for 2023 is added. To control for country differences, dummies are included for Albania, Bosnia and Herzegovina, Kosovo, Montenegro and North Macedonia. Given its generally stronger economic situation Serbia is used as the benchmark category.

Table 2 present descriptive statistics. Given that a subsidiary aim of this study is to examine changes pre and post the COVID-19 pandemic, descriptive statistics are provided separately for the 2020 and 2023 surveys and also for the pooled data. In both years micro and small enterprises account for about 80% of the total surveyed businesses. The average age of the enterprises surveyed was 16 years old. Manufacturing accounted for 15% of the businesses surveyed in 2023

Table 2. Descriptive statistics: 2020 and 2023 pooled data

Explanatory variables	2020	2023	Pooled 2020 and 2023
Business characteristics			
Micro: DV=1 if the business has less than 10 employees (*omitted category: medium and large companies*)	39%	35%	37%
Small, DV=1 if the business has between 10-49 employees (*omitted category: medium and large companies*)	42%	47%	44%
Age, number of years in operation since establishment of the business	16.4	16.0	16.3
Manufacturing, DV =1 if company operates in the manufacturing sector (*omitted category: non-manufacturing sectors)*	16%	15%	15%
Foreign investors, DV=1 if foreign owner is the largest one (*omitted category: domestic owner the largest investor*)	6%	3%	5%
Company exports, DV=1 if company exported in last 12 months (*omitted category: company did not export in last 12 months)*	27%	32%	30%
Labour supply factors			
Skills taught in the educational system do not meet the needs of my company, DV=1 if a business responded yes (*omitted category: skills taught in the educational system does not meet the needs of the company*)	22%	34%	28%
Skills and education of available workers obstacle to business operation and growth DV=1 if business responded yes (*omitted category: Skills and education of available workers is not an obstacle to business operation and growth*)	38%	56%	47%
Brain drain/migration crisis is an obstacle to the business operation and growth, DV=1 if yes (*omitted category: brain drain/migration crisis not an obstacle to business operation and growth)*	26%	66%	46%
Workers poached often or sometimes, DV=1 if a business responded yes otherwise (*omitted category: workers rarely or never poached)*	28%	37%	33%
Employees are ready to acquire additional qualifications in order to get promoted, DV=1 for businesses that responded yes (*omitted category: employees not ready to acquire additional qualifications in order to get promoted*)	56%	53%	54%
Business perceptions			
Balkan Barometer Business Sentiment Index	66	58	61.9

Source: RCC, Balkan Barometer Business Opinion Survey 2020, 2023. Authors' calculations.

and 16% in 2020. A smaller share of businesses with foreign investors as the largest owners was evident in 2023 (3% compared to 6% in 2020). In 2023, 32% of business reported to have exported goods or services in last 12 months compared to 27% in the 2020 survey.

With regards to labour supply factors, data indicate a more concerning picture in 2023: in that year a third of surveyed businesses noted that the skills taught in the educational system did meet the needs of their company (up from just over a quarter in 2020) and over half of the businesses considered that skills and education of available workers was a major or moderate obstacle to the operation and growth of their business. In 2023 two-thirds of businesses stated that the brain drain was a major or moderate obstacle, a very large increase compared to the responses to the 2020 question on the impact of the migration crisis. The survey responses suggest that poaching was also more prevalent in 2023. A similar share of companies in these two surveys indicated that workers were ready to acquire additional qualifications to get promoted. The BBSI was slightly higher in 2020 than in 2023.

5. Empirical findings

While the Probit model has the benefit of imposing a 0-1 boundary for probability, the estimated coefficients alone do not measure the (magnitude of) marginal effect. The marginal probability effects are the partial effects of each explanatory variable on the probability that the observed dependent variable $Yi = 1$.

Business characteristics

As revealed in Table 3, micro and small businesses are significantly less likely to have funded or arranged any training and development for staff in the organisation, including any informal on-the-job training, by 17 and 13 percentage points respectively. The age of the business does not have a statistically significant impact on training incidence. There is also no statistically significant difference in training and development of employees between manufacturing and non-manufacturing businesses. Compared to businesses with a domestic owner as the largest owner, those with foreign investors as the largest owners were more likely to fund or arrange any training and development of their employees. In comparison to businesses that did not export in the previous 12 months, those that had exported were more likely to fund or arrange any training and development of their employees.

These results were robust to various changes in the specification of the model. A dichotomous variable indicating whether the business was affected by credit constraints was added to the preferred model,

Table 3. Determinants of training provision, Probit marginal effects, 2020 and 2023 pooled data

Explanatory variables	MFX	Z-score	p-value
Business characteristics			
Micro enterprise (DV)	-0.17***	-5.66	0.000
Small enterprise (DV)	-0.13***	-4.26	0.000
Age	0.00	-0.77	0.443
Manufacturing sector (DV)	-0.04	-1.15	0.250
Foreign investors (DV)	0.12**	2.16	0.031
Company exports (DV)	0.12***	4.41	0.000
Labour supply factors			
Skills taught in the educational system do not meet the needs of a company (DV)	0.03	1.01	0.314
Skills and education of available workers obstacle to businesses (DV)	0.12***	4.95	0.000
Brain drain is an obstacle to the business (DV)	-0.01	-0.25	0.803
Workers poached often or sometimes (DV)	0.00	0.10	0.917
Employees are ready to acquire additional qualifications to get promoted (DV)	0.31***	15.79	0.000
Business perceptions			
Balkan Business Sentiment Index	0.001***	2.94	0.003
Year dummy			
Year 2023=1	0.06**	2.57	0.010
Country dummies			
Albania	0.08	1.76	0.079
Bosnia and Herzegovina	0.28***	6.23	0.000
Kosovo	0.18***	3.85	0.000
Montenegro	0.06	1.41	0.158
North Macedonia	0.08*	1.80	0.071
Number of observations			2,042
McFadden's R2			0.19

Notes: *p < 0.1, **p < 0.05, ***p < 0.01; z-statistics; for dummy variables (DV), dy/dx is for the discrete change of DV from 0 to 1. Source: Authors' calculations.

but the variable was not statistically significant and the results outlined above were unaffected.

Labour supply factors

Results show no statistically significant difference in training provision between businesses that agree or do not agree with the statement that skills taught in the educational system do not meet the needs of their company,. Respondents that indicated that the skills and education of available workers was an obstacle to their operation and growth of their business were 12 percentage points more likely to fund or arrange employee training. Results suggest that training provision is not influenced by businesses' perception on whether the brain drain is an obstacle to business operation and performance. Similarly, the risk of their workers being poached was not found to impact on training incidence. Businesses with workers who are ready to acquire additional qualifications to get promoted are 31 percentage points more likely to fund or arrange employee training, than those whose employees were less enthusiastic.

Business perceptions

As expected, businesses that perceive the present and future situation as more favourable were more likely to fund or arrange training and advancement for their employees: ceteris paribus, on average, for every additional point increase in the Business Sentiment Index the probability of a business arranging or funding training increases by 0.1 percentage point. The results reveal that in 2023 the share of businesses that funded or arranged training for their employees increased significantly by 6 percentage points. This finding suggests an increase in training provision after the onset of the COVID pandemic.

With regards to country differences in training incidence, the regression results show that compared to Serbia, Kosovo, Bosnia and Herzegovina and North Macedonia were more likely to fund or arrange training.

6. Conclusions

Increased investment in human capital is crucial if the WB6 countries are to close the productivity gap with the EU countries. If competitiveness is to improve in the face of the rapidly changing technologies and tastes then the workforce's skills need to be continually updated. This requires that the education and training systems support a flexible and productive workforce.

Schwab and Zahidi (2020) point to the inability of the education system alone to equip workers for the rapidly changing labour markets. They report that across developed and developing economies, significant gaps have emerged between the current capabilities and skills of the workforce and those required by employers. They argue that education systems are increasingly outdated. The adequacy of local secondary education systems to meet the needs of employment was rated at just 59 points (out of 100) by business executives in advanced economies and 42 points (out of 100) by those executives in emerging and developing economies while the adequacy of tertiary education to meet the needs of employment was rated at 68 points (out of 100) in advanced economies and 55 points (out of 100) in emerging and developing economies. A 2021 OECD report highlights that while education systems have been thought of traditionally as independent entities, now they should be viewed as part of a larger eco-system to which they contribute and by which they are influenced. Given that participation in formal education is no longer sufficient, the role of employers to support the upskilling and reskilling of their workforce is becoming of central importance.

According to the 2023 Balkan Barometer Opinion Business Survey over a third of businesses in the Western Balkan countries consider that skills taught in the educational system do not meet the needs of their company, a proportion that has increased by a half since 2020. Lack of a skilled and educated workforce are considered as obstacle to their business operation and growth by more than half of surveyed businesses, once again this proportion has increased by almost a half since 2020. Results from the 2022 OECD Programme for International Student Assessment (PISA) examining 15 years old students' knowledge in mathematics, reading and science, and what they can do with that knowledge (OECD 2023b), places Western Balkan countries significantly below the OECD averages in reading, mathematics and science, with no significant improvements compared to the 2018 results. This suggests that the education systems in the WB6 are not showing signs of noticeable improvements and thus the role of employer-provided training is of crucial importance for workforce development. Hence the concern that between 2016 and 2023 amongst the WB6, only Albania and Kosovo showed an increase in training incidence.

Data from the 2020 and 2023 Balkan Barometer Business Opinion Surveys show that overall training incidence in the WB6 increased from 28% to 35% of businesses reporting that they had funded or arranged training and development for their staff .. The

regression analysis indicates that icro and small enterprises are less likely to provide training compared to medium and large sized ones A greater probability to train is found among companies that exported in the previous 12 months, those with foreign owner as the largest one, those that consider that skills and education of available workers an obstacle to their growth, and among businesses whose workers are ready to acquire additional qualifications to get promoted. Businesses that had more optimistic perceptions of present and future situation in the economy were significantly more likely to arrange or fund training. This latter finding opens the possibility of generating a virtuous circle in the Western Balkans. That is, the promotion of economic development generates increased optimism about the future business situation and leads to additional investment in training by firms and a gradual closing of the productivity gap with the EU.

Comparing pre and post COVID-19 data it can be noted that the prevalence of training incidence increased after the arrival of COVID-19. It is tempting to suggest that the COVID pandemic crisis may have created opportunities for firms to invest in the skills their employees needed to adapt to remote working. However, a more detailed examination reveals that training incidence fell in Bosnia and Herzegovina, Montenegro and North Macedonia after the emergence of the pandemic. Moreover, the overall rise in training incidence in the WB6 between 2020 and 2023 is almost wholly due to an abnormally low training incidence in Albania in 2020 and a sharp rise in Kosovo's incidence after 2021.

The rationale for government intervention to stimulate employer-provided training is generally based on the presence of capital market constraints and externalities (Brunello and Wruuck 2020). The former rests upon the proposition that financing constraints prevent firms from funding profitable training opportunities. Whilst under-investment may also result from the failure of training firms to internalise the benefits which other future employers of the trained workers receive. Moreover, under-investment may result from the inability of training firms to capture all the benefits of that training, given the ability of trained workers to re-negotiate or quit once training has been completed, the hold-up problem (Leuven 2003). Black et al.'s (2023) survey of the consequences of government interventions to stimulate firm training suggests most policy initiatives generate large deadweight effects as firms reclassify informal training to receive subsidies.

Recognising the relevance of the employer provided training, a recent OECD report (2021) emphasises that governments can support companies to provide training in ways that can lead to increases in productivity, wages, and overall levels of well-being. The resulting increased provision of training is likely lead to greater and faster innovation. Moreover, if training is targeted on those skills likely to become more important in the future and on those workers whose skills are likely to be displaced in the labour market, then labour market efficiency and equity improve. One proposal that could be considered in the Western Balkan economies is the provision of financial incentives to support enterprises, such as voucher schemes. Martins (2021) has shown that well-designed and targeted voucher/grant programmes can be an effective way of stimulating employer-based training without producing large deadweight effects. However, a common current weakness amongst the WB6 is the absence of rigorous empirical evaluations of implemented policies. This weakness needs to be addressed before governments in the Western Balkans significantly expand support for employer-provided training.

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THE IMPACT OF THE CRISIS INDUCED BY THE CONFLICT IN UKRAINE ON FIRMS: EVIDENCE FROM NORTH MACEDONIA

Marjan Petreski

Abstract

This paper evaluates the impact of the Ukraine conflict-induced crisis on firms in North Macedonia using data from a survey conducted with 112 firms in April and May 2023. Through descriptive statistics and probit regression analysis, we find that small firms in low-wage sectors predominantly coped with the crisis by raising prices of final products and services, followed by cost-cutting measures. Larger firms tended to invest in self-electricity generation or energy-saving equipment. Our results show that firms with higher energy cost shares increased final prices more but experienced decreased competitiveness. Firms not addressing rising costs did not consistently pass these costs onto prices or maintain competitiveness, except for labor costs. Labor cost increases, such as from minimum wage hikes, may lead to cost-push inflation unless firms absorb these costs at the expense of profits.

Keywords: *crisis, firm costs, firm competitiveness, North Macedonia*

JEL classification: *D24*

1. Introduction

Following Russia's invasion of Ukraine on February 24, 2022, Europe experienced a profound transformation in its political and economic landscape, defying previous expectations. In response, Western allies swiftly implemented multiple rounds of sanctions targeting Russia to sever its economic ties with European and American nations (UN 2022). While these sanctions primarily targeted the Russian economy, their repercussions extended globally (Borin et al. 2022; Darvas and Martin 2022), given Russia's role as a major exporter of essential commodities, particularly grains, food, base metals, and energy. Notably, European economies, including Germany, heavily relied on Russian gas, although supply remained stable until late 2022. The resulting economic shifts led to unprecedented market distortions.

Three key impacts emerged from this crisis. Firstly, critical shortages arose in European and global grain and food markets due to Russia's export restrictions, directly affecting consumers (Artuc et al. 2022). Secondly, market instability, compounded by shortages of base metals like copper, nickel, and cadmium, exacerbated challenges across industries, including automotive, still grappling with supply chain disruptions

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from the fading COVID-19 pandemic. Thirdly, concerns over energy supply intensified as European energy production declined, particularly in renewable sources throughout 2021, leading to market disruptions and significant price increases in various sectors.

These market disruptions resulted in soaring prices across a wide range of products, significantly impacting household and business budgets, with real incomes declining sharply due to inflation. By the end of 2022, recessionary pressures mounted, with recessions on the doorstep in certain European economies by 2023 (World Bank 2022). Firms, already weakened by the lingering effects of COVID-19, faced heightened risks amid the emerging crisis. Rising energy costs, reduced foreign trade, increased raw material prices (especially critical for a net-importing country), and tightening access to finance compounded challenges for businesses.

Early studies suggest substantial negative effects on firms across Europe due to the Ukraine crisis. For instance, the EIB (2022) estimates a significant increase in EU firms generating losses and facing default. Sectors like chemicals, pharmaceuticals, transport, and food/agriculture are hardest hit. Emerging academic literature highlights negative abnormal returns, increased volatility, and lower equity returns for energy-intensive and carbon-intensive firms, along with inflationary pressures on product prices (Orhan 2022; Lo et al. 2022; Bougias, Episcopos and Leledakis 2022; Ferriani and Gazzani 2023; Abbassi, Kumari and Pandey 2023; Ropele and Tagliabracci 2024).

The objective of this study is to empirically analyse the impact of the Ukraine conflict-induced crisis on firms in North Macedonia. Moreover, we investigate impacts onto firms' cost structure, with emphasis on production and energy costs, and evaluate their strength to withstand the crisis. We rely on a freshly collected micro-survey of firms to understand the extent and nature of the crisis's impact, providing a foundation for designing targeted policy measures at the national level. This study contributes to the literature by offering a detailed, fresh and rapid micro-level analysis of how the Ukraine conflict-induced crisis has impacted firms in North Macedonia. Using freshly collected survey data, the study provides timely and contextually relevant insights into the extent and nature of these impacts. This contribution is also seminal given that business-relevant insights from the Ukraine and Russia conflict remain absent in the literature at the time of writing. By proposing policy-relevant conclusions based on identified challenges, the study bridges interdisciplinary perspectives, integrates geopolitical events with economic impacts, and addresses specific knowledge gaps related to crisis impacts on firms in smaller economies.

The study is structured as follows: Section 2 offers some stylized facts by reviewing the risks for Macedonian firms stemming from the Ukraine conflict-induced crisis and the government measures adopted to support firms during the crisis. Section 3 discusses methodological considerations, and Section 4 presents survey results documenting the crisis's impact on Macedonian firms. Finally, Section 5 summarizes the study's conclusions and implications.

