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Mateo Ivan Radman
T3K-Forensics GmbH
1030 Vienna, Austria
mateoradman@gmail.com

Mirjana Radman-Funarić
Polytechnic in Požega
34000 Požega, Croatia
radmanfunaric@vup.hr

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REGIONAL EARLY-STAGE ENTREPRENEURSHIP IN THE EUROPEAN UNION*

Abstract

Purpose: Entrepreneurship is often viewed as a driver of the global economy. However, previous research on the relationship between entrepreneurship and economic growth shows contradictory results depending on the research settings. The purpose of this paper is to investigate how early-stage entrepreneurship - including only enterprises that are less than three and a half years old - affects regional economic growth in the European Union.

Methodology: The methodology includes three methods: bivariate correlation, fixed effects regression with region and time fixed effects and spatial fixed effects regression. The panel sample consists of 273 NUTS 2 regions between 2008 and 2017.

Results: The results support the hypothesis of this research and show that early-stage entrepreneurship has a mild positive effect on the economic growth of European regions. However, the potential bidirectional nature of this relationship obliterates the ability to comment on the causality of this link. The percentage of people in the active population employed in human resources in science and technology and gross fixed capital formation have a significant and impactful effect on regional GDP.

Conclusion: The conclusion can be drawn that the effect of early-stage entrepreneurship on regional economic growth is conditioned by the population density of the region. Although these results show that enterprises founded in densely populated areas such as cities and metropolitan areas tend to have a larger effect on the regional economy, the results are ambiguous.

Keywords: Entrepreneurship, regional economic growth, EU NUTS 2, spatial analysis

1. *Introduction*

Until half a century ago, economic policy makers did not sufficiently recognise entrepreneurship as the driver of the economy. More recently, many studies have examined the impact of entrepreneurship and small and medium-sized enterprises on overall economic and social impacts. Due to the poor state of affairs following the great global financial crisis, with the aim of making the European economy more competitive and resilient to external eco-

* The research is based on Mateo Ivan Radman's Master's thesis entitled "Early-Stage Entrepreneurship and Regional Economic Growth in the European Union". It was defended on 15 June 2020 at the Utrecht University in the Netherlands.

nomic shocks, the European Commission (2013) decided to amend its economic policy and "reignite the entrepreneurial spirit in Europe" by introducing a review of the Small Business Act and the Action Plan 2020, which are expected to support entrepreneurs around the EU. According to Eurostat (2019), SMEs create four million jobs a year in the European Union and represent the largest body of employers. By giving such importance to the promotion of entrepreneurial activity and knowledge production over the past three decades, politicians, policy makers and scientists have contributed to the creation of a large number of research available today on this topic. In general, entrepreneurship has created a great image and is considered an accelerator of the economy (Acs et al., 2012; Acs et al., 2008; Aparicio et al., 2016).

Although there is a well-documented link between entrepreneurship and economic growth (OECD, 2019), the magnitude of this effect varies from country to country and from region to region. Today, numerous studies can be found that investigate the impact of entrepreneurship on the economic efficiency of neighbourhoods, regions, nations, and even continents (Wennekers & Thurik, 1999; Mitra, 2020). The impact of entrepreneurship on regional development is a very broad and interdisciplinary field that can be studied from multiple perspectives (Schumpeter, 1934; Romer, 1986; Lockett & Wright, 2005).

Historically, Birch (1981) found that two-thirds of all the net new jobs created (out of a total of 5.6 million businesses between 1969 and 1976) were created by small firms with twenty or fewer employees, and about 80% were created by firms with 100 or fewer employees. Furthermore, Birch reports that not all small businesses are job creators, but many job creators are relatively young start-ups. About 80% of the net new jobs are created by businesses four years old or younger. Recent research (Hallak & Harasztosi, 2019) at the level of EU member states shows that even though young small firms are not the largest contributors, their contribution to job creation amounts to 40%, which is far above their share in total employment, which is 15%. However, an overall decline in start-up firms in employment has been observed. Similar results were obtained by Criscuolo et al. (2014). An analysis of OECD countries showed that the contribution to job creation of young small firms is the largest, but this contribution decreases when looking at firms older than 5 years. However, it is important to note that this is subject to the country-specific environment firms are located in.

The explanation with the most evidence of the cause of the positive impact of entrepreneurship on regional growth is the claim that high-tech firms significantly improve regional economic growth (Audretsch & Fritsch, 2002). In doing so, according to Fritsch (2013), only high-quality start-ups generate value, as opposed to those that deliver already available products using the same technology as existing companies. Research conducted in Denmark (Eklund, 2020) shows that higher growth is associated with younger companies, human capital measured by the number of highly educated, especially organisational capital (including both management and marketing investments), and ICT capital assets. New high-potential firms, that is, those using new technology, are more prevalent in "R&D rich" countries, Reynolds et al. (2002). Audretsch & Fritsch (2002) and Fritsch (2013) suggest that quality is more important than the number of start-ups. The success of high-tech companies in one region attracts even more human capital and people move to that region to gain knowledge from those who have already started their own business (Porter & Stern, 2001).

According to Bosma et al. (2012), the regional emergence of start-up companies is motivated by regional norms and values that stimulate regional economic growth, which brings individual regions to a location advantage. Moreover, according to Bosma et al. (2020), entrepreneurial activity takes place within the specific context of a given environment, with its own unique social, cultural and economic characteristics. Reynolds et al. (1994) and Audretsch et al. (2015) argue that population growth and population density can positively affect the number of entrepreneurs and economic growth in regions caused by interaction and knowledge exchange. More precisely, Reynolds et al. (2002) and Linan & Fernandez-Serrano (2014) point out that firms in an early stage of development tend to have a positive impact on regional economies.

The aim of this paper is to investigate whether entrepreneurship leads to economic growth of European regions at an early stage. The research intends to fill a gap in the current literature in several ways. Firstly, early-stage entrepreneurship that takes into account the size and maturity of a firm is included in the analysis, so the results of this study are ex-

pected to be more robust and accurate. Secondly, the analysis reveals whether densely populated areas affect the size of the relationship between entrepreneurship and regional economic growth. The ultimate goal is to find evidence to support the hypothesis that early-stage entrepreneurship, measured by the number of companies under 3.5 years of age, causes regional economic growth in the EU-28. The analysis is based on a sample of 273 NUTS 2 regions from 2008 to 2017.

Several control variables were used in the paper, i.e. Human resources in science and technology, Percentage of people with tertiary education, Gross fixed capital formation, Percentage of economically active population, Population density and Intramural R&D expenditure, which are expected to be positively related to Regional GDP per capita.

Given that a large number of authors have concluded that the development of entrepreneurship within a region depends on its social, cultural and economic characteristics, we call for further research in the domain of political and institutional environment to focus on exploring whether such differences exist in East-West or the new-old Member State perspective.

2. Regional entrepreneurship

In the first few decades of the last century, the world was dominated by large corporations and companies that employed thousands of people. The central thought of that time was that the development of both society and the economy is shaped by physical capital (Solow, 1957). According to Audretsch (2018), physical capital and unskilled labour remained the most influential factors in virtually every research, and the only thing that varied is the unexplained residual in growth rates which was attributed to the fluctuations in technological advancement across countries and over time. Like Romer (1986), other studies also support the knowledge-based production function and Romer's theory of endogenous growth (Lucas, 1988; Acs & Audretsch, 1990). Acs et al. (2008) and Boschma (2005) show that new small businesses tend to be located near incumbent companies or sources of knowledge such as universities and science parks. Cross-industry and cross-regional competitiveness drives regional growth of one region and in this process it might hinder the growth of another (Audretsch et al., 2006). In the process of spillover, Boschma (2005) reports that knowledge remains tacit to the region. It does not move freely across space as it was believed in the past which is quite contradictory to globalisation and the rise of the Internet.

Two general levels can be identified that explain the differences in regional entrepreneurship: regional and individual (Chell et al., 1991; Lee et al., 2004; Runco et al., 2011; Batchelor & Burch, 2012). According to Fischer & Nijkamp (2019), while a lot of attention is paid to the characteristics of individuals, e.g. the Global Entrepreneurship Monitor - GEM, much of the research and discussion about what causes growth of entrepreneurial activity neglects the importance of the regional environment. At the macro level, Malecki (1997) points out that the entrepreneurial environment is defined as a socio-economic, political, infrastructural and market environment, crucial for entrepreneurship, but cultural characteristics also play a significant role because they reflect the way of doing business (Roberts, 1991; Woolcock, 2001). Glaeser (2011) concludes that metropolitan regions are the most optimal form of coexistence, where innovation, human capital, and a good entrepreneurial climate have almost no boundaries.

However, Acs and Storey (2004) show that many studies do not provide convincing evidence of the effect of an increase in the number of start-ups on regional growth. Stearns et al. (1995) and O'Reilly & Hart (2005) argue that the level of entrepreneurship varies from region to region, but the relationship between place and decision to engage in entrepreneurship remains unclear (Fritsch & Mueller, 2004). Despite all the evidence, very little is known about the mechanisms of how entrepreneurship affects economic growth taking into account regional differences. Therefore, according to Capello & Lenzi (2016), the impact of entrepreneurship on regional growth should be studied in greater detail.

3. Methodology and data

Guided by the research and theoretical contribution presented above, this paper assumes that entrepreneurship at an early stage causes higher economic growth. The reason for this is that the greater concentration of new companies located in the same area creates numerous benefits for the economy and residents in the region.

Total early-stage entrepreneurship denotes new companies younger than 3.5 years, GEM (2013). The number of firms that are in the "first" phase of entrepreneurship in NUTS2 regions was used instead of the number of entrepreneurs.

3.1 Methodology

In order to investigate the relationship between early-stage entrepreneurship and regional economic growth, two methods are employed: fixed effects regression with individual and time effects including the time-lag structure of the independent variable, and spatial econometric analysis including both a temporal and a spatial lag of independent variable X. The Breusch-Pagan LM test suggested the use a fixed or random effect model (Herwartz, 2006) of the panel data instead of the OLS model. The Hausman test (Hausman, 1978) showed that the use of fixed effects was better and more efficient ($p<0.01$). Modelling the regression of fixed effects was preceded by a check to include temporal effects and/or individual (regional) effects, performed by a two-way Lagrange Multiplier test for balanced panels, where statistically significant results recommend the use of both individual and time effects ($p<0.01$) (Lee & Yu, 2010). Choropleth charts were used as regional descriptive statistics.

Changes that occur in the economy as a result of starting a company are a long-term process, hence the time-lag structure is used. Carree & Thurik (2008) tested for the three periods in the time-lag structure and found evidence that the lags influenced their results on three different economic measures: GDP, labour productivity, and employment growth. Fritsch & Mueller (2004) explain that the third and the sixth year of existence correspond to the peak negative and the peak positive effect of new enterprises on regional economic growth, respectively.

In addition to the time-lag model, the spatial effect among European regions was also controlled (see Fujita & Thisse, 2002; Krugman, 1991; Guerrero et al., 2015). In order to take into account spatial spillovers across regions, due to its simplicity and the Hausman endogeneity test (Hill et al., 2018), which can identify the probability of endogenous variables in the model, the spatial econometric model called the spatial lag of X (SLX) was introduced, which empirically assesses the strength of this overflow (Vega & Elhorst, 2015; Capello & Lenzi, 2016). Additionally, this model includes the temporal lag of the independent variable.

Therefore, the final model is a combination of the econometric specification of the fixed effects SLX model with individual and time effects.

$$\begin{aligned}\ln(GDPpc_{it}) = {} & \alpha + \beta_1 \ln(Enterprises_{it}) \\ & + \beta_2 \ln(Enterprises_{it-3}) \\ & + \beta_3 \ln(Enterprises_{it-6}) \\ & + (\beta_4 \ln(Tertiary\ education_{it}) \\ & + \beta_5 \ln(HRST_{it}) + \beta_6 \ln(Capital_{it}) \\ & + \beta_7 \ln(Economic\ activity_{it}) \\ & + \beta_8 \ln(Population\ density_{it}) \\ & + \beta_9 \ln(R\&D\ Expenditure_{it}) \\ & + \ln(WEnterprises)\theta + \mu_i + \lambda_t + \varepsilon_{it}\end{aligned}$$

$i = 1, 2, ..., 273$

$t = 1, 2, ..., 10$

where i stands for any NUTS 2 region in the EU, t stands for the period (year) between 2008 and 2017, $\ln(GDPpc_{it})$ represents the natural log of GDP *per capita* for any given individual region i in any given year t, and the beta coefficient parameters are to be estimated in regression. $Enterprises_{it}$ is the independent variable which is a proxy for early-stage entrepreneurship. It is already by definition lagged forward by three years (see Table 1). $Enterprises_{it-3}$ and $Enterprises_{it-6}$ are additional three-year and six-year time-lagged independent variables, as suggested by the time-lag structure. *WEnterprises* is the spatially lagged independent variable. Control variables are θ, which represents the spatial effect associated with SLX, μ, which is a region-specific fixed effect, and λ_t, which is a time-specific fixed effect. ε_{it} is an error term.

3.2 Data and variables

This research uses the most recent NUTS 2 classification of 2016. The sample includes 273 NUTS 2 regions in the EU-28 in the period between 2008 and 2017, excluding 8 overseas and very distant territories (Açores, Madeira, Martinique, Guadeloupe, Canarias, Mayotte, La Réunion and Guyane). The sample includes the UK since it was still a member state of the European Union in the period of interest. Data were obtained solely from Eurostat to avoid potential bias in the amendment of the NUTS 2 classification across the years.

Table 1 Variables in the study

	Variable name	Eurostat code
Dependent variable	Regional GDP per capita [log GDPpc] (log)	nama_10r_2gdp
Independent variable	Number of regional enterprises founded in t-3 and still active in t (number of three-year-old enterprises) [N enterprises] (log)	bd_hgnace2_r3 (indicator: V11943)
Control variables	Percentage of people with tertiary education [Tertiary education] (log)	edat_lfse_04
	The number of people in Human Resources in Science and Technology (HRST) in high-tech (percentage of the active population) [hrst] (log)	hrst_st_rcat
	Gross fixed capital formation (in millions of EUR) [Capital] (log)	nama_10r_2gfcf
	Economic activity rate relative to the population (in percentage) [Economic activity] (log)	lfst_r_lfp2actrt
	Population density (people per square kilometre) [Population density] (log)	demo_r_d3dens
	Intramural R&D expenditure (in billions of EUR) [R&D expenditure] (log)	rd_e_gerdreg

Note: Where applicable, measurement units are reported in round brackets. Variable abbreviations that are used throughout the paper are reported in square brackets.

Source: Authors

The panel collected from Eurostat was not complete. Roughly 8% of the panel was missing and were imputed semi-automatically using the 'mice' package in R. 'Mice' uses a very complex algorithm which performs multiple imputations by using fully conditional specification (van Buuren & Groothuis-Oudshorn, 2011). Therefore, the panel is complete with 2,730 observations. The entire panel is transformed using a natural logarithm.

The dependent variable is regional economic growth, which tends to have direct positive effects on the region and the quality of life of its inhabitants. The measure of regional economic growth is the natural logarithm of regional gross domestic product per inhabitant, ln ($GDPpc_{it}$).

Linan & Fernandez-Serrano (2014) investigated the impact of early-stage entrepreneurship on national economic growth using cross-sectional data. Early-stage entrepreneurship, which is a term coined by the GEM, refers to all enterprises which are less than 3.5 years old. The unit of observation is an early-stage enterprise, or namely, the number of enterprises born in *t-3* having survived to *t*. Early-stage entrepreneurship is expected to positively affect regional economic growth.

The analysis included control variables that are expected to have a positive influence on GDP of NUTS 2 regions. They are chosen subject to the conceptual model outlined above and the availability of Eurostat data. Human capital is an important factor for regional economic growth (Glaeser, 2011). Human capital is measured in this study by means of two variables. Firstly, as a percentage of the regional population holding a tertiary degree. Secondly, as the percentage of people aged between 15 and 74, who fulfil the condition of Eurostat's definition of HRST. Capital is one of the most influential factors that determine economic growth (Solow, 1957). It is measured by Eurostat as regional gross fixed capital formation. Moreover, economic activity refers to the percentage of people who are eligible to work and supply labour (Eurostat, 2019). Population density, which represents a number of people per km^2, is an important factor because densely populated regions with large cities are believed to be more efficient and have higher economic growth (Glaeser, 2011). Innovation, measured as intramural R&D expenditure, refers to an increase in the stock of knowledge and the application of that knowledge (OECD, 2015).

Table 2 Descriptive statistics

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
Ln GDPpc	2730	10.02	0.60	8.04	9.70	10.42	12.33
N Enterprises	2730	7446	7650	139	2979	8960	67618
Tertiary education	2730	27.60	9.65	6.80	20.20	33.50	74.70
HRST	2730	39.75	9.79	12.90	32.70	45.60	81.80
Capital	2730	9539	11091	216.4	3449	11950	154285
R&D expenditure	2730	929	1576	63.30	113.02	1134	18664
Economic activity	2730	63.83	5.69	41.30	60.43	68.10	76.80
Population density	2730	464.36	1208	2.70	74.23	322.77	11357

Source: Authors

The data deviate a lot because of divergence between EU regions. Variables such as population density, the number of enterprises founded three years ago and still active, and intramural R&D expenditure have a standard deviation greater than the mean and the data suggest that the sample is remarkably diverse.

3.3 Space dimension

Analysis of data from 273 EU-28 regions shows the existence of spatial clusters and spatial heterogeneity. The largest cities are the hotspots and have the highest number of enterprises that are in the young business phase (less than 3.5 years). This is in line with scholars who argue that cities offer the best opportunity for business success (Glaeser, 2011). Patterns identified on the maps plotted show that there is spatial heterogeneity among NUTS 2 regions in the EU-28. It is also possible to observe Tobler's first law of geography (1970), which states that everything is related to everything else, but near things are more related than distant ones. The spatial effect should lose strength across larger distances.

Row-standardised spatial weights matrix W, which is based on spatial connections between regions, presents quantification of the spatial structure of NUTS 2 regions (Abreu et al., 2005). According to Smit (2017), the Gabriel matrix is a good choice for NUTS 2 regions since it does not allow a region to have neighbours and has the power of capturing remote territories and islands. The results of creating a spatial weight matrix show that there is no region without a link and 2 regions have only 1 link. The maximum number of links is 7 and there is an average of 4.17 links between every region.

Table 3 Summary statistics of weight matrices

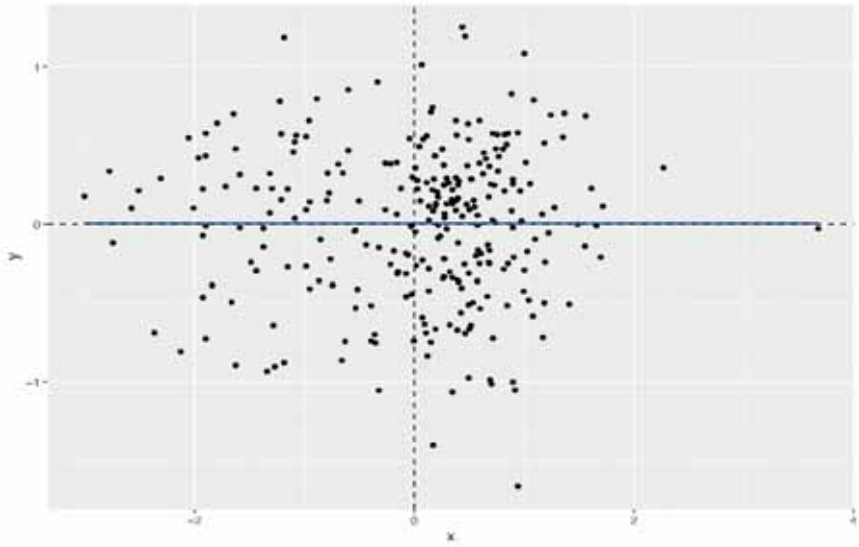
	Complete Gabriel Matrix	Within-country Matrix	Cross-border Matrix
Matrix dimensions	273 × 273	273 × 273	273 × 273
Number of links	1138	673	276
Minimum links	1	1	1
Maximum links	7	7	5
Average links	4.17	2.97	0.33

Source: Authors

In addition to the complete Gabriel matrix, two additional weight matrices were created, which separate within-country and cross-border neighbours to check whether border effects significantly change the results. The within-country matrix is calculated using the Hadamard product of the original Gabriel matrix and a binary matrix of equal dimensions. The cross-border matrix is then calculated as the Hadamard product of the original Gabriel matrix and the within-country matrix (Table 3).

The results of the Moran plot (Figure 1) suggest that most of the points are located on the right-hand side of the scatterplot, in the right upper and lower quadrant. Global Moran's I is statistically insignificant with the p-value of 0.39, which suggests that there is no spatial autocorrelation or spatial effect in this subsample.

Figure 1 Moran plot



Note: Standard deviations from the mean of the natural logarithm of GDP per capita are plotted on the x-axis.
Source: Authors

After unsatisfactory results from Global Moran's I, a plot of local indicators of spatial association (LISA) was made (Figures 2 and 3) according to (Anselin, 1995). Cluster maps show spatial association among EU regions based on *ln* ($GDPpc_{it}$) in 2008 and 2017. The plots are derived from the calculation of Local Moran's I. The results are presented on a coloured map and clusters are identified according to the similarity of the value with their neighbouring regions. Low-high and high-low combinations were not found. The results suggest that there are several statistically significant high-high and low-low clusters across the EU (Figures 2 and 3).

Figure 2 LISA map for ln ($GDPpc_{it}$) in the EU, by NUTS2 region for 2008

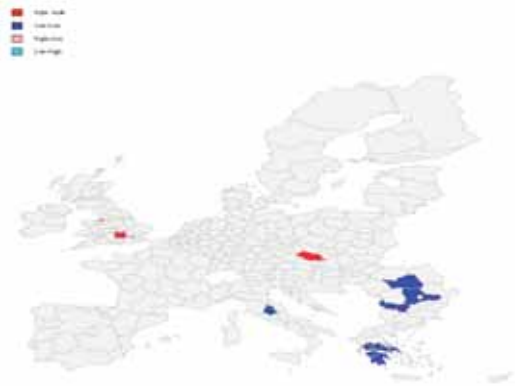
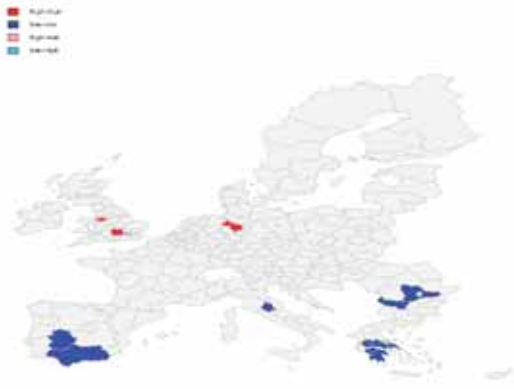


Figure 3 LISA map for ln ($GDPpc_{it}$) in the EU, by NUTS2 region for 2017



Note: LISA map was constructed using R.
Source: Authors

Overall, exploratory spatial analysis showed mixed results of the existence of spatial autocorrelation and spatial heterogeneity among NUTS 2 regions. On the one hand, Global Moran's I is insignificant. On the other hand, Local Moran's I and the local indicator of spatial association (LISA) show that there is a spatial effect present in the data (figures 1, 2 and 3). Consequently, spatial effects in spatial regressions were modelled and tested.

4. Empirical results and discussion

Table 4 shows the results of two-way fixed effect regression with the within estimator.

Table 4 Two-way fixed effect regression with the within estimator

	Dependent variable:		
	Regional gross domestic product per capita (log)		
	(1)	**(2)**	**(3)**
N enterprises (log)	0.015***	0.017***	0.051***
	(0.007)	(0.007)	(0.019)
Third lag of N enterprises (three-year-old enterprises three years ago) (log)		0.012	0.009
		(0.007)	(0.004)
Sixth lag of N enterprises (six-year-old enterprises six years ago) (log)		0.016	-0.003
		(0.019)	(0.004)
HRST (log)	0.138***	0.202***	0.199***
	(0.040)	(0.051)	(0.052)
Tertiary education (log)	-0.046*	-0.075**	-0.070**
	(0.028)	(0.030)	(0.033)
Capital (log)	0.283***	0.304**	0.303***
	(0.013)	(0.019)	(0.014)
Economic activity (log)	0.073	-0.069	-0.068
	(0.123)	(0.179)	(0.174)
Population density (log)	-0.010	-0.018	0.080**
	(0.009)	(0.012)	(0.034)
R&D expenditure (log)	0.465	-1.032	-0.889
	(0.638)	(0.547)	(0.940)
N Enterprises (log) *Population density (log)			0.008**
			(0.003)
Observations	2730	2724	2724
Adjusted R^2	0.108	0.187	0.191
Time-fixed effects	Yes	Yes	Yes
Region-fixed effects	Yes	Yes	Yes
LM spatial lag test	10.32***	11.79***	17.35***
LM spatial error test	4.35	5.01*	6.43

Note: Significance *p<0.1, **p <0.05, ***p<0.01. Standard errors are reported in parentheses.

Source: Authors

The first part of the analysis is a panel fixed effects regression with regional and time effects estimating three models. Model 1 introduces a time-lag structure consisting of two lagged independent variables enterprises *t-3* and *t-6* to the first model. Model 3 introduces an interaction variable between the number of enterprises in *t-3* and still active in *t* and population density. This way, it is possible to control for the effect of densely populated areas such as large cities on the impact of early-stage entrepreneurship on the regional economy (Audretsch et al., 2015). Results of fixed effects regression with individual and time effects on all three models (Table 4) show that the model, although acceptable (Mooi & Sarstedt, 2011), does not explain much of the variance in the dependent variable (adjusted R^2 = 0.11 do 0.19). The spatial error LM test yields insignificant results, except in model 2 ($p<0.1$). The LM spatial lag test shows statistical significance in all three models ($p<0.01$), which suggests that it is necessary to introduce a spatial lag.

These three models suggest that early-stage entrepreneurship positively affects regional economic growth ($p<0.01$).This result was expected and it is in line with previous literature on this topic (Capello & Lenzi, 2016). Every percentage increase in the total number of three-year-old enterprises is associated with 0.015, 0.017, and 0.051 percentage change in regional GDP*pc*, respectively. Translated, Île de France had 45,356 enterprises qualified as early-stage in 2008. However, in just 10 years that number has risen to 67,618. The difference between those two numbers is 22,262 and the percentage change is 49.08%. Therefore, regional GDP per capita of Île de France is expected to rise in these ten years by 0.74, 0.83, and 2.5%, respectively.

The percentage of the active population employed in HRST has a significant and positive impact on regional GDP*pc*. A10% increase in the share of HRST in the active population is expected to result in an approximately 2% increase (depending on the model) in regional GDP *per capita*. Since the HRST variable represents human capital in the region, evidence is in line with previous literature which suggests that human capital positively impacts the regional economy (Audretsch & Keilbach, 2008; Faggian et al., 2019).

Surprisingly, the percentage of people with tertiary education has a significant ($p<0.1$) negative effect on regional growth. Every increase by 10% in the share of the population holding a tertiary degree results in a circa 0.7% decrease in regional GDP. Considering that a percentage of people with tertiary education is a proxy for human capital, the results are undeniably opposed to prior research studies (Audretsch & Keilbach, 2008; Faggian et al., 2019). The results are contrary to the results of the relationship between HRST and GDP, which suggests that higher education alone is not a predictor of value-added.

Adding temporal lead variables to the model as part of the time-lag structure does not change the results at all. The results remain consistent throughout the analysis. Therefore, the results differ from Fritsch & Mueller (2004), who claim that the peak negative effect of the newly founded enterprise on regional growth is three years, and the peak positive effect six years after its inception. All in all, results of fixed effects regression with regional and time effects show that early-stage entrepreneurship is positively associated with regional GDP*pc*.

Table 5 Two-way fixed effect regression with the within estimator with a spatial lag of independent variable (FESLX)

	Dependent variable:		
	Regional gross domestic product per capita (log)		
	(1)	(2)	(3)
N enterprises (log)	0.014***	0.057***	0.015**
	(0.004)	(0.019)	(0.005)
Third lag of N enterprises (log)		0.011	0.013
		(0.009)	(0.011)
Sixth lag of N enterprises (log)		0.013	0.014
		(0.008)	(0.024)
HRST (log)	0.231***	0.193***	0.199***
	(0.041)	(0.051)	(0.061)
Tertiary education (log)	-0.088***	-0.072**	-0.120***
	(0.033)	(0.034)	(0.042)
Capital (log)	0.309***	0.360***	0.296***
	(0.013)	(0.015)	(0.022)
Economic activity (log)	-0.077	-0.088	-0.232
	(0.170)	(0.170)	(0.211)
Population density (log)	-0.010	0.080**	-0.020
	(0.002)	(0.030)	(0.014)
R&D expenditure (log)	-1.001	-0.886	0.773
	(1.110)	(1.103)	(1.219)
Spatially lagged N enterprises	0.016*	0.016	
	(0.009)	(0.008)	
N enterprises (log) * Population density (log)		0.008**	
		(0.002)	
Spatially lagged N enterprises (**within-border**)			0.014
			(0.008)
Spatially lagged N enterprises (**cross-border**)			0.008
			(0.006)
Observations	2730	2724	2724
Adjusted R^2	0.118	0.207	0.154
Time-fixed effects	Yes	Yes	Yes
Region-fixed effects	Yes	Yes	Yes
LM spatial lag test	5.03*	5.52	4.22
LM spatial error test	3.9	6.93	3.03
Spatial matrix	Entire	Entire	Split
Note: Significance *p<0.1, **p <0.05, ***p<0.01. Standard errors are reported in parentheses.			

Source: Authors

Since the analysis of spatial data showed that there may be spatial autocorrelation and heterogeneity in the data, spatial weights were included in regression. Three variables, i.e. a spatial lag, a spatial lag within-border and a spatial lag cross-border, were added (Table 5). A slight improvement in the explanatory power is observed, and insignificant spatial LM tests suggest that the models successfully control spatial variations in the sample. The significance and regression coefficients of entrepreneurship, HRST, tertiary education, and capital remain almost equal and statistically significant. The economic activity rate does not affect GDP.

In model 1, the spatially lagged number of three-year-old enterprises is statistically significant ($p<0.1$), which suggests that there is a spatial effect in the sample and neighbouring regions tend to positively affect each other, although not largely (0.016). This result is in line with the so-called spillover effect of entrepreneurship (Audretsch & Keilbach, 2008).