2. Conceptual framework and literature overview

The impact of the crisis in Ukraine on firms in North Macedonia can be understood through a comprehensive framework that considers the interplay of geopolitical conflict, economic interdependence, and firm-level responses. The crisis, rooted in geopolitical tensions involving Ukraine, Russia, and international actors, had ripple effects across regions. North Macedonia, situated in the Balkans and in close proximity to Eastern Europe, experienced indirect consequences due to its geographic proximity to the conflict zone. Disruptions in trade routes and supply chains due to the crisis significantly impacted Macedonian businesses. Fluctuations in energy prices and supply dynamics, influenced by the crisis, altered the cost structure and operations of firms in North Macedonia.

Studies in conflict studies literature shed light on the intricate dynamics between geopolitical conflicts and business operations (e.g. Freedman 2014), with the crisis in Ukraine serving as a relevant case study. However, the impact of crises, including conflict situations, on business and crisis management strategies during such times has been rather limited (Lim et al. 2022). Existing studies on business crisis management during conflicts have primarily focused on understanding how businesses and continuity outside the conflict zones are affected and predominantly concentrate on pre-2000s wars (Lakomaa 2017).[1] This trend is evident in recent studies of the crisis in Ukraine, which investigate the impact of the conflict on businesses and societies beyond Ukraine's borders. For instance, researchers have examined the shocks and consequences experienced by European countries (Prohorovs 2022), the expected repercussions on firms listed in the G7 stock market (Abbassi, Kumari and Pandey 2023), as well as the broader economic implications for the United States, United Kingdom, Canada, and Europe (Mbah and Wasum 2022). Additionally, scholars have explored topics

related to geopolitics and international business strategies in response to the crisis (Ratten 2023), including the role of stakeholders and stakeholderism in international companies withdrawing from Russia due to the conflict (Marcinkowska 2022; Mol, Rabbiosi and Santangelo 2023; Pajuste and Toniolo 2022). These studies collectively shed light on the complex interplay between crisis events, business operations, and strategic responses in the global arena.

The literature on the impact of armed conflict spans multiple disciplines, encompassing economics, environmental science, public health, and sociology. Economically, armed conflict disrupts economic activity and global welfare, impacting human capital, international trade, and national income (Glick and Taylor 2010). The costs of conflict extend to negatively affecting private investment and stripping countries of growth potential (Imai and Weinstein 2000). Environmentally, conflicts can lead to deforestation and habitat destruction due to increased reliance on wood for fuel and bushmeat for protein (Draulans and Van Krunkelsven 2002). In terms of public health, conflicts devastate healthcare systems, leading to improper sexual practices, food and medical supply shortages, and increased health complications (Ashford and Huet-Vaughn 1997). Recent research emphasizes the impact of conflict on public health amid current conflicts (Sheather 2022; Zaliska et al. 2022). Socially, conflicts reshape societal role structures and lead to forced displacement, physical injuries, and psychological trauma for survivors (Modell and Haggerty 1991; Cliff and Noormahomed 1993; McKray 2003). The enduring effects include intergenerational trauma and disruptions in education that threaten social unity (Kreso 2008; Betancourt et al. 2015; Bürgin et al. 2022).

Conflict can disrupt firm-level productivity by affecting key determinants such as technology, capital, organizational structure, and management practices (Bloom and Van Reenen 2010), as well as the size and skills of the workforce (Iranzo, Schivardi and Tosetti 2008). Armed conflict can significantly influence incumbent firms' sales, exports, profitability, and investment decisions, thus affecting the allocation of inputs and outputs among existing firms (Abadie and Gardeazabal 2003; Guidolin and La Ferrara 2007; Ksoll, Macchiavello and Morjaria 2010). Additionally, armed conflict can impact firm entry and exit dynamics (Camacho and Rodriguez 2013). However, there is a scarcity of studies that have examined the effects of conflict on firm activity.

Applying insights from conflict studies to the specific context of North Macedonia enriches our understanding of how the crisis in Ukraine affected Macedonian firms. By examining specific channels of impact, including trade disruptions, risk management strategies, and institutional responses, this research contributes to a broader discourse on the economic ramifications of geopolitical conflicts on businesses operating in interconnected global markets.

3. Stylized facts

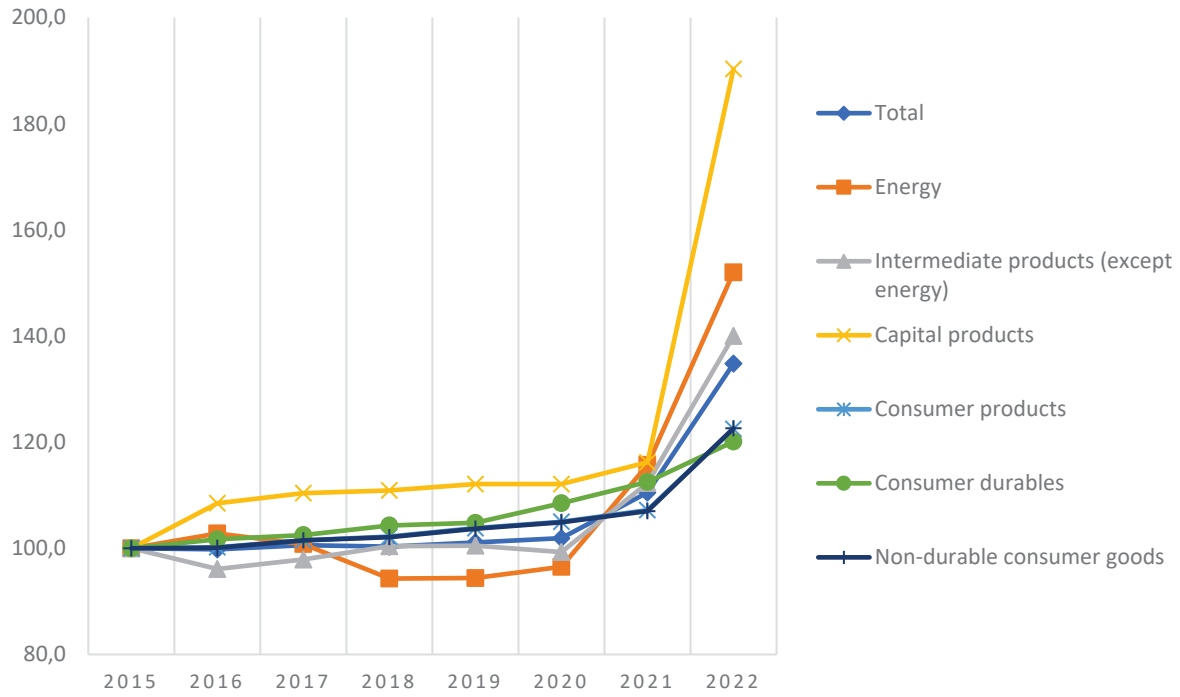
3.1. Risks for the firms in North Macedonia

North Macedonia has very weak economic ties with both Russia and Ukraine. These countries do not participate with more than 2.5% in North Macedonia's foreign trade. Yet, it should be noted that about a fifth of the fertilizers were imported from Russia in 2021, which together with gas and metals comprised most of the imports. Russia's and Ukraine's share in foreign direct investment inflow averaged less than a quarter of a percent over the last decade, with exception of certain years whereby Russian or Ukrainian companies entered the market mainly in the mining and oil trade. The financial system does not have Russian or Ukrainian bank or other financial institution. All this protected the economy from the direct impact of the crisis.

However, Macedonian firms has been indirectly affected in several ways. As a result of considerable trade openness, rising prices of key food and energy products were directly transmitted to the economy already in the first half of the year. By the end of 2022, inflation reached 19.5%, with an annual average of 14.2%, a level not seen since country's transition years in the early 1990s. Selling prices in manufacturing soared in 2022 (**Figure 1**), driven by the high input prices of, primarily, energy, though also the imported raw materials. Though, the observed price effect of the imported raw materials could be approximated by considering that almost half of the consumption of food, drinks and tobacco in the economy is being imported (**Figure 2**), which makes domestic firms price takers to a large if not exclusive extent. Within the primary food items, whose prices saw unprecedented surge on the global market, wheat supplies and nearly all of sunflower oil in North Macedonia is imported, which has been coupled with the dependence on fertilizers supply from Russia.

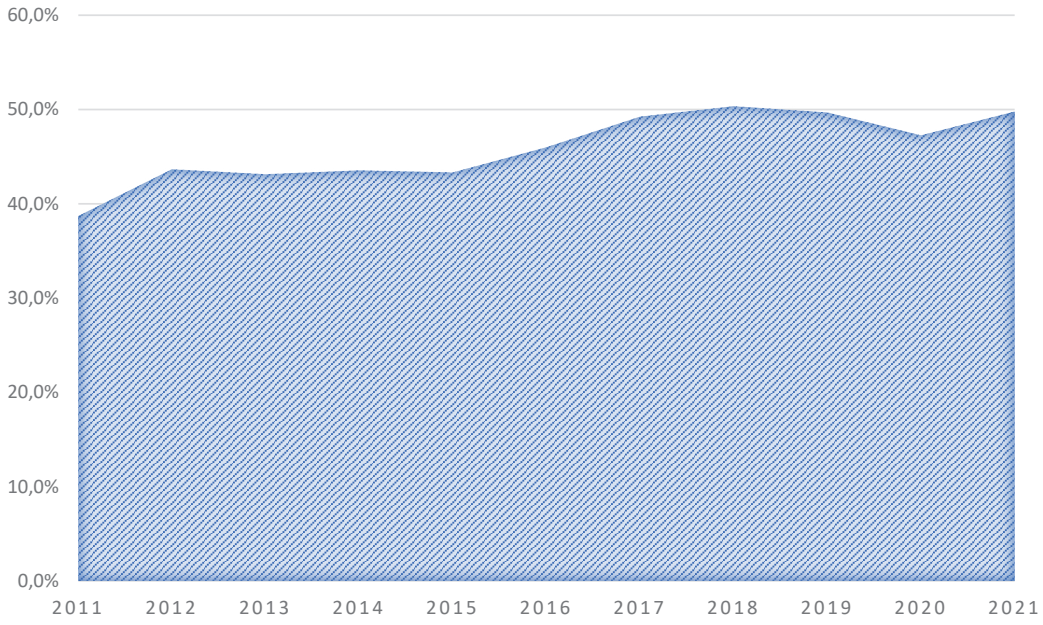
Large firms in North Macedonia have been particularly exposed to the energy/electricity price shock. Namely, only large firms in the country purchase electricity on the open market, usually on the Hungarian electricity market HUPX. The electricity price shock culminated in the summer of 2022, when the price of electricity per MWh has been twelvefold compared to the average of 2020. Households and small business

Figure 1. Selling prices of industrial producers (2015=100)



Source: State Statistical Office.

Figure 2. Share of import of food, drinks and tobacco in the total consumption of food, drinks and tobacco in North Macedonia



Source: State Statistical Office.

Note: The import of food, drinks and tobacco includes live animals, which is not included in the respective consumption item as such.

Table 1. Regulated prices for households and small business consumers (MKD/KWh)

Category	1.8.2020	1.7.2021	1.1.2022	1.7.2022	1.1.2023
Households, upper tariff*	5.9500	6.6900	7.3200	4.3484	4.7257
Households, lower tariff	2.9900	3.3600	3.6700	0.6193	1.3183
Small consumers, upper tariff	9.2700	10.4200	11.4100	13.8204	11.05
Small consumers, lower tariff	-	-	-	10.1348	8.1
Transmission and distribution fee	1.768	1.767	2.4570	2.6237	2.6795

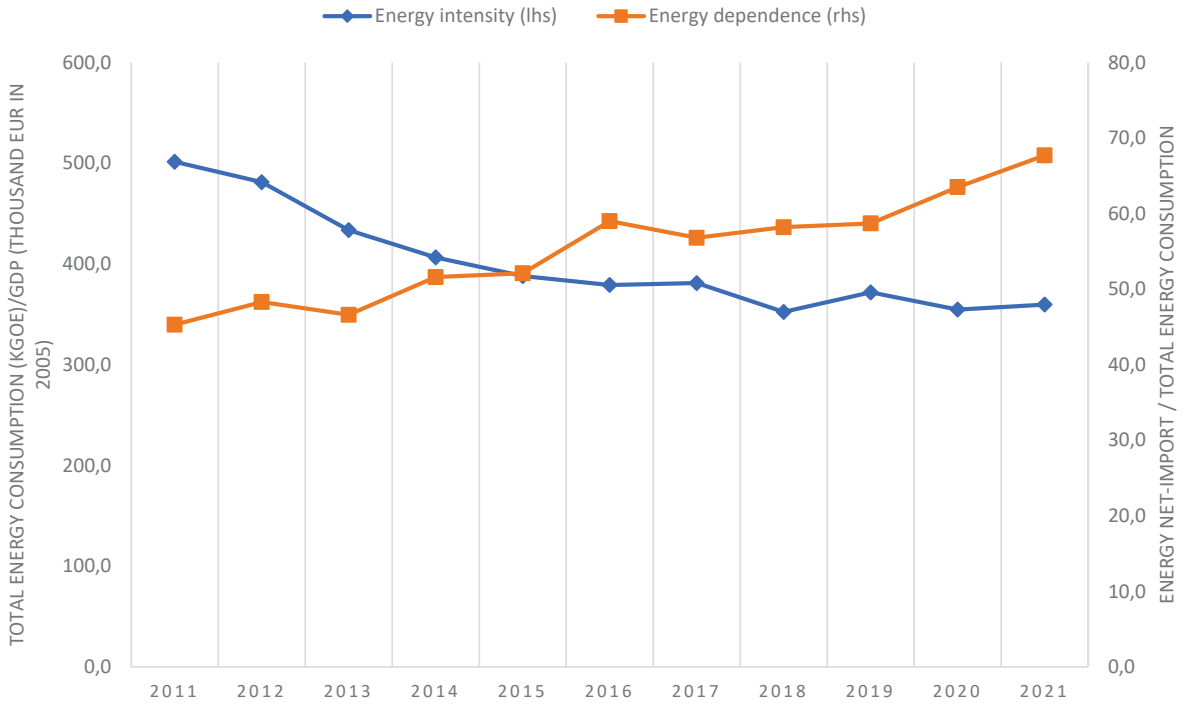
Source: Energy and Water Services Regulatory Commission.

Note: Since July 1, 2022, households are subject to progressive electricity price dependent on their consumption. The basic tariff (tariff 1) is shown in this table.

consumers (initially defined as those with not more than 50 employees and annual turnover not exceeding 10 mln. EUR) are shielded from the electricity price volatility through operating on the regulated market. **Table 1** presents the regulated prices on dates when the Energy and Water Services Regulatory Commission has been correcting the price. For example, since the onset of 2023, the price for MWh for the small business consumers has been fixed at about 179 EUR/MWh, being about two thirds of the 2022 average on the free market and above the January—May 2023 average of 120 EUR/MWh.

Both energy intensity and energy dependence are high in North Macedonia, which heavily reflects onto firms work and competitiveness. The energy intensity is very high in the country, despite the improvements over the last decade (**Figure 3**). Yet, with about 350 kilograms of oil equivalent per thousand EUR of GDP, the country is still thrice less energy efficient than the EU average (117 in 2021, Eurostat: NRG_IND_EI). This trend has been accompanied with growing energy dependence of the country, whereby more than two thirds of the energy consumption in 2021 has been supplied from import.

Figure 3. Energy intensity and dependence in North Macedonia



Source: State Statistical Office.

3.2. How has the government helped?

Government measures in North Macedonia have been primarily directed towards regulating prices of electricity and depressing prices of some primary food products in order to prevent a more severe erosion of the living standard of households. Only few of the measures were aimed at firms, and part of them already existed even before the crisis started aiming to support the green transition. Earlier, in the winter of 2021/22, the Government declared 'energy crisis' that allowed it to allocate additional funds from the central budget to electricity production and central heating companies. The 'energy crisis' was extended over 2022.

Over 2022, two packages of anti-crisis measures were adopted in a total declared value of 760 mln. EUR. Of the total of 33 measures in the two packages, 16 were aimed at companies (or companies and households), and these are presented in **Table 2**. With the exception of the regulation of the electricity/heating energy price for the small business consumers, which essentially boils down to subsidizing the price of electricity/heating energy by the government, the rest of the measures have been channeled through the Development Bank, and many of them, like the green lines from EBRD, Guarantee Fund etc. existed before, i.e. they ameliorate the effects of the crisis, but cannot be directly attributed to it.