In the second model, the interaction variable was added, and the explanatory power of the model measured in Adjusted R^2 jumped to 0.207. The third model includes two spatially lagged independent variables which control for border effects (Smit, 2017). This effect is split into cross-border and within-country to control for regions that interact with other countries and regions, which interact only with the ones on the domestic territory. Both spatially lagged numbers of three-year-old enterprises (within-border) and (cross-border) are statistically insignificant, which signals that there is no border effect in this sample, which is contrary to the results obtained by Smit (2017).

Models in Tables 4 and 5 estimate that every percentage increase in capital results in an approximately 0.3 percent increase in regional GDP *per capita*. To put this into perspective, the Austrian NUTS2 region 'Vienna' had approximately €16.9 billion of capital in 2010. However, in 2016, this number rose to €20.3 billion. This presents a 20.12% increase in only 6 years. Therefore, these models would likely estimate regional economic growth of 6% based on just this steep increase in physical capital. This result is in accordance with the research study suggesting that physical capital belongs to the production function and positively affects the economy (Solow, 1957).

Intramural R&D expenditure, a time-lagged number of enterprises, a spatially lagged number of three-year-old enterprises (within-border), and a spatially lagged number of three-year-old enterprises (cross-border) all have an insignificant effect in spatial analysis. Therefore, these results suggest that the time-lag structure does not apply to this case, and the border effect is not present in the sample.

Population density coefficients have a statistically significant effect ($p<0.05$) only in models where the interaction between it and the number of enterprises variable is included (Table 4 - Model 3, and Table 5 - Model 2). The results confirm that the effect of early-stage entrepreneurship on regional economic growth is conditioned by the population density of the region. Although these results show that enterprises founded in densely populated areas such as cities and metropolitan areas tend to have a larger effect on the regional economy, the results are ambiguous and partially differ from the literature on regional development and economic growth (Glaeser, 2011; Audretsch et al., 2015).

The results of this study show a positive relationship between early-stage entrepreneurship and regional economic growth in the EU. The extent of this effect is measured by the regression coefficient which ranges from 0.10 to 0.50, depending on the model. In other words, every percentage increase in the number of three-year-old enterprises results in a 0.1 to 0.5% increase in regional GDP *per capita*.

5. Conclusion

The magnitude of the impact of entrepreneurship on economic growth has been documented by numerous studies showing that it varies from country to country and from region to region. If fast-growing companies are studied, extremely good results of the impact of entrepreneurship on economic effects are likely to be found. However, if research is repeated using only small enterprises in the sample, the results are unlikely to be similar. The same is true for the maturity of companies and companies belonging to different regions. To avoid the methodological problems mentioned, this research has tried to fill the gap in the current literature in several ways. First, a significant proportion of scholars exploring the interrelationship of entrepreneurship and economic growth try to do so at the national level. If they choose to zoom in and inquire about the impact on the regional economy, researchers typically select regions in only one country or select a few countries. However, this paper contributes to

a small body of literature that investigates entrepreneurship in NUTS 2 regions in the European Union. Second, in contrast to previous papers on this topic, a measure for early-stage entrepreneurship which controls for both the size and the maturity of the enterprise was used in the analysis. Therefore, the results in this paper are more robust and accurate. Third, often scientists who have researched this topic at EU level do not control NUTS 2 regions that contain large cities within their borders. Therefore, the effect of the city on the countryside was introduced in this paper, which will reveal whether densely populated areas affect the size of the relationship between entrepreneurship and regional economic growth.

The main goal of this paper is to examine the link between early-stage entrepreneurship and economic growth in the NUTS 2 regions in the European Union between 2008 and 2017. Three statistics methods are employed: bivariate correlation analysis, fixed effects regression with individual and time effects including the time-lag structure of the independent variable, and spatial econometric analysis including both temporal and spatial lag of independent variable X.

Findings suggest that total early-stage entrepreneurship measured by the number of three-year-old enterprises has a mild positive effect on regional GDP per capita and does not change with the maturity of the enterprise. Results suggest that the time-lag structure does not apply to this case, and the border effect is not present in the sample. In other words, successful regions do not make their neighbours more or less successful.

The effect of early-stage entrepreneurship on regional economic growth is conditioned by the population density of the region but these results are not confirmed in all analysis models. The percentage of HRST has a significant and impactful effect on regional GDP. And an increase in physical capital results in an increase in regional GDP per capita. The results showed that a higher percentage of people with tertiary education harm regional GDP, which is in contrast to most past research studies and requires additional analysis in future research. Gross fixed capital formation significantly affects a region's GDP increase, which is not the case for the economic activity rate and intramural R&D expenditure. Importantly, there is a positive spatial spillover effect in the data. In other words, new enterprises formed in one region are likely to be somewhat related to economic growth in the neighbouring region.

The analysis presented in this paper also has some limitations. The research covered the end of 2017 due to the availability of data on the observed variables and the possibility of comparison. The period between 2008 and 2017 potentially creates a bias in the data since panel data over a longer period of time tends to be more accurate. As the literature on the economic benefits of entrepreneurship suggests that data for smaller administrative units yield more accurate results, data for the NUTS 3 region level would be more appropriate for this type of research but such data are not available. Causality cannot be asserted in the relationship between total early-stage entrepreneurship and regional economic growth based on the results of this study. The relationship between entrepreneurship and economic growth is often bidirectional and influenced by exogenous factors which may have been omitted in this study.

Due to the complex nature of the relationship between entrepreneurship and regional growth, it would be incorrect to affirm that there is causality present. However, policymakers can certainly use the results of this research. One potential policy-related problem would be to consider a larger investment in new enterprise formation, where lagging regions in the European Union would be able to offer their citizens an opportunity to start their business and become self-employed. Entrepreneurial opportunities should be available to everyone regardless of their education, social status, age, race, and other characteristics.

The link between early-stage entrepreneurship and regional economic growth has not yet been fully explored. Since a large number of authors have concluded that the development of entrepreneurship within a region depends on its social, cultural and economic characteristics, further research should focus on exploring whether there are such differences between East-West countries or the new-old member state perspectives. Research on the impact of the cultural and political environment and the quality of institutions is excluded, although they are considered very important for the impact on entrepreneurs, and ultimately on economic growth in the regions, and may hence be the subject of further research.

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Darija Prša
VERN' University
10000 Zagreb, Croatia
prsa.darija@gmail.com

Toni Milun
Algebra University College
10000 Zagreb, Croatia
toni@tonimilun.com

Silvije Orsag
University of Zagreb
Faculty of Economics & Business
10000 Zagreb, Croatia
silvije.orsag@zg.t-com.hr

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SHORT-TERM FINANCING AND THE IMPACT OF TRADE CREDIT ON THE PROFITABILITY OF SMALL AND MEDIUM ENTERPRISES IN THE REPUBLIC OF CROATIA

Abstract

Purpose: The establishment of credit policy is an integral part of the entire decision-making process on the manner and structure of corporate financing. Determining the credit policy is crucial for adequate management of a company's net working capital and its financing, in order to support continuous operation and the earning capacity of the company. In this process, the company will be influenced by the market in which it operates and by many others external and internal factors. For example, companies operating in less developed financial markets will find it more difficult to obtain the necessary financing. Such companies are most dependent on short-term financing in general, and trade credit in particular. This paper analyzes primarily internal factors - trade receivables and payables. Accordingly, the main goal of this paper is to investigate the relationship between the profitability of SMEs in the Republic of Croatia and their use of trade credit.

Methodology: In order to achieve the main goal and prove the hypotheses, panel data analysis examined the impact of trade credit on the level of profitability of Croatian SMEs.

Results: The results show that delaying payments to suppliers increased the profitability of the company. Furthermore, the results show that a decrease in receivables did not increase the profitability of SMEs.

Conclusion: Croatian SMEs can increase the profitability by not delaying the payment of obligations to suppliers for too long.

Keywords: Credit policy, short-term financing, supplier trade credit, trade receivables, profitability, SMEs

1. Introduction

Current liabilities are the most important form of both financing current assets and financing small and medium enterprises. When financing a company, it is necessary to take into account the advantages and disadvantages of long-term versus short-term financing. The advantages of using current liabilities are greater flexibility and lower financing costs. The disadvantages of using current liabilities

are the increased risk of their use, which is reflected as refinancing risk and interest rate risk, i.e., the risk of changes in interest rates. When deciding on the form of financing current assets, the company takes into account the interdependence of risk and reward (Orsag, 2015).

As the research is conducted on the case of small and medium-sized Croatian companies, the use of trade credit is even more important because such entities are not expected to have access to the market of commercial banks, and factoring is also predominantly in the hands of the banks that operate on a universal level and are primarily oriented towards larger entities. Most of the existing research was conducted on large companies in developed countries. The most common reason for omitting small businesses from the analysis is the unavailability of the information needed for the analysis. Accordingly, the **main goal of this paper** is to investigate the relationship between the profitability of SMEs in the Republic of Croatia and their use of trade credit.

The subject of this paper will be trade credits and their impact on the profitability of small and medium enterprises in the Republic of Croatia. On the one hand, this paper observes the impact of trade payables, the most common instrument of short-term financing of small and medium-sized enterprises, on the level of enterprise profitability. On the other hand, it observes the impact of trade receivables, as the most important instrument in the conditions of high competition to stimulate demand and retain customers, on the level of profitability of small and medium enterprises. Although these two forms of trade credit are at the entrance and exit of the company's internal processes, it should not be expected that their impact is exclusively the quantitative balance of expected opposing influences. This research will improve the knowledge of credit policy, i.e., the impact of the use of trade credit on the level of profitability of small and medium enterprises in a small post-transition economy characterized by complexity and difficulties in financing and in the overall business.

The results of the study reveal the impact of trade payables, but no impact of trade receivables on the profitability of small and medium enterprises. The higher the value of the variable supplier payment days, the lower the profitability of small and medium enterprises. Moreover, the wholesale sector, the retail sector, and the manufacturing sector have higher profitability compared to the construction sector.

The remainder of the paper is organized as follows. The chapter **Overview of previous research** presents a brief overview of previous research by other researchers and sets out three main hypotheses. In the third chapter, **Methodology**, the sample, data, selected variables and the measures used are defined and explained. The fourth chapter, **Empirical analysis**, presents the empirical part of the research focused on testing hypotheses and achieving the main goal of the paper. The fifth chapter, **Discussion**, explains the results obtained in empirical research according to the set hypotheses. In the last part, **Conclusion**, all relevant knowledge, information, attitudes, and scientific facts are presented systematically, clearly and concisely, and the most important results of scientific research are formulated and presented (that were previously presented and elaborated in detail in the chapter Discussion).

2. Overview of previous research

The purpose of working capital has already been noted by classical economists. Adam Smith (1776) differed circulating (working) from fixed capital and defined the main group of working capital funds. Karl Marx (1867) used the term variable capital and pointed its function for maintaining liquidity of production circulation. This circulation, according to Marx, should result in surplus, bringing into discussion working capital risk-reward trade-off. Trade-off between liquidity and profitability was the major point of Walker's theory of working capital. Today, this trade-off is incorporated in the main corporate finance textbooks, mostly as operating working capital (Brealy et al., 2016; Brigham & Ehrhardt, 2011; Ross et al., 2019). Cash conversion cycle theory developed by Richards and Laghlin (1980) is the most central one in explaining working capital management with all its concepts and components (Aminu & Zainudin, 2015). The cash conversion cycle is represented as the average collection period plus the inventory conversion period minus the average payment period. The inventory conversion period refers to the internal business processes. The collection period and the payment period are externally designated. As part of working capital management, receivable and payable management affects firm profitability. Shortening the collection period or extending the payable period can increase firm profitability, but can also increase risk, and vice versa.

According to Orsag (2002), the fundamental problem of small businesses is the liquidity of operations and the maintenance of daily solvency, which is a consequence of the narrowness of funding sources and the illiquidity of the financing instrument. On the other hand, it is difficult for small businesses to predict the future of their business, making it difficult to predict expected cash flows. PwC's research (2015) found that SMEs are less able to generate money from collecting receivables from customers and need more cash than large companies. Financial hardship theory (Bhattacharya, 2014) states that customers will pay more slowly to firms in difficulty which will result in even greater financial hardship. According to transaction cost theory, the use of trade credits will reduce transaction costs which will affect an increase in profitability (Bhattacharya, 2014). The European Commission (2016) lists several unique problems faced by SMEs, and one of the problems are difficulties in accessing finance. Makori and Jagongo (2013) argue that firms delay paying obligations to suppliers until the delay strains their relationship.

Given the difficulties in accessing finance, trade payables are one of the main external sources of finance. The authors expect a positive and significant impact of deferred payments to suppliers on the level of profitability because companies will defer payment of obligations to creditors to the extent where the benefits of using a commercial loan outweigh the costs of using it. The authors expect companies to use the excess money from deferred payments to increase sales which will result in increased profitability. Slower collection of trade receivables is expected to have a significant and negative impact on a company's level of profitability as money will not be available to generate higher sales. On the one hand, money is tied to receivables, which will result in the impossibility of creating new opportunities and profits, while on the other hand, there are high costs of maintaining receivables.

Trade credit, on the one hand, can be given by the supplier, resulting in receivables from customers, while on the other hand, it can be received by the customer, which creates obligations to suppliers (Baveld, 2012). The scientific and professional literature presents different conflicting results of the relationship between trade credits and corporate profitability. The authors assume a significant and positive impact of trade payables on the level of company profitability, and a significant and negative impact of trade receivables on the level of company profitability. But there are authors who reported the opposite findings, as well as those who did not find a significant relationship between the above variables. It is assumed that different findings are influenced by market development, limited funding sources, sectoral differences, and other factors.

Garcia-Teruel and Martinez-Solano (2007) analyzed Spanish SMEs. They found a significant and negative relationship between trade receivables and the level of profitability of the company. On the other hand, they failed to find a link between trade payables and company profitability. **Tauringana and Afrifa (2013)** analyzed British SMEs. They also found a significant and negative relationship between trade receivables and the level of company profitability, while on the other hand, they reported a negative relationship between trade payables and company profitability. **Gul et al. (2013)** analyzed Pakistani SMEs. They also confirmed a significant and negative relationship between trade receivables and the level of company profitability, while on the other hand, they reported a significant and positive relationship between trade payables and company profitability. **Gorondutse et al. (2017)** examined the effects of working capital management on a sample of 66 small and medium-sized Malaysian enterprises for the period 2006-2012. Empirical results determined the negative effect of the day of collection of receivables on ROA, which means that an increase in the day of collection of receivables will result in lower profitability of SMEs. Moreover, the study found a positive effect of the day of bill payment on ROA, which indicates that late payments to suppliers will affect an increase in profit. **Goncalves et al. (2018)** analyzed the effects of the economic cycle on the relationship between working capital management and profitability using a sample of British unlisted companies for the period between 2006 and 2014. The results show a statistically significant and negative relationship between profitability and the receivables collection day and a statistically significant and positive relationship between profitability and payment of liabilities to suppliers, which suggests that companies can increase profitability by extending the time to pay bills. The authors conclude that British companies use trade credits as a source of finance instead of taking advantage of possible cash discounts. **Yusoff et al. (2018)** investigated the relationship between working capital components and company profit-

ability for 100 selected manufacturing companies in Malaysia. The obtained results show that the days of collection of receivables are negatively related to the profitability of the company, while liabilities to suppliers are positively related to the profitability of the company. **Kumaraswamy and George (2019)** explored the relationship between trade credit management and corporate profitability. They use a sample of 41 manufacturing companies listed on the Saudi Arabian Stock Exchange for the period 2009-2017. The empirical results of the study identified a strong, positive, and significant impact of trade credit on firm profitability. The results of the study imply that effective trade credit management can significantly improve the cash flows and profitability of manufacturing companies in Saudi Arabia. **Hoang et al. (2019)** investigated the nonlinear association between trade credit and profitability of small and medium enterprises from nine countries or territories located in the East Asia and Pacific region in the period from 2010 to 2016. This study indicates that trade credit receivable and trade credit payable have an inverted U-shaped relationship with SMEs' profitability, which implies the existence of an optimal trade credit level that balances between costs and benefits to maximize firm profitability. This result suggests that managers should try to keep the level of trade credit investment as close to the optimal point as possible to avoid the case that their profitability reduces when they move away from this point. Moreover, this study also finds that the optimal level of more financially constrained firms is lower than that of less financially constrained firms. **Kwon et al. (2020)** compared the impact of trade credit on corporate profitability during and after the financial crisis. They analyzed 5,751 Korean SMEs in the period 2009-2012. Their results show that trade credit is more profitable in the post-crisis period than during the crisis. **Högerle et al. (2020)** empirically investigated the impact of working capital management on firm profitability and shareholder value in Germany. They analyzed 115 enterprises listed on the German Prime Standard, covering the period from 2011 to 2017. The results indicate that shorter collection days have a positive and significant impact on profitability. The authors obtained a positive relationship between liability management and profitability. The authors concluded that in order to achieve increased profitability, managers should focus on receivables and inventory management, which can be addressed with tighter credit policies or lean manufacturing tools. In contrast, extending payments periods to suppliers is crucial to the creation of shareholder value. Furthermore, they conclude that extending payment terms is particularly important in the long-term creation of shareholder value, whereas prompt payments increase profits in the short-run. In their study, **Braimah et al. (2021)** have empirically examined the relationship between working capital management and profitability in the non-financial sector of Ghana. The study was based on a sample of 366 SMEs in the period 2007-2016. The results indicate a positive relationship between the payment of trade payables and profitability and a negative relationship between the collection of trade receivables and profitability. The authors conclude that management should maintain an optimal level of receivable collection from customers. On the other hand, they conclude that negotiating a deferral of payment with suppliers leads to greater profitability.

Based on the latter, three hypotheses are set:

H1: Trade credits affect the level of profitability of small and medium enterprises in the Republic of Croatia.

H2: There is a significant and positive impact of liabilities to suppliers on the level of profitability of small and medium enterprises in the Republic of Croatia.

H3: There is a significant and negative impact of trade receivables on the level of profitability of small and medium enterprises in the Republic of Croatia.

3. Methodology

In this chapter, empirical research was conducted on a selected sample. In order to achieve the main goal and prove the hypotheses, panel data analysis examined the impact of trade credit on the level of profitability of Croatian small and medium enterprises in the period from 2011 to 2015.[1] This paper is focused on small and medium enterprises that represent 99.7% of all enterprises, hire 69.5% of all workers and participate with 58.5% in value added at the cost of production factors. The subject of this research are small and medium enterprises in the manufacturing sector, the wholesale sector, the retail sector, and the construction sector. These are enterprises in the four most important sectors according to the data on the total number of enter-

1 The method was used in the author's (Darija Prša) doctoral dissertation.

prises (about 47%), the number of employees (about 55%), total income (about 65%) and total business results (about 50%) (Structural Business Indicators of Enterprises, 2015).

3.1 Sample

The subject of the research are Croatian small and medium enterprises from the aforementioned sectors, which have the largest share of current assets in the structure of their balance sheet and the largest share of current liabilities in the liabilities on the balance sheet, namely liabilities to suppliers (the construction sector, the manufacturing sector, the retail sector, and the wholesale sector). This was the first criterion for sample selection. The paper used panel analysis on a sample of 276 companies for the period from 2011 to 2015.[2] Of the 276 observed companies, 66 companies are from the construction sector, 67 companies from the manufacturing sector, 64 companies from the retail sector, and 79 companies from the wholesale sector. Data were collected from the balance sheet and the profit and loss account of each observed company, which are published on the website of FINA (the Croatian Financial Agency). The second criterion for sample selection were small and medium-sized enterprises that were obliged to submit audit reports containing all data necessary for analysis. Companies with condensed financial statements were eliminated from the survey, as well as companies that submitted condensed financial statements in some years and audit reports in other years of observation. Finally, all companies that had available audit reports were observed for the entire observation period. The analysis was performed on accounting data on an annual basis because data for periods shorter than one year can be obtained exclusively in the company. The data were analyzed in the STATA 14 software package.

3.2 Data and variables

Following the example of other researchers, appropriate variables were selected and used to measure the impact of trade credit on the level of profitability of Croatian small and medium enterprises. In the panel model, the dependent variable is profitability, and the independent variable is trade credit, including trade payables on the one hand, and trade receivables on the other. The model used control variables of firm size, inventory, sales growth, inflation, and GDP.

Return on assets (ROA) is used to measure the dependent variable profitability, and it is calculated as the ratio of earnings before interest and taxes and the average total assets expressed in decimal numbers. The rate of return on assets tells us how much income is earned by the engaged assets. Return on assets is used by numerous researchers such as Garcia-Teruel & Martinez Solano (2007), Tauringana & Afrifa (2013), Enqvist et al. (2014), and Seyoum et al. (2016).

Supplier payment days (DPS) are used to measure the first independent variable trade credit, i.e., trade payables, and they are calculated as the ratio of the number of days in the year and the trade payables turnover. The turnover indicator for trade payables shows how many times a company pays its trade payables in one year. The company tries to postpone its obligations as long as possible, trying at the same time not to jeopardize its relations with suppliers and to take advantage of possible discounts for early payments. Supplier payment days show how many days it takes a company to meet its obligations to suppliers. Vendor payment days are used by numerous researchers such as Garcia-Teruel & Martinez-Solano (2007), Gul et al. (2013), Tauringana & Afrifa (2013), Almazari (2014), and Seyoum et al. (2016).

The days of collection of receivables (DCR) are used to measure the second independent variable trade credit, i.e., trade receivables, and they are calculated as the ratio of the number of days in the year and the receivables turnover. The receivables turnover indicator shows how many times a company collects its receivables during one year. The company strives to collect its receivables as quickly as possible. Receivables collection days represent the average time required to collect receivables from customers. Receivables collection days are used by a number of researchers such as Makori & Jagongo (2013), Enqvist et al. (2014), and Seyoum et al. (2016).

The logarithm of sales is used for control variables of enterprise size (SIZ), inventory binding days (INV) are used for an inventory variable, the percentage change in sales compared to the previous year is used for sales growth (SGR), the percentage of inflation in the current year compared to the previous year is used for the inflation rate (INF), and the percentage of GDP growth in the current year compared to the previous year is used for GDP growth.

2 Research is part of the author's (Darija Prša) doctoral dissertation.

4. Empirical analysis

At the beginning of empirical analysis, descriptive statistical data analysis was conducted. The arithmetic mean, standard deviation, the minimum and maximum values, and the number of observations of each variable are given for the observed variables. Instead of the variable Sector, three additional *dummy* variables were introduced for three sectors: the variable MANU with the value 1 if the company belongs to the manufacturing sector, and 0 if it belongs to other sectors, the variable RETA with the value 1 if the company belongs to the retail sector, and 0 if it belongs to other sectors, and the variable WHOL with a value of 1 if the enterprise belongs to the wholesale sector, and 0 if it belongs to other sectors, while construction remained the reference sector. Then, a basic model for all sectors was developed together with three basic panel models: a combined model, a model with fixed effects, and a model with random effects.

4.1 Descriptive statistics

The survey covered 276 companies over 5 years. The data were balanced, so for each observation unit all data for all 5 periods were known. A total of 1,380 observations were made in the analysis, i.e., 276 companies were observed during the five-year period: 66 companies belong to the construction sector, 67 to the manufacturing sector, 64 to retail trade and 79 to wholesale trade. Table 1 shows the arithmetic means, the corresponding standard deviations, the minimum and maximum values of all variables in the model, as well as the total number of observations, the total number of observed units and the number of periods. All values are shown for the entire data set (overall), but also between units (between) and within the observed unit (within).

Table 1 Descriptive statistics

Variable		Arithmetic mean	Standard deviation	Minimum value	Maximum value	Number of observations
ROA	Overall	0.0884943	0.1630554	-0.497219	2.396413	N = 1,380
	Between		0.1046428	-0.2118538	0.8826069	n = 276
	Within		0.1251747	-0.5296716	1.882115	T = 5
DPS	Overall	70.91456	51.55904	1.028011	380.814	N = 1,380
	Between		46.62542	2.123173	317.4717	n = 276
	Within		22.15201	-85.24964	243.7062	T = 5
DCR	Overall	63.15416	49.12015	0.2747547	342.0538	N = 1,380
	Between		46.12385	0.3618379	278.8284	n = 276
	Within		17.07484	-15.28314	196.2664	T = 5
INV	Overall	79.69976	104.3281	0.6413468	930.9683	N = 1,380
	Between		99.49547	1.019088	788.1379	n = 276
	Within		31.83901	-156.9592	437.75	T = 5
SIZ	Overall	7.79957	0.309215	6.381289	8.748257	N = 1,380
	Between		0.2985514	6.450961	8.686576	n = 276
	Within		0.0820949	7.466658	8.198523	T = 5
SGR	Overall	0.0618562	0.2257467	-0.5494	1.659051	N = 1,380
	Between		0.1100395	-0.2576387	0.5754846	n = 276
	Within		0.1972004	-0.6117998	1.36877	T = 5
INF		0.01398	0.01504	-0.00500	0.03400	T = 5
GDP		0.00608	0.01085	-0.00720	0.02327	T = 5

Source: Authors, according to STATA calculations

The dependent variable ROA has an average value of 0.0885 and 8.85% with an average deviation from the average of 0.1631, i.e., 16.31%. ROA varies from -0.2119 to 0.8826 among enterprises, and from -0.5297 to 1.8821 within enterprises. Greater variation was recorded within enterprises (0.1252) than among enterprises (0.1046).

The supplier payday variable has an average value of 70.92 days, with a standard deviation of 51.56 and a range from 1.03 to 380.81. A larger standard deviation was observed between enterprises (46.63) than within enterprises (22.15). The receivables collection days variable has an average value of 63.15 days ranging from a minimum value of 0.27 days to a maximum of 342.05 days. A larger standard deviation is observed among enterprises (46.12) than within enterprises (17.07).

The average value of the variable inventory days is 79.70 days, with an average deviation from the average of 104.33. A larger discrepancy was recorded between enterprises (99.50) than within them (31.84). The average enterprise size was 7.80 with a standard deviation of 0.31 and a range from 6.38 to 8.75. A larger average deviation from the average value was recorded between enterprises (0.30) than within enterprises (0.08). The average annual sales growth is 0.0619 or 6.19% with a large standard deviation of 0.2257, i.e., 22.57%. Such a large variation is common on the Croatian market. Interestingly, a larger standard deviation of sales growth was recorded within the enterprise (0.1972) than between enterprises (0.1100). The average value of the inflation rate in the observed period was 1.40%, ranging from -0.50 to 3.40%. From 2010 to 2015, GDP grew by an average of 0.61%, ranging from -0.72% to 2.33%.

4.2 Correlation analysis

The Spearman correlation coefficient is calculated below to determine the relationship between the dependent variable ROA and the independent variables supplier payment days and receivables collection days. The results are shown in Table 2.

Table 2 Spearman correlation coefficients

	Spearman's rho	p-value
X1_Days_Of_Payment_To_Suppliers (DPS)	-0.246**	0.000
X2_Days_Of_Collecting_Receivables (DCR)	-0.054*	0.045

*Correlation is significant at the 0.05 level ($p<0.05$); **Correlation is significant at the 0.01 level ($p<0.01$)

Source: Authors, according to STATA calculations

Table 2 shows that there is a slight negative correlation between the days of collection of receivables and ROA ($r=-0.054$, $p<0.05$), while the correlation between the supplier payment day and ROA is relatively weak and negative ($r=-0.246$, $p<0.001$). It can be concluded that lower values of these variables are related to higher values of the ROA variable. It should certainly be taken into account that the correlations are weak to insignificant.

4.3 Panel analysis

Three models were developed based on the data of the observed sectors: a combined model, a fixed effects model and a random effects model. The results of these three models are shown in Table 3.

Table 3 Coefficients and associated standard errors in panel regression models

	Pooled	Fixed	Random
DPS	-0.00032***	-0.00009	-0.000280***
	(0.00010)	(0.00014)	(0.000097)
DCR	0.00011	-0.00043	0.000025
	(0.00012)	(0.00037)	(0.000121)
INV	-0.00012***	-0.00006	-0.000113***
	(0.00004)	(0.00005)	(0.000039)
SIZ	-0.00028	-0.0126	-0.00035
	(0.0238)	(0.0548)	(0.02405)
SGR	0.0512***	0.0198	0.0361**
	(0.0190)	(0.0194)	(0.0156)
INF	-0.00613*	-0.00485	-0.00586
	(0.00364)	(0.00436)	(0.00371)
GDP	-0.00357	-0.00249	-0.00317
	(0.00456)	(0.00475)	(0.00458)
MANU	0.0307*	0	0.0308*
	(0.0178)	(.)	(0.0178)
RETA	0.0384***	0	0.0350**
	(0.0136)	(.)	(0.0141)
WHOL	0.0527***	0	0.0539***
	(0.0142)	(.)	(0.0142)
CONSTANT	0.0923	0.23296	0.0954
	(0.1781)	(0.41921)	(0.180)
R2	0.0458	0.0109	
ρ(rho)		0.3638	0.2395
F-test		0.0000	
LM test			0.0000
Hausman test			0.1963
Wald test			0.0000
Wooldridge test			0.8828
corr (u_i. Xb)		-0.1269	
Number of observations	1,380	1,380	1,380
Number of units	276	276	276

* p<0.1, ** p<0.05, *** p<0.01, values in parentheses are corrected (clustered robust) standard errors

Source: Authors, according to STATA calculations

The justification for using the model with fixed effects in relation to the combined model was confirmed by the F-test (p<0.01). The justification for using the model with random effects in relation to the combined model was confirmed by the LM test (p<0.01). Since dummy variables for sector affiliation were used in the model, the random effects model is more appropriate than the fixed effects model. This was confirmed by Hausman's test (p>0.05). The result is in line with expectations because the large variability of data is characteristic of the Croatian market, so that according to Wooldridge, no statistically significant difference in the parameters of both evaluators can be established (Wooldridge, 2012).

The random effects model is the most appropriate model.

The model confirmed the negative impact of the supplier payment days variable (p<0.01) on ROA, which means that stretching the payment of trade payables, i.e., extended payment days to suppliers, will reduce the profitability of small and medium enterprises. The sector variable also proved to be statistically significant: the wholesale sector (p<0.01), the retail sector (p<0.05) and the manufacturing sector (p<0.01) have higher profitability compared to the reference construction sector. Of the control variables, sales growth (p<0.05) has a positive effect on the dependent variable ROA, which means that sales growth affects an increase in corporate profitability. Furthermore, a negative influence of both variables - stock binding days (p<0.01) and inventory binding days (p<0.001) - on the dependent variable ROA was confirmed. The influence of the variable collection of receivables and the size of the company on the profitability of the company was not statistically significant. Finally, GDP and inflation did not prove statistically significant.

4.4 Regression diagnostics

Since the values of the modified Wald test are p<0.01, it can be concluded that there is a problem of heteroscedasticity. The problem was fixed using the cluster command. The result of the Wooldridge test indicates the absence of first-order autocorrelation. The possible existence of a multicollinearity problem was examined by a correlation matrix. Table 4 shows the correlation coefficients and the corresponding level of significance. All coefficients range between -0.6 and 0.6, which indicates the absence of multicollinearity problems.

Table 4 Correlation matrix of pairs of independent variables

	DCR	INV	DPS	SIZ	SGR	INF	GDP	MANU	RETA	WHOL
DCR	1.0000									
INV	-0.0252 (0.3503)	1.0000								
DPS	0.2414* (0.0000)	0.1907* (0.0000)	1.0000							
SIZ	-0.0744* (0.0057)	-0.0758* (0.0048)	-0.1868* (0.0000)	1.0000						
SGR	-0.1259* (0.0000)	-0.0728* (0.0068)	-0.1694* (0.0000)	0.1504* (0.0000)	1.0000					
INF	0.0993* (0.0002)	-0.0115 (0.6695)	0.1010* (0.0002)	-0.0532* (0.0483)	-0.0162 (0.5472)	1.0000				
GDP	-0.0544* (0.0432)	0.0058 (0.8296)	-0.0690* (0.0104)	0.0307 (0.2544)	0.0829* (0.0021)	-0.5843* (0.0000)	1.0000			
MANU	0.0432 (0.1084)	0.0984* (0.0003)	-0.0210 (0.4348)	-0.0971* (0.0003)	0.0371 (0.1686)	0.0007 (0.9806)	0.0001 (0.9981)	1.0000		
RETA	-0.4073* (0.0000)	0.1015* (0.0002)	-0.0820* (0.0023)	0.0190 (0.4810)	-0.0308 (0.2529)	0.0006 (0.9812)	0.0001 (0.9982)	-0.3111* (0.0000)	1.0000	
WHOL	0.2130* (0.0000)	-0.0907* (0.0007)	-0.0761* (0.0047)	0.2077* (0.0000)	-0.0129 (0.6327)	0.0007 (0.9783)	0.0001 (0.9979)	-0.3585* (0.0000)	-0.3479* (0.0000)	1.0000

* p<0.5

Source: Authors, according to STATA calculations

5. Discussion

The relationship between profitability of small and medium enterprises in the Republic of Croatia and their use of trade credit was investigated in this paper. Descriptive statistical data analysis was conducted, the Spearman correlation coefficient was calculated, determining the strength and direction of the relationship between the dependent and independent variables, and three basic panel models were developed, i.e., the combined model, the fixed effects model and the random effects model.

All three set hypotheses were tested. The first hypothesis, **H1**: Trade credits affect the level of profitability of small and medium enterprises in the Republic of Croatia, has been partially confirmed. The supplier payment days variable proved to be statistically significant, while the trade receivables variable did not prove to be statistically significant. The second hypothesis, **H2:** There is a significant and positive impact of liabilities to suppliers on the level of profitability of small and medium enterprises in the Republic of Croatia, has been rejected. Namely, the negative impact of the variable supplier payment days ($p<0.01$) on ROA was confirmed. The third hypothesis, **H3:** There is a significant and negative impact of trade receivables on the level of profitability of small and medium enterprises in the Republic of Croatia, has been rejected because no statistically significant impact of the trade receivables variable on the level of enterprise profitability was obtained.

The model confirmed the impact of the payment days variable on the profitability of small and medium enterprises in the four most important sectors in the Republic of Croatia, which is negative, confirming the first basic working hypothesis, because there is a significant impact of trade payables on the profitability of SMEs. But the second hypothesis is rejected because there is significance, but in the opposite direction – the impact is negative. The results show that reducing the payment days to suppliers will increase a company's profitability. A negative relationship can result from using surplus money, stretching payments to suppliers, settling one's own debts and preserving existing jobs, rather than increasing sales. Most likely, the companies are in financial difficulties, so they are forced to postpone their payments, and it is very likely that the creditor depends on the debtor. Moreover, by extending the time of using suppliers for financing, free trade credits become chargeable, and additional costs arise in the form of non-use of discounts for early payments and high penalties, i.e., default interest for non-payment on time. The results are consistent with Tauringana and Afrifa (2013), Almazari, (2014), Enqvist et al. (2014), and Seyoum et al. (2016). The obtained results are in line with the European Payment Practices survey (EOS Group, 2017), whose findings show that developed countries whose companies have the most liquid payments and achieve high earnings, also have the shortest payment terms. On the other hand, countries with payment difficulties and low wages have a longer period for payments at their disposal, which results in lower wages, which is characteristic of and especially pronounced in post-transition countries. Therefore, special care should be taken in terms of determining the optimal payment limit which, if exceeded, leads to the creation of poor payment practices that negatively reflect on the level of a company's profitability. Observing the sectors separately, a statistically significant negative impact of the supplier payment days variable on ROA was obtained for all sectors, with the exception of wholesale trade where no statistically significant impact was found. Companies in the construction sector had the longest payment days to suppliers (88 days), while companies in the retail sector had the shortest payment days to suppliers (63 days). Companies in the wholesale sector and in the manufacturing sector had payables to suppliers 65 and 69 days, respectively.

The model did not confirm the influence of the receivables collection days variable on the level of profitability of small and medium-sized Croatian companies, which rejects the third hypothesis. A longer collection period of receivables was expected to reduce a company's profitability. The results show that a decrease in receivables did not increase the profitability of small and medium enterprises. This result can be explained such that the positive and negative impact are very likely to be annulled. On the one hand, a reduction in credit standards led to an increase in sales, and thus the level of profitability of the company. On the other hand, companies were most likely not cautious in lowering credit standards with the cost of additional receivables outweighing the benefits of additional sales. In addition, money remained tied to receivables and negatively affected the level of profitability as it was not used to generate new earnings. European Pay-

ment Practices research shows a higher probability of late payment when the customer has a longer payment period. Thus, the post-transition countries have the longest payment terms, but also the smallest share of timely payments, while the most developed countries such as Germany have the shortest payment terms, but also the most liquid payments. The results are consistent with Makori and Jagongo (2013), Enqvist et al. (2014), and Seyoum et al. (2016).

Observing the sectors separately, no statistically significant impact of the trade receivables variable on the level of corporate profitability was recorded in any of the sectors. The shortest and the longest trade receivable collection periods were given to companies from the retail trade sector (27 days) and from the wholesale trade sector (80 days), respectively. Companies in the construction sector had 75 collection days, while companies in the manufacturing sector had 67 days. These results are expected since invoices and cash payments are most common in the retail trade sector.

6. Conclusion

Panel analysis investigated the relationship between the profitability of small and medium enterprises in the Republic of Croatia and their use of trade credit. The impact of trade payables and trade receivables on the profitability of Croatian small and medium-sized enterprises was examined.

Croatian SMEs from the four observed sectors, i.e., construction, manufacturing, wholesale and retail, can increase the profitability of their companies by not using trade credit as the most important source of their finance or by delaying the payment of obligations to suppliers for too long. The results indicate that it is more profitable for companies to take advantage of discounts for early payments on the one hand, and to avoid high costs of penalties for non-payment on time, as well as default interest, on the other. This indicates that Croatian companies are mostly users of collection loans. Given that the Croatian economy belongs to the group of post-transition countries, it can be concluded that the use of trade credit would not have a negative impact on the level of profitability of companies if companies did not have difficulties in doing business. Namely, if the companies were more liquid, they would use trade credit to the optimal limit, which would not result in additional operating costs. Furthermore, surplus money would be used for the purpose of improving sales, which would have a positive effect on the level of a company's profitability, and not for the purpose of settling its own debts, preserving existing and creating new jobs. On the other hand, the research did not show a negative impact of trade receivables on the level of a company's profitability as expected, which also confirms the conclusions presented earlier. Due to the difficulties in doing business faced by companies in post-transition countries, they reduce credit standards in order to stimulate demand, but also due to the imposition of payment terms by customers, which will not result in increased profitability. Although no significant impact of trade receivables was found on the level of profitability in either direction, a decrease in profitability is expected due to high costs of maintaining receivables, and partly due to permanently uncollected receivables.

The research improved the knowledge of credit policy, i.e., the impact of the use of trade credit on the level of profitability of small and medium enterprises in a small post-transition economy characterized by complexity in starting a business, administrative barriers to doing business, insufficient share of growing companies, financing difficulties and obtaining loans, underdeveloped financial markets, etc.

The basic scientific contribution of this paper and the subject of research consists of research findings that have determined the effects of credit policy on the level of corporate profitability. The conducted research showed that trade payables significantly affect the profitability of small and medium-sized enterprises, while trade receivables do not have a significant impact on the level of profitability of Croatian enterprises.

The scientific contribution is manifested in the development of a model for analyzing the impact of credit policy, i.e., trade credit of suppliers on the one hand, and trade receivables on the other hand, on the profitability of small and medium enterprises in a specific environment characteristic of post-transition countries.

Although the model was tested on Croatian small and medium-sized enterprises, it is also applicable to enterprises in other post-transition countries, especially in the countries of the region. The scientific results presented in this paper make a scientific contribution to economics in theoretical and

applied aspects. Moreover, the scientific results and findings of this research are of great value for the management of small and medium enterprises in the Republic of Croatia, but also in the countries of the region.

Despite the importance of the research results in this paper, the authors encourage further research. This paper based profitability on accounting data. Future studies could measure profitability based on a company's market value. This paper has several limitations. Since SMEs that were required to submit an audit report were analyzed, it is questionable whether the results can be applied to all SMEs in the region. For such companies, access to financial markets is even more difficult, so their management of trade credit will be even more important. In addition, due to insufficient data, the authors could not distinguish between small and medium-sized companies. The observation period of this paper is from 2010 to 2015. The results are expected to be the same by 2019, which is the last "normal" year before the pandemic. But the research should be conducted during the crisis and after the crisis, where the need for trade credit will certainly be even more important given the problems with liquidity and profitability.

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Elvira Ćatić-Kajtazović
University of Bihać
Faculty of Economics
77000 Bihać,
Bosnia and Herzegovina
elvira.catic-kajtazovic@efbi.unbi.ba

Mirela Kljajić-Dervić
University of Bihać
Faculty of Economics
77000 Bihać,
Bosnia and Herzegovina
mirela.kljajic-dervic@efbi.unbi.ba

Jerko Glavaš
Josip Juraj Strossmayer
University of Osijek
Faculty of Economics in Osijek
31000 Osijek, Croatia
jerko.glavas@efos.hr

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THE EFFECTS OF CREATIVITY SUPPORTED AT THE UNIVERSITY ON ENTREPRENEURIAL BEHAVIOR

Abstract

Purpose: This paper examines direct and serial indirect effects of creativity supported at the university on male and female entrepreneurial behavior through entrepreneurial self-efficacy and individual entrepreneurial intent.

Methodology: The hypothesized model (which we tested) was a serial mediation model with two mediators. To examine the question of whether the relationship between variables varies by gender, model 6 in PROCESS macro (Hayes, 2018) was utilized separately for male (n = 218) and female (n = 385) students from nine different universities in Bosnia and Herzegovina.

Results: Serial mediation of entrepreneurial self-efficacy and individual entrepreneurial intent in the relationship between creativity supported at the university and student entrepreneurial behavior were supported in both male and female samples.

Conclusion: Serial mediation analyses indicated that a higher level of creativity supported at the university will improve student entrepreneurial self-efficacy, which may increase their entrepreneurial intent, and consequently, their entrepreneurial behavior. When the university encourages students to produce new ideas and examine old problems in new ways, it improves student confidence in their ability to mobilize cognitive, motivational, and behavioral facilities to perform entrepreneurial tasks successfully, and, in response, students demonstrate a higher level of individual entrepreneurial intent and a greater propensity for entrepreneurial behavior. However, it should be noted that an indirect effect of UC on EB only through EI was not significant in the female sample, which highlights the importance of ESE in the relationship between UC, female EI, and female EB. The results opened up a new field of research on how other types of creativity and other types of university support may affect students' entrepreneurial behavior.

Keywords: Creativity supported at the university, propensity for entrepreneurial behavior, entrepreneurial self-efficacy, entrepreneurial intention, students

1. Introduction

Google offers about 22,500,000 results to the query "definition of entrepreneurial behavior", which can indicate the relevance of the topic and an abundance of definitions. By analyzing these definitions, it is worth noting that several concepts frequently

occur when defining entrepreneurial behavior, and those are: discovering, creating, and taking advantage of opportunities (Bahtijarević-Šiber, 1990; Shane & Venkataraman, 2000; Sedlan-König, 2013). The multidimensionality of entrepreneurship and the relevance of entrepreneurial behavior have drawn attention to the identification of factors that stimulate entrepreneurial behavior. Krueger et al. (2000) stated that entrepreneurial activities could be precisely predicted by studying intention. Namely, "intentions are the single best predictor of any planned behavior" (Krueger et al., 2000, p. 412), while in the context of entrepreneurship, the relationship between intention and actual (entrepreneurial) behavior has been repeatedly proven (Kautonen et al., 2013).

Thompson (2009, p. 676) points out that "entrepreneurial intent is a necessary condition for a nascent entrepreneur." The best-known intention models are Shapero's entrepreneurial event model (SEE: Shapero, 1975; Shapero & Sokol, 1982) and the theory of planned behavior (TPB: Ajzen, 1991). According to Shapero's entrepreneurial event model, the following three factors are crucial for EI: perceived desirability, perceived feasibility, and the propensity to act (Molino et al., 2018). According to the TPB, there are three antecedents of intention: attitude toward behavior, subjective norms and perceived behavioral control, and "performance of a behavior is a joint function of intentions and perceived behavioral control" (Ajzen, 1991, p. 185).

Authors particularly point out the "sensitivity of measurements" of entrepreneurial intention (Krueger & Carsrud, 1993; Kruger et al., 2000; Gurel et al., 2010). Regardless of this sensitivity, a single-item measure was often used (Kruger et al., 2000).

Thompson's Individual Entrepreneurial Intent Scale (IEIS: Thompson, 2009) represents a significant improvement in the operationalization of entrepreneurial intention (Valliere, 2015). IEIS is a reliable internationally applicable scale (Thompson, 2009). However, it is interesting that research studies that measured entrepreneurial intent by the IEIS construct are limited. To the best of our knowledge, no research has explicitly examined the relationship between creativity supported at the university (UC), entrepreneurial self-efficacy (ESE), individual entrepreneurial intent (EI), and a propensity for entrepreneurial behavior (EB). Testing the hypothesized model from the current study provides a more detailed insight into these relationships.

After presenting the hypothesized model, variables, and a research sample, the results of testing the model are represented. The paper ends with a discussion, and the conclusion includes research limitations.

2. Literature review and the hypothesized model

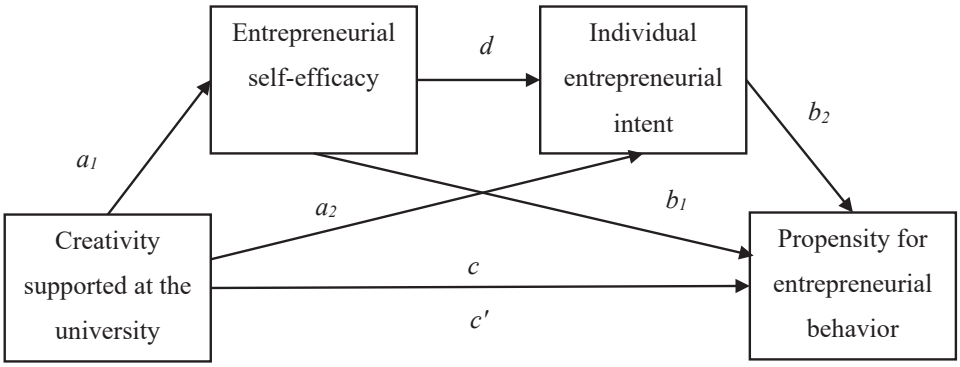
Intent is the most significant predictor of behavior (Miljković Krečar, 2010), but according to the TPB theory, perceived behavioral control affects behavior directly and indirectly through intentions (Ajzen, 1991). According to Ajzen (2002), self-efficacy should be seen as a component of perceived behavioral control. Therefore, we can expect that self-efficacy is positively related to both intention and behavior. In a theoretical model developed by Boyd and Vozikis (1994), self-efficacy was proposed as an antecedent of entrepreneurial intentions. Entrepreneurial self-efficacy can be defined as "an individual's confidence in his or her ability to successfully perform entrepreneurial roles and tasks" (Zhao et al., 2005, p. 1265). Entrepreneurial self-efficacy comes from Bandura's social cognitive theory (Newman et al., 2019). According to social cognitive theory (SCT: Bandura, 1986), self-efficacy beliefs are vital predictors of intention and direct predictors of behavior (Norman & Conner, 2017).

A sample of students proved a significant positive association between ESE and EI (Chen et al., 1998; Zhao et al., 2005; Darmanto & Yuliari, 2018; Shahab et al., 2019). In our hypothesized model, entrepreneurial self-efficacy directly affects EI and EB, and indirectly EB through EI. Therefore, if ESE is a vital tool in entrepreneurship education (EE) to increase students' entrepreneurial intentions (Fayolle, 2005, as cited in Sánchez, 2013, p. 450), the question arises as to how higher education institutions can affect students' entrepreneurial self-efficacy.

One of the factors of the environment that can potentially be associated with entrepreneurial self-efficacy and entrepreneurial intention is university support for creativity. Studies conducted by Zampetakis & Moustakis (2006) and Zampetakis et al. (2011) investigate how three types of creativity (individual creativity, creativity supported in the family, and creativity supported at the university) affect students' entrepreneurial intention. Their results suggest "that student own creativity has a positive effect to his/her entrepreneurial intentions. Moreover, perceived family environment supportive of creativity can predict increased levels of entrepreneurial intentions" (Zampetakis & Moustakis, 2006, p. 425). Although UC impact on entrepre-

neurial intention has not been confirmed in studies (Zampetakis & Moustakis, 2006; Zampetakis et al., 2011), we believe that this is one of the environmental factors associated with entrepreneurial self-efficacy, individual entrepreneurial intent, and students' entrepreneurial behavior. Namely, suppose the university encourages students to produce new ideas and examine old problems in new ways. In that case, the university creates an environment that stimulates entrepreneurial self-efficacy, increases entrepreneurial intention, and develops entrepreneurial behavior, as represented in Figure 1.

Figure 1 The hypothesized model



Source: Authors, based on the literature review and Hayes (2013)

In the hypothesized model, we examine direct and serial indirect effects of creativity supported at the university on entrepreneurial behavior through entrepreneurial self-efficacy and individual entrepreneurial intent. The hypothesized model is a serial mediation model with two mediators (based on Hayes 2013, p. 145, as cited in Demming et al., 2017, p. 79). As illustrated in Figure 1, a total effect (c) refers to the relationship between creativity supported at the university (UC) and entrepreneurial behavior (EB) without controlling for mediators; a direct effect (c′) refers to the relationship between UC and EB after controlling for mediators; a total indirect effect (a1b1+a2b2+a1db2) refers to the role of two mediators in the relationship between UC and EB; and a specific indirect effect (a1b1 and/or a2b2) refers to the role of a particular mediator in the relationship between UC and EB (explanation from Cabello & Fernandez-Berrocal, 2015).

Part of the statistical model are four covariates (U1: age, U2: the existence of a close person who is an entrepreneur, U3: student participation in extracurricular activities that focus on entrepreneurship, and U4: participation in the course *Entrepreneurship*) "included in the analysis to statistically remove these potential confounding influences on the paths in the process model (see Hayes, 2013, pp. 172-183)" (Hayes, 2015, p. 8). According to the results of the study conducted by Ćatić-Kajtazović et al. (2015a), there is a statistically significant correlation between entrepreneurial intention and student participation in extracurricular activities that focus on entrepreneurship and the existence of a close person who is self-employed. In addition, many other studies "show that the presence of role models within the family, relatives or friends can strongly influence the EIs and activities of students" (Karimi et al., 2014, p. 699). Paray & Kumar (2020) found a positive impact of entrepreneurship education on stimulating the start-up intention of students. The study (Ćatić-Kajtazović et al., 2015a) shows no difference in the entrepreneurial mindset, attitudes, and intentions considering whether or not the students attended the course/module *Entrepreneurship*. According to Nguyen (2018), gender is one of "two key demographic variables that influence entrepreneurship activities". Still, there are mixed findings on gender effects regarding the impact of entrepreneurship education on entrepreneurship activities (van Ewijk & Belghiti-Mahut, 2019).

The hypothesized model presented in Figure 1 examines male and female samples separately. Namely, studies in Bosnia and Herzegovina have shown that after graduation 28.21% of female students wish to start their own business, 61.54% and 10.26% wish to work in the public sector and in the private sector, respectively, while 48% of male students wish to start their own business after graduation (Ćatić-Kajtazović et al., 2016). Female students in B&H have statistically significantly lower entre-

preneurial intentions than male students (Ćatić-Kajtazović et al., 2016). Results such as these were expected bearing in mind characteristics of a patriarchal environment in B&H. Furthermore, results of previous studies suggest "that women have both lower entrepreneurial self-efficacy and lower entrepreneurial intentions" (Wilson et al., 2007, p. 391).

3. Measures and samples

A survey aimed at testing entrepreneurial intentions of B&H students studying at 9 different universities was conducted in the period May-June 2017. This paper presents part of research results that measured students' entrepreneurial intent by means of the IEIS scale. After rejecting incomplete questionnaires, a database with 610 questionnaires was created. By additional verification of missing values in the database, only those respondents were taken into account whose missing values do not exceed 2% (Liñán & Chen, 2009). After that, seven respondents were excluded. We have replaced missing values with series means. The sample of this study consisted of 603 students (63.8% female students and 36.2% male students) from nine different universities in Bosnia and Herzegovina. Among the respondents, 52.9% participated in the course *Entrepreneurship*, 30% of students participated in extracurricular activities that focus on entrepreneurship, and 64.7% have a close person who is an entrepreneur.

We have used construct measures adapted from existing scales to examine the relationship between UC, ESE, EI, and EB among male and female students.

Creativity supported at the university (UC) was measured with the construct "Attitudes towards a university environment that promotes creativity" (Zampetakis et al., 2011, p. 193; adapted from Amabile, 1996) with three items (e.g. At my university you learn that there is more than one solution to a problem; At my university you learn to examine old problems in new ways (1 - 5: strongly disagree - strongly agree)). According to the UC items, we have proposed the following definition of creativity supported at the university. Creativity supported at the university is the university environment that supports and promotes creativity. We recognize it as an environment in which students learn that there is more than one solution to a problem, in which students learn to examine old problems in new ways, and where faculties encourage students to produce and employ new ideas. M (SD) = 3.76 (0.87).

Entrepreneurial self-efficacy (ESE) "can be defined as an individual's confidence in his/her ability to mobilize cognitive, motivational and behavioral facilities to successfully perform entrepreneurial tasks" (Sedlan-König, 2016, p. 313). ESE was measured with the construct "Student self-report measures of entrepreneurial self-efficacy" (Sedlan-König, 2012a, 2012b, 2016) with eleven items (e.g. How successful are you in: 1) managing interpersonal relations; 2) dealing with uncertainty)). Each item is assessed on a Likert scale ranging from 1 -completely unsuccessful to 5 - very successful. M (SD) = 3.66 (0.69).

Individual Entrepreneurial Intent (EI) is defined as "self-acknowledged conviction by a person that they intend to set up a new business venture and consciously plan to do so at some point in the future" (Thompson, 2009, p. 676). EI was measured with the construct "Individual Entrepreneurial Intent Scale" (IEIS: Thompson, 2009, p. 680) with six items, e.g. Thinking of yourself, how true or untrue is it that you: Never search for business start-up opportunities (R); Do not read books on how to set up a firm (R); (a 6-point interval measure; 1 = very untrue, 6 = very true). M (SD) = 3.76 (0.94).

Entrepreneurial behavior (EB) "consists of actions and reactions of individuals that are a response to external and internal stimuli, which are necessary for the creation and discovery of opportunities, making changes and the creation of organizations which aim to exploit these opportunities and cope with the increasing level of uncertainty and complexity" (Sedlan-König, 2012a, p. 146). In the current study, EB was measured with the construct "Propensity for entrepreneurial behavior" (Sedlan-König, 2012a, 2012b, 2016) with two items, e.g. How much are you interested in: Reaction to the observed opportunity (a 5-point scale ranging from 1- not interested to 5 - very interested). M (SD) = 4.00 (0.84).

The value of Cronbach's alpha for all variables was acceptable (George & Mallery, 2016), ranging from 0.74 for EI, 0.79 for EB, 0.87 for UC, and 0.89 for ESE.

4. Results

4.1 Correlation between study variables and the t-test

Statistical analyses were performed using IBM SPSS Statistics for Windows, Version 24 (IBM Corp, Armonk, NY, USA), in combination with the PROCESS version 3.1 macro by Andrew F. Hayes. It can be seen in the following table that there is a difference in mean values of UC ($t = 2.085$; $p < 0.05$),

ESE (t = -2.264; p < 0.05), EI (t = -3.379; p < 0.01), and EB (t = -3.362; p < 0.01), in terms of gender.

As expected, females had significantly lower level scores referring to the perception of entrepreneurial self-efficacy (M = 3.61), individual entrepreneurial intent (M = 3.66), and a propensity for entrepreneurial behavior (M = 3.92) than males. Nevertheless, females had a significantly higher score in creativity supported at the university (M = 3.82) than males (M = 3.66).

Table 1 Means, standard deviations, intercorrelations, and gender differences between study variables

	All students (N = 603)				Males / females			
	UC	**ESE**	**EI**	**EB**	**UC**	**ESE**	**EI**	**EB**
Creativity supported at the university (UC)	1				-	0.37**	0.21**	0.27**
Entrepreneurial self-efficacy (ESE)	0.35**	1			0.35**	-	0.37**	0.46**
Individual entrepreneurial intent (EI)	0.25**	0.39**	1		0.34**	0.40**	-	0.39**
Entrepreneurial behavior (EB)	0.24**	0.44**	0.42**	1	0.23**	0.37**	0.44**	-
	UC		**ESE**		**EI**		**EB**	
Mean (SD) for females	3.82 (0.83)		3.61 (0.66)		3.66 (0.90)		3.92 (0.85)	
Mean (SD) for males	3.66 (0.94)		3.74 (0.74)		3.93 (0.98)		4.15 (0.79)	
t	2.085*		-2.264*		-3.379**		-3.362**	

Notes: Correlations for the female sample (N = 385) and the male sample (N = 218) are presented above and below the diagonal, respectively.

*p < 0.05; **p < 0.01

Source: Authors' calculations

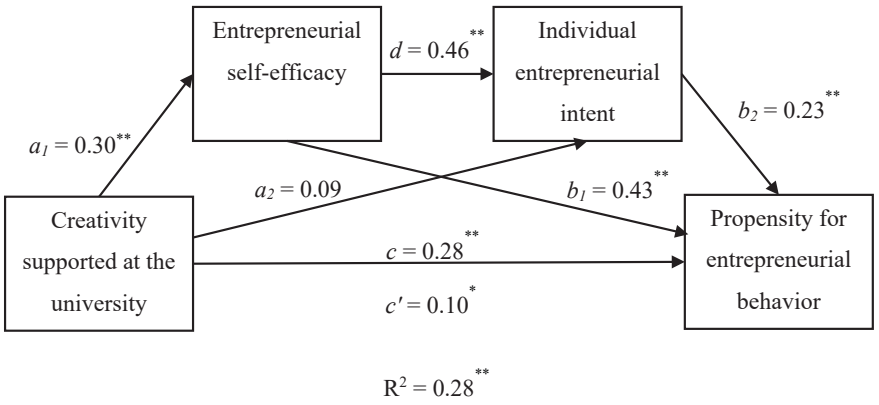
As can be seen in Table 1, there are statistically significant correlations between mediator variables (ESE and EI) and the independent variable (UC) and the dependent variable (EB). All correlation coefficients between variables are positive, which is in line with the hypothesized model.

4.2 Direct and indirect effects of creativity supported at the university on entrepreneurial behavior

In order to better understand the relationship between UC, ESE, EI, and EB, for each group of students, model 6 in PROCESS macro (Hayes, 2018) was tested twice: first without controlling for age, close person, extracurricular activities, and the Entrepreneurship course, and then by putting these variables in the covariate box. Special testing of statistical models in studies investigating student EI (first without controlling for some variables like age, level of education, and then when controlling these variables) is frequently used in research on students' entrepreneurial intentions (e.g. Karimi et al., 2014).

First, we have tested model 6 without putting U1, U2, U3, and U4 in the covariate box for the female sample (n = 385). With 95% bootstrap confidence intervals based on 5,000 bootstrap samples (Hayes, 2018), for female students, there was a significant direct effect of UC on EB (c' = 0.10, SE = 0.05, t = 2.14, p = 0.03, p < 0.05). The model is at a significance level (F(3-381) = 49.29, p = 0.00). Since two mediators were used, there were three specific indirect effects (Hayes, 2018) of UC on female EB. As can be seen in Figure 2, the first indirect effect of UC on female EB through ESE was positive and statistically significant (B = 0.1270, 95% CI [0.0780, 0.1854]). The second indirect effect of UC on female EB through EI was not significant because the confidence interval contained zero (B = 0.0208, 95% CI [-0.0083, 0.0517]). The third indirect effect is the specific indirect effect of UC on female EB through ESE and EI in serial (B = 0.0315, 95% CI [0.0163, 0.0510]). This so-called "long-way mediation" (X → M1 → M2 → Y) is small but significant (the confidence interval does not contain zero), which means that the results are consistent with the claim about serial mediation (Demming et al., 2017).