Only two of the measures refer to reduction of the input prices for companies: the one for the reduction of the customs duties on basic food products and raw materials, helping out in depressing the global prices but not their volatility; and the fixation of the electricity price for the food industry in order to stabilize the prices of the basic food product like bread, milk and

Table 2. Government measures aimed at firms

		Targeted towards	Responsible institution
1.	Subsidizing the price of electricity for the regulated market (for households and small business consumers) – enacted at the end of 2021	SMEs	Government through ESM – Electricity production company
2.	Subsidizing the price of heat energy (for households and small business consumers of central heating)	SMEs	Government through ESM – Electricity production company
3.	Change in electricity price setting methodology for households and small business consumers on the regulated market	SMEs	Energy and Water Services Regulatory Commission
4.	Loans for investment in projects for energy efficiency and renewable energy sources, with an interest rate not exceeding 1.6%	SMEs	Development Bank
5.	New line to support the economy through the European Investment Bank for a green transition	SMES	Development Bank
6.	Green financing through the EBRD, the UNDP and commercial banks (for households and SMEs)	SMEs	Development Bank
7.	Financial support through direct lending from the Development Bank to companies	SMEs	Development Bank
8.	Financial support through commercial banks with interest-free loans for working capital	SMEs	Development Bank
9.	Credit line for SMEs to support liquidity	SMEs	Development Bank
10.	Credit line for production, refinement and export of agricultural products	SMEs	Development Bank
11.	Subsidized price of 80 EUR/MWh for food production companies	Large firms	Government / MoE
12.	Use of the Guarantee Fund at the Development Bank	All firms	Development Bank
13.	Subsidizing of contractual interest rate on loans granted by commercial banks to business entities that will reinvest the profit for 2021	All firms	Government / Development Bank
14.	Autonomous measure for the import of basic food products and raw materials that have customs duties from all countries	All firms	MoF / Customs Office
15.	Exemption of VAT in the import of electricity, natural gas, heat energy and cooling energy	All firms	MoF / Customs Office
16.	Consultative support for the development of feasibility studies for energy efficiency and renewable energy projects	All firms	Government / MoE

Source: Authors' compilation based on announcements at www.vlada.mk.

meat. The latter, however, was short-lived as it did not result in significant decline in the final product prices. Hence, overall, no measure was offered by the government that directly and explicitly targeted companies, particularly the large ones which purchased the electricity on the open market and were most heavily exposed to the electricity price increase in 2022. For this reason, we put less emphasis on the government measures in understanding the manner in which companies withstood the crisis.

4. Methodological note

The underlying data collection instrument for this analysis is the Survey on the impact of the crisis induced by the conflict in Ukraine on firms in North Macedonia. The Survey has been administered over a heterogeneous sample of 112 companies in North Macedonia of various sectors, sizes and regions in the country in the course of April and May 2023. In general, there is no sufficiently-developed culture on answering surveys in North Macedonia, which prevents that a fully representative sample is obtained. Data collectors face large non-response rates. In our case, the survey was sent to a large list of over 2,000 companies, of which the response rate was about 6%.

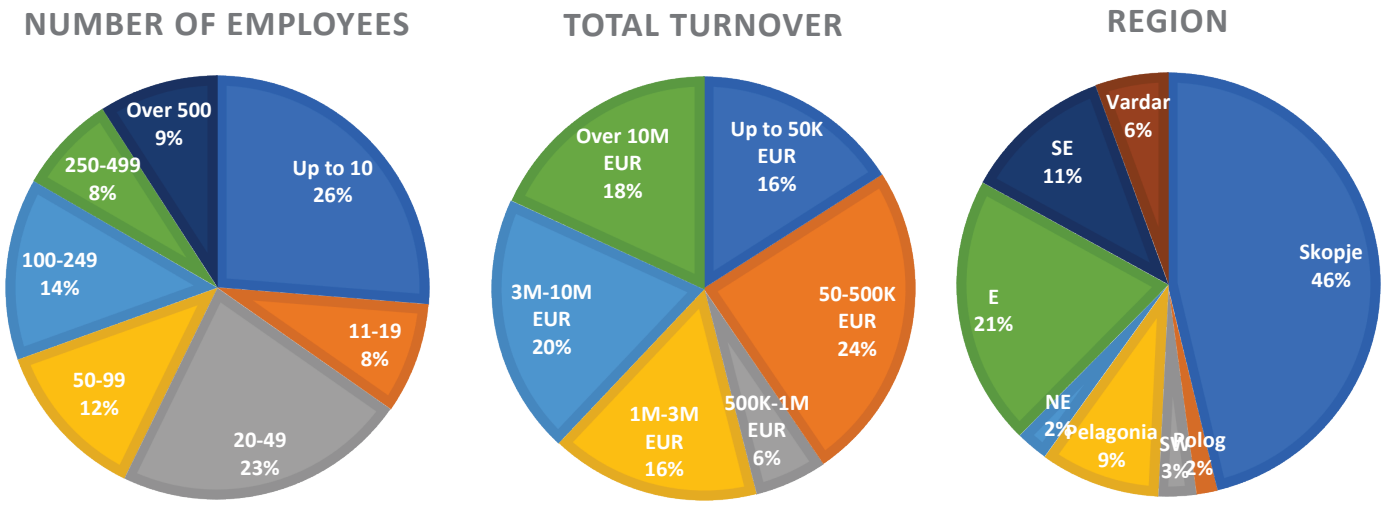
To overcome potential problems with biased sample, we used the national statistics on firms to create weights which we use throughout the entire analysis. Namely, we rely on the number of firms per sector (a total of 13 aggregated sectors are used) from the State Statistical Office of North Macedonia, in order to accordingly weight the firms in our survey and secure satisfactory potential of inference. By equalizing the sectoral distribution of the firms in our sample with that of the national statistics, we obtain the following distribution on three other metrics: seize by employees and turnover, and the regional distribution (**Figure 4**). We observe distributions which sufficiently well reflect the distribution of firms within the national statistics.

The questions in the Survey were divided in a couple of themes:

- The impact of the crisis on the production costs
- Energy use and prices
- Cost of labor
- Cost of services used in the firm
- Demand for firm's product and services
- Observations for the general operations of the firm.

In the following section, we use descriptive tables and graphs to present the answers on various questions in their frequencies and distribution across the observable characteristics of the firm, like sector, size (employees and turnover) and the extent to which a firm is an exporter. It is to be noted that we apply certain aggregation of sectors on agriculture, industry, construction, low-pay services (trade, transport and hotels); medium pay services (administrative, professional and personal services); and high-pay services (finance, insurance, real estate and IT). The latter resonates the idea to which exported were more hit by the price hikes due to their direct exposure to the global developments.

Figure 4. Weighted sample characteristics



Source: Survey on the impact of crisis induced by the conflict in Ukraine on firms 2023.

Finally, to understand the impact of the crisis for firms' adjustment mechanism and competitiveness, we rely on an ordered probit regression of the following type:

$$P(outcome_i) = \alpha + \sum \beta_j X_i + \sum \gamma_j Z_i + \varepsilon_i$$

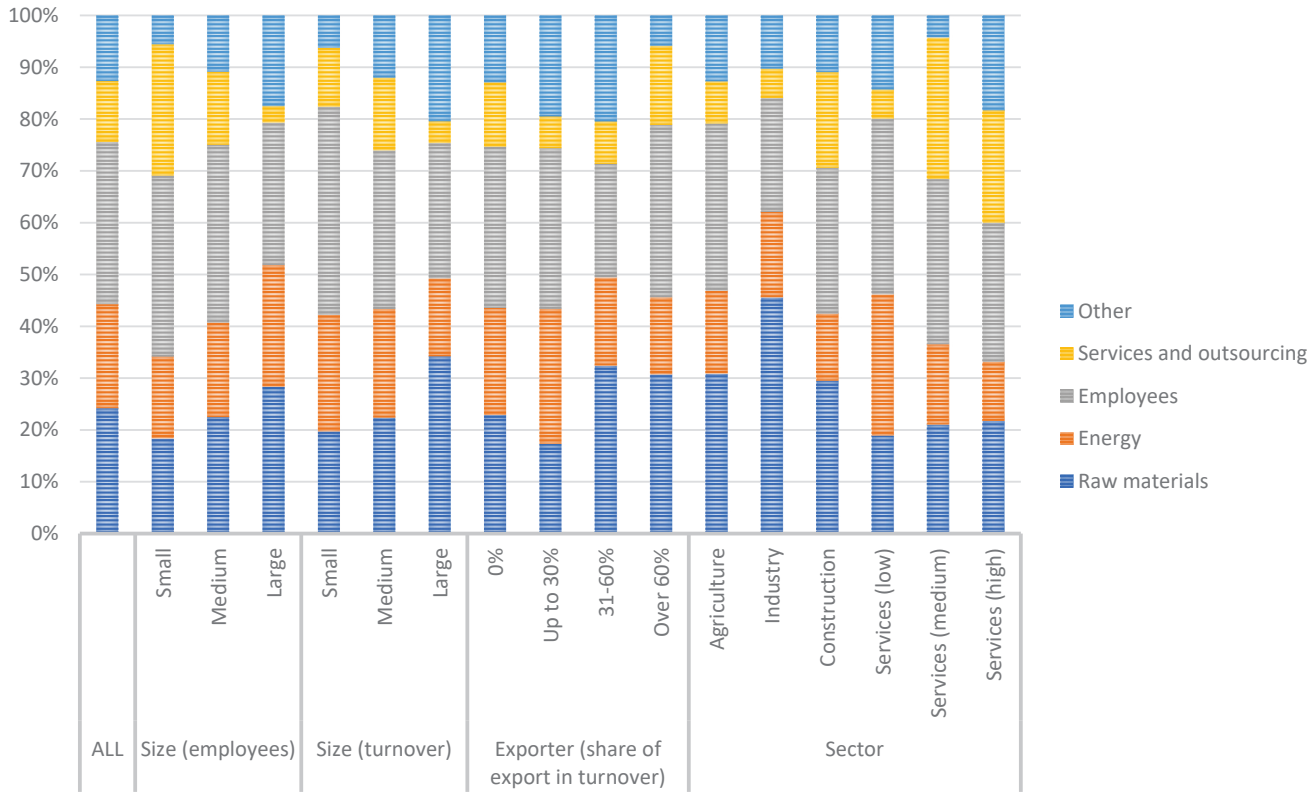
Whereby $P(outcome_i)$ stands for the probability that the firm reported that its final prices increased more than its total cost (a Likert scale 1-5) or that is responded that its competitiveness in 2022 compared to 2021 significantly deteriorated (a Likert scale 1-5); is a vector of observable firm's characteristics: region, sector, size (employees and turnover) and the extent to which a firm is an exporter; is another vector containing variables of our specific interest: the energy intensity of the firm (share of energy cost in total cost); labor intensity (share of labor cost in total cost); self-assessment about the behavior of the demand during the crisis; and a binary indicator signifying that the firm did not undertake any step to combat the increasing costs in raw materials, energy or labor. We estimate the above equation with an ordered probit technique and we comment in a general fashion about the way in which these firm's tenets affected the probability to fare the crisis better or worse.

5. Survey results

5.1. The impact of the crisis on production costs and costs of raw materials

The first set of results refers to the cost structure of the firms and the crisis impact onto the cost of the raw materials. **Figure 5** documents that, on average, the largest share of firms' costs are associated with the employees, 31.3%, followed by raw materials, 24.2% and energy 20.8%. However, there are some structural differences across the firms' categories. The share of raw materials costs is larger for larger firms, which are more frequently exporters belonging to the industry. Interestingly, the share of energy cost is the largest among low-pay service sectors like trade, transport and hotels (27.2%), which were inter-alia the strongest hit by the pandemic. Service and outsourcing cost is the largest among the smallest firms which are more

Figure 5. Structure of firms' operational costs



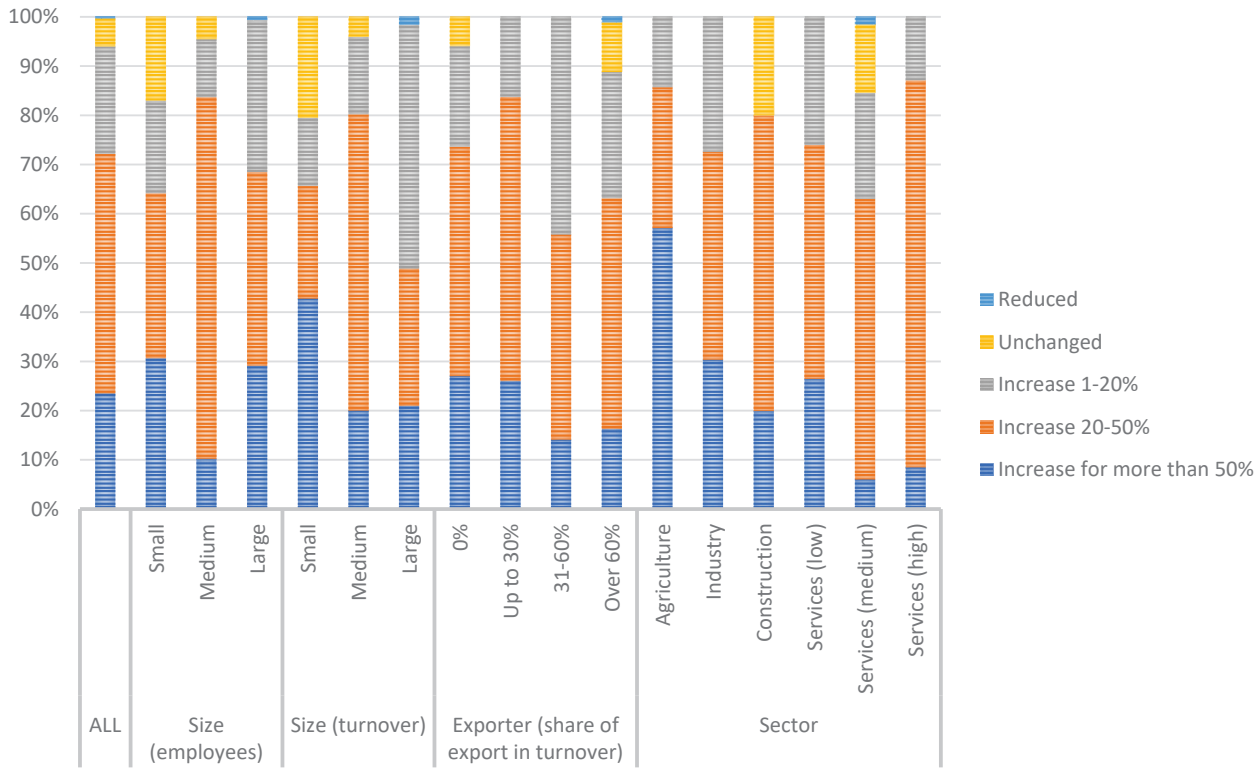
Source: Survey on the impact of crisis induced by the conflict in Ukraine on firms 2023.

frequently nested among the higher-pay service sectors. There are no stark differences in the share of the personnel cost.

Based on the primary origin of raw material purchases, it was found that in less than half of the cases, firms sourced their raw materials from abroad, with larger exporting firms in the industry sector having a notably higher percentage. This exposes these firms to rapid global economic developments impacting their profit margins and output prices. Interestingly, despite being large industrial exporters, the reported raw material price increases in 2022 were not the highest. Thirty percent of both large and small firms experienced raw material price increases exceeding 50%, with this share even higher among small firms based on turnover. Agriculture had the highest share of firms experiencing significant price increases, followed by industry and low-wage services. This indicates that smaller firms in low-wage sectors faced the heaviest burden of raw material price increases. However, for other segments, the majority reported price increases in the range of 20-50%. Notably, a small fraction of the largest exporters reported a decline in raw material prices.

Table 3 illustrates firms' strategies for managing rising raw material costs. Note that firms were allowed to select multiple options, resulting in a total exceeding 100%. The table uses color-coding to indicate the magnitude of each percentage, with small percentages shown in red and higher percentages in green. The most common strategy reported to cope with increased raw material costs was raising product prices, chosen by 57.6% of firms (Table 3). Additionally, 46.4% of firms implemented cost consolidation strategies across other areas of their cost structure, and 37.6% postponed planned investments. While firms of all sizes increased output prices, larger firms in agriculture, industry, and low-wage services were more likely to focus on cost reduction strategies, reflecting the heavier impact of price shocks in these sectors.

Figure 6. Price change of the key raw material (2022 compared to 2021)



Source: Survey on the impact of crisis induced by the conflict in Ukraine on firms 2023.