Figure 2 Relationship between UC, ESE, EI, and EB of female students



Notes: N = 385. Unstandardized path coefficients are presented.
*p < 0.05; **p < 0.01
Source: Authors' calculations

Age (U1), the existence of a close person who is an entrepreneur (U2), student participation in extracurricular activities that focus on entrepreneurship (U3), and participation in the course *Entrepreneurship* (U4), were controlled throughout the subsequent analyses. As shown in Table 2, adding these variables did not significantly change the results shown in Figure 2. In addition, the model overall was seen to be at a significant level ($F_{(7\text{-}377)} = 22.89$, $p = 0.00$, $R^2 = 0.30$). The existence of a close person who is an entrepreneur is significantly associated with ESE (B = 0.20, p < 0.01) and EI (B = 0.25, p < 0.01). Student participation in extracurricular activities that focus on entrepreneurship is only significantly associated with EI (B = 0.30, p < 0.01). Participation in the course *Entrepreneurship* is only, but negatively (1 = No, 2 = Yes), associated with female EB (B = - 0.23, p < 0.01).

Table 2 Serial mediation analysis to identify direct and indirect effects between UC and female EB

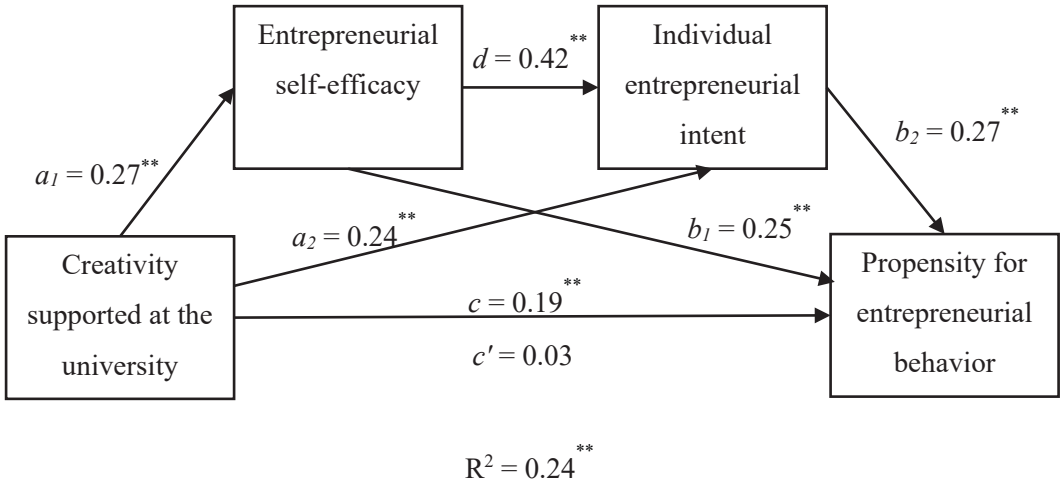
Effect	Path	Coefficient	SE	95% CI	
				LL	UL
Direct effect of UC on ESE	a_1	0.2781	0.0371	0.2051	0.3511
Direct effect of UC on EI	a_2	0.0945	0.0546	-0.0128	0.2019
Direct effect of ESE on EI	d	0.3971	0.0705	0.2584	0.5358
Direct effect of ESE on EB	b_1	0.4482	0.0640	0.3224	0.5741
Direct effect of EI on EB	b_2	0.2267	0.0448	0.1385	0.3148
Total effect of UC on EB without accounting for ESE and EI	c	0.2765	0.0499	0.1783	0.3747
Direct effect of UC on EB when accounting for ESE and EI	c'	0.1054	0.0478	0.0114	0.1993
Total indirect effect	a_1b_1+a_2b_2+a_1db_2	0.1711	0.0308	0.1158	0.2390
Indirect via ESE	a_1b_1	0.1247	0.0269	0.0770	0.1836
Indirect via EI	a_2b_2	0.0214	0.0139	-0.0029	0.0520
Indirect via ESE and EI	a_1db_2	0.0250	0.0078	0.0122	0.0428
Behavior total effect model (R^2 = 0.30**)					

Notes: N = 385. CI - confidence interval. LL - lower limit. UL - upper limit. SE - standard errors. 5,000 bootstrap samples.
[a] Age, a close person, extracurricular activities, and the Entrepreneurship course were covaried.
Source: Authors' calculations

As a whole (with covariates) direct effect of UC on female EB is significant (c' = 0.11, SE = 0.05, t = 2.21, p = 0.03, p < 0.05), the shortcut indirect effect (UC → ESE → female EB) is significant (B = 0.1247, 95% CI [0.0770, 0.1836]), and the long-way specific indirect effect is significant (B = 0.0250, 95% CI [0.0122, 0.0428]), so we can conclude that ESE and EI did serially mediate the link between UC and female EB, but only partially (for more information about mediation types, see Zhao et al., 2010).

Findings obtained on serial mediation of ESE and EI in the relationship between UC and EB in the male sample (without covariates) are shown in Figure 3. The direct effect of UC on male EB was not significant (c' = 0.03, SE = 0.05, p = 0.58, p > 0.05) when accounting for ESE and EI. The model is at a significance level (F (3-214) = 27.32, p = 0.00, R2 = 0.24). All indirect effects of UC on male EB are significant. So a serial multiple indirect effect was supported on male students. To be more precise, single mediation of ESE (B = 0.067, CI [0.0245, 0.1356]), single mediation of EI (B = 0.0643, 95% CI [0.0184, 0.1173]), and serial mediation of ESE and EI (B = 0.0307, 95% CI [0.0134, 0.0527]) were found statistically significant.

Figure 3 Relationship between UC, ESE, EI, and EB of male students



Notes: N = 218. Unstandardized path coefficients are presented.

*p < 0.05; **p < 0.01

Source: Authors' calculations

Then, age, the existence of a close person who is an entrepreneur, participation in extracurricular activities, and participation in the course *Entrepreneurship* were controlled. Only "a close person who is an entrepreneur" is significantly associated with ESE (B = 0.31, p < 0.01). Also, the model overall was seen to be at a significant level ($F_{(7\text{-}210)}$ = 9.50, p < 0.001, R^2 = 0.24).

Table 3 Serial mediation analysis to identify direct and indirect effects between UC and male EB

Effect	Path	Coefficient	SE	95% CI	
				LL	UL
Direct effect of UC on ESE	a_1	0.2642	0.0489	0.1678	0.3605
Direct effect of UC on EI	a_2	0.2460	0.0668	0.1143	0.3777
Direct effect of ESE on EI	d	0.3758	0.0880	0.2023	0.5492
Direct effect of ESE on EB	b_1	0.2492	0.0751	0.1012	0.3973
Direct effect of EI on EB	b_2	0.2650	0.0564	0.1539	0.3761
Total effect of UC on EB without accounting for ESE and EI	c	0.1927	0.0563	0.0817	0.3037
Direct effect of UC on EB when accounting for ESE and EI	c'	0.0354	0.0564	-0.0759	0.1466
Total indirect effect	$a_1b_{1+}a_2b_{2+}a_1db_2$	0.1573	0.0369	0.0902	0.2348
Indirect via ESE	a_1b_1	0.0658	0.0276	0.0224	0.1299
Indirect via EI	a_2b_2	0.0652	0.0245	0.0210	0.1159
Indirect via ESE and EI	a_1db_2	0.0263	0.0095	0.0107	0.0471
Behavior total effect model ($R^2 = 0.24^{**}$)					

Notes: N = 218. CI - confidence interval. LL - lower limit. UL - upper limit. SE - standard errors. 5,000 bootstrap samples.

[a] Age, a close person, extracurricular activities, and the Entrepreneurship course were covaried.

Source: Authors' calculations

Overall, it can be argued that the relationship between UC and male EB is serially mediated through ESE and EI. Single mediation of ESE (B = 0.0658, 95% CI [0.0224, 0.1299]), single mediation of EI (B = 0.0652, 95% CI [0.0210, 0.1159]), and serial mediation of ESE and EI (B = 0.0263, 95% CI [0.0107, 0.0471]) were found statistically significant. It should be remembered that according to Preacher & Kelley (2011, p. 97), "it is more likely that a mediator will completely mediate a relatively small total effect (c) than a relatively large total effect."

5. Discussion, limitations and future directions

Results of the current study confirm that entrepreneurial self-efficacy is a predictor of entrepreneurial intentions and entrepreneurial behavior (Bandura, 1986; Boyd & Vozikis, 1994). The results indicate that the more students perceive their entrepreneurial self-efficacy as successful, the more likely they are to show high entrepreneurial intentions and high entrepreneurial behavior. These results are in line with findings of Sedlan-König (2016).

Serial mediation analyses indicated that higher levels of UC were associated with greater EB via two indirect mechanisms: ESE and EI. There is a significant total effect of UC on students' propensity for entrepreneurial behavior without accounting for ESE and EI. These findings could be ascribed to social cognitive theory (the environment may influence individual behavior) and support the claims that the university context has some influence on students' entrepreneurial activities (see Shirokova et al., 2016). The direct effect of UC on EI of male students and the indirect effects of UC through ESE on EI of male and female students are significant. We could conclude that the university environment that promotes creativity can stimulate entrepreneurial self-efficacy and increase entrepreneurial intention - directly and indirectly in male students and indirectly through ESE in female

students. These findings point to the importance of self-efficacy in the relationship between creativity and entrepreneurial intentions (Bellò et al., 2017), especially in the female sample. In this sense, our study extends the literature on creativity, self-efficacy, and EI.

The results of the direct and indirect effect of UC on the EI through ESE are opposite to the results of studies by Zampetakis & Moustakis (2006) and Zampetakis et al. (2011). However, they measured the impact of UC on students' EI (as stated before) through individual creativity (student own creativity). At the same time, they used two items to measure students' EI. Thompson (2009) previously pointed to the problem of using different constructs to measure EI. "This threat to research progress is evident in studies that find inconsistent results when using individual entrepreneurial intent as a key, but differently defined and measured variable" (Thompson, 2009, p. 670). In response to the "threat to research progress," Thompson (2009) proposed a reliable and internationally applicable IEIS scale, used also in this research, so in this context, our study extends and complements the literature.

We have found significant differences in which males had a higher level of entrepreneurial self-efficacy, a higher level of individual entrepreneurial intent, and a higher level of entrepreneurial behavior than females. These results are consistent with the findings of several previous studies (Wilson et al., 2007; Sedlan-König, 2012a). As Liñán and Fayolle (2015) state, part of this difference can be explained by gender stereotypes. This explanation is especially applicable in Bosnia and Herzegovina, given traditional perceptions of gender roles in B&H (Ćatić-Kajtazović et al., 2016). Also, in the findings of the GEM Women's Entrepreneurship Report 2018/2019 (Elam et al. 2019, p. 21), the lowest women's TEA rate across 59 countries was recorded at 2.7% in Bosnia and Herzegovina.

In comparison to males, females reported a higher level of creativity supported at the university, which can mean that females noticed more support provided by the university than males did. Results indicate that extracurricular activities and *Entrepreneurship* course attendance are more related to female than male entrepreneurship. *Entrepreneurship* course attendance is negatively associated with female entrepreneurial behavior. It looks like mixed findings on gender effects regarding the impact of entrepreneurship education on entrepreneurship activities (van Ewijk, & Belghiti-Mahut, 2019) will continue. Some authors explained negatively associated entrepreneurship education and entrepreneurship activities by the fact that during their education students "have obtained more realistic perspectives both on themselves as well as on what it takes to be an entrepreneur" (Oosterbeek et al., 2010, p. 452). When it comes to research results in Bosnia and Herzegovina, a study conducted by Ćatić-Kajtazović et al. (2015b) showed that more than half of students surveyed thought that starting a business is very difficult in B&H. In the current study, *Entrepreneurship* course attendance is negatively associated only with female entrepreneurial behavior. Similar to these results, Oosterbeek et al. (2010) found that a negative impact of entrepreneurship education on entrepreneurial intentions is more common for women.

Moreover, other results of this study support the claim that "men and women are to be treated as different target groups in raising entrepreneurial intentions" (Leroy et al., 2009, p. 18) as well as in developing entrepreneurial behavior. Contrary to male students, we found a significant direct effect of creativity supported at the university on female students' entrepreneurial behavior, accounting for entrepreneurial self-efficacy and individual entrepreneurial intent. It seems reasonable to explain such results with different motivating factors because instrumental factors drive male students, "while female students are more motivated by social factors" (Karimi et al., 2013, p. 211). The existence of a close person who is an entrepreneur is significantly related to ESE, so our results can follow the line of the explanation of Karimi et al. (2013, p. 211), who, in the light of SCT theory, pointed out that "role models, in particular, can encourage self-efficacy."

While there is a significant total effect of UC on EB in our analyses, without accounting for ESE and EI, future studies are needed to address this relationship rigorously. However, the current study can serve as a starting point to examine the role that creativity supported at the university plays in enhancing students' entrepreneurial behavior.

There are several limitations of this paper. The first relates to the use of constructs. For example, ESE was measured through a self-report construct, while in such constructs, the danger of overestimating one's own abilities is especially present. Entrepreneurship behavior is measured with two items

using a scale "Propensity for entrepreneurial behavior" (Sedlan-König, 2012a, 2012b, 2016). However, it is about very complex behavior that "consists of actions and reactions of individuals that are a response to external and internal stimuli…" (Sedlan-König, 2012a, p. 146). That is why we recommend for futures studies to measure EB with more than two items. There is still a "gap" between intention and actual behavior (Shirokova et al., 2016), and "not all entrepreneurial intentions are translated into actions (Kautonen et al., 2013)" (Shirokova et al., 2016, p. 9). So it would be good to repeat research on the same sample of students to see how many of them have actually "started their own business," how many are intrapreneurs, etc.

Second, "there is no well documented theory linking creativity attitude with entrepreneurial intention" (Zampetakis & Moustakis, 2006, p. 425). It is also necessary to include in the future studies measures like one's own creativity and a family environment that promotes creativity (e.g. Zampetakis & Moustakis, 2006, Zampetakis et al., 2011). Some of the questions from this research need to be expanded. For example, suppose there is a course in entrepreneurship. In that case, it is necessary to include more research questions such as curriculum content, creativity, and dedication of the teacher teaching the course. When it comes to close persons who are entrepreneurs, the questions must be extended with more details, e.g. who those close people are, whether they are successful and responsible entrepreneurs, whether the business is inherited, etc. We consider the percent of explanation of the total variance in entrepreneurial behavior (about 24% in the male sample and about 30% in the female sample) to be a limitation, which opened a path to the search for new variables which increase the percent of explanation of the total variance in entrepreneurial behavior in developing countries.

6. Conclusion

This paper contributes to the existing knowledge by understanding the relationship between creativity supported at the university, entrepreneurial self-efficacy, individual entrepreneurial intent, and a propensity for entrepreneurial behavior. In the male sample, we found that higher levels of UC were associated with greater EB, (a) indirectly via a higher ESE, (b) serially via a higher ESE and higher EI, and (c) indirectly via a higher EI. In the female sample, UC was associated with EB (a) indirectly via ESE, (b) serially via ESE and EI, and (c) directly when accounting for ESE and EI. Taken together, the results of the current study confirm serial mediation of entrepreneurial self-efficacy and individual entrepreneurial intent in the relationship between creativity supported at the university and students' entrepreneurial behavior.

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Roberto Ercegovac
University of Split
Faculty of Economics
21000 Split, Croatia
roberto.ercegovac@efst.hr

Ante Tolj
University of Split
Faculty of Science
21000 Split, Croatia
ante.tolj@pmfst.hr

Damir Piplica
University of Split
University Department
of Forensic Sciences
21000 Split, Croatia
damir.piplica@gmail.com

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THE PASS-THROUGH EFFECT OF UNCONVENTIONAL MONETARY POLICY TO NET INTEREST INCOME STRUCTURE OF EUROPEAN BANKS

Abstract

Purpose: Financial banking intermediaries are sensitive to changes in market interest rates. The volatility of market interest rates affects the level of bank net interest income and determines the bank interest rate policy. Banks are actively managing structural interest rate risks to mitigate the negative effects of changes in market interest rates. The post-crisis period is characterised by unconventional monetary policy, and one of the basic objectives of the monetary instrument is a negative interest rate policy. This paper researches the effects on the bank net interest income structure with an impact on bank performance indicators. The basic research hypothesis is that during the financial crisis and a negative interest rate policy, the movement of bank interest income does not converge compared to a bank interest expense.

Methodology: According to the characteristics of the dataset, which includes 32 listed banks from Great Britain, Switzerland and the European Union for the period 2002-2019, panel data analysis is applied. To analyse the effect of the interest rate level on total interest income and total interest expense, we formed two models. Fixed-effects models were used for parameter estimation.

Results: A bank interest expense is more sensitive to unconventional macroeconomic policy than bank interest income.

Conclusion: The traditional interest earning customer related business can enable banks to stabilise the bank performance indicator during market disruption.

Keywords: Unconventional monetary policy, net interest income, bank, bank management

1. Introduction

The main responsibility of the European Central Bank (ECB) is to maintain appropriate monetary policy and price stability. During the last financial crisis the ECB started with a negative interest rate policy. A central bank negative interest rate is part of unconventional policy and it is usually applied during the crisis period. Unconventional monetary policy aims at the medium- and long-term interest rate to stimulate money demand and investments. A negative interest rate policy makes a significant effect on business performance of commercial banks. In economic theory, low interest rates should increase bank lending activities, dissimulate bank deposit holders, allocate saving funds to capital market instruments, decrease interest income and disturb bank profit. The central bank monetary policy transition mechanism from policy to market interest rates is making an impact on the bank funding structure. Low interest rates will make investing in bank deposits less attractive, which decreases credit capacity of the banking sector. To make the funding source stable, most banks follow the zero interest rate policy on client deposits even when the market rates have a negative value. To retain their profitability, banks should increase interest rate margins where the lending rates have a slower downward trend than deposit rates. Unconventional monetary policy forced banks to manage interest income and interest expenses to keep the client related business and market share. The main research objective of the paper is to analyse the effect of the negative interest rate on a particular component of bank net interest income. In comparison with other similar research, this paper compares the market interest rate impact on bank interest income and interest expenses, separately taking into consideration other relevant endogenous and exogenous parameters. The research hypothesis is that interest expenses are more sensitive to unconventional monetary policy during the crisis period than interest income. Interest rates on the loan portfolio are more stable during the crisis period. Banks are motivated to preserve profitability indicators as well as to cover enlarged credit risk on the loan portfolio. The research hypothesis will be analysed on the system of important European banks using panel data estimation during the period 2002-2019.

2. Literature review

After the sovereign debt crisis, unconventional monetary policy should stabilise the European monetary system and the interbank market with a positive effect on lending activities and investor expectations on long-run market stability (Piplica, 2013). During the 2007 financial crisis, there were many research papers on a low interest rate policy impact on bank net interest income (Klein, 2020). Bernanke and Reinhart (2004) questioned the effectiveness of monetary policy of low interest rates. Bullard (2009) suggests that a quantitative approach to solving emerging problems is more appropriate in the current environment, while interest rate policies were more appropriate in the past. His approach is that central banks should expand permanent parts of their balance sheets and maintain the monetary base at an increased rate. Bullard also suggests inflation targeting to help control inflation expectations. Cecioni et al. (2011) agree that empirical research has shown that the application of unconventional measures in monetary policy have been effective with a significant impact on the economy. Weber et al. (2009) showed that the general principles of the Eurosystem's monetary policy remain appropriate despite the significant turning points of the transmission mechanism. Duarte and Modenesi (2015) concluded that in spite of the gradual reduction in unconventional ECB measures, sustainable growth in the euro area could not be based on monetary policy but needs to be complemented with countercyclical fiscal policy measures as well as institutional reforms. Ozhan et al. (2013) argue that despite certain constructive implications of unconventional measures, the implementation of such monetary policy does not guarantee long-lasting effects. The authors propose that appropriate procedures should be taken to rehabilitate the financial sector that will be more aggressive in lending to investment activities.

The theoretical and empirical research on the relationship of interest rate volatility and bank performance indicators has attracted the attention of many authors. In a banking firm, there is constant asynchronous information on the loan and deposit side that affects bank net interest income. Ho and Saunders (1981) developed the model of maximising the bank utility function with optimising the interest margin at the level of accepted risk aversion. Efficient interest rate risk management should immunise the bank position of market interest rate

volatility. That fact encourages English (2002) to analyse the sensitivity of the interest margin to interest rate volatility in developed financial markets. Analysing a small open economy, Peng (2003) also found a strong relationship between interest rate movements and bank profitability. Other studies focused on changes in the regulatory framework and the level of the banks' net interest margin (Saunders & Schumacher, 2000). The new regulation required banks to hold more stable customer deposits with higher costs compared to deposits in the interbank market, which increased funding costs (Ötker & Pazarbasioglu, 2010). Unconventional and low interest rate monetary policy has changed some traditional views of interest rate risk management in commercial banks (Ercegovac & Buljan, 2017). Borio et al. (2017) found a positive relationship between bank profits and interest rates and also found that the relationships are more significant when market interest rates are lower. Claessens et al. (2017) reached similar conclusions when analysing net interest income relative to total earning assets for a wide range of banks over the 2005-2013 period. Klein (2020) concludes that net interest income is always positively related to bank lending activities absent during the post-crisis deleveraging process. Demiralp et al. (2017) extended the research and concluded that the sensitivity of net interest income is related to the bank business model. They defined the unconventional monetary channels and emphasised that wholesale and investment banks are more flexible in balance sheet reorganisation and more efficient in structural interest rate risk management. The complexity of the transmission channels of unconventional monetary policy is the challenge for bank management in optimising bank performance measures (Dell' Ariccia et al., 2017).

3. Research data

To analyse the impact of the interest rate level on each component of net income, we formed two models. In the first model, we analysed the effect of the interest rate level on total interest income. In the second model, we analysed the effect of the interest rate level on total interest expense. After the 2007 crisis, monetary authorities promote an expansionary monetary policy with the zero interest rate set as its target. The end-of-year interest rates used in the model during the period under study are shown in the following table.

Table 1 Currency structure of the three month market interest rates (in %, end-of-year data)[1]

Year	CHF	EUR	GBP
2002	0.6167	2.2971	4.0225
2003	0.2600	2.1240	4.0375
2004	0.7167	2.1550	4.8850
2005	1.0100	2.4880	4.6394
2006	2.1025	3.7250	5.3200
2007	2.7567	4.6840	5.9938
2008	0.6617	2.8920	2.7700
2009	0.2517	0.7000	0.6050
2010	0.1700	1.0060	0.7575
2011	0.0517	1.3560	1.0801
2012	0.0120	0.1870	0.5150
2013	0.0230	0.2870	0.5253
2014	-0.0630	0.0780	0.5640
2015	-0.7560	-0.1310	0.5904
2016	-0.7292	-0.3190	0.3666
2017	-0.7462	-0.3290	0.5211
2018	-0.7134	-0.3090	0.9124
2019	-0.6884	-0.3830	0.7916

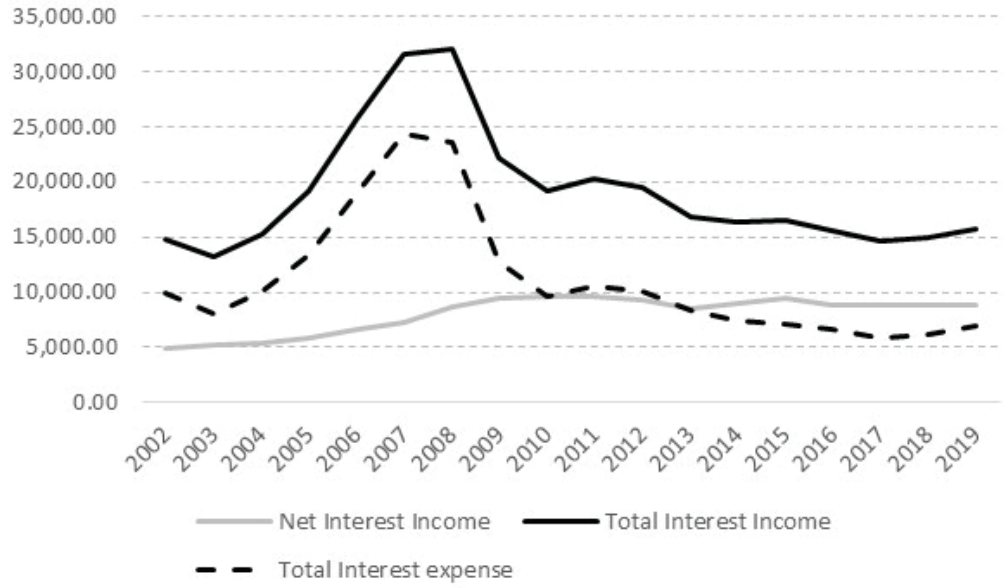
Source: Bloomberg

The data in the table confirm the sharp decline in interest rates from 2008 with the negative value of EUR and CHF interest rates. This fact challenged the banks' interest rate policy and structural risk management, as the focus of fund transfer pricing policy shifted from borrowing costs to lending income. To capture the change in sensitivity of the impact of the interest rate level on total interest income and total interest expense, we compared the parameters of the model in the whole period (2002-2019) with the parameters in the sub-period (2012-2019). The model under study includes balance sheet data and market parameters of 32 listed banks from Great Britain, Switzerland and the European Union.[2] The following figure shows the dynamic lines of interest income and interest expenses, including net interest income, during the period under study.

1 For non-euro European banks, the euro exchange rate will be used to adjust the national monetary policy to the ECB.

2 Banks included in the model are as follows: Abn Amro, Banco Bilbao Vizcaya Argenta, Banco de Sabadell Sa, Banco Santander Sa, Bankia Sa, Bankinter Sa, Barclays Plc, BNP Paribas, Caixabank Sa, Commerzbank Ag, Credit Agricole Sa, Credit Suisse Group Ag, Danske Bank As, Deutsche Bank Ag, Dexia Sa, DNB Asa, Erste Group Bank Ag, HSBC Holdings Plc, Intesa Sanpaolo, Jyske Bank, KBC Group Nv, Lloyds Banking Group Plc, Nordea Bank Abp, Raiffeisen Bank International, Royal Bank of Scotland Group, Skandinaviska Enskilda Bank, Societe Generale Sa, Standard Chartered Plc, Swedbank, UBS Group Ag, and Unicredit Spa.

Figure 1 Average net interest income component of selected banks (in million EUR)



Source: Bloomberg, annual reports, authors' calculation

It is clear from Figure 1 that during the research period the dynamic lines of interest income and interest expenses, including net interest income, do not have the same slope. Banks manage interest rate policy in new market conditions to achieve required performance. They used to exploit liquidity transformation of funding lines under the zero funding costs using liquidity profile internal modelling to match liquidity requirements.

Table 2 shows summary statistics for the variables. As can be seen from the table, the average total interest income of the banks during the period under study was 18,979.95 million EUR, with a maximum of 104,515 million EUR (Dexia Sa. in 2008), and a minimum of 552 million EUR (Jyske Bank in 2004).

The average total expense of the banks was 10,913 million EUR. The highest and the lowest total interest expense were made by Dexia Sa. in 2008 (101,786 million EUR) and Jyske Bank in 2013 (181 million EUR), respectively.

Although the average country risk premium was 9.16, standard deviation was only 2.03, showing that resident banks' systemic risk remained relatively stable over the period under study.

HSBC Holdings Plc had the highest total equity in 2015 (181,776 million EUR), which is significantly higher than the average total equity of banks in the period under study (35,056 million EUR).

The average non-performing asset of banks amounted to 12,656 million EUR, with the highest value achieved by Intesa Sanpaolo in 2014.

Standard deviation of a total risk-based capital ratio (4.11) has relatively small variations due to a regulatory determination of the minimum indicator value.

The average three month interest rate of banks was 1.33%. Although it was positive for most of the period, Table 1 shows the effect of unconventional monetary policy during the post-crisis period and the negative interest rates for the EUR and CHF currency structure.

GDP growth and CPI with the highest (7.5% and 4.20, respectively) and lowest (-8.28% and -1.30, respectively) values show that bank managed within the business cycle and the time horizon of the study is appropriate.

Table 2 Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Total interest income (TII)	553	18,979	16,205	552	104,515
Total interest expense (TIE)	551	10,913	11,961	181	101,786
Country risk premium (CRP)	416	9.16	2.03	4.36	16.15
Total equity (TEQ)	553	35,056	31,635	-6,055	181,776
Non-performing asset (NPF)	531	12,656	15,011	35,67	84,079
Total risk-based capital ratio (RCR)	544	15.07	4.11	7.70	31.80
Three month interest rate (MIR)	576	1.33	1.64	-0.76	5.99
GDP growth (GDP)	558	1.44	1.94	-8.28	7.50
Consumer price index (CPI)	540	1.64	1.11	-1.30	4.20

Source: Bloomberg, annual reports, authors' calculation

4. Research model definition

Given the theoretical framework and previous research, we used five independent variables in the first model, i.e. the country risk premium, non-performing assets, total equity, the total risk-based capital ratio and a three-month interest rate. We also used two control variables, i.e. GDP growth and the consumer price index. The country risk-free rate and total loans were omitted due to their correlation with other independent variables. The data were taken from the Bloomberg database including annual reports of particular banks. All balance sheet data are nominated in millions of EUR.

According to the characteristics of our dataset, panel data analysis is applied. To analyse the effect of interest rate level on total interest income, we formed the following model:

$$TII_{it} = \alpha_0 + \alpha_1 CRP_{it} + \alpha_2 NPA_{it} + \alpha_3 MIR_{it} + \alpha_4 RCR_{it} + \alpha_5 TEQ_{it} + \alpha_6 GDP_{it} + \alpha_7 CPI_{it} + \varepsilon_{it},$$

where TII_{it} represents total interest income of the bank i in year t, CRP_{it} stands for the country risk premium in the countries of residence of the banks (Great Britain, Switzerland, Austria, Belgium, Denmark, Germany, Finland, France, Italy, the Netherlands, Norway, Spain and Sweden) in the 2002-2019 period, NPA_{it} denotes the non-performing asset of the bank i in year t, MIR_{it} denotes the three month interest rate of the bank i in year t, RCR_{it} denotes the total risk-based capital ratio of the bank i in year t, TEQ_{it} denotes total equity of the bank i in year t, GDP_{it} denotes the gross domestic product growth rate of the country i in year t, CPI_{it} denotes the consumer price index of the countries of residence of the banks in the 2002-2019 period, α_0 is a constant, and it is assumed that ε_{it} are identically and independently distributed error terms. All variables were log-transformed.[3]

Parameter estimation was performed using fixed effects models. The fixed effects model controls for the difficult-to-measure time-invariant variables with time-invariant effects, which reduces the problem of endogeneity due to omitted variables. The results of the Hausman test confirm the suitability for use of the fixed effects model.