Table 3. Ways of coping with the increased costs of raw materials

	ALL	Size (employees)			Size (turnover)			Exporter (share of export in turnover)			
		Small	Medium	Large	Small	Medium	Large	0%	Up to 30%	31-60%	Over 60%
Did not undertake anything	4.7%	12.4%	0.0%	3.5%	3.7%	6.3%	0.0%	4.1%	0.0%	0.0%	10.1%
Changed / diversified / negotiated with the supplier	20.8%	20.5%	20.7%	21.0%	14.1%	22.1%	21.7%	24.3%	22.0%	0.0%	15.8%
Focused on reducing the other operational costs	46.4%	18.2%	34.9%	71.9%	16.5%	49.3%	61.7%	38.3%	73.4%	28.4%	44.9%
Increased prices of our products (outputs)	57.6%	47.4%	60.4%	61.8%	43.8%	60.1%	60.4%	57.5%	68.8%	55.8%	49.8%
Reduced or stopped production while prices stabilize	5.9%	7.5%	0.0%	9.2%	9.4%	3.0%	13.1%	8.7%	0.0%	14.2%	3.6%
Postponed some planned investment	37.9%	35.7%	31.3%	44.0%	44.6%	35.7%	39.8%	40.3%	36.3%	41.7%	33.7%
Applied other strategy	17.6%	10.4%	10.6%	27.2%	11.2%	12.5%	41.2%	11.8%	25.0%	57.9%	18.5%

	Sector					
	Agriculture	Industry	Construction	Services (low)	Services (medium)	Services (high)
Did not undertake anything	0.0%	1.5%	0.0%	3.3%	13.9%	8.2%
Changed / diversified / negotiated with the supplier	14.3%	23.5%	0.0%	26.8%	20.0%	0.0%
Focused on reducing the other operational costs	100.0%	53.9%	20.0%	50.6%	43.1%	16.5%
Increased prices of our products (outputs)	85.7%	77.4%	60.0%	67.1%	26.1%	75.3%
Reduced or stopped production while prices stabilize	28.6%	3.9%	0.0%	9.7%	0.0%	0.0%
Postponed some planned investment	42.9%	53.9%	60.0%	38.7%	16.9%	4.1%
Applied other strategy	14.3%	11.7%	20.0%	27.8%	7.7%	0.0%

Source: Survey on the impact of crisis induced by the conflict in Ukraine on firms 2023.

5.2. The impact of the crisis on energy costs

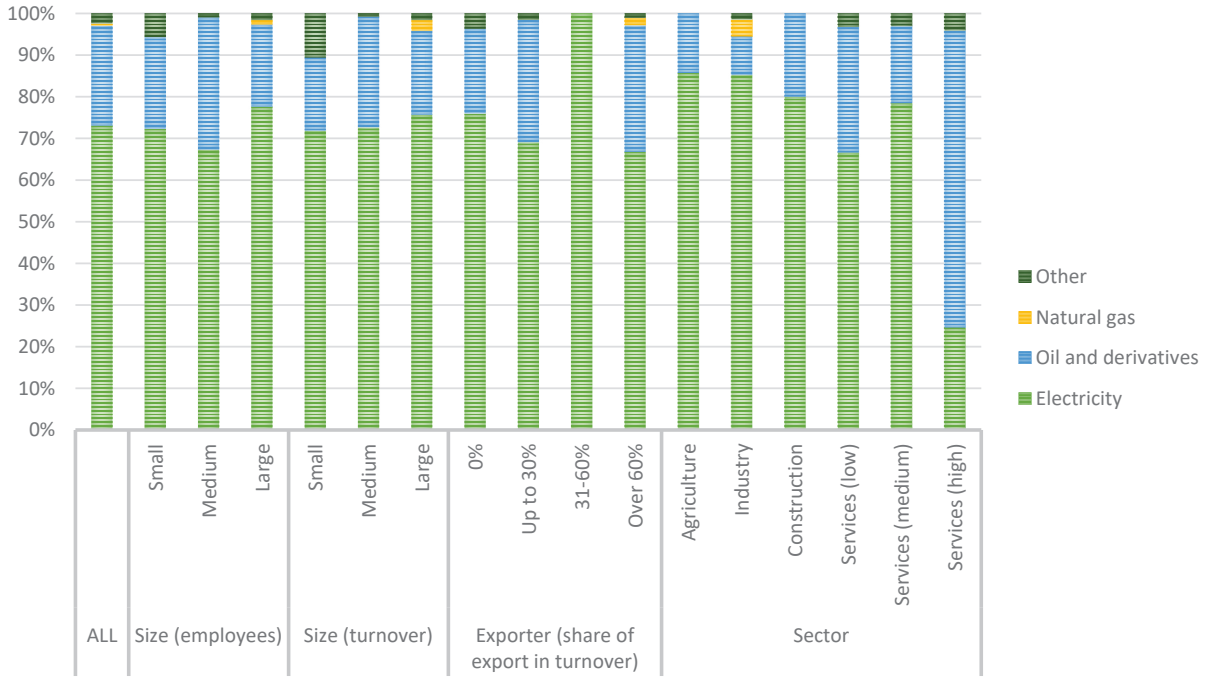
Macedonian firms rely on electricity as the main source of energy, with 73.1% of respondents (**Figure 7**). The next meaningful energy input is oil and derivatives, with 24%. There are no stark differences when firms are observed by size, but only when observed sectorally. The share of electricity in the sources of energy is higher than the average in agriculture and industry, while the share of oil and derivatives is higher than the average in low-pay services (due to transport being part of it) and in high-pay services (despite this may be a reflection of the rather small total consumption of energy in these sectors).

For more than a third of firms (37.6%), the increase in the price of the key energy input ranged twofold to fivefold between 2021 and 2022 (**Figure 8**). This has been more so the case for the large firms which have been purchasing electricity on the open market, including the notion that larger share of them marked increase in this cost larger than fivefold compared to the previous year (30.7% for the firms whose turnover exceeds 10 mln. EUR annually). Sectorally, the increases in the energy cost has been the largest in construction (40% of firms reporting increase more than fivefold), while the lowest in medium-pay services (47.7% reporting increase up to 50%).

The majority of small firms did not take action to address the rising energy costs, possibly due to operating within regulated markets and limited resources to absorb significant cost shocks (Table 4). In contrast, medium and large firms (40% to 50%) reorganized operations to reduce energy consumption and invested in energy-efficient equipment, with larger firms also investing in their own energy production, primarily through photovoltaics. Despite these adjustments, nearly half of larger firms increased prices to offset energy costs, while also implementing cost consolidation measures. Sectorally, energy consumption reduction efforts were more common in agriculture, industry, and low-wage services, with industrial firms leading

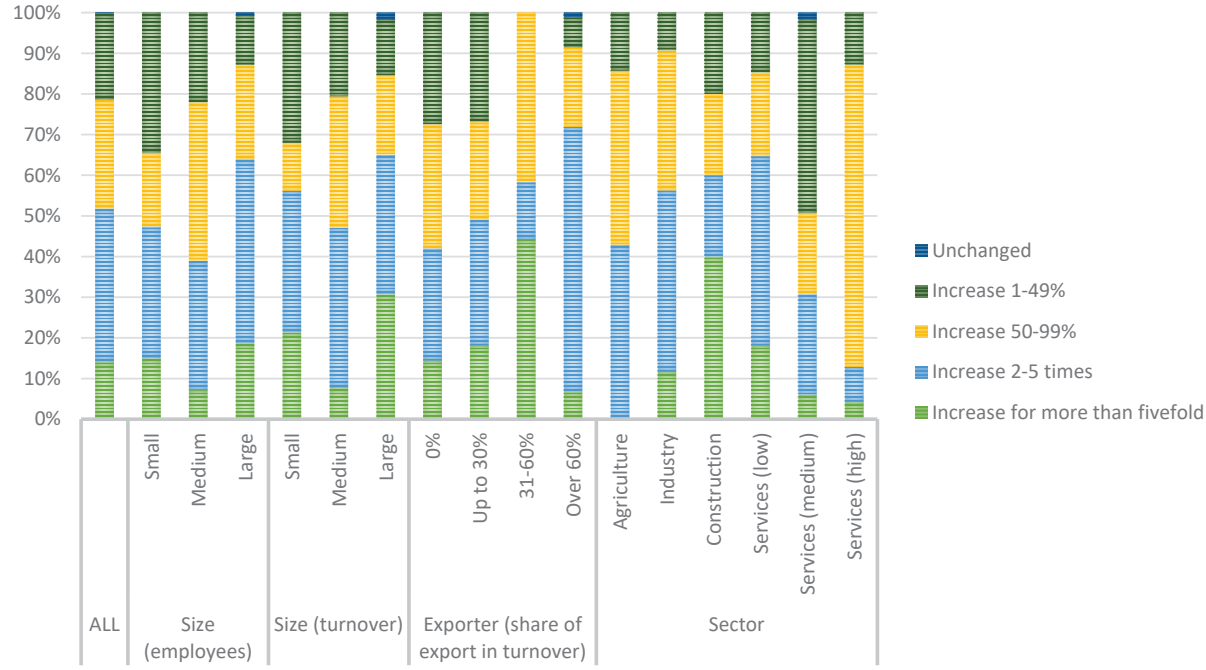
in installing own energy production facilities (43%). Price adjustments in response to energy costs were prevalent in industry, construction, and unexpectedly, high-wage services. Cost consolidation strategies were observed across all sectors.

Figure 7. The main energy input in firms



Source: Survey on the impact of crisis induced by the conflict in Ukraine on firms 2023.

Figure 8 – Energy cost change (2022 compared to 2021)



Source: Survey on the impact of crisis induced by the conflict in Ukraine on firms 2023.

Table 4. Ways of coping with the increased costs of energy

	ALL	Size (employees)			Size (turnover)			Exporter (share of export in turnover)			
		Small	Medium	Large	Small	Medium	Large	0%	Up to 30%	31-60%	Over 60%
Did not undertake anything	18.8%	51.5%	9.6%	5.4%	27.5%	17.5%	16.1%	22.8%	9.4%	0.0%	20.2%
Reorganized the work process to reduce energy consumption	37.5%	6.5%	43.3%	52.3%	11.8%	41.2%	46.4%	31.2%	46.3%	42.1%	42.7%
Invested in energy-efficient machines and equipment	14.3%	11.1%	7.3%	21.4%	10.1%	14.0%	18.8%	8.4%	15.6%	14.2%	24.9%
Invested in machines and equipment using alternative energy sources	1.5%	0.0%	0.0%	3.5%	0.0%	2.3%	0.0%	2.9%	0.0%	0.0%	0.0%
Invested in energy-efficient equipment or new buildings/halls	4.8%	0.0%	4.5%	7.9%	0.0%	6.6%	2.6%	6.6%	7.4%	0.0%	0.0%
Invested in own energy production	20.8%	0.0%	9.7%	41.5%	0.0%	23.1%	30.4%	11.1%	23.7%	41.7%	34.8%
Timely purchased energy input, when prices were still favorable	4.9%	0.0%	6.3%	6.8%	0.0%	6.0%	5.0%	3.8%	7.8%	14.2%	3.5%
Increased prices of our products (outputs)	37.8%	19.4%	43.9%	44.7%	30.4%	37.7%	44.8%	38.1%	47.1%	41.7%	30.1%
Reduced the work scope (temporary or permanent lay-offs and/or production reduction in general)	12.3%	26.8%	0.0%	12.3%	37.8%	5.0%	16.2%	16.4%	0.0%	0.0%	14.7%
Focused on reduction of other operational costs	42.9%	7.2%	59.8%	52.6%	21.8%	43.3%	59.4%	38.3%	54.1%	86.3%	38.1%

	Sector					
	Agriculture	Industry	Construction	Services (low)	Services (medium)	Services (high)
Did not undertake anything	0.0%	0.0%	20.0%	18.5%	44.6%	4.1%
Reorganized the work process to reduce energy consumption	57.1%	48.5%	20.0%	43.1%	27.7%	8.2%
Invested in energy-efficient machines and equipment	14.3%	11.7%	0.0%	19.1%	10.8%	4.1%
Invested in machines and equipment using alternative energy sources	0.0%	0.0%	0.0%	3.3%	0.0%	0.0%
Invested in energy-efficient equipment or new buildings/halls	14.3%	0.0%	0.0%	3.3%	0.0%	0.0%
Invested in own energy production	28.6%	43.0%	20.0%	17.3%	26.1%	4.1%
Timely purchased energy input, when prices were still favorable	28.6%	7.8%	0.0%	6.5%	0.0%	0.0%
Increased prices of our products (outputs)	28.6%	67.2%	60.0%	37.2%	10.8%	75.3%
Reduced the work scope (temporary or permanent lay-offs and/or production reduction in general)	14.3%	11.7%	0.0%	17.3%	4.6%	4.1%
Focused on reduction of other operational costs	71.4%	42.2%	40.0%	39.4%	41.5%	71.2%

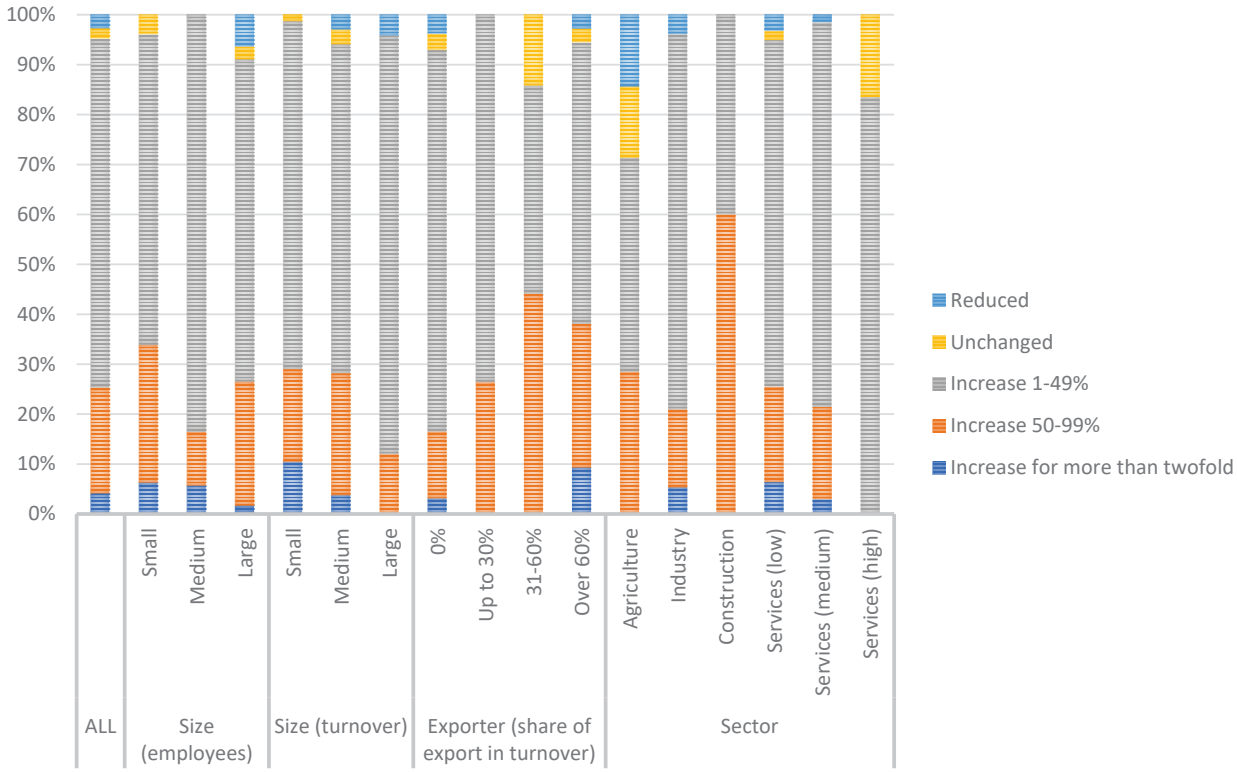
Source: Survey on the impact of crisis induced by the conflict in Ukraine on firms 2023.

5.3. The impact of the crisis on labor and other services

Labor costs increased mainly up to 50% compared to the year before (**Figure 9**). The burden of the soaring labor costs has been slightly higher on small than compared to larger firms, as well as among exporters. The latter may be due to the labor-market scarcity for medium skills, which have been likewise dragging the wages up. Sectorally, the scarcity of specific occupations is likely pronounced in construction, whereby cases of imported construction workers are known. The labor cost pressure has been the smallest in high-pay services, probably because the wage level there has been already very high.

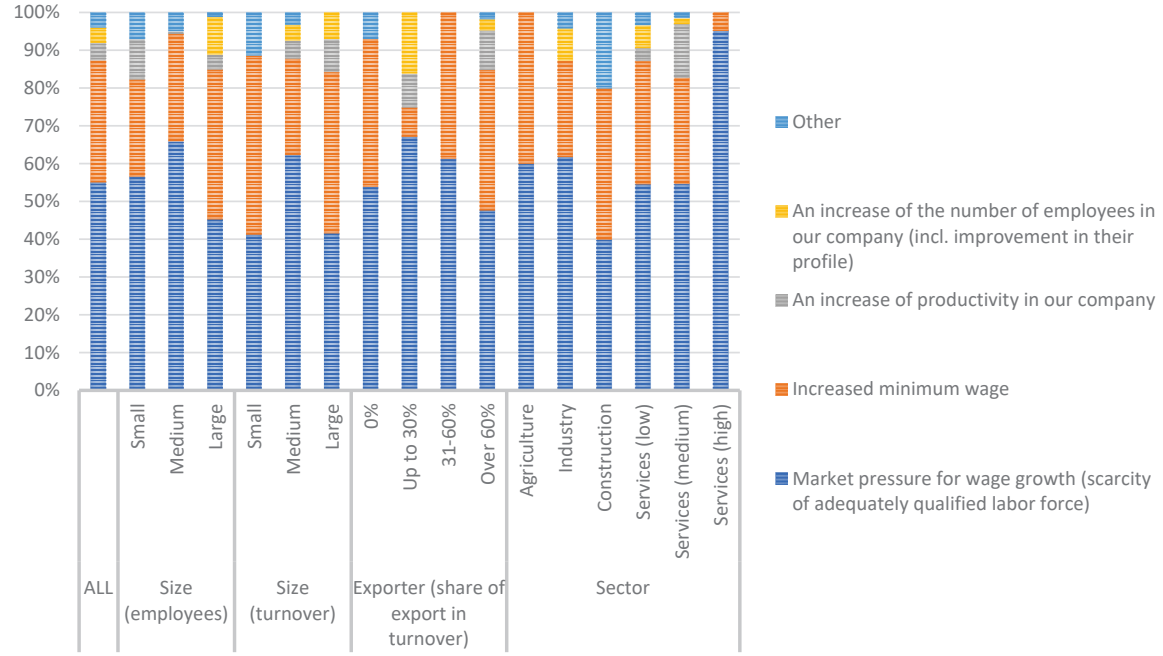
That labor and skill scarcity may be driving the labor cost surge is observed through the notion that 55.1% of firms responded that the main reason for the labor cost increase is the market pressure (**Figure 10**). This pressure is highly reflected in medium-sized local firms of high-pay service profile. It is likely that most of the high-pay service firms are more frequently exposed to global developments, so that the wage increases there are driven by the market forces both

Figure 9. Labor cost change (2022 compared to 2021)



Source: Survey on the impact of crisis induced by the conflict in Ukraine on firms 2023.

Figure 10. The main reason for the labor cost increase



Source: Survey on the impact of crisis induced by the conflict in Ukraine on firms 2023.

domestically and globally. Yet, the minimum wage is a significant presser of the labor cost, reported by 32.2% of firms. Small firms are hit most by the minimum wage increases, but the pressure onto the other firms is not strikingly smaller. Low-pay sectors like agriculture, construction and low-pay services (trade, transport, hotels) expectedly suffer most of the minimum wage hikes.

Firms mostly did not react to the elevated labor costs (**Table 5**). This is reported by 35.8% of firms, but the reaction was strongest among small local firms – between half to three fourths reported so. The other two coping strategies have been those who we observed through the coping mechanisms within the other costs surge: transferring of the burden onto consumers through increasing own-product prices and cost consolidation. The other potential coping strategies for the labor costs included reduction of number of workers or hours, using government measure or outsourcing services or processes, but all these were selected by small number of firms. Interestingly, it is only large firms who opted for outsourcing of some processes, including through investing in software, AI etc. and these were usually in industry and construction.

Table 5. Ways of coping with the increased labor costs

	ALL	Size (employees)			Size (turnover)			Exporter (share of export in turnover)			
		Small	Medium	Large	Small	Medium	Large	0%	Up to 30%	31-60%	Over 60%
No reaction, the budget line for these costs remained elevated	35.8%	52.7%	34.6%	26.2%	76.2%	28.3%	27.7%	43.5%	41.6%	14.2%	19.2%
Reduced the number of employees or cut the working hours	11.1%	13.9%	2.2%	15.8%	16.5%	7.9%	17.7%	10.6%	11.3%	44.2%	7.6%
Utilized government measures (e.g. active employment measures) to support the costs	7.0%	5.4%	4.0%	10.3%	8.9%	6.3%	8.0%	0.0%	2.4%	44.2%	19.3%
Outsourced some services which were performed in-house	7.4%	0.0%	10.7%	9.6%	0.0%	6.4%	17.7%	8.1%	7.8%	44.2%	1.1%
Outsourced some processes (incl. with investment in e.g. software, AI etc.)	11.1%	5.7%	2.5%	20.7%	9.4%	8.0%	23.5%	3.8%	17.7%	44.2%	16.3%
Increased prices of our products (outputs)	48.3%	33.8%	61.3%	47.8%	38.4%	51.5%	45.3%	47.2%	52.5%	57.9%	46.1%
Focused on reduction of other operational costs	39.7%	25.7%	41.1%	47.2%	18.8%	44.6%	40.0%	33.1%	29.5%	72.1%	55.5%

	Agriculture	Industry	Construction	Services (low)	Services (medium)	Services (high)
No reaction, the budget line for these costs remained elevated	28.6%	30.4%	40.0%	42.9%	26.1%	12.4%
Reduced the number of employees or cut the working hours	14.3%	15.6%	0.0%	16.7%	4.6%	4.1%
Utilized government measures (e.g. active employment measures) to support the costs	14.3%	3.9%	0.0%	9.0%	3.1%	0.0%
Outsourced some services which were performed in-house	0.0%	0.0%	0.0%	8.3%	1.5%	67.0%
Outsourced some processes (incl. with investment in e.g. software, AI etc.)	14.3%	19.6%	20.0%	9.7%	4.6%	0.0%
Increased prices of our products (outputs)	28.6%	50.0%	40.0%	57.7%	27.7%	75.3%
Focused on reduction of other operational costs	42.9%	40.6%	40.0%	26.4%	55.4%	67.0%

Source: Survey on the impact of crisis induced by the conflict in Ukraine on firms 2023.

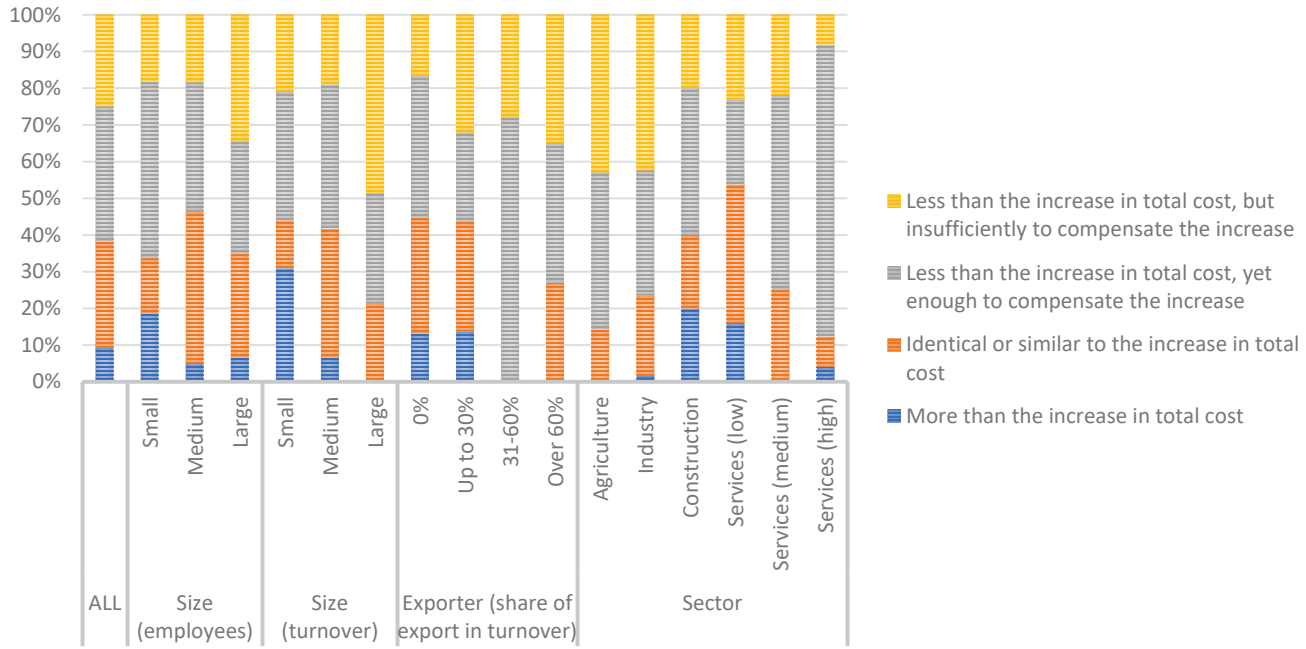
5.4. Firms' specifics and the strength to withstand the crisis induced by the conflict in Ukraine

Macedonian companies have primarily coped with rising costs by passing the burden onto consumers through price increases, as evidenced by the detailed cost analysis in the preceding section. Responses regarding the extent to which increased final prices offset rising input costs vary (**Figure 11**). On average, responses are evenly distributed among those stating that final prices are equal to the total cost increase, less than the increase but sufficient to compensate, and less than the increase and insufficient to compensate. However, there are notable differences across segments. Small firms more frequently succeeded in fully transferring cost increases to prices, particularly in construction and low-wage services, such as trade and hotels, where input cost surges were fully or excessively reflected in output prices. Conversely, many large firms in industry and agriculture were unable to effectively pass on cost increases, with a significant share failing to fully reflect the cost surge in their final prices.

Cost and price structure in firms is determining their competitiveness on the market. The dramatic surge in input costs which then triggered to a significant or large extent conference onto the final prices of own products and services, during the current crisis induced by the conflict in Ukraine, likely affected firms' competitiveness. However, on average, half of the firms (51.3%) reported that their competitiveness has been neither harmed nor improved. For small local firms though, more than for medium-sized ones, the competitiveness worsened. This is the case for agriculture, industry and construction, despite a non-negligible share of firms in industry (19.6%) reported competitiveness enhancement. The higher the skill intensity in services, the lower the worsening of competitiveness perception, whereby in the high-pay services an astonishing 71.2% of firms reported their competitiveness improving.

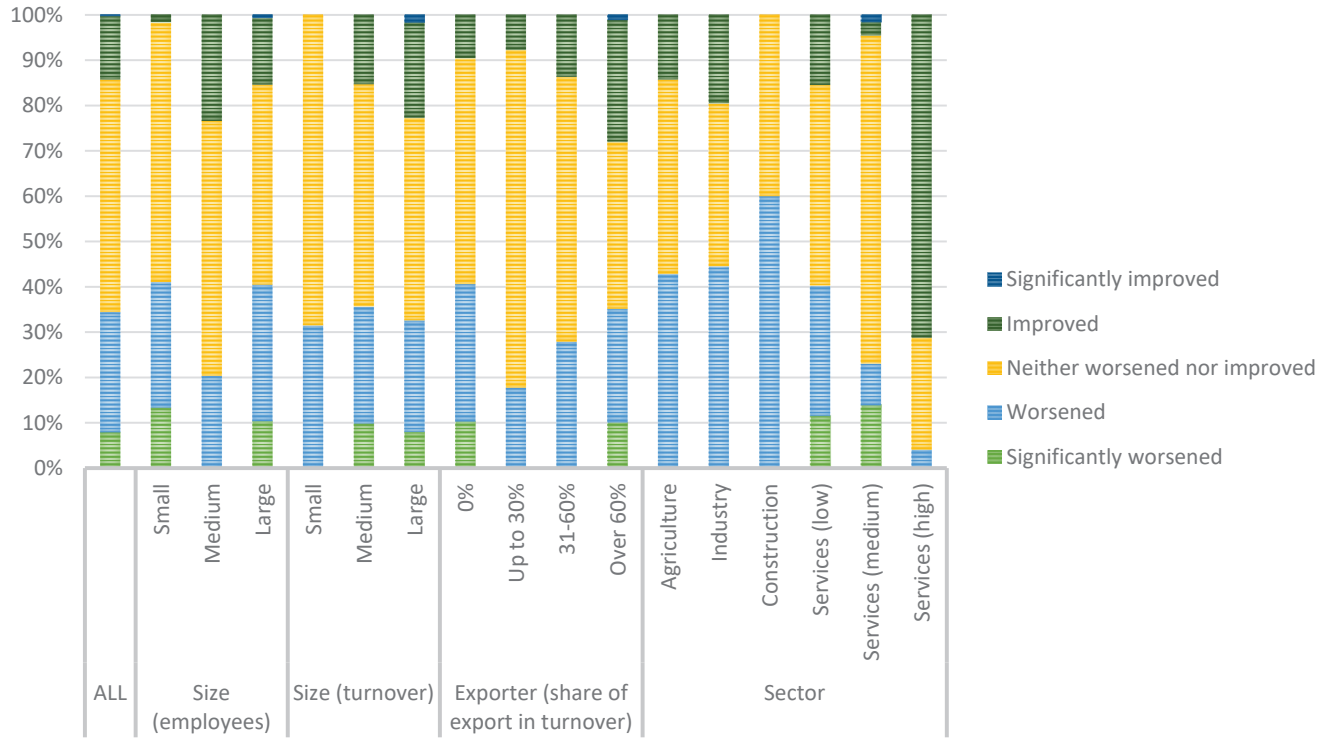
In the final analysis, we examine how the probability of cost surges being passed on to final prices and changes in competitiveness depend on firm characteristics. The results are summarized in **Table 6**, with a focus on significant findings due to space limitations. Note that the number of observations drops to 92 and 94 in the two regressions respectively, mainly due to missing data in the reporting the shares of various costs in total costs by firm. Descriptive statistics of the variables included is provided in the Appendix.

Figure 11. The increase in prices compared to the increases in costs



Source: Survey on the impact of crisis induced by the conflict in Ukraine on firms 2023.

Figure 12. Perception on the changes in own-firm competitiveness



Source: Survey on the impact of crisis induced by the conflict in Ukraine on firms 2023.

Significant improvements in competitiveness were observed only in high-wage services amid the crisis induced by the conflict in Ukraine, likely due to increased global demand enhancing their competitiveness. Medium-sized firms also showed improved competitiveness compared to smaller firms, while larger firms were less likely to fully transfer input cost surges to final prices.

Regionally, firms in Polog, Southwest, and Southeast regions were less successful in passing input cost increases to prices compared to those in Skopje, possibly due to a prevalence of low-wage, low-competitive firms with limited market power. Interestingly, firms in the Southwest region experienced declining competitiveness, whereas those in the Southeast region saw an increase compared to Skopje.

Insights from the second part of the Table highlight that higher energy cost shares in total costs were associated with increased input cost transfers to final prices but worsened competitiveness. Labor cost shares did not significantly impact cost transfers or competitiveness, suggesting labor cost surges were market-driven. Increased demand during the crisis correlated with improved competitiveness. Notably, firms that did not take steps to address rising labor costs were less likely to convert input cost surges into higher final prices, highlighting the importance of labor cost management strategies.

Table 6. The probability of cost transferring onto prices and of competitiveness worsening

		Final price reflecting input cost (from more to less)	Competitiveness perception (from worsening to improvement)
Sector (Agriculture is reference category)	Industry	-0.2438	-0.1555
		(0.669)	(0.624)
	Construction	0.0948	-0.0536
		(0.838)	(0.696)
	Low-pay services	-0.6726	-0.1262
		(0.625)	(0.602)
	Medium-pay services	-0.2379	-0.3058
		(0.642)	(0.659)
	High-pay services	0.1821	1.5090**
		(0.659)	(0.763)
Size (Small firms are reference category)	Medium-sized	0.2213	0.7056*
		(0.523)	(0.418)
	Large	1.0930**	0.2095
		(0.525)	(0.562)
Region (Skopje is the reference category)	Polog	0.7832*	0.8537
		(0.451)	(0.546)
	Southwest (SW)	2.3808*	-0.7122*
		(1.320)	(0.382)
	Pelagonia	-0.119	-0.5519
		(0.478)	(0.464)
	Northeast (NE)	0.394	-0.6432
		(1.321)	(0.721)
	East (E)	-0.4939	0.4345
		(0.442)	(0.508)
	Southeast (SE)	1.2807*	1.0589*
		(0.675)	(0.583)
	Vardar	-0.3675	-0.1459
		(0.723)	(0.906)
Exporting, share in turnover (Non-exporters are the reference category)	1-30%	-0.2984	0.8151**
		(0.470)	(0.413)
	31-60%	0.5088	0.887
		(0.412)	(0.549)
	Over 60%	0.0621	0.4012
		(0.278)	(0.523)
Energy cost share		-0.0275***	-0.0123*
		(0.009)	(0.007)
Labor cost share		0.0044	-0.0019
		(0.008)	(0.007)
Demand (from reduction to increase)		-0.2378	0.5974**
		(0.211)	(0.250)
Firms who did not undertake any step for coping with raw material price surge		-0.4517	0.0585
		(0.537)	(0.370)
Firms who did not undertake any step for coping with energy price surge		0.3706	0.0196
		(0.469)	(0.491)
Firms who did not undertake any step for coping with labor cost surge		0.7499*	0.075
		(0.438)	(0.332)
	Observations	92	94

Source: Author's calculations.