The results of the modified Wald test confirm the heteroscedasticity problem, and the results of the Wooldridge test confirm the serial autocorrelation problem. To eliminate the problems of heteroscedasticity and autocorrelation, we used robust standard errors.

To analyse the effect of the interest rate level on total interest expense, we formed the following model:

$$TIE_{it} = \alpha_0 + \alpha_1 CRP_{it} + \alpha_2 TEQ_{it} + \alpha_3 MIR_{it} + \alpha_4 GDP_{it} + \alpha_5 CPI_{it} + \varepsilon_{it},$$

where TIE_{it} represents total interest expense of the bank i in year t and TEQ_{it} denotes total equity of the bank i in year t.

The results of the Hausman test confirm the suitability for use of the fixed effects model. All variables were log-transformed. As in Model 1, the modified Wald test and the Wooldridge test confirmed the problem of serial autocorrelation and heteroscedasticity, which were eliminated by using robust standard errors.

3 For variables that contain negative values, a constant value is added to the data before applying the log transformation.

5. Results and discussion

The Panel 1 results are shown in the following table.

Table 3 Results of selected total interest income variables

Total interest income (TII) / Period	2002-2019	2012-2019
Country risk premium (CRP)	-0.063892	-0.02128
	(0.091839)	(0.062265)
Non-performing asset (NPA)	0.1842188	0.2074903
	(0.0285339)***	(0.0442478)***
Total equity (TEQ)	-0.0006172	-0.0347826
	(0.0295979)	(0.0047312)***
Total risk-based capital ratio (RCR)	-0.5676411	-0.15791
	(0.1254287)***	(0.1506534)
Three month interest rate (MIR)	0.0850665	0.0314196
	(0.0292845)***	(0.0162041)*
GDP growth (GDP)	-0.0433059	-0.2418163
	(0.0462599)	(0.1003541)**
Consumer price index (CPI)	-0.0466064	-0.0428189
	(0.0166684)***	(0.0204268)**
Constant	9.736219	8.98861
	(0.5640523)***	(0.7188938)***

*, **, *** indicate 10%, 5% and 1% levels of significance

Source: Bloomberg, annual reports, authors' calculation

The Panel 1 results confirm a negative statistically insignificant impact of the country risk premium on total interest income. Comparing the model coefficients for the entire period under study (2002-2019) and the post-crisis period (2012-2019), we find that the country risk premium on total interest income is smaller and not statistically significant in the post-crisis period. This is due to the strong effect of unconventional macroprudential regulation that targets low interest rates and enforces the repurchase programme for securities on bank balance sheets. In this way, regulators minimise the negative effects of bank restructuring and adjustment to Basel III requirements on banks' liquidity and capital positions (Baumeister & Benati, 2013).

The impact of non-performing assets on total interest income is positive and statistically significant in both pre- and post-crisis periods. Non-performing assets are directly related to net interest income, adjusted for provisioning costs for certain interest-earning assets.

Total equity has a weak negative and statistically insignificant impact on total interest income throughout the period under study. Comparing the impact of equity volume in the post-crisis period, it is clear that the impact is stronger due to the substantial capitalisation of banks enforced by regulatory requirements.

The total risk-based capital ratio has a negative impact on total interest income throughout the period under study. The impact in the post-crisis period is smaller and not statistically significant. Banks increased the ratio in the post-crisis period and replaced a significant portion of the loan portfo-

lio with lower-income sovereign bonds. The effect was regulatory and had no economic impact on the bank's interest income.

The three month interest rate has a positive impact on total interest income. In the post-crisis period, the effect is less significant. Despite the embedded floor, banks have increased their credit risk premiums in order to stabilise net interest income due to the increase in the share of non-performing loans (Eggertsson et al., 2019).

The impact of GDP is negative but not statistically significant in the period under study and more significant in the post-crisis period due to the stable GDP growth line after the crisis shock. Lending activities of banks are the most stable activities during the systemic financial crisis with a time lag in the adjustment of lending rates to market changes. The unexpected results are directly related to long-term unconventional monetary policy with the zero interest rate and liquidity access channels (Heider et al., 2019).

The consumer price index has a negative impact on total interest income. In the post-crisis period, the effect of the consumer price index was unchanged compared to the total period under study.

The Panel 2 results are shown in the following table.

Table 4 Results of selected total interest expense variables

Total interest expense (TIE) / Period	2002-2019	2012-2019
Country risk premium (CRP)	-0.3985755	-0.1821387
	(0.1147096)***	(0.1950606)
Total equity (TEQ)	-0.0515851	-0.0750777
	(0.0287573)*	(0.0086437)***
Three month interest rate (MIR)	0.281764	0.1415343
	(0.0280129)***	(0.0568072)**
GDP growth (GDP)	-0.1562996	-0.9749828
	(0.0518124)***	(0.1996858)***
Consumer price index (CPI)	-0.0953442	-0.1664606
	(0.0407472)**	(0.0634555)**
Constant	10.64512	12.15014
	(0.3687717)***	(0.5235712)***

*, **, *** indicate 10%, 5% and 1% levels of significance

Source: Bloomberg, annual reports, authors' calculation

The results confirm a negative statistically significant impact of the country risk premium on total interest expense over the period 2002-2019. The effect of the country risk premium is negative and not significant in the post-crisis period due to the same explanatory reasons of the influence of bank interest income. An overly liquid banking sector during the implementation of unconventional policy combined with a low interest rate policy reduced the sensitivity of banks' interest expenses to systemic risk conditions.

Total equity has a negative effect on total interest expense in both periods under study. The statistical significance is stronger in the post-crisis period due to the relative importance of bank capital structure compared to the funding of interest expenses.

The three month interest rate has a positive impact on total interest expense. The impact is lower in the post-crisis period due to the zero floor on most client deposits of the banks (Beau et al., 2014). Banks manage different funding options during the period

when they exploit the effects of expansionary monetary policy (Ginelli et al., 2018). This caused a discrepancy compared to research conducted during the going concern macroeconomic conditions.

The effect of GDP is negative in both periods under study. The comparison shows a stronger effect after 2012, also an increase in savings, but the strong effect of zero interest rate monetary policy lowers the funding costs of banks (Han & Melecky, 2013).

The consumer price index has a negative statistically significant impact on total interest expense during the total period under study. In the post-crisis period, the impact of the consumer price index on bank interest expenses is unchanged. The impact of consumer prices on the nominal interest rate is constant.

6. Conclusion

Net interest income is one of the most important performance measures of the banking financial intermediaries. The structure of net interest income is directly related to market interest rates, the level of systemic risk, the volume of non-performing loans, client risk profiles, and the macroeconomic environment. Many authors indicated the insufficient pass-through effect of interest rate monetary policy on the bank lending channel (Stráský & Hwang, 2019). The negative interest rate policy transfers lower market rates and lower rates to interbank deposits without a similar effect on bank loans and deposit rates (Heider et al., 2021). Therefore, the research findings of this paper suggest a differential sensitivity of banks' interest income and interest expense to unconventional monetary policy. The sample results show that unconventional monetary policy of negative interest rates caused a convergence of banks' funding costs toward zero. Banks took advantage of free funding and protected the level of their net interest margins by keeping lending rates above market interest rates. With the higher interest income, bank intermediaries would have had to cover increased regulatory costs and the risk of non-performing loans, including the loss of income from unfair competition from shadow banks (Doyle et al., 2016). Unconventional monetary policy has not helped to expand bank lending and lower commercial sector loan prices, which were the main objectives of monetary policy to support economic growth (Roengpitya et al., 2017). Contrary to monetary policy expectations, the banking sector faced additional and significant asset and liability management costs due to negative interest rates (Ercegovac & Buljan, 2017). The results of the study can recommend monetary authorities to work with prudential authorities to take advantage of the impact of low market interest rates. The research can analyse the lack of positive effects of unconventional monetary policy and appropriate complementary prudential measures to support lending. Otherwise, banks will adjust the structure of their assets and switch to risk-free positions with positive returns, which will reduce lending and increase net interest margin (Bubeck et al., 2020). Without regulatory convergence, the contribution of the banking system to the restructuring of the global economy will be insufficient (Roengpitya et al., 2017).

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Turgut Karabulut
Erzincan Binali Yıldırım University
Department of Business Administration
24100 Merkez/Erzincan, Turkey
tkarabulut@erzincan.edu.tr

Salim Sercan Sari
Erzincan Binali Yıldırım University
Department of Business Administration
24100 Merkez/Erzincan, Turkey
salim.sari@erzincan.edu.tr

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THE ATTITUDE OF ACADEMIC STAFF TOWARDS BITCOIN

Abstract

Purpose: Bitcoin, the most prominent among cryptocurrencies, is a peer-to-peer ("P2P") electronic currency and payment system used based on mutual trust. The study aims to measure awareness of Bitcoin, which has recently become popular among investors with its rapidly increasing use. To this end, a questionnaire was applied to the participants to evaluate their opinions and preferences regarding Bitcoin. With this purpose in mind, a questionnaire was applied to the academics of Erzincan Binali Yıldırım University in Turkey.

Methodology: In the process of analysing the obtained data, frequency analysis and the chi-square test method were used by using the SPSS 26.0 software package.

Results: According to the results of the study, it was observed that 51.6% of the academics (159 persons) had knowledge of Bitcoin, and while 31.5% of the academics participating in the study (97 persons) considered they would buy Bitcoin within five years, 57% (176 persons) conceived the use of Bitcoin would increase within ten years. Despite all these positive attitudes, it was also observed that 45.5% (140 people) considered Bitcoin as unreliable and 51.6% (159 persons) would prefer gold instead of using Bitcoin. As for the opinion of academics, it was concluded that gold and other different investment tools would be preferred instead of Bitcoin despite its increasing use.

Conclusion: This research is important as it is the first research study in the field, which means that no similar study has been conducted in Turkey before, and it is thus expected to greatly contribute to the literature within the context of the importance and originality of the study.

Keywords: Cryptocurrencies, Bitcoin, academic staff, awareness level

1. *Introduction*

In all currencies used by humans, many security measures are required to be taken so as to prevent counterfeiting. As with fiduciary currencies, cryptocurrencies aim to enable people to transact securely without suspicion. Nevertheless, unlike fiduciary currencies, cryptocurrencies apply completely technological security rules based on cryptographic reality. As the name suggests, cryptography is used extensively in cryptocurrencies that are not dependent on a central authority and make use of an electronic payment system that allows direct transactions without the need for a third party. In cryptography, which is regarded as an academic research field, different mathematical techniques that are not simple to figure out are put to use. The coding of the cryptocurrency system in a secure environment is provided by a mechanism created through cryptography.

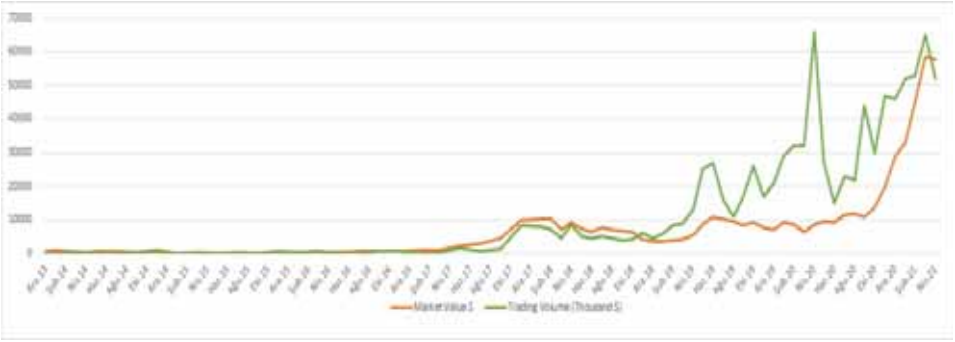
Although cryptocurrencies exhibit many features of other financial markets such as foreign exchange and stocks, market structures essentially differ. One

of the cryptocurrencies transacted with cryptographic structures is Bitcoin. Bitcoin was first introduced in an article by Satoshi Nakamoto, a pseudonym of a computer programmer or group in 2008, as a peer-to-peer ("P2P") cryptocurrency protocol that operates without a central authority. Bitcoin is a cryptocurrency or virtual currency derived from mathematical cryptography and designed as an alternative to government-backed currencies. Since it first went online in 2009, Bitcoin has evolved from an experimental commodity traded among enthusiasts to a digital currency that has attracted great attention of investor actors. The database of Bitcoin users is not only becoming more and more global but also diverse day by day. Consequently, Bitcoin has left behind the days when a single exchange completely dominated the market and is traded on numerous exchanges in different countries around the world that support different currencies (Cheah & Fry, 2015, p. 32; Brandvold et al., 2015, p. 18).

As an electronic medium of exchange, Bitcoin is a speculative investment tool that can be traded twenty-four hours a day, seven days a week. Yermack (2015) and Baur et al. (2018) note that a significant portion of Bitcoin transactions are made by speculative investors and the number of people using Bitcoin to purchase goods and services is a minority. They argue that Bitcoin acts more like a speculative investment than a currency. They state that the USA treats Bitcoin as property, the UK and the European Union classify it as currency, and most other countries do not regulate Bitcoin's legal status (Dyhrberg et al., 2018, p. 140).

The rapid change in monthly trading volume and market value since the beginning of Bitcoin trading is shown in Figure 1 below.

Figure 1 Change in Bitcoin monthly market value and trading volume in the December 2013 - April 2021 period



Source: Investing.com

As shown in Figure 1, the change in trading volume and market value reached the highest value in December 2017 after Bitcoin started trading. Trading volume and market value, which decreased in 2018, started to increase again in 2019. Together with the changes in Bitcoin price that attracted the attention of individual and institutional investors, the rapid increase in trading volume caused Bitcoin's market value to reach a record high in April 2021.

Bitcoin, whose market value and price have increased tremendously since the day it began trading, has gained outstanding popularity not only among the public but also in the media. The increasing popularity of Bitcoin has led to Bitcoin being increasingly used and accepted as an investment tool. The study aims to determine academics' awareness of Bitcoin, the most popular cryptocurrency. In this context, a questionnaire is distributed to academics working at Erzincan Binali Yıldırım University to determine their awareness of Bitcoin. After a literature review, the purpose, a data collection tool, population, and the sample of the research study are explained in detail. After presenting the findings, they are evaluated and interpreted in the final section and new solutions are offered along with the existing ones for future research.

2. Literature review

Bohr and Bashir (2014) present an analysis of a study on Bitcoin users. In the analysis made by using public survey data of Bitcoin users, they investigate wealth accumulation of Bitcoin users, op-

timism about the future of Bitcoin, and themes attracting Bitcoin users to cryptocurrency. As a result of their study, they state that age, time of initial use, geographic location, mining, intriguing online discourse, and political orientation are relevant factors in explaining various aspects of wealth, optimism and attractiveness of Bitcoin.

Yelowitz and Wilson (2015) collected Google Trends data in their study to examine the determinants of interest groups in Bitcoin, which systematically analyse Bitcoin interest including hard-to-observe customers. Based on anecdotal evidence related to Bitcoin users, they conclude that Bitcoin is represented by four possible types of clients: computer programming enthusiasts, speculative investors, libertarians, and criminals. Furthermore, they testify that computer programming enthusiasts and illegal activities have fuelled interest in Bitcoin.

Applying variance decomposition analysis and the Granger causality test based on the VAR model, Dulupçu et al. (2017) investigate that the price increase of Bitcoin is due to both its real value and speculative transactions in direct proportion to its popularity. The result of their study shows that the direction of causality is from popularity to the price of Bitcoin. They convey that Bitcoin's popularity drives its price movements and that the more popularity Bitcoin gains, the more its price increases.

Sütçü and Aytekin (2018) conduct a study in which they measure the level of entrepreneurship of individuals who mine, buy and sell Bitcoin, or follow its trade, choosing Twitter users related to the topic as their sample. The aim of their research is to investigate the impact of entrepreneurship on the motivation that makes people interested in Bitcoin and similar cryptocurrencies enter this field and evaluate the dominant factors. Upon analysing their findings, they conclude that entrepreneurial values of people interested in Bitcoin mining or trading are at a high level.

In their study, Cihangir et al. (2019) develop a scale to determine the participation tendencies of university students in the Bitcoin market. The study is conducted using a questionnaire distributed to the students of the Faculty of Economics and Administrative Sciences and the Faculties of Engineering studying at Cumhuriyet University, Gaziosmanpaşa University, Kahramanmaraş Sütçü İmam University, and Osmaniye Korkut Ata University. Consequently, it is observed that university students are interested and willing to perform transactions even though they do not have enough knowledge of Bitcoin.

Choi (2021) uses the number of tweets as a representative to attract the attention of investors. He uses high-frequency data to investigate real-time impact of tweets on Bitcoin liquidity. He explains that a 1% increase in tweets leads to a liquidity recovery of about 7% in the next five to ten minutes, and that the impact of tweets decays after about an hour. As a result, the study suggests that active investor interest can significantly increase Bitcoin liquidity in real time.

Guegan and Renault (2021) use a dataset of about one million messages sent to StockTwits to investigate the relationship between investor sentiment on social media and Bitcoin intraday returns. They find a statistically significant relationship between investor sentiment and Bitcoin returns at frequencies up to 15 minutes. They also show that the impact of sentiment on returns is focused on the period around the Bitcoin bubble.

In their study, Steinmetz et al. (2021) conduct a representative online survey of 3,864 Germans. They find that 83% of respondents are aware of cryptocurrencies, but have limited self-assessed knowledge of cryptocurrencies and the underlying blockchain technology. According to their findings, 9.2% of respondents say that they owned cryptocurrency at the time of the survey, and 9.1% state that they used to own cryptocurrency before. The findings appear to have implications for regulators and businesses potentially affected by the growing social interest in cryptocurrency.

3. Purpose and the scope of the research

This study is comprised of two different aims. The first aim of the study is to investigate academics' awareness of Bitcoin which is accepted as an investment tool. Furthermore, the second aim is to make a comparative evaluation of the level of awareness among academics with different income levels. Thus, we believe this study will shed light on the future research into how and in what ways the investor awareness strategies may be developed. In other words, this study, which is, as already mentioned, limited to only the academics working at Erzincan Binali Yıldırım University, will support looking at the big picture in this regard.

The scope of the study is limited to the academic staff working at Erzincan Binali Yıldırım University.

4. Research method

The survey applied online in the study was taken from the Bitcoin research conducted by the Blockchain Capital Company in 2017. In the study, the

questionnaire was distributed to the stratified and randomly selected academic staff at Erzincan Binali Yıldırım University. The population of the study consisted of 1,109 people. The sample size was calculated by equation (1) and obtained as 294 persons (Saracel et al., 2002, p. 28). Later, the sample numbers for each title were calculated and shown in Table 1.

$$n = \frac{N}{1+(N*\alpha^2)} = \frac{1109}{1+(1109*0.05^2)} \cong 294 \quad (1)$$

Table 1 Sample numbers (stratified) by title

Titles	Population	Sample Number
Prof. Dr.	81	22
Assoc. Prof. Dr.	115	31
Asst. Prof. Dr.	332	88
Res. Asst.	342	91
Lect.	239	63

Source: Authors

In total, 308 academic staff participated in the research, of whom 24 were appointed full professors, 33 associate professors, 90 assistant professors, 94 research assistants and 67 lecturers. This indicates that more participants than the required sample number showed interest in the study.

In the analysis of the study, frequency analysis and the chi-square test were used. The chi-square test was tested according to the 5% significance (95% confidence) level. To make them clear, frequency analysis is a statistical technique used to obtain the observation frequency and percentage distributions of the data. When it comes to the chi-square test, it is a statistical technique used to analyse whether there is a relationship between categorical variables (groups) (Karagöz, 2019, p. 38, p. 518).

5. Findings

Demographic information about the academic staff who participated in the study is shown in Table 2.

Table 2 Demographic information

Variables	N	%	Variables	N	%
Gender			**Marital Status**		
Female	105	34.1	Single	86	27.9
Male	203	65.9	Married	222	72.1
Age			**Title**		
30 years and under	51	16.6	Prof. Dr.	24	7.8
31 - 40 years	183	59.4	Assoc. Prof. Dr.	33	10.7
41 - 50 years	56	18.2	Asst. Prof. Dr.	90	29.2
51 - 60 years	10	3.2	Res. Asst.	94	30.5
61 years and over	8	2.6	Lect.	67	21.8

Source: Authors

Participants in the study consisted of 105 female (34.1%) and 203 male (65.9%) academics. A total of 51 respondents (16.6%) were under the age of 30, 183 (59.4%) were between the ages of 31 and 40, 56 (18.2%) were between the ages of 41 and 50, 10 (3.2%) were between the ages of 51 and 60, and 8 (2.6%) were older than 61. In terms of marital status, 86 (27.9%) academics who participated in the study were single, while 222 (72.1%) were married. As to the titles of the participants, 24 (7.8%) were professors, 33 (10.7%) were associate professors, 90 (29.2%) were assistant professors, 94 (30.5%) were research assistants, and 67 (21.8%) had the title of lecturer.

Table 3 Demographic variables and answers given to the question: "How familiar are you with Bitcoin?"

Variables		I own Bitcoin	Very familiar	Somewhat familiar	Heard of it but not familiar	Never heard of it
Gender	Female	10 (9.5%)	19 (18.1%)	27 (25.7%)	48 (45.7%)	1 (1.0%)
	Male	25 (12.3%)	44 (21.7%)	69 (34.0%)	64 (31.5%)	1 (0.5%)
Age	30 years and under	9 (17.6%)	7 (13.7%)	15 (29.4%)	19 (37.3%)	1 (2.0%)
	31 - 40 years	21 (11.5%)	38 (20.8%)	65 (35.5%)	58 (31.7%)	1 (0.5%)
	41 - 50 years	3 (5.4%)	17 (30.4%)	12 (21.4%)	24 (42.9%)	0 (0.0%)
	51 - 60 years	0 (0.0%)	1 (10.0%)	3 (30.0%)	6 (60.0%)	0 (0.0%)
	61 years and over	2 (25.0%)	0 (0.0%)	1 (12.5%)	5 (62.5%)	0 (0.0%)
Marital Status	Single	13 (15.1%)	13 (15.1%)	30 (34.9%)	30 (34.9%)	0 (0.0%)
	Married	22 (9.9%)	50 (22.5%)	66 (29.7%)	82 (36.9%)	2 (0.9%)
Title	Prof. Dr.	2 (8.3%)	8 (33.3%)	2 (8.3%)	12 (50.0%)	0 (0.0%)
	Assoc. Prof. Dr.	2 (6.1%)	6 (18.2%)	12 (36.4%)	13 (39.4%)	0 (0.0%)
	Asst. Prof. Dr.	11 (12.2%)	19 (21.1%)	26 (28.9%)	33 (36.7%)	1 (1.1%)
	Res. Asst.	9 (9.6%)	19 (20.2%)	38 (40.4%)	27 (28.7%)	1 (1.1%)
	Lect.	11 (16.4%)	11 (16.4%)	18 (26.9%)	27 (40.3%)	0 (0.0%)

Source: Authors

According to the results of the chi-square test, it was revealed that there was no difference of opinion between gender (sig. = 0.166), age (sig. = 0.130), marital status (sig. = 0.341) and titles (sig. = 0.366).

Table 4 Demographic variables and answers given to the question: "How much do you agree or disagree with the statement: "Bitcoin is a positive innovation in financial technology."?"

Variables		Not at all sure	Strongly disagree	Somewhat disagree	Somewhat agree	Strongly agree
Gender	Female	27 (25.7%)	9 (8.6%)	19 (18.1%)	36 (34.3%)	14 (13.3%)
	Male	20 (9.9%)	37 (18.2%)	40 (19.7%)	67 (33.0%)	39 (19.2%)
Age	30 years and under	9 (17.6%)	3 (5.9%)	5 (9.8%)	26 (51.0%)	8 (15.7%)
	31 - 40 years	31 (16.9%)	26 (14.2%)	37 (20.2%)	54 (29.5%)	35 (19.1%)
	41 - 50 years	6 (10.7%)	12 (21.4%)	15 (26.8%)	17 (30.4%)	6 (10.7%)
	51 - 60 years	0 (0.0%)	3 (30.0%)	2 (20.0%)	5 (50.0%)	0 (0.0%)
	61 years and over	1 (12.5%)	2 (25.0%)	0 (0.0%)	1 (12.5%)	4 (50.0%)
Marital Status	Single	12 (14.0%)	11 (12.8%)	14 (16.3%)	36 (41.9%)	13 (15.1%)
	Married	35 (15.8%)	35 (15.8%)	45 (20.3%)	67 (30.2%)	40 (18.0%)
Title	Prof. Dr.	3 (12.5%)	2 (8.3%)	5 (20.8%)	8 (33.3%)	6 (25.0%)
	Assoc. Prof. Dr.	4 (12.1%)	7 (21.2%)	8 (24.2%)	10 (30.3%)	4 (12.1%)
	Asst. Prof. Dr.	21 (23.3%)	10 (11.1%)	22 (24.4%)	22 (24.4%)	15 (16.7%)
	Res. Asst.	14 (14.9%)	12 (12.8%)	12 (12.8%)	39 (41.5%)	17 (18.1%)
	Lect.	5 (7.5%)	15 (22.4%)	12 (17.9%)	24 (35.8%)	11 (16.4%)

Source: Authors

The results of the chi-square test showed that there was no difference of opinion between marital status (sig. = 0.341) and titles (sig. = 0.366). However, it was determined that there was a difference of opinion between gender (sig. = 0.002) and age (sig. = 0.013).

While 50 female academics (47.6%) stated that Bitcoin was a positive innovation in financial technology, 28 (26.7%) reported that it was not a positive innovation. 106 male academics (52.2%) agreed with the statement, whereas 77 (37.9%) did not agree with the statement.

While 34 academics (66.7%) aged 30 and under agreed with a positive opinion of innovation, 8 (15.7%) did not agree with a positive opinion of innovation. Whereas 89 (48.6%) of the academics between the ages of 31 and 40 stated that they agreed with the statement, 63 (34.4%) stated that they disagreed. While 23 academics (41.1%) between the ages of 41 and 50 reported that Bitcoin was a positive innovation in financial technology, 27 (48.2%) stated that it was not a positive innovation. The same number of academics between the ages of 51 and 60 (5, i.e. 50% in each group) agreed and did not agree with a positive opinion of innovation. In terms of the academics aged 61 and over, 5 (62.5%) stated that they agreed with the statement and 2 (25%) disagreed.

Table 5 Demographic variables and answers given to the question: "How much do you agree or disagree with the statement: "Bitcoin is a bubble."?"

Variables		Not at all sure	Strongly disagree	Somewhat disagree	Somewhat agree	Strongly agree
Gender	Female	28 (26.7%)	12 (11.4%)	25 (23.8%)	35 (33.3%)	5 (4.8%)
	Male	26 (12.8%)	21 (10.3%)	56 (27.6%)	56 (27.6%)	44 (21.7%)
Age	30 years and under	12 (23.5%)	5 (9.8%)	15 (29.4%)	12 (23.5%)	7 (13.7%)
	31 - 40 years	38 (20.8%)	20 (10.9%)	46 (25.1%)	58 (31.7%)	21 (11.5%)
	41 - 50 years	3 (5.4%)	5 (8.9%)	17 (30.4%)	16 (28.6%)	15 (26.8%)
	51 - 60 years	0 (0.0%)	0 (0.0%)	3 (30.0%)	4 (40.0%)	3 (30.0%)
	61 years and over	1 (12.5%)	3 (37.5%)	0 (0.0%)	1 (12.5%)	3 (37.5%)
Marital Status	Single	16 (18.6%)	13 (15.1%)	23 (26.7%)	19 (22.1%)	15 (17.4%)
	Married	38 (17.1%)	20 (9.0%)	58 (26.2%)	72 (32.4%)	34 (15.3%)
Title	Prof. Dr.	0 (0.0%)	6 (25.0%)	8 (33.3%)	7 (29.2%)	3 (12.5%)
	Assoc. Prof. Dr.	4 (12.1%)	2 (6.1%)	11 (33.3%)	11 (33.3%)	5 (15.2%)
	Asst. Prof. Dr.	18 (20.0%)	10 (11.1%)	15 (16.7%)	30 (33.3%)	17 (18.9%)
	Res. Asst.	21 (22.3%)	8 (8.5%)	30 (31.9%)	23 (24.5%)	12 (12.8%)
	Lect.	11 (16.4%)	7 (10.4%)	17 (25.4%)	20 (29.9%)	12 (17.9%)

Source: Authors

The chi-square test results revealed that there was no difference in opinions between marital status (sig. = 0.324) and titles (sig. = 0.207). However, it was determined that there was a difference of opinion between gender (sig. = 0.000) and age (sig. = 0.016).

While 40 female academics (38.1%) said that Bitcoin was a bubble, 37 (35.2%) stated that Bitcoin was not a bubble. When it comes to male respondents, 100 male academics (49.3%) agreed with the statement that Bitcoin is a bubble, whereas 77 of them (37.9%) did not agree with that statement.

In terms of age, 19 academics aged 30 and under (37.2%) agreed with the statement, and 20 (39.2%) did not, 79 academics between the ages of 31 and 40 (43.2%) said that Bitcoin was a bubble, and 66 (36%) stated that it was not a bubble. Among the academics aged between 41 and 50, 31 of them (55.4%) agreed with the said statement, while 22 (39.3%) did not agree. On the other hand, 7 academics between the ages of 51 and 60 (70%) agreed with the statement, and 3 of them (30%) stated that they disagreed with the statement. Four academics aged 61 and over (50%) reported that Bitcoin was a bubble, and 3 (37.5%) stated that it was not.

Table 6 Demographic variables and answers given to the question: "How much do you agree or disagree with the statement: "Most people will probably use Bitcoin in the next 10 years."?"

Variables		Not at all sure	Strongly disagree	Somewhat disagree	Somewhat agree	Strongly agree
Gender	Female	26 (24.8%)	5 (4.8%)	17 (16.2%)	41 (39.0%)	16 (15.2%)
	Male	28 (13.8%)	14 (6.9%)	42 (20.7%)	99 (48.8%)	20 (9.9%)
Age	30 years and under	9 (17.6%)	0 (0.0%)	9 (17.6%)	24 (47.1%)	9 (17.6%)
	31 - 40 years	35 (19.1%)	15 (8.2%)	37 (20.2%)	74 (40.4%)	22 (12.0%)
	41 - 50 years	8 (14.3%)	2 (3.6%)	11 (19.6%)	33 (58.9%)	2 (3.6%)
	51 - 60 years	0 (0.0%)	1 (10.0%)	1 (10.0%)	7 (70.0%)	1 (10.0%)
	61 years and over	2 (25.0%)	1 (12.5%)	1 (12.5%)	2 (25.0%)	2 (25.0%)
Marital Status	Single	12 (14.0%)	5 (5.8%)	19 (22.1%)	35 (40.7%)	15 (17.4%)
	Married	42 (18.9%)	14 (6.3%)	40 (18.0%)	105 (47.3%)	21 (9.5%)
Title	Prof. Dr.	4 (16.7%)	1 (4.2%)	3 (12.5%)	14 (58.3%)	2 (8.3%)
	Assoc. Prof. Dr.	7 (21.2%)	1 (3.0%)	8 (24.2%)	17 (51.5%)	0 (0.0%)
	Asst. Prof. Dr.	18 (20.0%)	9 (10.0%)	13 (14.4%)	38 (42.2%)	12 (13.3%)
	Res. Asst.	16 (17.0%)	3 (3.2%)	22 (23.4%)	42 (44.7%)	11 (11.7%)
	Lect.	9 (13.4%)	5 (7.5%)	13 (19.4%)	29 (43.3%)	11 (16.4%)

Source: Authors

According to the results of the chi-squared test, it was ascertained that there was no difference of opinion between gender (sig. = 0.058), age (sig. = 0.201), marital status (sig. = 0.248) and titles (sig. = 0.486).

Table 7 Demographic variables and answers given to the question: "Which of the following is similar to investing in Bitcoin?"

Variables		Currency	A commodity	A technology company	A bank	Other
Gender	Female	25 (23.8%)	21 (20.0%)	28 (26.7%)	11 (10.5%)	20 (19.0%)
	Male	43 (21.2%)	39 (19.2%)	48 (23.6%)	6 (3.0%)	67 (33.0%)
Age	30 years and under	12 (23.5%)	8 (15.7%)	16 (31.4%)	2 (3.9%)	13 (25.5%)
	31 - 40 years	36 (19.7%)	39 (21.3%)	48 (26.2%)	13 (7.1%)	47 (25.7%)
	41 - 50 years	19 (33.9%)	9 (16.1%)	6 (10.7%)	1 (1.8%)	21 (37.5%)
	51 - 60 years	0 (0.0%)	2 (20.0%)	4 (40.0%)	1 (10.0%)	3 (30.0%)
	61 years and over	1 (12.5%)	2 (25.0%)	2 (25.0%)	0 (0.0%)	3 (37.5%)
Marital Status	Single	9 (10.5%)	15 (17.4%)	38 (44.2%)	5 (5.8%)	19 (22.1%)
	Married	59 (26.6%)	45 (20.3%)	38 (17.1%)	12 (5.4%)	68 (30.6%)
Title	Prof. Dr.	7 (29.2%)	8 (33.3%)	2 (8.3%)	0 (0.0%)	7 (29.2%)
	Assoc. Prof. Dr.	9 (27.3%)	2 (6.1%)	12 (36.4%)	0 (0.0%)	10 (30.3%)
	Asst. Prof. Dr.	16 (17.8%)	14 (15.6%)	28 (31.1%)	7 (7.8%)	25 (27.8%)
	Res. Asst.	23 (24.5%)	28 (29.8%)	18 (19.1%)	6 (6.4%)	19 (20.2%)
	Lect.	13 (19.4%)	8 (11.9%)	16 (23.9%)	4 (6.0%)	26 (38.8%)

Source: Authors

According to the chi-square test results, there was no difference in opinions between age (sig. = 0.217) groups. However, it was determined that there was a difference of opinion between gender (sig. = 0.015), marital status (sig. = 0.000) and titles (sig. = 0.012).

In terms of gender, 25 female academics (23.8%) stated that investing money in Bitcoin was like investing in currency, 21 (20%), 28 (26.7%) in a technology company, 11 (10.5) in a bank, and 20 (19%) in other types of investment. As for male academics, 43 (21.2%) reported that investing money in Bitcoin was similar to investing in currency, 39 (19.2%) in a commodity, 48 (23.6%) in a technology company, 6 (23.6%) in a bank and 67 (33%) in other types of investment.

In terms of marital status, 9 single academics (10.5%) stated that it was similar to investing in currency, 15 (17.4%) in a commodity, 38 (44.2%) in a technology company, 5 (%) 5.8) in a bank, and 19 (22.1%) in other investment types. Of the married academics, 59 (26.6%) reported that it was similar to investing in currency, 45 (20.3%) in a commodity, 38 (17.1%) in a technology company, 12% (17.1%) in a technology company, 12 (5.4%) in a bank, and 68 (30.6%) in other investment types.

As for the titles, 7 professors (29.2%) stated that it was similar to investing in currency, 8 (33.3%) in a commodity, 2 (8.3%) in a technology company, and 7 (29.2%) in other types of investment. For 9 associate professors (27.3%) it was like investing in currency, for 2 (6.1%) like investing in a commodity, for 12 (36.4%) like investing in a technology company, and for 10 (30.3%) like in other investment types. Sixteen assistant professors (17.8%) stated that it was like investing in currency, 14 (15.6%) in a commodity, 28 (31.1%) in a technology company, 7 (7.8%) in a bank, and 25 (27.8%) in other investment types. Twenty-three research assistants (24.5%) said that it was similar to investing in currency, 28 (29.8%) in a commodity, 18 (19.1%) in a technology company, 6 (6.4%) in a bank, and 19 (20.2%) in other investment types. Thirteen lecturers (19.4%) stated that investing in Bitcoin was like investing in currency, 8 (11.9%) in a commodity, 16 (23.9%) in a technology company, 4 (6.0%) in a bank, and 26 (38.8%) in other investment types.

Table 8 Demographic variables and answers given to the question: "When you compare Bitcoin to other forms of financial assets, which of the investment tools worth $1,000 would you prefer to own instead of $1,000 worth of Bitcoin?"

Variables		Stock	Government bonds	Real estate	Gold	Foreign currency
Gender	Female	13 (12.4%)	6 (5.7%)	22 (21.0%)	51 (48.6%)	13 (12.4%)
	Male	34 (16.7%)	12 (5.9%)	28 (13.8%)	108 (53.2%)	21 (10.3%)
Age	30 years and under	10 (19.6%)	0 (0.0%)	11 (21.6%)	24 (47.1%)	6 (11.8%)
	31 - 40 years	28 (15.3%)	9 (4.9%)	24 (13.1%)	100 (54.6%)	22 (12.0%)
	41 - 50 years	5 (8.9%)	8 (14.3%)	14 (25.0%)	24 (42.9%)	5 (8.9%)
	51 - 60 years	4 (40.0%)	1 (10.0%)	0 (0.0%)	4 (40.0%)	1 (10.0%)
	61 years and over	0 (0.0%)	0 (0.0%)	1 (12.5%)	7 (87.5%)	0 (0.0%)
Marital Status	Single	17 (19.8%)	3 (3.5%)	18 (20.9%)	42 (48.8%)	6 (7.0%)
	Married	30 (13.5%)	15 (6.8%)	32 (14.4%)	117 (52.7%)	28 (12.6%)
Title	Prof. Dr.	5 (20.8%)	3 (12.5%)	3 (12.5%)	10 (41.7%)	3 (12.5%)
	Assoc. Prof. Dr.	5 (15.2%)	6 (18.2%)	5 (15.2%)	12 (36.4%)	5 (15.2%)
	Asst. Prof. Dr.	5 (5.6%)	3 (3.3%)	18 (20.0%)	50 (55.6%)	14 (15.6%)
	Res. Asst.	21 (22.3%)	4 (4.3%)	13 (13.8%)	48 (51.1%)	8 (8.5%)
	Lect.	11 (16.4%)	2 (3.0%)	11 (16.4%)	39 (58.2%)	4 (6.0%)

Source: Authors

The chi-square test results ascertained that there was no difference of opinion between gender (sig. = 0.463) and marital status (sig. = 0.177). However, it was determined that there was a difference of opinion between age (sig. = 0.021) and titles (sig. = 0.016).

Of all respondents aged 30 and under, 10 (19.6%) stated that instead of $1,000 worth of Bitcoin, they would prefer $1,000 worth of stocks, 11 (21.6%) would prefer $1,000 worth of real estate, 24 (47.1%) would prefer $1,000 worth of gold, and 6 (11.8%) would prefer $1,000 worth of foreign currency. Academics aged between 31 and 40, 28 (15.3%) said that instead of $1,000 worth of Bitcoin, they would prefer $1,000 worth of stocks, 9 (4.9%) would prefer $1,000 worth of government bonds, 24 (13.1%) would prefer $1,000 worth of real estate, 100 (54.6%) would prefer $1,000 worth of gold, and 22 (12%) would prefer $1,000 worth of foreign currency. Five academics between the ages of 41 and 50 (8.9%) said that instead of $1,000 of Bitcoin, they would prefer $1,000 worth of stocks, 8 (14.3%) would prefer $1,000 worth of government bonds, 14 (25%) would prefer $1,000 worth of real estate, 24 (42.9%) would prefer $1,000 worth of gold, and 5 (8.9%) would prefer $1,000 worth of foreign currency. Of the academics aged 51-60, 4 (40%) stated that instead of $1,000 worth of Bitcoin, they would prefer $1,000 worth of stocks, 1 (10%) would prefer $1,000 worth of government bonds, 4 (40%) would prefer $1,000 worth of gold, and 1 (10%) would prefer $1,000 worth of foreign currency. Finally, 1 academic aged 61 and over (12.5%) stated that instead of $1,000 worth of Bitcoin, they would prefer to own $1,000 worth of real estate, and 7 (87.5%) would prefer $1,000 worth of gold.

In terms of titles, 5 professors (20.8%) stated that instead of $1,000 worth of Bitcoin, they would prefer $1,000 worth of stocks, 3 (12.5%) would prefer $1,000 worth of government bonds, 3 (12.5%) would prefer $1,000 worth of real estate, 10 (41.7%) would prefer $1,000 worth of gold, and 3 (12.5%) would prefer $1,000 worth of foreign currency. Instead of $1,000 worth of Bitcoin, 5 associate professors (15.2%) stated that they would prefer $1,000 worth of stocks, 6 (18.2%) would prefer $1,000 worth of government bonds, 5 (15.2%) would prefer $1,000 worth of real estate, 12 (36.4%) would prefer $1,000 worth of gold, and 5 (15.2%) would prefer $1,000 worth of foreign currency. Five assistant professors (5.6%) stated that instead of $1,000 worth of Bitcoin, they would prefer $1,000 worth of stocks, 3 (3.3%) would prefer $1,000 worth of government bonds, 18 (20%) would prefer $1,000 worth of real estate, 50 (55.6%) would prefer $1,000 worth of gold, and 14 (15.6%) would prefer $1,000 worth of foreign currency. Of the total number of research assistants, 21 (22.3%) stated that instead of $1,000 worth of Bitcoin, they would prefer $1,000 worth of stocks, 4 (4.3%) would prefer $1,000 worth of government bonds, 13 (13.8%) would prefer $1,000 worth of real estate, 48 (51.1%) would prefer $1,000 worth of gold, and 8 (8.5%) would prefer $1,000 worth of foreign currency. When it comes to lecturers, 11 of them (16.4%) stated that instead of $1,000 worth of Bitcoin, they would prefer $1,000 worth of stocks, 2 (3%) would prefer $1,000 worth of government bonds, 11 (16.4%) would prefer $1,000 worth of real estate, 39 (58.2%) would prefer $1,000 worth of gold, and 4 (6%) would prefer $1,000 worth of foreign currency.

Table 9 Demographic variables and answers given to the question: "If someone gave you Bitcoin, what would you do with it?"

Variables		Hold on to it	Sell it	Spent it	Other
Gender	Female	65 (61.9%)	17 (16.2%)	9 (8.6%)	14 (13.3%)
	Male	90 (44.3%)	48 (23.6%)	20 (9.9%)	45 (22.2%)
Age	30 years and under	29 (56.9%)	9 (17.6%)	2 (3.9%)	11 (21.6%)
	31 - 40 years	99 (54.1%)	40 (21.9%)	15 (8.2%)	29 (15.8%)
	41 - 50 years	24 (42.9%)	11 (19.6%)	6 (10.7%)	15 (26.8%)
	51 - 60 years	3 (30.0%)	2 (20.0%)	3 (30.0%)	2 (20.0%)
	61 years and over	0 (0.0%)	3 (37.5%)	3 (37.5%)	2 (25.0%)
Marital Status	Single	47 (54.7%)	15 (17.4%)	12 (14.0%)	12 (14.0%)
	Married	108 (48.6%)	50 (22.5%)	17 (7.7%)	47 (21.2%)
Title	Prof. Dr.	10 (41.7%)	5 (20.8%)	7 (29.2%)	2 (8.3%)
	Assoc. Prof. Dr.	14 (42.4%)	4 (12.1%)	7 (21.2%)	8 (24.2%)
	Asst. Prof. Dr.	46 (51.1%)	21 (23.3%)	5 (5.6%)	18 (20.0%)
	Res. Asst.	52 (55.3%)	17 (18.1%)	5 (5.3%)	20 (21.3%)
	Lect.	33 (49.3%)	18 (26.9%)	5 (7.5%)	11 (16.4%)

Source: Authors

The chi-square test results show no difference of opinion between marital status (sig. = 0.139). However, a difference of opinion was found between gender (sig. = 0.029), age (sig. = 0.020) and titles (sig. = 0.016).

In terms of gender, 65 female academics (61.9%) would hold on to Bitcoin, 17 (16.2%) would sell it, 9 (8.6%) would spend it, and 14 (13.3%) would consider other options, while 90 male academics (44.3%) would hold on to Bitcoin, 48 (23.6%) would sell it, 20 (9.9%) would spend it, and 45 (22.2%) would consider other options.

When age is taken into consideration, 29 academics aged 30 and under (56.9%) would hold on to it, 9 (17.6%) would sell it, 2 (3.9%) would spend it, and 11 (21.6%) would consider other options. A total of 99 academics (54.1%) between the ages of 31 and 40 would hold on to it, 40 (21.9%) would sell it, 15 (8.2%) would spend it, and 29 (15.8%) would consider other options. On the other hand, 24 academics (42.9%) between the ages of 41 and 50 would hold on to it, 11 (19.6%) would sell it, 6 (10.7%) would spend it, and 15 (26.8%) would consider other options. Of the academics between the ages of 51 and 60, 3 (30%) would hold on to it, 2 (20%) would sell it, 3 (30%) would spend it, and 2 (20%) would consider other options. As for the academics aged 61 and over, 3 (37.5%) reported that they would sell Bitcoin, 3 (37.5%) would spend it, and 2 (25%) would consider other options.

Ten professors (41.7%) stated that would hold on to Bitcoin, 5 (20.8%) would sell it, 7 (29.2%) would spend it, and 2 (8.3%) would consider other options, whereas 14 associate professors (42.4%) would hold on to it, 4 (12.1%) would sell it, 7 (21.2%) would spend it, and 8 (24.2%) would consider other options. Out of a total number of assistant professors, 46 (51.1%) would hold on to Bitcoin, 21 (23.3%) would sell it, 5 (5.6%) would spend it, and 18 (20%) would consider other options, while 52 research assistants (55.3%) would hold on to it, 17 (18.1%) would sell it, 5 (5.3%) would spend it, and 20 (21.3%) would consider other options. On the other hand, 33 lecturers (49.3%) would hold on to it, 18 (26.9%) would sell it, 5 (7.5%) would spend it, and 11 (16.4%) would consider other options.

Table 10 Demographic variables and answers given to the question: "If you had to choose, what would be more reliable?"

Variables		Big banks	Bitcoin
Gender	Female	93 (88.6%)	12 (11.4%)
	Male	186 (91.6%)	17 (8.4%)
Age	30 years and under	44 (86.3%)	7 (13.7%)
	31 - 40 years	167 (91.3%)	16 (8.7%)
	41 - 50 years	54 (96.4%)	2 (3.6%)
	51 - 60 years	8 (80.0%)	2 (20.0%)
	61 years and over	6 (75.0%)	2 (25.0%)
Marital Status	Single	75 (87.2%)	11 (12.8%)
	Married	204 (91.9%)	18 (8.1%)
Title	Prof. Dr.	22 (91.7%)	2 (8.3%)
	Assoc. Prof. Dr.	31 (93.9%)	2 (6.1%)
	Asst. Prof. Dr.	83 (92.2%)	7 (7.8%)
	Res. Asst.	83 (88.3%)	11 (11.7%)
	Lect.	60 (89.6%)	7 (10.4%)

Source: Authors

The chi-square test results revealed that there was no difference in opinions between gender (sig. = 0.384), age (sig. = 0.134), marital status (sig. = 0.207) and titles (sig. = 0.842).

6. Conclusion

This study aims to contribute to the literature by being the first study to systematically investigate Bitcoin awareness among academics in Turkey. In the study, Bitcoin awareness of academics was analysed in depth. The statistical results obtained from the findings highlight the importance of developing strategies that could help raise awareness of Bitcoin investors in Turkey.

One of the strengths of the study is considered to be the use of a quantitative methodology, which is quite appropriate for the contexts of the questions evaluated, the sample of the study, the quality of the findings, and the presentation of the results. As mentioned earlier in the study, although the limitation to the academics working at Erzincan Binali Yıldırım University can be considered as a weakness, the detailed determination of the sample through stratified sampling can completely eliminate this weakness.

The results of the study showed that only two people had no information about Bitcoin. In addition, it was found that 25 persons owned Bitcoin, and 159 (51.6%) persons were informed about Bitcoin. This showed that academics were very well informed about Bitcoin.

While 156 (50.7%) academics agreed that Bitcoin is an innovation in financial technology, only 105 (34.1%) academics disagreed with this positive statement. It was also found that there was a difference of opinion between male and female academics on this issue. Interestingly, male academics were more likely to agree that Bitcoin was an innovation in financial technology than female academics. This difference was not limited to gender, as differences in opinion also appeared across age groups. Academics aged 41-50 were less likely to approve of Bitcoin as an innovation in financial technology than the other age groups. Among academics aged 51-60, half thought Bitcoin was an innovation, while the other half did not. This suggests that the new and complex Bitcoin technology has created this difference of opinion among academics.

While 114 (37%) academics thought Bitcoin was reliable, 140 (45.5%) academics said it was not. There were differences in opinion between genders and

age groups on this question. It was observed that male academics trusted Bitcoin less than female academics. 50 (16%) of academics aged 40 and below said they were not sure. Therefore, as mentioned above, it can be argued that doubts about Bitcoin's reliability persist and academics are wary of Bitcoin.

Furthermore, 176 of academics (57.1%) indicated that they would use Bitcoin within a decade. Thus, the use of Bitcoin is expected to increase as doubts about its reliability are likely to be resolved in the coming years.

In addition, most academics stated that investing in Bitcoin was similar to investing in technology companies and then in currency. This shows uncertainty about what type of investment tool Bitcoin is.

Another finding was that 159 of academics (51.6%) would prefer gold over Bitcoin. It was found that 50 (16.2%) would prefer real estate, 47 (15.2%) would prefer stocks, 34 (11%) would prefer foreign currency, and 18 (5.8%) would prefer government bonds. This indicates that gold, which is a classic investment tool, might be preferred to a new investment tool such as Bitcoin. Additionally, the subjective nature of investment preference could lead to differences in relation to demographic variables.

155 academics (50%) stated that they would hold on to Bitcoin. More than 50% of academics, who are exclusively 40 years old and younger indicated that they would hold on to it. It can be concluded that the upward trend of Bitcoin has led academics to consider Bitcoin as a custody tool for investment purposes.

279 academics (90.5%) considered big banks more reliable than Bitcoin, which makes it possible to evaluate Bitcoin as less reliable than big banks.

In conclusion, all results draw attention to one point: No matter how much you know about Bitcoin, it remains uncertain what Bitcoin is. Although Bitcoin was considered an investment tool, it was not known what type of investment tool it was. Although participants noted that there are innovations in financial technology, it was observed that traditional investment tools, especially gold, are preferred. It was concluded that the uncertainties in the minds regarding reliability led to a kind of ambiguity that could not be resolved. Despite the fact that participants expressed negative opinions about Bitcoin, it was found that Bitcoin is used by academics and will be available to most people in the coming years.

Based on the results of this study, several suggestions can be made. First of all, it could be suggested to increase confidence in Bitcoin and find out what kind of investment tool Bitcoin is. Apart from academics, surveys can also be conducted among persons who are in the financial markets and are difficult to observe. This study could also serve as a stimulus for other research studies to be conducted that would deal with different cryptocurrencies. Last but not least, new strategies can be developed to raise Bitcoin awareness, and existing research studies on understanding awareness can be extended.

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Cansin Kemal Can
Istanbul Medeniyet University
Faculty of Political Sciences
34720 Kadikoy/Istanbul, Turkey
kemal.can@medeniyet.edu.tr

Emin Efecan Aktaş
Kırşehir Ahi Evran University
Vocational School of Social Sciences
40100 Kırşehir/Merkez, Turkey
efecanaktas@yahoo.com

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QUANTIFYING THE OPTIMAL LONG-RUN LEVEL OF GOVERNMENT EXPENDITURES IN TURKEY: 1968-2019

Abstract

Purpose: This paper gauges the nexus between government expenditures and the output level in Turkey. Our primary research objective is to evaluate the extent to which government expenditures give rise to an increase in GDP taking the Armey curve theory as a basis for the analysis. Succinctly speaking, this theory suggests that the expansionary impact of government expenditure on income level has diminishing nature and beyond a certain threshold public spending impairs rather than accelerates economic activities for several reasons including crowding out, rent-seeking, tax hikes, and public debt surges.

Methodology: In order to test the validity of this theory, we use a dataset with annual frequency covering the 1968-2019 period, which is the longest dataset used to carry out this analysis in the literature for Turkey. We set up an ARDL model to estimate the long-run coefficients required for quantifying the optimal level of government spending in Turkey.

Results: According to our findings, the estimated function exhibits a concave down functional form, which implies a diminishing marginal effect of government spending on GDP, suggesting thereby that the Armey curve theory is valid for Turkey. In addition, even though government expenditure has topped out in recent years, it is still below the GDP maximising optimal level, which indicates that there is sufficient room for expansionary fiscal policies, with the caveat of a potential negative marginal impact on GDP once the optimal threshold is exceeded.

Conclusion: The long-run coefficients from the ARDL estimation reveal that despite a consistent upward trend, government expenditures are still below their optimal level, which implies that there is fiscal space available to the government as far as output maximisation is concerned. However, government expenditures have been on a downward trend recently, which is contrary to output maximisation.

Keywords: Armey curve, optimal size of governement, output level, public expenditure, ARDL

1. Introduction

There is a long-standing controversy in the academic literature as to whether government spending will cause disruption or growth in the economy. Determining the ideal size of the public sector has been a primary research objective for several studies during the recent decades. The fiscal policy arsenal has tools to promote growth, so scarce public resources can be used to achieve the optimal level of government spending to maintain the output level in a countercyclical manner. This is particularly crucial for developing countries since their resources and financial expertise are limited compared to Western economies. In addition, the size of government spending also varies among countries, and their impact is also country-specific, which further arouses interest in the analysis of the nexus between the output level and fiscal policy.

One of the contributions in line with this renewed interest is Armey (1995), who examines the nonlinearity in the relationship between government expenditure and the output level. According to this theory, a nonlinear (concave down) functional form implies that the magnitude of the impact of government spending on the output level exhibits a decreasing trend and beyond a certain threshold level the marginal effect becomes negative causing deterioration rather than improvement in the output level. Some of the reasons for this adverse outcome include crowding out of the private sector, consequent tax hikes, budget deficit, public debt surges, etc. The size of the public sector can contribute to economic growth through regulations for the protection of property rights, infrastructure services, and the provision of basic public goods. However, diminishing marginal productivity of government spending hinders economic growth beyond a certain threshold level.

For developing countries like Turkey, determining this threshold level is crucial since fiscal space and capacity are limited and therefore any level of profligacy not only depletes scarce fiscal resources but also decreases the output level due to the aforementioned reasons.

In view of this context, the importance of determining and quantifying the optimal level of government spending inspires our motivation for this study. To accomplish this objective, we carry out an empirical analysis in this study to find out whether the nonlinearity assumption is valid for Turkey in the long run, using a dataset for the 1968-2019 period which covers the longest range for the Turkish economy in the literature. In addition, we intend to determine the optimal level of long-run government spending which maximizes the long-run output level in Turkey.

The rest of the paper is developed in three sections. The first section discusses the theoretical issues related to the Armey curve theory. It sheds light on the underlying principles of the theory and its importance. The second section is devoted to a review of the empirical literature on the Armey curve. This section assesses country-specific findings from several sources to gain an understanding of the existing empirical literature. The third section deals with empirics. This section introduces salient data features and presents the design and implementation of the model along with the discussion of empirical findings. The final part concludes.

2. Theoretical background

There are opposing views in the literature on the nexus between government expenditure and the output level. Many authors, including Ram (1986), for example, claim that government spending has a positive effect on growth, while some other authors like Scully (1994) argue that after a certain threshold level, the growth-inducing impact of public spending vanishes, and then government expenditures give rise to an economic downturn instead of economic promotion.

Advocates of higher government spending argue that social expenditures of the government, such as education and health, improve labour productivity, which in turn increases economic growth. Furthermore, according to this view, government expenditures on infrastructure facilitates economic expansion by reducing production costs, which stimulates private investment and promotes economic growth.

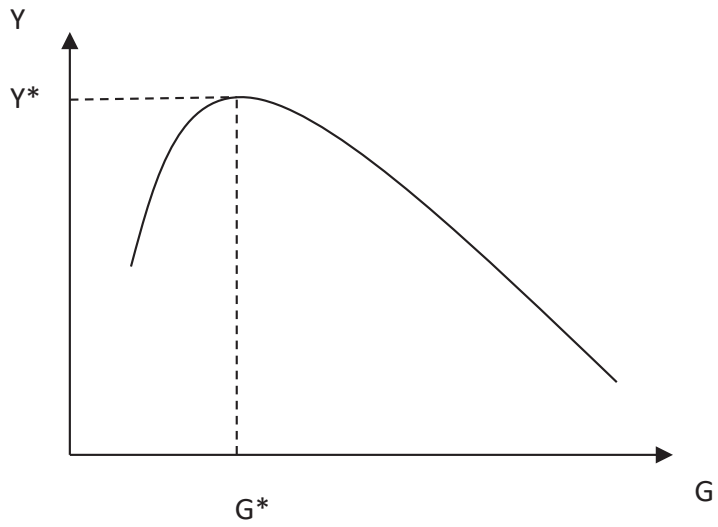
Nevertheless, according to the opponents of the view of big government, part of the explanation for the reduction in the positive growth rate resulting from government expenditures can be found in public choice theory. In particular, an increase in government expenditures may give rise to rent-seeking behaviour among individuals and firms. In addition, excessive government spending often results in crowding out of the private sector, which is mostly more productive than government in-

vestments. As public sector size increases, efficient resource distribution deteriorates, private sector investments are crowded out and as a result, productivity decreases, and economic growth is negatively affected.

Proponents of reducing government spending productivity also posit that in order to service increasing public expenditures, the government will eventually implement a tax hike which in turn will lead to disincentives for the economy as real wages and investment returns will fall dramatically. As a result, economic activity will slow down in contrast to the planned economic expansion through a decline in aggregate demand. By increasing production costs, increased taxes reduce financial space for investors, which also contributes to a decline in economic activity. Another channel through which government expenditure impedes economic growth is the financing method implemented by the government. If the government raises borrowing (which it often does), financial funds are withdrawn from the market and transferred to the unproductive government sector leaving the productive private sector with scarce financial resources. Consequently, a lack of sufficient financial resources caused by government intervention prevents the private sector from undertaking their planned investments (Mitchell, 2005).

All these factors jointly lead to a declining marginal impact of government spending on income level, which leads to an inverted U-shaped relationship between public sector size and the economic growth rate. Figure 1 below illustrates the concave down functional form which represents the nonlinear relationship between government spending and income level. G on the horizontal axis denotes government spending, while Y on the vertical axis stands for the output level. In the graph, the G* represents the level of government spending corresponding to the optimal level of government spending which maximizes the output level in the economy. Any movement in either direction from this point results in a lower income level due to the aforementioned reasons.

Figure 1 Armey curve



Source: Armey (1995)

This argument presented in the graph is underlined by several theorists in the literature. Barro (1990), for instance, is a seminal contribution to the literature in terms of the discussion of the inverted-U shaped relationship among government spending and the output level. Barro (1990) stated that the private sector is insufficient to provide public services and emphasised that the public sector should

carry out activities that will increase the efficiency of the private sector, such as education, health, infrastructure investments, dissemination of R&D activities, technology transfer, strengthening of communication networks, protection of property rights, etc. Barro's study not only emphasises the relationship between public sector size and economic growth, but also leads to the emergence of a large body of literature on this subject.

Another economist who points out that there is an "inverted-U" relationship between public sector size and economic growth is Richard Armey. Armey (1995) argued that there is a nonlinear relationship between public sector size and economic growth, similar to the Kuznets and Laffer curves confirming Barro's discourses. The Armey curve theory suggests that public sector size encourages economic growth to some extent, and when that point is exceeded, the continuum of public sector growth negatively affects economic growth. The high growth rate occurs initially as a result of the public sector's growth-promoting goods and services. In other words, the delivery of public goods and services fully increases economic efficiency of the private sector. The increase in efficiency occurs due to the positive externalities that the public provides to the private sector through the performance of public activities, i.e., unpaid benefits. According to the theory, marginal productivity of public spending will be equal to marginal productivity of private spending up to the point where economic growth reaches its maximum. After this point, the continued increase in public expenditures will either have no contribution or will have a negative contribution to economic growth and an additional increase in public expenditures would only mean an economic contraction. Therefore, it is important to accurately determine the relationship between public sector size and economic growth for the purpose of an effective division of tasks among the public and the private sectors.

3. *Review of the empirical literature*

A vast literature has been developed in this field with a large array of country-specific findings. A large number of studies focus on quantification of the optimal level of economic activity, while others concentrate on the existence and direction of the nexus between economic output and government spending.