*, ** and *** refer to a statistical significance at the 10%, 5% and 1% level, respectively. Standard errors provided in parentheses. Standard errors robust to heteroscedasticity. Weights accordingly used.

5.5. Other costs, demand and the most pressing current challenges

The costs of various services used by firms have generally risen, albeit to a lesser extent compared to raw materials, energy, and labor. Transport costs increased up to 50% in 2022, especially impacting agriculture, industry, and construction. Accounting and IT service costs remained stable for about a third of firms but saw significant increases for others, particularly in agriculture. Bank services and interest expenses rose, with a notable share experiencing more than a doubling of costs, especially affecting agriculture. Maintenance and security service costs also increased up to 50%, although some firms reported no change.

Following the invasion of Ukraine by Russia, the global economy encountered a severe supply shock, contributing to rising uncertainty, declining real incomes, and high costs that suppress demand, leading to recessionary trends. Growth prospects have diminished globally and in North Macedonia, with GDP growth projections halved to around 2-2.5% for 2023, significantly below the economy's potential of 4-4.5%. Despite this, demand remained intact for 57.6% of Macedonian firms, particularly among larger exporting firms in industry and high-pay services. In construction, a third of firms reported increased demand, potentially driving up real estate prices in response to inflationary pressures.

Key challenges faced by firms in North Macedonia include economic uncertainty, environmental uncertainty, and, most significantly, a shortage of qualified labor (**Table 7**). Smaller firms are particularly concerned about economic uncertainty, followed by labor shortages, while medium-sized firms are most affected by labor shortages. Large firms, exposed to volatile market conditions, are equally concerned about high electricity prices and economic uncertainty. In agriculture, high electricity prices are as critical as raw material costs and input services, likely influenced by soaring fertilizer prices due to the Ukraine conflict. Labor shortages are a challenge across industries, particularly affecting industry and other sectors requiring semi- or high-skilled workers. Medium- and high-pay service sectors prioritize economic and policy uncertainty as their main challenge, with labor shortages ranking third.

Table 7. The three most pressing challenges presently

	ALL	Size (employees)			Sector					
		Small	Medium	Large	Agriculture	Industry	Construction	Services (low)	Services (medium)	Services (high)
High price of electricity and energy inputs	39.7%	32.9%	28.0%	52.3%	71.4%	67.2%	20.0%	45.2%	10.8%	16.5%
High price of raw materials and input services	24.2%	37.2%	16.9%	21.5%	71.4%	57.8%	0.0%	24.6%	10.8%	4.1%
Increased uncertainty in the economic environment	41.6%	50.9%	52.8%	27.8%	42.9%	27.4%	80.0%	26.0%	61.6%	83.5%
Shortage of qualified workers	55.3%	44.7%	71.7%	50.0%	28.6%	47.6%	100.0%	55.7%	46.1%	75.3%
High labor costs	28.0%	29.7%	29.0%	26.3%	14.3%	34.4%	40.0%	21.9%	36.9%	8.2%
Supply interruptions	5.4%	7.4%	0.0%	8.1%	14.3%	3.9%	0.0%	9.7%	0.0%	0.0%
Transport and logistics interruptions	3.4%	3.2%	0.0%	5.9%	0.0%	3.9%	0.0%	5.1%	3.1%	0.0%
Access to finance challenges	10.3%	18.3%	8.4%	6.9%	28.6%	7.8%	20.0%	8.3%	7.7%	4.1%
Uncertainty for and increased interest rates	8.6%	1.9%	25.5%	0.5%	0.0%	3.9%	0.0%	9.7%	16.9%	8.2%
Accumulated debt	6.5%	5.7%	4.5%	8.5%	0.0%	3.9%	0.0%	9.7%	0.0%	4.1%
General uncertainty (determined by the unclear moves of economic policies)	42.3%	43.8%	36.4%	45.7%	28.6%	27.4%	0.0%	37.6%	66.2%	79.4%

Source: Survey on the impact of crisis induced by the conflict in Ukraine on firms 2023.

6. Conclusions

The aim of this study was to empirically examine the impact of the crisis induced by the conflict in Ukraine on firms in North Macedonia using data from a survey conducted with 112 firms in April and May 2023. Descriptive statistics and probit regression were employed to analyze the raw data.

Key findings indicate that although larger industrial exporters have higher raw material costs, smaller firms in agriculture and low-pay services were more adversely affected by price increases. All firms, regardless of size, responded to cost pressures by increasing final product prices, while larger firms more frequently implemented cost-reduction strategies compared to smaller firms. Many firms of all sizes also postponed planned investments, with agricultural firms more likely to halt production.

Energy costs, primarily reliant on electricity for production, surged dramatically for large firms purchasing on the open market, particularly in industry and construction. High-pay services experienced more manageable energy cost increases. While all firms passed on energy price shocks to their products and employed cost consolidation, medium and large firms also invested in electricity production facilities and energy-saving processes, mainly in industry, agriculture, and low-pay services. Conversely, many small firms did not adopt specific coping strategies, likely due to operating within a regulated electricity market.

Labor costs increased due to labor and skill shortages, exacerbated by minimum wage hikes, affecting small local firms in low-pay sectors disproportionately. Large industry and construction firms responded with outsourcing and technological investments. Various other costs, including accounting, IT, bank services, and maintenance, rose moderately across sectors, with significant increases noted in agriculture.

Demand for Macedonian firms' products and services remained stable overall in 2022, with increases in industry and construction and decreases in smaller agricultural businesses. Persistent challenges unrelated to the crisis include labor shortages and economic uncertainty, more pronounced among smaller firms and in specific sectors.

Regression results highlight that higher energy cost shares correlate with increased input cost transfers to final prices but worsen competitiveness. Increased product demand during the crisis generally improved competitiveness, while firms not addressing rising costs struggled to convert input increases into higher prices, especially in response to labor cost hikes. This underscores that firms absorbing labor cost hikes without price increases could mitigate cost-push inflation.

This study builds upon a conceptual framework that recognizes the interplay between geopolitical conflicts, economic interdependence, and firm-level responses. By applying insights from conflict studies to the context of North Macedonia, this research enriches our understanding of how global geopolitical events reverberate through interconnected markets. The findings align with previous studies on the economic consequences of armed conflicts, which highlight disruptions in trade routes, supply chains, and energy dynamics as key factors influencing firm behavior. Furthermore, the focus on specific channels of impact, including raw material costs, energy price surges, labor shortages, and demand fluctuations, underscores the relevance of these global events within a localized context. This analysis not only contributes to academic discussions but also informs policymakers and business leaders in North Macedonia and the broader region about effective strategies to navigate and mitigate the economic challenges posed by geopolitical crises.

The conclusions drawn from the study suggest several policy implications that can address critical challenges faced by firms in North Macedonia. Firstly, given the persisting economic and policy uncertainty, the government should prioritize stability by engaging in comprehensive consultations with stakeholders before implementing regulatory changes. This approach will mitigate disruptions caused by abrupt policy shifts, particularly in areas like tax and finance. Secondly, addressing the labor shortage requires activating the unemployed labor force through reskilling and upskilling programs, reducing social support constraints, and considering flexible employment options for students. Thirdly, to manage electricity price volatility, large firms could negotiate with the government for stable pricing models or invest in their electricity production capacities. Additionally, streamlining permit processes and promoting consultation support for renewable energy investments are essential. Lastly, upgrading the electricity transmission network and supporting energy storage solutions will be crucial to sustain the growth of renewable energy production. These policies, coupled with clear communication and accessible financing mechanisms, can foster resilience and growth amid economic challenges.

Despite yielding valuable insights, this study has several limitations that warrant consideration. Firstly, the sample size used in the survey was relatively small, which may limit the generalizability of the findings to the broader population of firms. Additionally, the

study primarily focused on examining the impact of the crisis induced by the conflict in Ukraine on firms within a domestic context. Exploring more complex relationships and considering participation in global value chains (GVCs) could provide a deeper understanding of how external shocks affect firms within a global economic context. Moreover, the study's emphasis on all firm sizes or sectors may have obscured more nuanced variations across different types of firms. By diversifying the sample to include a broader spectrum of firm sizes and sectors, the study could generate more specific and targeted policy recommendations tailored to different segments of the economy. Other generic limitations include potential response biases in the survey data, the reliance on self-reported information, and the inability to establish causal relationships due to the cross-sectional nature of the study. Future research efforts should aim to address these limitations to enhance the robustness and applicability of the findings.

Endnotes

1 They specifically examine topics such as companies' roles in developing innovative weaponry, war financing, and the taxation of war profits.

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Appendix – Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Final price reflecting input cost (from more to less)	107	2.86	0.92	1	4
Competitiveness perception (from worsening to improvement)	111	2.73	0.77	1	5
Sector					
Agriculture	106	0.07	0.25	0	1
Industry	106	0.26	0.44	0	1
Construction	106	0.05	0.21	0	1
Low-pay services	106	0.30	0.46	0	1
Medium-pay services	106	0.24	0.43	0	1
High-pay services	106	0.08	0.28	0	1
Firm size					
Small	111	0.23	0.43	0	1
Medium-sized	111	0.26	0.44	0	1
Large	111	0.50	0.50	0	1
Region					
Skopje	111	0.43	0.50	0	1
Polog	111	0.03	0.16	0	1
SW	111	0.04	0.19	0	1
Pelagonia	111	0.13	0.33	0	1
NE	111	0.03	0.16	0	1
E	111	0.17	0.38	0	1
SE	111	0.11	0.31	0	1
Vardar	111	0.07	0.26	0	1
Share of exports in revenue					
Non-exporter	111	0.47	0.50	0	1
1-30%	111	0.16	0.37	0	1
31-60%	111	0.05	0.21	0	1
Over 60%	111	0.32	0.47	0	1
Energy cost share	100	17.25	19.10	0	100
Labor cost share	100	31.60	21.16	0	99
Demand (from reduction to increase)	109	2.72	0.79	1	4
Firms who did not undertake any step for coping with raw material price surge	111	0.05	0.21	0	1
Firms who did not undertake any step for coping with energy price surge	111	0.13	0.33	0	1
Firms who did not undertake any step for coping with labor cost surge	111	0.36	0.48	0	1

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THE ROLE OF SOCIAL FACTORS IN THE ACCEPTANCE OF ARTIFICIAL INTELLIGENCE-BASED SERVICES: THE EXAMPLE OF THE BANKING SECTOR OF BOSNIA AND HERZEGOVINA

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Abstract

In times when AI's development and research is moving at an unprecedented speed, this paper explores its role in retail banking. The results presented are part of a wider research of market readiness and AI acceptance, especially in developing economies. The research was conducted in Bosnia and Herzegovina (B&H). The quantitative portion consisted of a survey completed by 671 respondents. This paper focuses on the influence of social factors (perceived humanness, perceived social interactivity, and perceived social presence) on the attitudes towards – and subsequently acceptance of - AI-based services. Chatbots, specifically ChatGPT-4, were the technology the research focused on. The results indicate that perceived humanness and perceived social interactivity have a positive effect on attitudes – and acceptance – of AI-based services. This research could not prove that there is a positive relationship between social presence and attitudes towards AI-based services. The positive relationship between attitude and acceptance was proven as well.

Keywords: *Artificial intelligence (AI), Machine learning (ML), Banking, Technology readiness*

JEL classification*: O32*

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1. Introduction

Artificial intelligence (AI) is a complex term that many have tried to define since it was coined in 1956. There is no widely accepted definition of AI (Allen 1998; Duan, Edwards, and Dwivedi 2019; Kirsh 1991; Monett and Lewis 2018, Nilsson 2009; Winston 1982). For the purposes of this text, the assumed definition is that AI is 'the ability of a machine to perform cognitive functions that we associate with human minds, such as perceiving, reasoning, learning, interacting with the environment, problem solving, decision-making, and even demonstrating creativity' (Rai, Constantinides, and Sarker 2019, p. 3).

In 2024, AI seems to be ubiquitous – in development, in research, and in daily news articles. The release of ChatGPT in late 2022 led to a major boost of interest and media coverage in all things AI. Leaders from all industries are considering how AI can improve their daily operations and make sure they are keeping up with the fast pace of technology development. AI has major potential to improve operations, from significantly enhancing how repetitive tasks are performed, to lowering costs. Banking is no exception; however, while some perceive banking as an innovative industry (Marous 2017, Cocheo 2020, J.P. Morgan 2021, Citi 2018), others argue it is the exact opposite. During the financial crisis in 2009, Paul Volcker, former US Federal Reserve chief, memorably said that 'the ATM has been the only useful innovation in banking for the past 20 years' (Lumley 2022). King (2014) agrees – nineteenth-century banking principles are still discernible. Whatever the case may be, banking (as any other industry) will have to adapt to the major technological shift in order to remain competitive. Many believe that the combination of humans and technology will be the competitive advantage in banking of the future. Davenport et al. (2019) argue that AI will be more effective if it is used to augment, not replace, humans.

There are many ways in which AI can be used in both back-office and front-office banking operations. While all use cases are relevant research topics, and while it is inarguably important to continue researching the readiness of banks, the focus in this paper is the readiness of customers to accept AI in retail banking.

Readiness for and acceptance/rejection of new technologies has long been an area of research interest among scholars from various fields, including information systems (IS). TAM (Technology Acceptance Model) and different variations of it are some of the most popular research models for assessing technology acceptance. One of the popular expanded versions is The Service Robot Acceptance Model (sRAM), originally developed by Wirtz et al. (2018), that adds 'previously underexplored social and relational variables' as acceptance drivers (Fernandes and Oliveira 2021).

The present study combines TAM and sRAM to assess the readiness of banking customers in Bosnia and Herzegovina for AI-based banking services. The conceptual model presented in this study focuses on the role of social factors in shaping attitudes toward AI-based banking services and intention to adopt AI-based banking services.

1.1. AI in banking

According to Manser Payne, Dahl and Peltier (2021), combining the growth of digital technologies with the concept of servitization (shifting to service-oriented business models, fueled by innovation) results in a new term – digital servitization. It utilizes digital service technologies to create customer value. Despite many being aware that AI and digital servitization in banking offer immense potential, there is not a lot of research on the impact AI has on the value co-creation process. Additionally, Manser Payne, Dahl and Peltier (2021) note that 'organizations employing digital servitization strategies increasingly view AI-enabled technologies as efficient ways to replace human-to-human interactions of frontline service providers or to automate various processes'. As AI becomes more competent at mimicking human cognition and emotions, conversational bots might be considered as actors in the value co-creation process. This calls for research on how client-facing AI is affecting the service exchange, as well as research on consumer acceptance of AI in consumer-facing contexts. The research presented in this paper contributes to this need.

According to Marous (2017), the use of AI is not new in banking. Financial organizations have been using AI to solve issues of different complexity, by simplifying manual processes and making them more accurate, faster, and less costly. AI is now expanding beyond process improvement and is 'becoming the new user interface (UI)'.

Ng (2020) lists AI and deep learning applications in banking, arguing it is now used in everything from deposits and lending, to insurance, payments, investment management, and capital markets. Deep learning can find a way to connect events that appear not to be connected, and is now arguably the best mean for fraud detection, as well as a tool for setting insurance prices and predicting stock market prices. On the other hand, breakthroughs in natural language processing (NLP), along with deep learning, resulted in chatbots that can now do both sales and customer service. Despite further developments, deep learning certainly has constraints (which include anything from implementation issues to ethical issues). The data this technology relies on needs to be unbiased, which is not an easy thing to achieve. The more bias the data – the more bias the algorithm / machine. Specifically for finance, this can easily mean racial and gender discrimination when setting loan rates, interest rates, or insurance premiums. Using AI in large, connected systems (e.g., the stock market) can lead to dramatic consequences (such as another financial crisis,

considering the one in 2008 originated from the financial market). Privacy and use of personal data are the main ethical issues to be considered. On top of easily being biased, AI can also easily be unethical. Ng makes an interesting comparison by saying 'AI is the new electricity', but also states that that major opportunity also comes with great responsibility.