- One of the contributions related to the first strand of studies is Rahn and Fox (1996). In this study, the authors carried out empirical analysis reconfirming the existence of an optimal size of government, graphically represented through an inverted U-shaped curve. The theory is used to investigate a decrease in overall government spending and taxation. The inverted-U-shaped curve suggests that the optimal level of government spending is 15-25% of GDP.
- Another contributor in this category is Scully, who analysed the relationship between public revenue, tax rates, and economic growth for many countries several times (Scully, 1994, 1995, 1996, 1998, 2000, 2002, 2003). According to him, excessive increases in expenditure have a substantially depressive effect on economic growth and the economic growth rates are maximised when public expenditure is approximately equal to one-fifth of national income (Scully, 1994, pp. 1-10).
- In addition, Pevcin (2004) found that the optimal ratio of government expenditure to GDP is between 36.6% and 42.1% for 12 European countries.
- Furthermore, in the analysis for Taiwan, Chen & Lee (2005) estimated the optimal ratio of total government expenditure as 22.84%, the optimal ratio of public investment expenditures as 7.30%, and the optimal ratio of public consumption expenditures as 14.97%.

The second strand of literature tests the validity of the Armey curve theory using several techniques for different countries.

- One of the leading empirical studies of this sort was carried out by Richard Rubinson. Rubinson (1977) revealed that the effect of public revenues on GNP in 45 developed and developing countries for the period from 1955 to 1970 is incompatible with the theory. Accordingly, the impact of public revenues on GNP is more notable in poor countries compared to rich countries (Rubinson, 1977, p. 26).
- Landau (1983) examined the effect of government consumption expenditures on the

increase in real per capita income during the 1961-1976 period for 104 countries with different income levels. The study is based on the share of real government consumption in GDP as an indicator of public sector size. A negative effect for the sample countries is asserted according to estimation results of the study (Landau, 1983, p. 791).

- Grier & Tullock (1989) argue that state growth in OECD countries and countries with interventionist regimes for the years 1951 and 1980. According to their results, government spending has a significantly negative effect on GDP growth (Grier & Tullock, 1989, p. 274).
- Tanzi & Schuknecht (1997a; 1997b; 1998a; 1998b; 2007) conclude that the long-term dynamics of public expenditure in small industrialised countries does not generally exhibit worse socio-economic and welfare indicators compared to large states.
- Borcherding et al. (2003) confirmed that public sector size has a statistically significant and negative effect on economic growth in 20 OECD countries over the period 1970-1997.
- AbuAL-Faul & Rafiq (2007) estimated the optimal size of the public sector for Jordan as 10.4% for the period 1975-1996.
- The nexus between growth and deficit for OECD countries from 1970 to 2007 was studied by Alesina & Ardagna (2009). They found that spending adjustments are more likely to cause a recession in the economy than taxes, and that tax cuts potentially have a higher growth-generating capacity than spending reductions (Alesina & Ardagna, 2009, p. 15).
- According to Olasode et al., 2014, the Armey curve assumption is valid and government consumption expenditure is statistically significant. The optimal government expenditure level is 11% for Nigeria for the 1983-2012 period.
- The optimal level of government expenditure needed to maximise Jamaica's economic growth is identified through the error correction model by Malcolm (2017). Quarterly data from 1993 to 2016 were used for the analysis. The optimal level of government expenditure maximising economic growth is 33.2% for Jamaica.
- Dobrescu (2015) examined the binomial relationship of the public budget and global output in the perspective of the Armey curve. Statistical data for Romania from 1990 to 2013 were used for the analysis. Three cointegrating regressions (fully modified least squares, canonical cointegrating regression, and dynamic least squares) and three algorithms based on instrumental variables (two-stage least squares, the generalised method of moments, and limited information maximum likelihood) were adopted for estimation. The Armey curve as a parabola with a maximum is consistent with the theory for Romania (Dobrescu, 2015, pp. 693-699).
- The role of public sector size for economic growth in selected South Asian countries was analysed by Ali & Khan (2017). Data from 1996 to 2016 are used for the panel cointegration test. It is concluded that the nonlinear nexus between economic growth and public sector size and the existence of the Armey curve is confirmed (Ali & Kahn, 2017, p. 11).
- Smooth transition regression (STR) was adopted for the nonlinearity effect of public sector size on economic growth in Iran by Rabiei et al. (2017). The existence of the Armey curve was tested using quarterly data from 1988 to 2008. There is a significant threshold value of GDP (14.29) for public sector size in Iran. Government consumption expenditures in Iran have a negative effect on economic growth below the estimated threshold value and a positive effect above the estimated threshold value (Rabiei et al., 2017, p. 1).
- The results of the ARDL cointegration test carried out by Vedder & Gallaway (1998) for G7 countries show that there is a long-run relationship between economic growth and government consumption expenditures. In addition, according to the findings of Bozma et al. (2019), the hypothesis is invalid for the United Kingdom, Japan, Germany, and

Italy, while it is valid for the USA, Canada, and France (Bozma et al., 2019, p. 58).

- The effect of government expenditure on economic growth for Spain from 1980 to 2016 was analysed by the time series method following the Armey curve assumption by Garcia (2019). Total public expenditure is an independent variable, while the rate of annual economic growth of per capita GDP at constant prices is a dependent variable. The existence of a nonlinear nexus between public sector size and economic growth is detected for the indicated period in Spain (García, 2019, p. 145).
- The inverted U-shape relationship between GDP growth and government purchases following the Armey hypothesis was examined by Vasilev (2020) for the Bulgarian economy from 2000 to 2018. A Keynesian model extended with a quadratic relationship between government expenditure and investment is established for empirical analysis. The existence of a nexus between economic growth and government spending (Armey curve) was verified for the selected period in Bulgaria (Vasilev, 2020, p. 25).

Finally, it is worthwhile to outline the existing literature on the Turkish economy in order to reconcile our contribution to the existing literature.

- Another study testing the nonlinearity between economic growth and public sector size for Turkey was presented by Varol Iyidogan & Turan (2017). Quarterly data from 1998:1 to 2015:1 were adopted for a threshold regression model. The findings indicate that an increase in public sector size causes a decline (rise) in the economic growth rate when public sector size is above (below) the threshold level, which indicates that the Armey curve hypothesis is confirmed (Varol Iyidogam & Turan, 2017, p. 142).
- According to Yamak & Erdem (2018), the Armey curve hypothesis was valid in Turkey from 1998 to 2016. An ARDL bounds test approach is applied for the purpose of analysis using the long-run series. It is noted that the nexus between long-run public sector size and long-run economic growth is quadratic and nonlinear (Yamak & Erdem, 2018, p. 335).
- For Turkey, the existence of the Armey curve was also tested by time series analysis using the FMOLS method by Bayrak (2019). The analysis covers the 1990-2017 period. The optimal ratio of defence expenditure is calculated as 2.5% of GDP.
- Altunc and Aydin (2012) tested the Armey hypothesis by time series analysis for Turkey between 1975 and 2010. It was confirmed that there is an inverted U-shaped relationship between economic growth and expenditure categories, except for government investment expenditures and total government expenditures. Moreover, the optimal level of total government expenditure for Turkey constitutes 16% of GDP. This ratio is below the level of 26.6%, which is the ratio of 2010 government expenditure to GDP (Altunc & Aydin, 2012, p. 79).
- Furthermore, Altunc and Aydin (2013) investigated whether there is an inverted U-shape relationship between economic growth and government expenditure in Romania, Bulgaria, and Turkey. The data for the period 1995-2011 and the ARDL bounds testing approach are used for the analysis. The theoretical nexus of the study is associated with the Armey curve. The share of current government expenditure in GDP for three countries exceeds optimal government expenditure (Altunc & Aydin, 2013, p. 66).
- Yüksel (2019) analyses the Armey curve for Turkey for the 1981-2018 period by adapting the ARDL bounds test approach. The findings indicate that the optimal size of government is 16% of GDP for the period under study. The results of the study, which indicate that this rate was on average 20% in the 1981-2018 period, indicate that from 1981 to 1992 public expenditure in Turkey was below the optimal level of 16%, and between 1993 and 2018 public expenditure was above the optimal level (Yüksel, 2019, p. 137).

4. Data and methodology

4.1 Methodology

Since the aforementioned Armey curve theory on which our analysis relies analyses the extent to which government expenditure affects economic activity, the fundamental indicators to be included in the model are essentially some measures of government size and the level of output in the economy. In the literature, some other control variables are also included to avoid omitted-variable bias since there are numerous output level determinants in economic theory. The control variables used in the literature include the consumer price index, foreign direct investment, trade openness, and unemployment (Al-Abdurrazag & Mensi, 2021; Lupu & Asandului, 2017; Kleyhans & Coetzee, 2019). These variables are incorporated into the model based on country-specific conditions and data availability.

In addition, since the theory tests the existence of a threshold level of public spending that maximises the output, the equation to be estimated should be formulated in a quadratic manner involving the inclusion of public spending squared as an explanatory variable. This transformation geometrically enables the formulation to have a maximum with respect to government spending which can be calculated through algebraic derivations.

In view of these arguments, the model we used to test the Armey curve in Turkey is formulated as follows:

$$Y_t=\beta_0+\beta_1 G_t+\beta_2 G_t^2+CF_t+u_t,$$

where:

Y: Level of output (GDPCCUSD)

G: Government spending (GFCCUSD)

G^2: Government spending squared (GFCCUSD-SQR)

CF: Gross capital formation (GCFCUSD)

Geometrically, for the function to have a maximum value of output with respect to government spending, the function needs to have a concave form, which requires β_1 to be positive and β_2 to be negative. Furthermore, taking the first derivative of the function with respect to G_t, setting the differential equal to zero and solving for G_t we get $G^* = -\frac{\beta_1}{2\beta_2}$,, which denotes the output-maximising level of government spending. In the literature, this point is also called the *Scully point*, and from an economic theory perspective, it represents the level of public spending beyond which the marginal impact of government expenditures on output level turns negative. Thus, any level of government spending below G^*opens space for expansionary fiscal policy, whereas values above G^* require contractionary fiscal policy provided that the output level is the primary concern of the government.

4.2 Salient data features

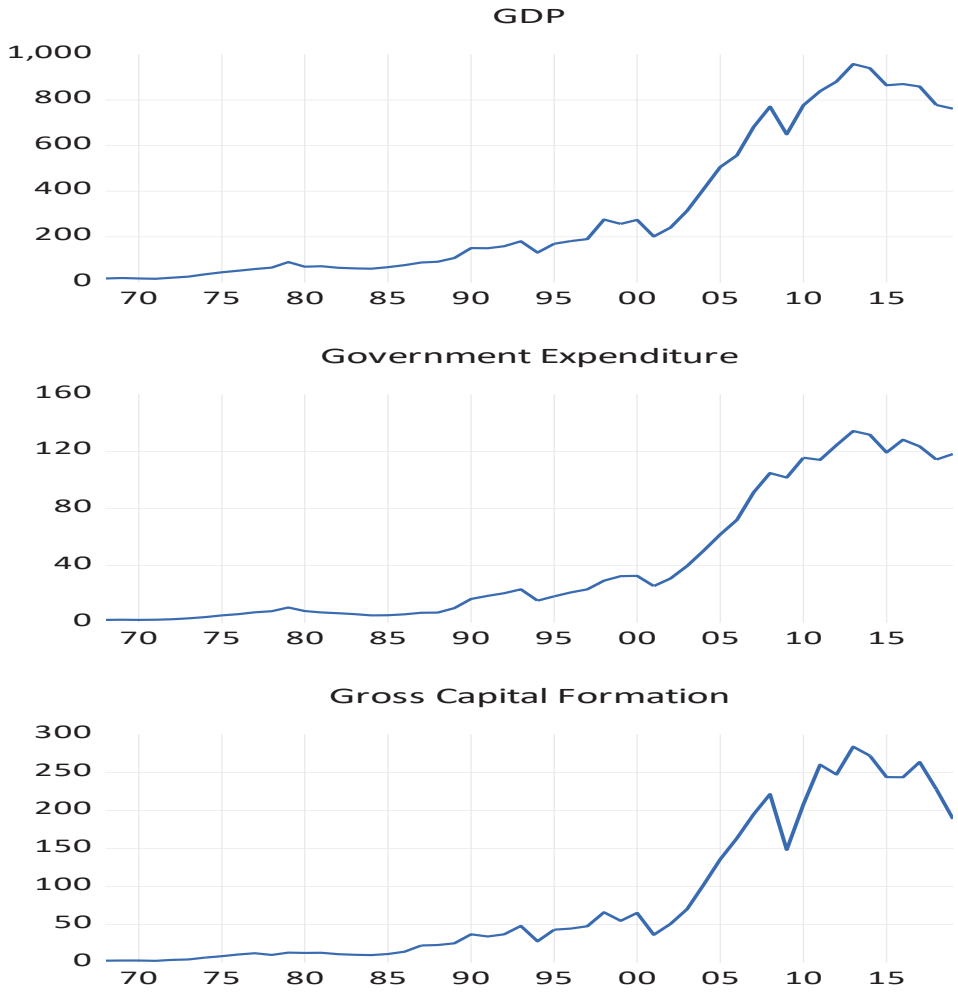
The dataset used for estimating the above model covers the 1968-2019 period with an annual frequency and was retrieved from the World Development Indicators Dataset of the World Bank. All values in the dataset are calculated with constant 2010 US dollar prices. The primary explanatory variable, government expenditures, is proxied by the government's final consumption expenditure to keep the span of the series as long as possible. Since our study is based on a single country, the number of observations plays a key role in the quality of estimations. Moreover, in Keynesian taxonomy, one of the components of the output equation is government spending, which is represented by the sum of expenditures on final goods and services by the government. Hence, we preferred this series as an indicator of government spending because it was the longest available data on government spending which fits the postulates of economic theory.

Furthermore, we include gross capital formation as a control variable in the model. According to the Keynesian paradigm, investment is an important determinant of the output level. Thus, to improve the accuracy of the model by reducing omitted-variable bias, we added this series to account for the impact of investments on GDP. According to the World Bank, this series was formerly known as *Gross Domestic Investment* and consists of additions to fixed assets and the level of inventories. Thus, it represents an investment in the economy.

Figure 2 below shows the plots of each variable of the model. The first point to observe in the graph is that GDP is steadily increasing throughout the sample but the graph becomes steeper after the 2000s,

indicating a sharper growth rate of output. The other two graphs show trends in the determinants of the GDP level and it is obvious that an increase in the output level largely stems from investment and government expenditure since investment and government expenditure also have an upward trend. In other words, the output level increased continuously in parallel with expansionary fiscal policies and investment spending hikes, which is evidenced by visually similar shapes of graphs in parts referring to post-2000s. At the beginning of the millennium, the government signed several agreements with the IMF and the single-party government firmly adhered to those recovery and transformation agreements signed by its predecessors, which resulted in significant improvements in economic activity represented by remarkable shifts in the graphs above. Nevertheless, in recent years, the performance of the economy is not on a par with previous years. The downward trend shown in the graphs might be interpreted as a signal of a looming recession in the economy.

Figure 2 Data plots



Source: All series retrieved from the World Development Indicators Database

4.3 Empirics

4.3.1 Stationarity tests

Tables 1 and 2 below show the results of formal stationarity tests for each series.

Table 1 Formal stationarity test results (level)

	ADF	PP	KPSS
GDP	0.00323	-0.20775	0.82045
1%	-3.56543	-3.56543	0.73900
5%	-2.91995	-2.91995	0.46300
10%	-2.59791	-2.59791	0.34700
Gov. Exp.	-0.86274	0.19580	0.80362
1%	-3.57445	-3.56543	0.73900
5%	-2.92378	-2.91995	0.46300
10%	-2.59993	-2.59791	0.34700
Gov. Exp.Sqr.	-1.73047	-0.11666	0.69072
1%	-3.59662	-3.56543	0.73900
5%	-2.93316	-2.91995	0.46300
10%	-2.60487	-2.59791	0.34700
Gr. Cap. For.	-0.65922	-0.65315	0.79341
1%	-3.56543	-3.56543	0.73900
5%	-2.91995	-2.91995	0.46300
10%	-2.59791	-2.59791	0.34700

Source: Authors' own calculations

Table 2 Formal stationarity test results (first difference)

	ADF	PP	KPSS
GDP	-2.91598	-6.31903	0.17246
1%	-3.60559	-3.56831	0.73900
5%	-2.93694	-2.92118	0.46300
10%	-2.60686	-2.59855	0.34700
Gov. Exp.	-2.16726	-5.62452	0.24620
1%	-3.57445	-3.56831	0.73900
5%	-2.92378	-2.92118	0.46300
10%	-2.59993	-2.59855	0.34700
Gov. Exp.Sqr.	-3.07461	-6.59411	0.22058
1%	-3.60559	-3.56831	0.73900
5%	-2.93694	-2.92118	0.46300
10%	-2.60686	-2.59855	0.34700
Gr. Cap. For.	-7.08902	-7.09019	0.12909
1%	-3.56831	-3.56831	0.73900
5%	-2.92118	-2.92118	0.46300
10%	-2.59855	-2.59855	0.34700

Source: Authors' own calculations

The test results indicate that all variables are non-stationary at the level and that their first differences are stationary. Thus, it is evident from the above results that all variables in the dataset are integrated of order one, or more formally, I(1). The existence of the same level of integration for each variable creates the potential for the variables to have a long-run relationship; thus, the next step in our analysis is to test the existence of a long-run cointegrating relationship between the variables. The validity of the Armey curve theory entails a long-run equation, where GDP is a dependent variable, the estimated coefficient for government expenditure has a positive sign, and the estimated coefficient for government expenditure squared has a negative sign. To test the existence of such long-run equation, we use the ARDL approach whose estimation results are presented in the next section.

4.3.2 Basics of the ARDL approach

The ARDL approach was designed by Pesaran (1997), Shin & Pesaran (1999) and Peseran et al. (2001). This approach consists of three stages. First, the existence of cointegration among variables is tested through the bounds test based on the following equation:

$$\Delta Y_t = \alpha_0 + \sum_{i=1}^{m} \alpha_{1i} \Delta Y_{t-i} + \sum_{i=0}^{m} \alpha_{2i} \Delta X_{1t-i} + \cdots + \sum_{i=0}^{m} \alpha_{ki} \Delta X_{kt-i} + \alpha_1 Y_{t-1} + \alpha_2 X_{1t-1} + \cdots + \alpha_k X_{kt-1} + u_t$$

The F-bounds test simply examines the common importance of $\alpha_1 \ldots \alpha_k$ to confirm the existence of cointegration among variables. Once cointegration is detected, the long-term relationship between variables can be represented by the following formula provided that coefficient stability is established and the model does not suffer from serious deficiencies such as autocorrelation, heteroskedasticity, violation of normality for residuals, etc.

$$Y_t = \alpha_0 + \sum_{i=1}^{m} \alpha_{1i} \Delta Y_{t-i} + \sum_{i=0}^{n} \alpha_{2i} \Delta X_{1t-i} + \cdots + \sum_{i=0}^{r} \alpha_{ki} \Delta X_{kt-i} + u_t$$

In addition, the error correction model below represents the short-run dynamics of the model and the last term indicates the magnitude of error correction in each round. Thus, for a stable long-run equilibrium the coefficient needs to have a value between -1 and 0.

$$\Delta Y_t = \alpha_0 + \sum_{i=1}^{m} \alpha_{1i} \Delta Y_{t-i} + \sum_{i=0}^{n} \alpha_{2i} \Delta X_{1t-i} + \ldots + \sum_{i=0}^{r} \alpha_{ki} \Delta X_{kt-i} + \mu ecm_{t-1} + u_t$$

4.3.3 Empirical findings

4.3.3.1 F-bounds test

The table below exhibits the test statistic for the F-bounds test along with critical values for several levels of significance.

Table 3 F-bounds test

Test statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1,000	
F-statistic	44.35219	10%	2.37	3.20
k	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66
Actual sample size	48		Finite sample: n=50	
		10%	2.54	3.40
		5%	3.05	4.00
		1%	4.19	5.33
			Finite sample: n=45	
		10%	2.56	3.43
		5%	3.08	4.02
		1%	4.27	5.41

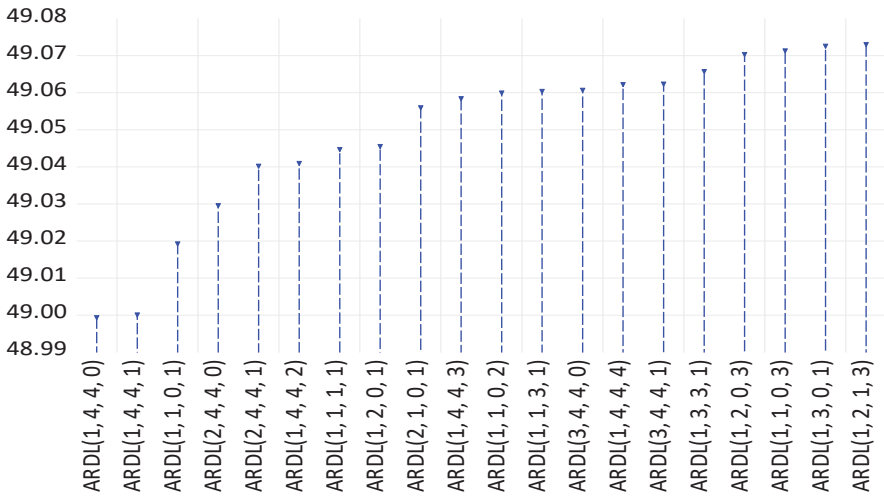
Source: Authors' own calculations

The F-bounds test results above clearly indicate that cointegration exists among the variables as the test statistic is higher than the upper bound value for all levels of significance.

4.3.3.2 Model selection

The graph below illustrates the AIC values for the top 20 models. According to the information given in the graph, the (1,4,4,0) model has the minimum AIC value, so it is the most appropriate model based on the information criteria.

Table 4 Akaike information criteria (top 20 models)



Source: Authors' own calculations

4.3.3.3 Diagnostics

Before analysing the estimation results, it is essential to verify whether the model passes certain diagnostic tests. Reasonable interpretations of the model imply that the model does not have autocorrelation, heteroskedasticity, non-normally distributed error terms, and unstable coefficients.

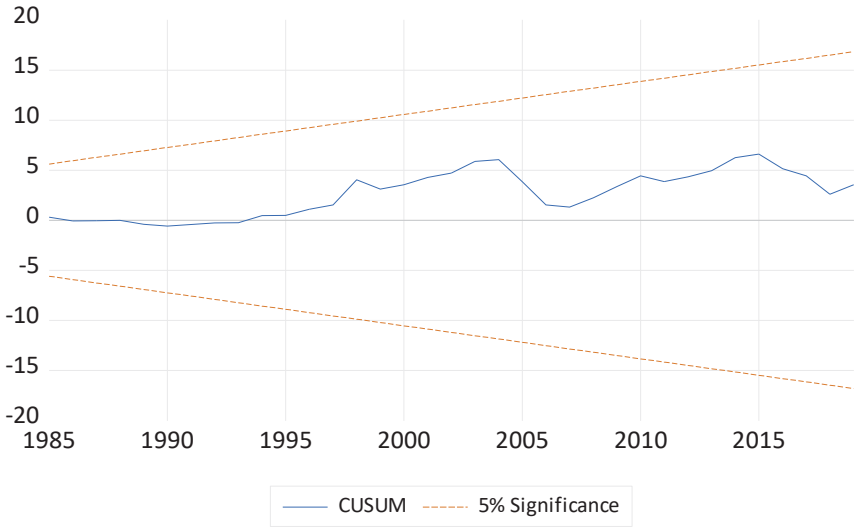
Table 5 Diagnostics

Diagnostic test	Test statistic	P-value
Normality test	JB: 5.401502	0.067
Serial correlation LM test	F-stat: 0.2261	0.7988
	N^*R^2: 0.6491	0.7228
BPG heteroskedasticity test	F-stat: 0.8081	0.6403
	N^*R^2: 10.4142	0.5797
	Scaled Exp.SS: 9.3214	0.6753
Ramsey RESET test	t-stat: 0.6894	0.4953
	F-stat: 0.4752	0.4953
	L.R: 0.6663	0.4143

Source: Authors' own calculations

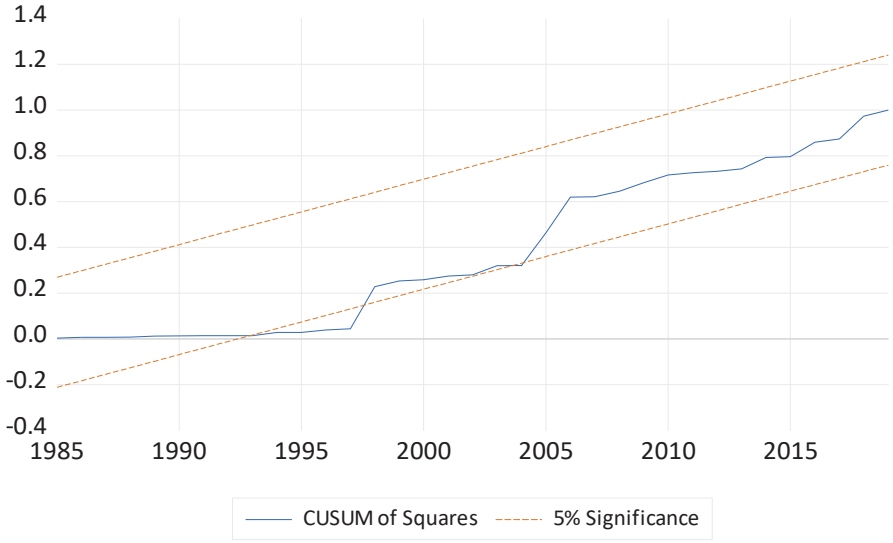
Table 5 above summarises the diagnostic test results. According to these tests, the model has no defects in terms of residuals and structure. However, for visual inspection of model stability, it is worth checking the behaviour of the recursive residuals.

Figure 3 Recursive residuals (CUSUM)



Source: Authors' own calculations

Figure 4 Recursive residuals (CUSUMSQR)



Source: Authors' own calculations

The two graphs above show the behaviour of the recursive residuals via CUSUM and CUSUMSQR values. According to these graphs, residuals are well-behaved in general with a slight deviation evidenced by CUSUMSQR in the mid-90s. The short deviation in those years is not constant and it can be assumed that the residual variance is generally stable.

4.3.3.4 Estimation results and discussion

Now that we have implemented lag selection and diagnostic control procedures, in the final stage we report the estimation results and make discussions in line with our research objectives.

Table 6 ARDL regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDPCCUSD(-1)	0.25096	0.049639	5.05574	0.0000
GFCCUSD	5.12176	0.556897	9.19696	0.0000
GFCCUSD(-1)	-2.81466	0.878993	-3.20215	0.0029
GFCCUSD(-2)	0.10361	0.500666	0.20693	0.8373
GFCCUSD(-3)	-0.54252	0.740792	-0.73236	0.4688
GFCCUSD(-4)	1.57469	0.912259	1.72615	0.0931
GFCCUSDSQR	-9.06E-12	2.58E-12	-3.51249	0.0012
GFCCUSDSQR(-1)	4.17E-12	4.36E-12	0.95541	0.3459
GFCCUSDSQR(-2)	2.04E-12	2.72E-12	0.74821	0.4593
GFCCUSDSQR(-3)	3.52E-12	3.82E-12	0.92299	0.3623
GFCCUSDSQR(-4)	-1.13E-11	4.33E-12	-2.60349	0.0134
GCFCUSD	1.47281	0.085656	17.19441	0.0000
C	1.02E+10	2.30E+09	4.41989	0.0001
R-squared	0.999354	Mean dependent var	3.36E+11	
Adjusted R-squared	0.999132	S.D. dependent var	3.20E+11	
S.E. of regression	9.44E+09	Akaike info criterion	48.99938	
Sum squared resid	3.12E+21	Schwarz criterion	49.50616	
Log likelihood	-1162985.00000	Hannan-Quinn criter.	49.19089	
F-statistic	4510.560	Durbin-Watson stat	20.96181	
Prob(F-statistic)	0.000000			

Source: Authors' own calculations

Table 7 Error correction model

Dependent variable: D(GDP)				
ECM regression				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GFCCUSD)	5.12176	0.60467	8.47032	0.00000
D(GFCCUSD(-1))	-1.13578	0.57980	-1.95890	0.05810
D(GFCCUSD(-2))	-1.03217	0.58703	-1.75831	0.08744
D(GFCCUSD(-3))	-1.57469	0.58330	-2.69965	0.01062
D(GFCCUSDSQR)	9.06E-12	2926.86392	-3.09442	0.00386
D(GFCCUSDSQR(-1))	5.70E-12	3027.98965	1.88361	0.06795
D(GFCCUSDSQR(-2))	7.74E-12	3077.76843	2.51487	0.01665
D(GFCCUSDSQR(-3))	1.13E-12	3117.21336	3.61354	0.00094
CointEq(-1)*	-0.74904	0.04765	-15.71958	0.01963
R-squared	0.97339	Mean dependent var		1.55E+10
Adjusted R-squared	0.967928	S.D. dependent var		4.99E+10
S.E. of regression	8.94E+09	Akaike info criterion		48.83271
Sum squared resid	3.12E+21	Schwarz criterion		49.18356
Log likelihood	-1162.985	Hannan-Quinn criter.		48.96530
Durbin-Watson stat	2.096181			

Source: Authors' own calculations

Table 8 Long-run model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GFCCUSD	4.59640	0.45187	10.17186	0.00000
GFCCUSDSQR	-1.41E-11	2.96E-12	-4.78418	0.00000
GCFCUSD	1.96627	0.17574	11.18867	0.00000
C	1.36E+10	3.36E+09	4.04676	0.00003

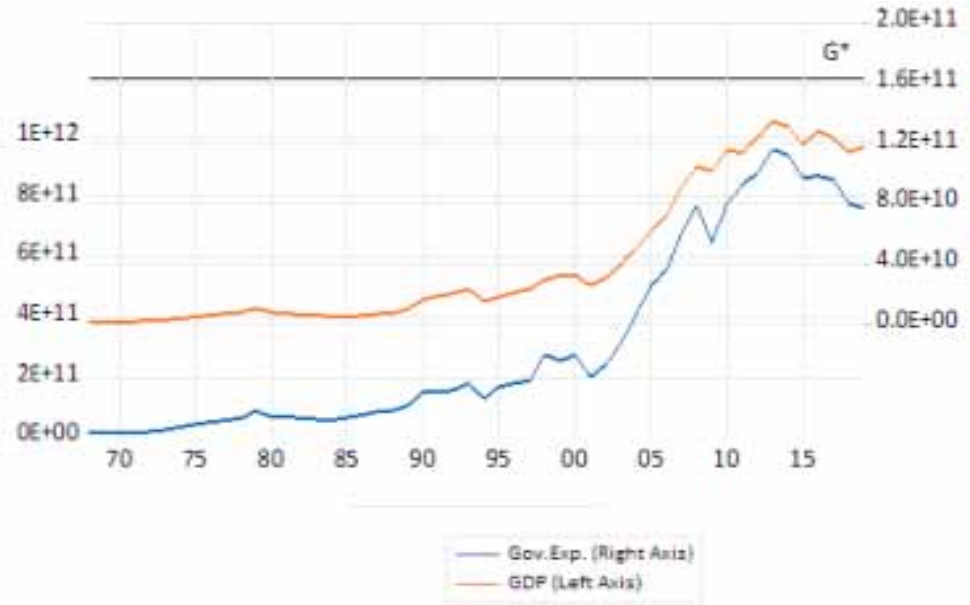
Source: Authors' own calculations

According to the estimation result above, the error correction term is -0.74, which indicates that cointegration is stable and that the long-run equilibrium is mean-reverting. In addition, the estimated coefficient for government expenses squared is less than zero, while the coefficient for government expenses is greater than zero, which guarantees a concave down functional form for the estimated equation. As mentioned earlier, the concave down form proves the validity of the Armey curve for Turkey as it geometrically brings about a diminishing marginal effect of government expenditure, which in turn generates an income maximising level for government spending that can be calculated by the formula: $G^* = -\frac{\beta_1}{2\beta_2}$. The estimated long-run values for β_1 and β_2 are 4.59640 and -1.41E-11, respectively.