De Miranda (2019) explored the impact of AI in finance in a wider sense, by sharing a theory that the acuteness of the 2008 global financial crisis was in part rooted in the fact that non-transparent computer programs started 'a destructive loop that snowballed across the financial system'. This sort of risk is increased by the fact that financial systems are mutually connected and commonly based on similar software. This results in the need for human supervision, which in turn puts ethical and legal limits to using AI in finance. De Miranda concludes that new currencies and new automated transactions may either fortify capitalism or expedite its fall.

King (2018) states that there are two broad areas where AI will affect financial services – interaction/conversational AI layer between the customer and the institution, and internally within any process a human can learn within a bank that does not heavily depend on social cues. An algorithm will be able to learn as well as a human, and thus might replace them in many aspects. Specifically for retail banking, Boobier (2018) elaborates on the idea that front-office staff might be becoming an endangered species. Banks around the world are already piloting robots in their everyday work. For example, news came out in 2015 that Bank of Tokyo-Mitsubishi UFJ uses a robotic humanoid bank teller (named Nao) in its flagship Tokyo branch. Nao could potentially operate in 19 languages and 'memorize' details about 5.5 million of customers and 100 products. Another example is Pepper, a 1.2 metres tall robot that retails at around $1600 plus software costs. It has a so-called emotion engine, able to recognize human feelings and simulate them. Note that all of this was available prior to launching ChatGPT and other LLM-based agents, which introduced new levels of simulating human behavior and emotion, such as empathy. All of this calls for questioning what the future of retail banking looks like. Bank branches will likely not exist in their current form. Concepts such as café-banks, which offer informal workspaces and combine banking, working, and drinking coffee, are already emerging. It seems to mirror fintech start-ups, that operate through small groups collaboratively working in public spaces. It is not hard to imagine a robot banking advisor in that scenario.

Brown (2020) suggests using AI to boost innovation across the entire product line – from enhancing and simplifying human interfaces using voice and super sensors, to creating new products that manage themselves and combining human talent with collaborative AIs to build new service offerings at new price points.

Karmakar (2020) refers to Bill Gates' famous quote that 'We need banking, but we don't need banks anymore', and expands on that idea by explaining that banks of the future will be built around people and delivered when and where they need it. They will be powered by data and technology. An AI future offers vast amounts of opportunity, but it comes with potential hazards. Navigating the way to a better future will be the ultimate challenge of our time.

When it comes to AI applications in banking, every available study or publication offers its own categorization. For the purposes of this text, AI applications will be divided into operations-focused and customer-focused applications.

Operations-focused applications of AI in banking

There are numerous ways to use AI for any back-office operations in banking. Some of the most prominent use cases are (in no specific order): (1) document analysis, (2) deposits, lending, and crediting, (3) payments, (4) trading, investments, and portfolio management, (5) (cyber) risk management, fraud detection and prevention, and (6) compliance. Since this paper focuses on front-office / retail banking operations, details of these use cases are omitted. Multiple previous publications (such as King 2018) offer a detailed overview of these use cases.

Customer-focused applications of AI in banking

AI could theoretically be used in any segment of client communication, and in any banking operation in general. Prominent use cases for customer-focused applications of AI in banking include (1) wealth management and financial advising, (2) client onboarding, and (2) client relationship management and chatbots. When it comes to financial advising, King (2018) states that fintech startups were the first to introduce robo-advisors. He argues that human advice is now of marginal value; in the vast majority of cases, robo-advisors can do as good of – or better – job than human advisors can. As for client onboarding, using AI for onboarding will mean faster turnaround than when humans perform the service, plus the benefit of having this service available all day, all year, without holidays, weekends, or any types of leave. It will also be able to process more requests with less mistakes.

1.1.1. Client relationship management and the role of chatbots

Chatbots are AI programs that 'simulate conversations with people via voice or messaging' (Xiang 2020), and were chosen for this research as they are amongst the easiest ways to leverage AI to exceed customer expectations. They are becoming the new norm because they can provide 'the immediate and convenient experience that consumers crave' (Tan 2017).

Walch (2019) expands on this by starting that using bots as customer service agents is 'revolutionizing the relationships between companies and their clients'. Chatbots can assist a much larger number of clients, any time of the day, in comparison to human employees. For this reason, AI-enabled chatbots are quickly gaining in popularity as 'the front-line of customer engagement'. Having a contact point at any time can significantly improve time to resolution and customer satisfaction. While chatbots cannot always resolve a query, they can make sure the right people address it. This results in higher productivity since human agents can focus on more complex cases.

Xiang (2020) notes that chatbots can be used for debt collection as well. They are more effective than humans in simple collection scenarios, like informational and reminder phone calls. They can simultaneously speak to how ever many clients, and remain polite and professional regardless of how tense the situation may get.

Boukadakis (2021) states that AI-powered conversational banking gained additional prominence when the COVID-19 global pandemic started and limited person-to-person (banker-to-customer) contact. One of the biggest reasons for increased use of AI-backed voice technology will be its capability to engage clients like never before. These user-friendly tools can save clients the time they would usually spend browsing through menus, looking for detailed information about their savings and spending. Instead, clients could ask questions like 'How much should I budget for eating out, based on my spending on it over the last six months?'. In short, technology makes it possible to maintain meaningful relationships with clients even when they are away from the bank physically.

Levitt (2024) summarized the findings from the fourth annual State of AI in Financial Services Report, produced by NVIDIA, an industry leader in AI computing. Generative AI and Large Language Models (LLMS) are quickly gaining popularity in a wide range of financial services, from marketing and sales to data generation. Customer experience is another popular use case, which means using chatbots, virtual assistants, and recommendation systems to engage new and existing clients.

It is important to keep in mind that every new technology comes with both opportunities and risks. Using chatbots might also mean issues that include but are not limited to data security and financial risks (Vieira and Sehgal 2017, Richad et al. 2019, Alt, Vizeli, and Saplacan (2021).

1.2. Service Robot Acceptance Model (sRAM)

This model was originally developed to examine the consumers' perceptions, beliefs, and behavioral intentions pertaining to the services delivered by robots. This model builds on the initial TAM by adding social-emotional and relational variables as determinants of robot-delivered services. sRAM also draws on the Role Theory (Solomon et al. 1985) and the Stereotype Content Model (SCM) by Fiske, Cuddy and Glick (2007). The Role Theory assumes that functional, social, and cultural norms direct the actions of interacting parties, i.e., service provider/robot and consumers in a particular situation (Fernandes and Oliviera 2021). On the other hand, the SCM sheds light on two main dimensions of interpersonal and inter-group cognition: perceived warmth and competence. While the 'warmth' dimension refers to perceived intentions (friendliness, helpfulness, and sociability), the 'competence' dimension pertains to the perceived capacities (intelligence, skillfulness, and efficiency), as explained by Fiske, Cuddy and Glick (2007). Hence, consumer acceptance will depend on how well robots can meet the functional needs (competence dimension) and the social-emotional and relational needs (warmth dimension) (Fernandes and Oliviera 2021).

Fernandes and Oliveira (2021) also comment on the limitations of sRAM, which they customized for use for a somewhat similar research topic (acceptance of digital voice assistants - DVAs). They note that other frameworks (e.g., the uses and gratifications (U&G) theory) and other drivers such as entertainment (hedonic dimension) or even inhibitors (e.g., privacy concerns and negative attitudes towards robots) can be useful in explaining customer acceptance of DVA and other automated technologies.

2. Research

2.1. Research background and objectives

Social elements of AI-based services entail perceived humanness, perceived social interactivity, and perceived social presence. Perceived humanness refers to the anthropomorphic qualities that the consumer

recognizes in robots. Perceived social interactivity refers to the perception that robots display appropriate actions and display 'emotions' according to societal norms (Wirtz et al. 2018). Perceived social presence refers to the extent to which the robot makes individuals feel as though they are in the presence of another social entity (Heerink et al. 2010). Social presence can also be explained as the degree to which users feel that other intelligent beings interact with them within the digital environment (Tan and Liew 2022) or the feeling that another being 'living or synthetic' also exists in the world and appear 'to react to you' (Heeter 1992, p. 265).

The objective of this research is to test the effects of social factors on attitudes towards AI-based services, and therefore acceptance of those services. It aims to provide more insight into banking clients' attitudes towards interacting with non-human entities when contacting their bank. This will mean a significant shift to front-office operations, and understanding how (not) ready the clients are, as well as what the precedents of their acceptance are, is of key importance for banks to make well-informed technology-related decisions.

2.2. Overview of previous research

When it comes to chatbot research in general, a significant number of studies exist; but considering that the technology is on the rise (and has likely progressed faster between late 2022 and mid-2024 than in all the years before), the research will have to switch to a higher gear to be able to keep up. Generally speaking, users expect for chatbots to be high performing, smart, seamless, and personable (Zamora 2017). Svenningsson and Faraon (2019) expand on this and offer guidance on how to develop AI in a way that boosts adoption. Their research shows that a chatbot should (1) avoid small talk and remain formal in communication, (2) let the user know they are speaking to a chatbot and ask how it can assist them, (2) provide specific information in well-formed sentences, (3) ask follow-up questions, and (4) apologize when the context is not understandable, while proceeding to move the conversation forward.

The role of social factors in attitudes and acceptance of AI-based services has been the topic of previous research studies; however, since the sRAM is fairly new, the number of studies that used it is still quite low (for example, Google Scholar search points to 336 papers mentioning sRAM and Wirtz). 'Limited research has acknowledged the role played by social elements on technology adoption since past technologies do not convey the same human-like characteristics' (Fernandes and Oliveira 2021, p. 188). Recent AI advancements have enabled a previously unseen level of social presence for machines, which means the relevance of this type of research has dramatically increased.

Perceived humanness

Ma and Huo (2023) researched the acceptance of chatbots, on the topic of ChatGPT, using the AIDUA (which stands for 'AI Device Use Acceptance') framework, and confirmed that perceived humanness increases consumers' performance expectancy and decreases their effort expectancy about ChatGPT. Gursoy et al. (2011) stated that users who perceive high anthropomorphism in AI devices often think that AI devices with humanlike features threaten their human identity. Referencing this, Zhang et al. (2021) suggest that AI virtual assistants should be designed with a moderate level of perceived humanness. This will help grow trust between users and AI, and minimize the chances of users feeling threatened and fearful due to excessive perception of humanness. Premathilake and Li (2024) researched users' responses to humanoid social robots. They concluded that relationship between perceived humanness and perceived social presence is significant, and that both factors affect users' continued usage intention.

Brendel et al. (2023) wrote an interesting paper on the paradoxical role of humanness in aggression toward conversational agents. They argue that a more humanlike conversational agent is a double-edged sword, as it can both increase and decrease the user's frustration and, consequently, aggression. According to their research, there are three ways in which perceived humanness can impact a user's aggression towards a conversational agent: (1) perceived humanness increases frustration when a conversational agent produces errors; (2) perceived humanness increases service satisfaction, which consequently lowers frustration, and (3) perceived humanness has an effect on the nature of aggression when a user is frustrated (for example, if the conversational agent is less human-like, the user is more likely to use very offensive language).

Perceived social interactivity

Zhang et al. (2021) researched acceptance of AI virtual assistants and confirmed that perceived social interactivity and perceived social presence are positively related to trust. Kim, So and Wirtz (2022) applied social exchange theory to better understand

human–robot interactions, and found that perceived social presence and perceived social interactivity have a positive relationship with rapport, consequently driving usage intentions. Aslam et al. (2023) explored drivers of chatbot acceptance, using an extended version of sRAM. They found that, amongst social elements, only perceived social interactivity has an effect on chatbot acceptance.

Perceived social presence

Tan and Liew (2022) researched the effects of m-Commerce chatbot interface on, amongst other things, social presence. They found that social presence from anthropomorphic agents can influence trusting beliefs toward online platforms. Verhagen et al. (2014) focused their research of virtual customer service agents and found that social presence influences the satisfaction that consumers feel about the service encounter. Araujo (2018) researched chatbots; one of the most interesting conclusions found was that there were no major differences in social presence between human-like and machine-like conditions. The author concluded that the interaction style (dialogue) and the medium (messaging interface) might be enough to trigger social presence. McLean and Osei-Frimpong (2019) examined the variables impacting the use of AI voice assistants and confirmed a positive relationship between social presence and usage. Fernandes and Oliveira (2021) also explored the drivers of adoption for digital voice assistants and found social elements to be significant direct drivers of acceptance, primarily through perceived social presence, which is influenced by social interactivity. They could not find a significant effect for perceived humanness. Al-Fraihat, Alzaidi and Joy (2023) researched the adoption of smart voice assistants and found perceived social presence to be one of the necessary predictors for the consumers' intentions to adopt.

2.3. Methodology

A mixed-method research approach was applied, meaning that qualitative and quantitative research was conducted, with the goal of maximizing the benefits and minimizing the shortcomings that both of these approaches come with. The qualitative research is summarized in a previously published paper and consisted of semi-structured interviews with managers from seven banks in Bosnia and Herzegovina (representing the majority of the local bank industry). The research analysis yielded many conclusions, including that Bosnian-Herzegovinian banks agree that their clients still highly value human touch in service encounters (Turnadzic, Pestek and Cinjarevic 2023), especially when it comes to more complex and sensitive topics, such as lending.

For the quantitative part of the research, the data was collected from bank customers in Bosnia and Herzegovina and used to test the proposed conceptual model. The snowball sampling technique was used to collect responses from 671 bank customers. This technique was chosen for its convenience in terms of chain referral (Pasikowski 2023). The survey was anonymous and the respondents were not asked to confirm their current bank. Responses were collected online, primarily using social media (LinkedIn, Facebook) and direct contacts. While web-based surveys are not without their shortcomings, they have a rapid turnaround, high reach, and they make data quality checking easier (Illum, Ivanov, and Liang 2010).

Discarding incomplete responses, the sample consisted of 664 respondents – users of banking services provided by commercial banks operating in Bosnia and Herzegovina. The gender split was fairly even, with women leading at 56%. Most respondents' highest level of education completed is high school (43%), and the majority is employed (66%). The biggest age groups were 36-45 (25%) and 26-35 (22%). In terms of residence (considering there are three entities in Bosnia and Herzegovina), the majority of respondents (81%) lives in Federation of Bosnia and Herzegovina. In terms of household size (including the respondent), the biggest group are those that live in 4-person households (33%). The same percentage (33%) of respondents live in households where the average monthly net income during 2023 was less than 2000 BAM (roughly equivalent to 1000 EURO).

Before accessing survey questions, the respondents were required to watch a video of a conversation with ChatGPT about lending. Lending was chosen as the topic because it is the core of banking. This was mentioned by one of the qualitative research participants, and is a common perception in the industry. International Monetary Fund, Gobat (n.d.) explains that banks do a lot of things, but their primary role revolves around deposits and lending. When answering the questions, respondents were asked to imagine a future where a chatbot run by their bank will be providing information on all services offered by the bank.

All constructs from the research model were measured by scales developed and validated in previous research (see Table 1). Constructs related to social factors are listed in Table 2.

Table 1. Research constructs' references

Model segment	Construct	Measurement scale adapted from previous studies
Social elements	Perceived humanness	Fernandes and Oliveira (2021), Ma and Huo (2023)
	Perceived social interactivity	Fernandes and Oliveira (2021)
	Perceived social presence	Fernandes and Oliveira (2021), Tan and Liew (2022)

2.4. Hypotheses

Four hypotheses were assumed:

H1: Perceived humanness is positively related to attitudes towards AI-based services.

H2: Perceived social interactivity is positively related to attitudes towards AI-based services.

H3: Perceived social presence is positively related to attitudes towards AI-based services.

H4: Attitude towards AI-based services is positively related to acceptance of AI-based services.

2.5. Analysis and discussion of results

Data analysis was conducted through Covariance Based Structural Equation Modeling (CB-SEM), using SmartPLS 4.0 software. Confirmatory Factor Analysis (CFA) was done as the first step. The analysis was also conducted in bootstrapping mode. CB-SEM is usually the path when wanting to confirm theories and their underlying hypotheses; it is theory-driven (Hair et al. 2021, Agic 2018). In line with these guidelines, CFA and CB-SEM were chosen for this research work.

Model goodness-of-fit (RMSEA - Root Mean Square Error of Approximation, TLI - The Tucker and Lewis Index, CFI - Comparative Fit Index, SRMR - Standardized Root Mean Square Residual), outer loadings (see Table 2 for more details), composite reliability (rho_c and Cronbach's alpha), convergent reliability (Average Variance Extracted (AVE)), and discriminant reliability (the Fornell-Larcker criterion and the HTMT criterion) were all checked, as well as basic SEM prerequities (which are (1) normal data distribution, (2) absence of multicollinearity, (3) linearity, (4) homoscedasticity and (5) sample size). See Table 3 for details on RMSEA, TLI (NNFI), CFI, SRMR, and Table 4 for details on Cronbach's alpha, composite reliability, and average variance extracted. Based on all of the above, it was concluded that the used scale and model are a reliable base for the research.

When it comes to sample size, Kline (2016) explains that SEM is, generally speaking, a large-sample technique. However, it is hard to specify what large enough constitutes, at least not in a way that

Figure 1. Research model

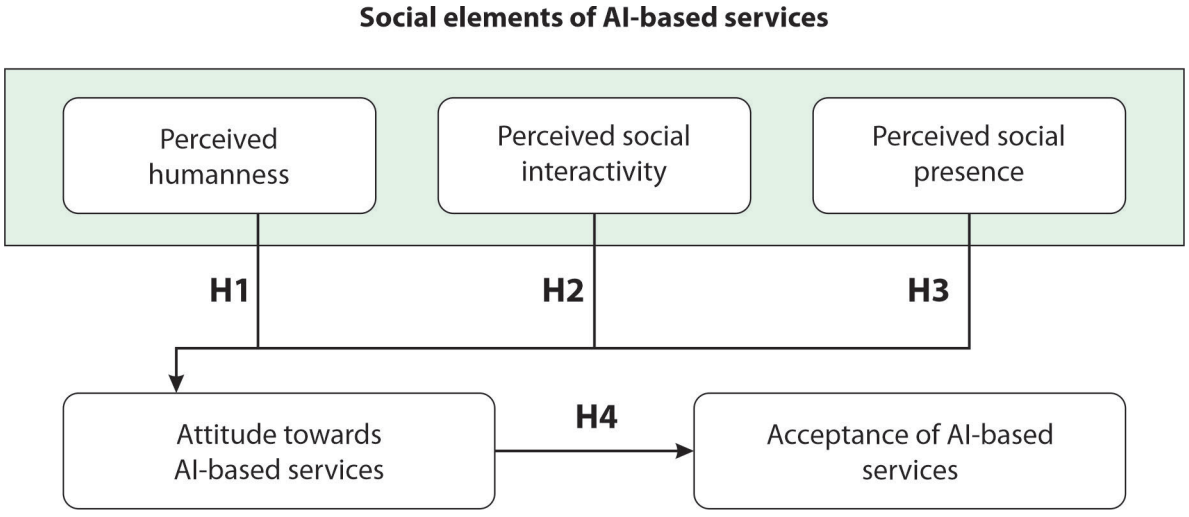


Table 2. Outer loadings

Latent variable	Manifest variable	Codes	ST loadings
Perceived humanness	Banking chatbot's responses feel natural.	PH1	0.849
	Banking chatbot offers a human-like response.	PH2	0.882
	Banking chatbot's responses do not feel machine-like.	PH3	0.615
	Banking chatbot reacts in a very human way.	PH4	0.811
Perceived social interactivity	I consider the banking chatbot a pleasant conversational partner.	PSI1	0.900
	I consider the banking chatbot pleasant to interact with.	PSI2	0.920
	I feel that the banking chatbot understands me.	PSI3	0.745
Perceived social presence	I can feel the human contact with the banking chatbot.	PSP1	0.818
	I can feel a sense of human sociability with the banking chatbot.	PSP2	0.879
	I can feel a sense of human warmth with the banking chatbot.	PSP3	0.871
	I can feel a sense of human sensitivity with the banking chatbot.	PSP4	0.874

Table 3. Model fit indices

Index	**General rule for acceptable fit if data is continuous**	**Value in this research**
RMSEA	< 0.06 to 0.08 with confidence interval	0.063
TLI (NNFI)	≥ 0.95 can be 0 > TLI > 1 for acceptance	0.889
CFI	≥ 0.95 for acceptance	0.899
SRMR	≤ 0.08	0.085

Adapted from: Schreiber et al. (2006)

would be applicable to all cases. The more complex the model (the more parameters there are), the bigger the sample size should be. MacCallum et al. (1999) researched the guidelines for sample size in factor analysis and came to the conclusion most authors agree with nowadays – that there is not a one-size-fits-all approach. Agic (2018) notes that minimal sample size varies between 100 and 500. Wolf et al. (2013) also researched different approaches to determining sample size in SEM models and concluded that more is not always better. They list some of the guidelines provided by other authors (such as a minimum sample size of 100 or 200 (Boomsma 1985), or 5 to 10 observations per parameter (Bentler and Chou 1987)) and describe them as problematic, as they are not model-specific. The '10-times rule' (which says that sample size should be greater than ten times the maximum number of model links pointing towards latent variables in the model) has been popular (Kock and Hadaya 2016; Hair et al. 2011; Jayaram et al. 2004), but that does not mean it cannot lead to inaccurate estimates (Kock and Hadaya, 2016; Goodhue et al. 2012). While the validity of the '10-times rule' is questionable, the sample size in this thesis exceeds it, thus conforming to widely accepted standards.

It does not make sense to include every index included in the program's output. However, it is also important to avoid choose those fit indices that indicate the best fit (Hooper et al. 2007). Different authors suggest including different indices. Kline (2016) recommends including model chi-square statistic, RMSEA, CFI, and the SRMR. Schreiber et al. (2006) recommend TLI, CFI, and RMSEA for one-time analyses (which is the case in this research).

The main source for the strict cutoff criteria are Hu and Bentler (1999). They say that CFI and TLI values should be 'close to .95 or greater'. Brown (2015) explains that the 'use of the phrase 'close to' is not accidental, because the recommended cutoff values were found to fluctuate as a function of modeling conditions and whether or not an index was used in combination with other fit indices.

When discussing TLI, Schermelleh-Engel explain that more complex models are penalized by a downward adjustment, while more restrictive models are rewarded by an increase in the fit index.

Ringle et al. (2024) note both 0.08 and 0.10 as acceptable thresholds for SRMR.

Marsh et al. (2004) wrote a paper on the dangers in overgeneralizing Hu and Bentler's findings. Despite Hu and Bentler suggesting caution, many reseachers 'have inappropriately promoted their new, more stringent guidelines for acceptable levels of fit into something approaching the golden rules' (p. 322). The results by Hu and Bentler have limited generalizability in typical practice. While it might be disappointing to researchers wanting clear rules, 'interpretations of the degree of misspecification should ultimately have to be evaluated in relation to substantive and theoretical issues that are likely to be idiosyncratic to a particular study' (p. 340).

Since RMSEA fits the criteria, SRMS fits the less strict criteria, and CFI and TLI are close to less strict cutoffs (0.90), after thoroughly reviewing both theory and other versions of the model, the author found the model formed for this research to be a good fit. Its complexity makes it hard for all metrics to fit more strict acceptable ranges. While this paper only presents the parts of the model related to social elements, the full model also included functional elements (perceived ease of use, perceived usefulness, and perceived social norms) and technology readiness elements (innovativeness, optimism, discomfort, and insecurity).

It is also worth noting that R-Square, the coefficient of determination (which Hair et al. (2021) define as 'the variance explained in each of the endogenous constructs and a measure of the model's explanatory power') is satisfactory (above 0.64 for acceptance; above 0.81 for attitudes).

Table 4. Composite and convergent validity

Latent variable	Cronbach's alpha (standardized)	Composite reliability (rho_c)	Average variance extracted (AVE)
Humanness	0.866	0.872	0.634
Interactivity	0.886	0.891	0.737
Social presence	0.918	0.919	0.741

Table 5. Hypotheses' direct effects

Hypothesis		Beta	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values	
H1	PH -> ATT	0.145	0.144	0.054	2.706	0.007	Confirmed
H2	PSI -> ATT	0.157	0.159	0.046	3.389	0.001	Confirmed
H3	PSP -> ATT	-0.084	-0.085	0.046	1.818	0.069	Not confirmed
H4	ATT -> CA	0.778	0.778	0.021	37.044	0.000	Confirmed

Table 6. Hypotheses' specific indirect effects

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
PH -> ATT -> CA	0.113	0.112	0.042	2.687	0.007
PSI -> ATT -> CA	0.122	0.123	0.036	3.395	0.001
PSP -> ATT -> CA	-0.065	-0.066	0.036	1.814	0.070

There is also partial (indirect) mediation to consider. According to Ryu and Cheong (2017), the mediation effect can be specified as an indirect effect (Alwin and Hauser 1975; Bollen 1987) such as 'the indirect effect of an independent variable (X) on a dependent variable (Y) via a mediator (M)' in which X affects M, which in turn affects Y. The results in the table above are in line with direct effects shown in the previous table.

Beta should be positive if the assumed relationship is positive, and vice versa. As for P values (a measure for null hypothesis significance testing), the number shows how likely it is that the data would have occurred by random chance (i.e., that the null hypothesis is true). Acceptable ranges vary depending on the author. Hair et al. (2022) use <0.05 as the norm and are amongst the most cited; however, many use more stringent approaches such as <0.01. Zhu (2016) is just one of the authors questioning the trend of aiming for lower P values and claiming statistical significance as a result.

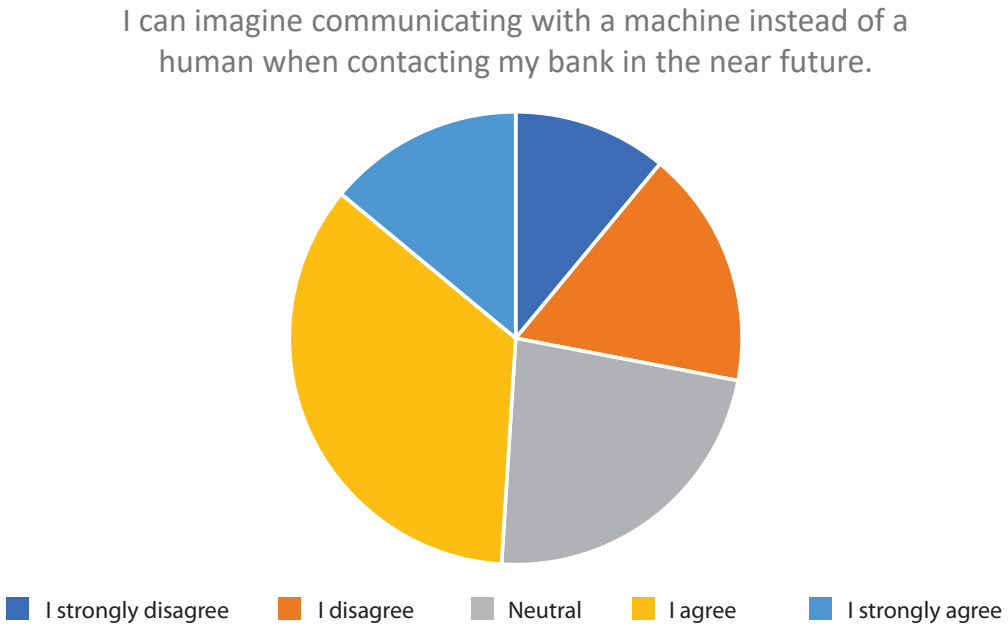
Before diving into model testing and hypotheses, with the goal of better understanding the effects of social factors on attitudes and acceptance of AI, it is important to consider how open users are (not) to communicating with AI. Almost half of the survey respondents can imagine communicating with a machine instead of a human when contacting their bank in the near future, which is a good start (see Table 7 and Figure 2 below).

Considering betas and P values (see Tables 5 and 6), the first, second and fourth hypotheses in this group were proven. The third hypothesis could not be proven.

Table 7. Openness to non-human communication

I can imagine communicating with a machine instead of a human when contacting my bank in the near future.	Percentage
I strongly disagree	11%
I disagree	17%
Neutral	23%
I agree	35%
I strongly agree	14%

Figure 2. Openness to non-human communication



3. Conclusion

Perceived humanness (meaning, the anthropomorphic qualities that humans perceive in AI entities) and perceived social interactivity (meaning, the perception that AI entities display 'emotions' in line with societal norms) have a positive effect on attitudes – and acceptance – of AI-based services. However, this research could not prove that there is a positive relationship between social presence and attitudes towards AI-based services. Fernandes and Oliveira (2021), whose work served as basis for parts of the research model used for this thesis, researched the drivers of adoption of digital voice assistants, and concluded that the impact of social elements was only marginally significant. Interestingly, Zulfakar et al. (2022) researched customer acceptance and intention to use service robots in the hospitality industry, using sRAM, and found that none of the three social-emotional elements are essential in determining acceptance. They interpreted their research results as indicating that customer acceptance is much more related to functionality than it is to the machine's perceived social behavior. This is closely related to the research of Wang et al. (2023), that focused on user adoption of healthcare chatbots. While the authors found perceived social presence to be of key significance, the social features of chatbots are only useful (meaning, they have a positive effect on trust and satisfaction) when combined with functionality.

The attitude – intention relationship in the context of AI-based services was proven. Attitude, as expected, is positively related to acceptance. As per Dickinger et al. (2008, p. 6, 7), 'attitude is directly related to behavioural intention because people will only have intention to perform behaviours towards the things for which they have positive feelings'. Zhu et al. (2012) and Wong et al. (2013) are some of the many authors that showed that attitude positively correlated with user intention of use. In the realm of AI research, Rafiq et al. (2022) explored the intention to adopt AI chatbots in tourism, and found that the consumers' affective and cognitive attitudes were significant predictors of AI-chatbot adoption.

3.1. Research implications

From a theoretical standpoint, this paper seeks to expand the limited body of knowledge on the influence of social factors on AI acceptance. The value of researching social factors in AI acceptance is directly related to how advanced AI technology is (meaning, how well it can portray social behavior). AI consumer technology, specifically chatbots, have seen radical improvements over the past two years, making this research topic much more relevant. As time goes by and this technology continues to develop, the research topic will grow even more important. Since ChatGPT was first released in November 2021, several new and improved versions of the most popular chatbot were released (at the moment of writing this article, ChatGPT-5 is pending, and an improved version of ChatGPT-4 was released in May 2024). Every version of the chatbot came with significant improvements in the accuracy of outputs and the natural feel of the conversations. Given this major progress, any and all research concerning chatbots (from how best to develop them to what the users need to adopt the new technology as a main form of communication) is much needed.

From a managerial standpoint, the results of this study identify some of the drivers of AI-based services adoption among bank customers and thus allow bank managers to design AI-based services that will align with the expectations and needs of bank customers. This particular study is especially interesting for transitional economies. In the case of Bosnia and Herzegovina, the present study showed that the vast majority of local banks can be classified as digital laggards. The overall research conclusion is that Bosnian-Herzegovinian banks know little about the potential use cases of AI in banking and do not have developed strategies as to how to implement it going forward. Using academic and commercial research can hopefully assist banks on their way to implementing AI, and then fully exploring its benefits. One of the major prerequisites of doing so is understanding the stance of customers, starting with the drivers of their future adoption of AI-based services.

While banking was chosen as the industry of focus for this research (due to the fact that a big portion of the planet will at some point be a bank's client), research findings related to AI acceptance are relevant for other industries as well. This is especially true for industries that deal with sensitive data (as banking does with financial information and money), such as insurance and healthcare. As one of the respondents in the related qualitative research (Turnadzic, Pestek and Cinjarevic 2023), put it, openness to using AI depends on the service type (e.g., it is easier to talk to AI about withdrawing money than about taking out a housing loan).

3.2. Research limitations and further research recommendations

Every technology acceptance model has its own inherent limitations. The research model used (see Figure 1) in this thesis inevitably inherits some of those limitations. The same goes for the analysis – SEM, as well as SmartPLS, have both major benefits and some limitations. Conducting the research using other techniques and software would be beneficial. The research model could also be simplified for future similar studies.

The effects of sample size are a never-ending topic amongst researchers. While the sample size in this thesis was satisfactory, the author's recommendation is to expand the research in terms of sample size, as well as to explore the effects of different demographic characteristics. Additionally, as the majority of respondents were based in Federation of Bosnia and Herzegovina, it would be worthwhile increasing the number of respondents from Republika Srpska and District Brcko. Outside of the country, it would be interesting to see how the results from other transitional economies (those post-war like Bosnia and Herzegovina and others) would compare to this study. Expanding on that, it would be useful to conduct the research in developed economies and see if/how the results differ.

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