By inserting these values into the equation we get: G^* = 162.9 billion dollars, which is about 52% of the average GDP in the estimation period. The government expenditure series topped out in 2013 and reacheed 134.2 billion dollars, which is 82% of

the optimal level of income maximisation. After that, it was in a downward trend that deviates even more from the optimal level, which indicates that the government has not given priority to economic growth in recent years through expansionary fiscal policy. In other words, despite the substantial improvement in government spending in the post-2000 phase of the estimation sample, there is still considerable room for expansionary fiscal policies in Turkey as far as fiscal space between the existing and the optimal level of government spending is concerned.

Figure 5 Optimal government spending level



Source: Authors' own calculations

Figure 5 above illustrates that government expenditure was below the optimal level for the entire sample and therefore ran parallel to the GDP series, with a recent downward trend in both series. However, once government expenditure exceeds the G* level in the near future, the two series are expected to move in opposite directions according to our estimation results. In order words, any movement in government expenditure beyond G* will correspond to the reverse movement of GDP due to the fact that the marginal effect of government expenditure on GDP will become negative for government spending levels greater than G*, as postulated by the Armey curve theory.

4.3.3.5 Robustness check

The findings in the diagnostics section and the recursive residual diagrams above indicate a stable model, but in this section, we run a secondary model to further test the robustness of the model parameters. To this end, we run a dynamic ordinary least squares (DOLS) version of the same model to calculate the long-run model parameters. Table 9 below summarises these estimates. The estimated coefficients in this version are significantly close to their ARDL counterparts in the original regression which supports the robustness of the results in the original model. Performing the same mathematics to calculate the optimal long-run level of government spending we get $G^* = -\frac{\beta_1}{2\beta_2}$ = 4.2948/-1.16E-11*2= 185.1, which is also quite close to the optimal level calculated in the original model. Despite the fact that this level corresponds to slightly larger fiscal space, the overall conclusion of the original model is verified by the results of the auxiliary model.

Table 9 DOLS estimation results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GFCCUSD	4.29448	0.83359	5.15178	0.00000
GFCCUSDSQR	-1.16E-11	2.99E-12	-3.87209	0.00040
GCFCUSD	2.00366	0.44369	4.51586	0.00010
C	1.19E+10	4.47E+09	2.66152	0.01150

Hansen Test (H_0: Series are cointegrated) LC Test Stat:0.0426 p>0.20
Park Test (H_0: Series are cointegrated) Chi-Sqr Test Stat:3.76314 p=0.0524
Source: Authors' own calculations

5. Conclusion

In this study, our main research objective is to test the existence of a diminishing marginal effect of government spending on the output level in Turkey. For this purpose, we used a dataset with annual frequency covering the 1968-2019 period, which is the longest dataset used for testing the Armey curve theory for Turkey in the literature. In this sense, our study contributes to the literature by incorporating this dataset into the analysis of the impact of government spending on GDP. The dataset comprises three variables: GDP, government final consumption expenditure, and gross capital formation, which is used as a control variable in the model. Since the model variables are non-stationary, we were forced to look for a long-run equilibrium among the variables. For this purpose, we applied the ARDL technique to calculate long-run coefficients. According to the Armey curve theory, the geometric shape of the estimated equation should be concave down for government spending to have a diminishing marginal impact on the economy. For this reason, we included a square form of the government spending variable in the model to take into account the nonlinear relationship. Geometrically, the validity of the Armey curve relationship implies a negative coefficient for the squared series and a positive coefficient for the normal series. Only then does the second derivative of the function become negative and a local maximum appears for the function which guarantees the diminishing impact of government spending on the economy.

Our findings are in line with the expected coefficient signs in that the estimated coefficients are 4.5964 and -1.41E-11 for normal and squared government spending series, respectively, which proves that the Armey curve theory is valid for the Turkish economy. In addition, our estimation results also indicate that there is currently significant room for expansionary fiscal policy in Turkey. More clearly, the level of government spending is seemingly below the optimal level, which creates the potential for the government to increase expenditures in an attempt to reach higher levels of GDP in the near future. However, it is worth noting the optimal level of government spending, which according to our calculations is 160.3 billion dollars. Any spending level above this threshold might instead lead to a drop in the output level as the marginal impact subsequently becomes negative.

Finally, it is worth mentioning that the arguments and findings in this study are tentative and experimental but by no means decisive. Thus, further studies might be carried out to enhance the scope of the research. For instance, with a comprehensive dataset from multiple countries it is possible to run panel regression to test the validity of the theory on a larger scale. Furthermore, the coverage of the data might be extended by incorporating other aspects of the economy in the form of control variables. As noted earlier, indicators associated with GDP growth such as unemployment, international trade openness, the consumer price index, and foreign direct investment, are potential candidates for inclusion in the model as control variables. In addition, the analysis can be carried out using a different social welfare indicator alongside GDP. In other words, the optimal level of government spending which maximised social welfare might be quantified using the same methodology. Finally, the use of alternative methodologies for estimation is an option to explore different aspects of the subject. Threshold regression, for example, can provide the researcher with the opportunity to analyse the subject more dynamically under different regimes, while the DSGE approach allows the researcher to incorporate microfoundations into the analysis.

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Yusuf Yildirim
University of California, Santa Cruz
Santa Cruz, CA 95064,
United States of America
yyildiri@ucsc.edu

Erhan Vicil
University of Gazi
06560 Yenimahalle/
Ankara, Turkey
erhanvicil@tuik.gov.tr

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THE ASYMMETRIC EFFECTS OF THE CURRENT ACCOUNT BALANCE ON INFLATION: A NARDL APPROACH FOR TURKISH ECONOMY

Abstract

Purpose: We aim to highlight the asymmetric relationship between the current account balance and inflation via the nonlinear boundary test approach for the period 2002:01-2020:10. We analyze the Turkish economy because Turkey has started implementing a new economic policy, which mainly aims to control inflation by maintaining a current account surplus. As a result, the primary purpose of this research is to determine the influence of the current account balance on local inflation, as well as to assist in the formulation of appropriate economic policies to minimize any negative effects on the local economy.

Methodology: The nonlinear boundary test approach (NARDL) is used for the 2002:01-2021:10 data period due to the possibility of long-term nonlinear relations between the inflation rate and the current account balance.

Results: According to the analysis findings, there is a long-term cointegration relationship between variables. It is deduced that while there exists long-term asymmetry between the current account balance and inflation, the coefficients themselves are not statistically significant, and magnitudes are negligible. However, the effect of dollarization and the lagged values of the CPI on current inflation are statistically significant and substantial, which underpins the importance of inflation inertia, inflation expectations, and the pass-through effect.

Conclusion: With a view to stabilizing inflation, policymakers should prevent dollarization by taking the necessary measures.

Keywords: Current account balance, NARDL, asymmetric effect

1. Introduction

The movement of macroeconomic variables is dominated by the performance of the balance of payments (BOP) and all of its components. Changes and imbalances in the BOP items impact the economy's internal balance. The trade balance, for example, is one of the most critical components of the current account, which is an integral part of the BOP. International trade plays a vital role in most international

economies through import and export activities. The commodities, labor, monetary, and financial markets are all affected by these activities.

Because of the impact of imported inflation on domestic price levels, an increase in the trade imbalance produced by growing imports might lead to higher domestic inflation. The current account has an impact on more than just the trade balance. Other aspects of the current account, such as current transfers and the balance of services, impact the local economy. Current transfers, primarily in the form of foreign aid and worker remittances, assist in providing the required liquidity to fund economic development plans and manufacturing projects and meet consumer wants, all of which contribute to economic growth.

In general, the current account deficit has two effects on prices: on the one hand, it reduces inflationary pressure by containing some of the excess demand through increased imports. On the other hand, it exacerbates inflationary risks by causing the local currency to depreciate. The final effect, however, is determined by which effect is stronger. Suppose the Marshall-Lerner condition, which is the absolute sum of a country's export and import demand greater than one, is satisfied. In that case, the indirect effect on the quantity of trade will exceed the direct impact of the country paying a higher price for its imports and receiving a lower price for its exports. In other words, if the condition holds, then when a country's currency depreciates (e.g., it takes fewer Turkish lira to buy a dollar), its balance of trade will improve. Turkey is a growing country with a free market economy. Because of its openness, the country is subject to external shocks. Turkey primarily relies on imports to support economic growth and export activities because raw materials, intermediate goods, and investment goods account for a large portion of imports. Turkey has also started implementing a new economic policy, which mainly aims to control inflation by maintaining the current account surplus. As a result, the primary purpose of this research is to determine the influence of the current account balance on local inflation and assist in the formulation of appropriate economic policies to minimize any negative effects on the local economy.

The main contribution of our paper relative to existing papers is that this is the first paper that studies the relationship between the current account balance and inflation via the NARDL model. The study also provides recommendations to policymakers about whether the economy achieves long-term price stability by maintaining the current account surplus.

The paper proceeds as follows. Section 2 briefly describes the relevant literature. Section 3 explains the theoretical framework and methodology. Section 4 describes the data and presents empirical analysis. Section 5 concludes the study with some policy implications.

2. Literature review

Researchers generally studied the components of the balance of payments or inflation separately. To the best of our knowledge, two papers combine these two components. In the first paper, Alawin and Oqaily (2017) discovered that the current account deficit positively impacts inflation for Jordan's economy in the short run. However, an increase in the current account deficit affects domestic inflation negatively in the long run. In the second paper, Akcay and Eratas (2011) analyzed the relationship between the current account deficit and inflation for Brasil, Russia, India, China, and Turkey for the period 1993-2011 by using a panel causality test. They concluded that the current account deficit and inflation are cointegrated in these countries, which means that they move together in the long run. They also found unidirectional causality from the current account deficit to inflation.

There follows a summary of some of the studies that have analyzed these two components separately:

Hepsağ (2009) analyzed the relationship between inflation and unemployment in Turkey for the short and long term using the data for the period 2000Q1-2007Q3 by employing the boundary test method. They discovered a relationship between inflation and unemployment in the short run, but there is a cointegration relationship between these two variables in the long run. Based on this result, they stated that in the short run, past inflation rates, not unemployment, have an effect on inflation in the current period. In contrast, unemployment impacts current inflation in the long run.

Karacor et al. (2009) analyzed the relationship between inflation and growth in Turkey using quarterly data for the period 1990-2005 by employing cointegration and causality tests. At the end of the study, they highlighted a negative relationship between inflation and growth in Turkey.

Dugru (2020) investigated the interaction between the current deficit and the budget deficit for the period 2009Q1:2020Q2 in Turkey. To that end, she applied cointegration analysis and the bound test based on the Autoregressive Distributed Lag Model (ARDL) approach. As a result of the study, she came to the conclusion that the direction of the relationship between two variables is negative in the long term and positive in the short term.

Çeştepe et al. (2014) examined the causality between current deficits and foreign debts in the period 1980-2013 via the Granger causality test. They found that there is bidirectional causality between current deficits and foreign debt.

Afsal et al. (2018) studied the relationship between inflation and nominal interest rates for the Turkish economy in the period of 2004:01-2018:05 via the nonlinear boundary test approach (NARDL). They found that a long-term asymmetric cointegration relationship exists between variables. Although inflation and nominal interest rates have a symmetrical relationship in the short run, they have an asymmetric relationship in the long run.

3. Methodology

The most frequently used cointegration tests in the literature are the two-stage Engle-Granger method (Engle & Granger, 1987) based on the error term and the systems approach based on Johansen (1988) and the Johansen and Juselius (1990) method. For these methods to be applied, all variables in the model should not be stationary at the level, which is denoted by I(0), but in their first difference (Pesaran et al., 2001). The inability to apply the cointegration method to series with different cointegration degrees is eliminated by the ARDL method developed by Pesaran and Shin (1995) and Pesaran et al. (2001). The advantage of this approach is to investigate whether there is a cointegration relationship between the variables, regardless of the degree of integration. In addition, the bound test provides robust results for small or limited sample sets.

Shin et al. (2014) developed the ARDL model further and introduced the NARDL model to the literature by considering the asymmetrical relationships. The NARDL approach is a new modeling approach to detect nonlinear relationships by highlighting the short- and long-term asymmetries between the relevant variables. This approach emphasizes short- and long-term asymmetrical relationships between variables and determines the effects of negative and positive changes in the explanatory variables on the dependent variable.

The linear ARDL cointegration model developed by Pesaran and Shin (1999) and Pesaran et al. (2001) is generally defined follows:

$$\Phi(L)y_t = \alpha_0 + \alpha_1 w_t + \beta'(L)x_{it} + u_t\,, \quad (1)$$

where $\Phi(L) = 1 - \sum_{i=1}^{\infty} \phi L^i$ and $\beta(L) = \sum_{k=1}^{\infty} \beta_k L^k$, (L) is the lag operator, w_t is a vector containing deterministic variables such as seasonal dummies, trend, or other exogenous variables with constant lag.

Asymmetric cointegration regression, which is used in this study and based on Schorderet (2003) and Shin et al. (2014), is defined as follows:

$$y = \beta^+ x_t^+ + \beta^- x_t^- + u_t\,, \quad (2)$$

where y and x are scalar I(1) variables, β^+ and β^- are long-term parameters, and x is decomposed as $x_t = x_0 + x_t^+$, where x_t^+ and x_t^- are the partial sum processes of positive and negative changes in x:

$$x_t^+ = \sum_{j=1}^{t} \Delta x_j^+ = \sum_{j=1}^{t} \max(\Delta x_j, 0), x_t^- = \sum_{j=1}^{t} \Delta x_j^- = \sum_{j=1}^{t} \min(\Delta x_j, 0) \quad (3)$$

When equation (2) is associated with the ARDL(p, q) model, the following asymmetric error correction model (AECM) is obtained:

$$\Delta y_t = \rho y_{t-1} + \theta^+ x_{t-1}^+ + \theta^- x_{t-1}^- + \sum_{j=1}^{p-1} \varphi \Delta y_{t-j} + \sum_{j=0}^{q} \left(\pi_j^+ \Delta x_{t-j}^+ + \pi_j^- \Delta x_{t-j}^-\right) + e_t,$$

j=1…p , (4)

where $\theta^+ = -\rho\beta^+$ and $\theta^- = -\rho\beta^-, \pi_t^+ = -\beta^+\varphi_i + \psi_{2i}, \pi_t^- = -\beta^-\varphi_i + \psi_{2i}$.

In equations (3) and (4), "t" indicates time, "i" indicates the delay of the series, and "j" indicates for which period the cumulative total is taken. Although the NARDL method, which considers the asymmetric cointegration relationship, is not used when the variables are I(2), it allows cointegration analysis regardless of whether the variables are I(0) and I(1), as in the ARDL approach (Shin et al., 2014). Therefore, in the first stage, stationarity analyses are performed for the variables in the model, and it is decided to what degree the variables are integrated. After the stationarity tests, the

following stages are followed briefly in the NARDL cointegration approach. First, equation (4) is estimated by the least squares method. Later, the null hypothesis stating $\rho=\theta^{+}=\theta^{-}=0$ is tested via the F-test developed by Pesaran et al. (2001) and Shin et al. (2014). In this way, it is investigated whether there is a long-term relationship between the levels of y_t, x_t^+ and x_t^-. In the next step, long-term symmetry, which is $(\theta=\theta^{+}=\theta^{-})$, and short-term symmetry, which is $\pi_i^+ = \pi_i^-$ for all i or $\sum_{i=0}^{q} \pi_i^+ = \sum_{i=0}^{q} \pi_i^-$, are tested using the Wald test. Suppose it is concluded that symmetry does not exist between y_t, x_t^+ and x_t^-. In that case, by using equation (4) in the last step, the asymmetric dynamic multiplier effects of a one-unit change in x_t^+ and x_t^- on the dependent variable y are obtained via the following equations:

$$m_h^+ = \sum_{j=0}^{h} \frac{\partial y_{t-j}}{\partial x_t^+}, m_h^- = \sum_{j=0}^{h} \frac{\partial y_{t-j}}{\partial x_t^-}, \mathrm{h} = 0,1,2 \ldots$$

4. Empirical application

4.1 Model and data set

The empirical model used in this paper is determined based on the existing models examining the effect of the current account balance on the inflation rate. In addition to the current account balance, control variables such as the real effective exchange and the dollarization rate are also added to the model.

Before moving on to the NARDL model, the cointegration relationship between the variables can be shown with the linear model below:

$$CPI_t = \beta_0 + \beta_1 CAD_t + \beta_2 DOL_t + \beta_3 RER_t + \varepsilon_t,$$

where ε_t denotes the error term of the model, CPI_t represents inflation, CAD_t is the current account balance, D_t is the dollarization rate, and RER_t is the CPI-based real effective exchange rate. In the model, while β_0 shows the constant, β_1, β_2 and β_3 represent the coefficients for the current account deficit, the dollarization rate and the real effective exchange rate, respectively.

In this study, monthly time series for Turkey are used for the period 2002:12-2021:10. The variables include the inflation rate, the current account balance, the real effective exchange rate (RER), and the dollarization rate. The annual rate of change of the Consumer Price Index (CPI) is used for the inflation rate. The CPI-based real effective exchange rate is used for the the exchange rate (RER), and the share of FX deposits in total deposits is used for the dollarization rate. All data were taken from the Central Bank of Turkey - Electronic Data Distribution System (EVDS).

4.2 NARDL exercise

The study starts with performing unit root tests of the variables. After detection of the fact that the variables are stationary at their first differences, the cointegration test was carried out with the ARDL method. The most commonly used methods for testing the stationarity level of series in practice is the Augmented Dickey Fuller (ADF) test (Dickey & Fuller, 1981). In addition to ADF, the Zivot-Andrews (ZA) (Zivot & Andrews, 1992) structural break unit root test was also applied, which considers structural breaks in the series.

In the null hypothesis of the ADF and ZA tests, it is argued that the series contains the unit root as opposed to the alternative hypothesis that the series is stationary.

When the ADF and ZA unit root test results in Table 1 are examined, it is seen that the other variables, except for the Current Account Balance (CAB) variable, are not stationary at the level and contain a unit root. However, it is found that Dollarization (DOL), Inflation (CPI), and Real Effective Exchange Rate (RER) variables become stationary when first-order differences are taken into account. According to the ADF test results, all variables are stationary in I(1). Since the extended Dickey-Fuller test ignores structural breaks, the Zivot-Andrews test is also applied. According to the ZA unit root test, only the CAB variable is stationary at the level similar to the ADF test. Although the other variables are not stationary at the level, all variables are stationary when their first difference is taken into account. In addition, according to the ZA structural break unit root test, the structural break dates of the CAB, DOL, CPI, and RER variables are 2018m06, 2007m05, 2016m08, and 2006m07, respectively. The feature of the NARDL method used in the study is that it allows examining whether there is a cointegration relationship between variables with different degrees of integration (except I(2)) without considering the degrees of stationarity of the variables. According to the ADF and ZA unit root test results, the NARDL method can be applied. The reason is that while the CAB variable is stationary at the level, the other variables become stationary when their first difference is taken into account.

Table 1 ADF and ZA unit root test results

Variables	ADF test statistics		ZA test statistics		Structural break dates	Result
	Level values	First difference values	Level values	First difference values		
INFLATION	4.93	-4.85	-1.55	-6.93	2016m08	I(1)
	$t_{1\%}$=-3.47	$t_{1\%}$=-3.47	$t_{1\%}$=-4.94	$t_{1\%}$=-4.94		
	$t_{5\%}$=-2.87	$t_{5\%}$=-2.87	$t_{5\%}$=-4.44	$t_{5\%}$=-4.44		
	$t_{10\%}$=-2.57	$t_{10\%}$=-2.57	$t_{10\%}$=-4.19	$t_{10\%}$=-4.19		
CURRENT ACCOUNT BALANCE	-3.65	-3.18	-5.67	-9.14	2018m06	I(0)
	$t_{\%1}$=-3.47	$t_{\%1}$=-3.47	$t_{1\%}$=-4.94	$t_{1\%}$=-4.94		
	$t_{\%5}$=-2.87	$t_{\%5}$=-2.87	$t_{5\%}$=-4.44	$t_{5\%}$=-4.44		
	$t_{10\%}$=-2.57	$t_{10\%}$=-2.57	$t_{10\%}$=-4.19	$t_{10\%}$=-4.19		
DOLLARIZATION	-1.35	-12.3	-3.33	-9.2	2007m05	I(1)
	$t_{1\%}$=-3.47	$t_{1\%}$=-3.47	$t_{1\%}$=-4.94	$t_{1\%}$=-4.94		
	$t_{5\%}$=-2.87	$t_{5\%}$=-2.87	$t_{5\%}$=-4.44	$t_{5\%}$=-4.44		
	$t_{10\%}$=-2.57	$t_{10\%}$=-2.57	$t_{10\%}$=-4.19	$t_{10\%}$=-4.19		
REEL EFFECTIVE EXCHANGE RATE	-0.47	-11.68	-3.75	-8.33	2006m07	I(1)
	$t_{1\%}$=-3.47	$t_{1\%}$=-3.47	$t_{1\%}$=-4.94	$t_{1\%}$=-4.94		
	$t_{5\%}$=-2.87	$t_{5\%}$=-2.87	$t_{5\%}$=-4.44	$t_{5\%}$=-4.44		
	$t_{10\%}$=-2.57	$t_{10\%}$=-2.57	$t_{10\%}$=-4.19	$t_{10\%}$=-4.19		

Source: The Turkish Statistical Institute and the Central Bank of the Republic of Turkey - Electronic Data Delivery System

To have a robust and reliable estimate, the test of endogeneity is conducted by using the methodology proposed by Clive Granger. The Granger causality test, which forms the basis of causality analysis, is defined as x is the Granger cause of y if the history of a random x variable provides a relatively better prediction of the future of a random y variable. The first condition to apply this test is to have a stationary time series. To test the null hypothesis that x does not Granger-cause y, one first finds the proper lagged values of y to include in a univariate autoregression of y:

$$y_t = a_0 + a_1 y_{t-1} + a_2 y_{t-2} + \cdots + a_m y_{t-m} + \epsilon_t.$$

Next, autoregression is augmented by including the lagged values of x:

$$y_t = a_0 + a_1 y_{t-1} + a_2 y_{t-2} + \cdots + a_m y_{t-m} + b_1 x_{t-1} + b_2 x_{t-2} + \cdots + b_p x_{t-m} + \epsilon_t,$$

where y and x denote the first difference of the current account balance and inflation, respectively. If all lagged values of x that are individually significant according to their t-statistics provided that collectively they add explanatory power to regression according to an F-test, then one holds all lagged values of x in regression. The null hypothesis that x does not Granger-cause y is accepted if and only if no lagged values of x are retained in regression. This methodology is applied to our data. First, the proper lag length is determined from an unrestricted VAR model, whose result is displayed in the Appendix, with the help of the Akaike information criterion, and it is chosen as 6. The results regarding Granger causality are presented in Table 2. The Granger causality test results indicate that the null hypothesis that inflation does not Granger-cause the current account balance can not be rejected. These results provide evidence that the current account balance is exogenous and no causal connection is present from inflation to the current account balance.

Table 2 Granger-causality test results

Dependent Variable: D(CURRENT ACCOUNT BALANCE)	F-test	df	Prob.
D(CPI)	6.19	6	0.40
D(REAL EFFECTIVE EXCHANGE RATE)	4.58	6	0.59
D(DOLLARIZATION)	9.49	6	0.14

Source: The Turkish Statistical Institute and the Central Bank of the Republic of Turkey - Electronic Data Delivery System

Thus, to determine the cointegration relationship between the series that are stationary when the first difference is taken into account, the cointegration test is performed via the following unrestricted error correction model with three different independent variables. The results are presented in Table 3.

$$\Delta CPI_t = \alpha_0 + \sum_{i=1}^{p} b_i \Delta CPI_{t-i} + \sum_{i=0}^{p} b_i \Delta CAD_{t-i} + \sum_{i=0}^{q} c_i \Delta DOL_t + \sum_{i=0}^{q} c_i \Delta RER_t + \phi_1 CPI_{t-1} + \phi_2 CAD_{t-1} + \phi_3 DOL_{t-1} + \phi_4 RER_{t-1} + e_t \quad (5)$$

According to the linear ARDL model estimation result in Table 3, since the F-value is below the upper critical limit value of Pesaran et al. (2001) in 1% and 5% levels, the null hypothesis that there is cointegration between the dependent avariable and the estimators can not be rejected.

Table 3 ARDL and NARDL model cointegration test results

Dependent Variable	F statistics	Asymptotic Critical Values				Result
		1%		5%		
		I(0)	I(1)	I(0)	I(1)	
Linear ARDL (4,0,0,4) Model	$F_{PSS\text{-}ARDL}$ = 8.910	3.74	5.06	2.86	4.01	Cointegration exists
NARDL Model	$F_{PSS\text{-}NARDL}$ = 5.490					Cointegration exists

Source: The Turkish Statistical Institute and the Central Bank of the Republic of Turkey - Electronic Data Delivery System

Although the ARDL model can be used to analyze the relationship between the current account balance and inflation, we opted for using the NARDL model developed by Shin et al. (2014) because it allows the analysis of the short-run and long-run asymmetric response of each of the CAD, DOL, and RER to the CPI. With this methodology, the positive and negative partial sums of the exogenous variable *CPI*, which are $\ln CPI_t^+$ and $\ln CPI_j^-$, are decomposed as increases and decreases and are obtained using the following equation:

$$CPI_t^+ = \sum_{j=1}^{t} \Delta CPI_j^+ = \sum_{j=1}^{t} \max\left(\Delta CPI_j, 0\right) \text{ and } CPI_t^- = \sum_{j=1}^{t} \Delta CPI_j^- = \sum_{j=1}^{t} \min\left(\Delta CPI_j, 0\right). \quad (6)$$

Extending the linear ECM model shown in equation (5) by adding short-term and long-term asymmetries, the following NARDL model, which is developed by Shin et al. (2014), is obtained.

$$\Delta CPI_t = c_0 + \rho CPI_{t-1} + \theta_1^+ CAD_{t-1}^+ + \theta_1^- CAD_{t-1}^- + \phi DOL_{t-1} + \psi RER_t + \sum_{i=1}^{p-1} \varphi_i \Delta CPI_{t-i} + \sum_{i=0}^{q} \pi_{1,i}^+ \Delta CAD_{t-i}^+ + \sum_{i=0}^{q} \pi_{1,i}^- \Delta CAD_{t-i}^- + \sum_{i=0}^{q} \phi_i \Delta DOL_{t-i} + \sum_{i=0}^{q} \psi_i \Delta RER_{t-i} + t + e_t \quad (7)$$

The + and – superscripts shown in equation (7) indicate positive and negative partial sums calculated by the decomposition method in equation (6). Equation (7) tests the existence of the cointegration relationship between CPI and the positive and negative elements of CAD, DOL, and RER. In other words, equation (7) shows the existence of asymmetries both in the short run and in the long run, or only in the long run or short run. Equation (7) also corrects for the weak endogeneity of any nonstationary explanatory variable, and ensures that the choice of an appropriate lag structure

will free the model from any residual correlation (Olowofeso et al., 2021). The existence of a long-term cointegration relationship applied to this model is determined by testing the null hypothesis that the lagged level coefficients of the variables are collectively equal to zero. In other words, the null hypothesis stating that the coefficients in front of the CPI_t, CAD_t^+, CAD_t^-, DOL_t and RER_t variables are equal to zero $(\rho = \theta_1^+ = \theta_1^- = \phi = \psi = 0)$ is tested with the F-test. The first row in equation (7), which is used to evaluate the bound test, highlights the long-term relationship. The second line contains the lags of the asymmetric CAD terms in the first difference, which tests short-run asymmetry. Short-term asymmetry is tested in both strong and weak form. Short-run asymmetry in strong form is investigated by testing the null hypothesis that the coefficients of both positive and negative factors coming from the lags are exactly equal. In short, the null hypothesis stating that $\pi_{1,i}^+ = \pi_{1,i}^-$ is tested for CAD in all *i*. Short-run asymmetry in weak form is investigated by testing the null hypothesis that the sum of the positive factor coefficients from all lags is equal to the sum of negative factor coefficients. The null hypothesis for CAD in weak form is in the following form:

$$\sum_{i=0}^{p} \pi_{1,i}^+ = \sum_{i=0}^{p} \pi_{1,i}^-$$

By estimating the NARDL model, which is equation (7), the asymmetric dynamic multiplier effects (long-run coefficients) of a one-unit change in CAD_t^+ and CAD_t^- on the dependent variable CPI_t are obtained by means of the equations defined below.

$$L_h^+ = \sum_{j=0}^{h} \frac{\partial CPI_{t-j}}{\partial CAD_t^+}, L_h^- = \sum_{j=0}^{h} \frac{\partial CPI_{t-j}}{\partial CAD_t^-}, \text{and h} = 0,1,2 \ldots$$

Then, with the help of the Wald test, the existence of the asymmetric effect is investigated with the null hypothesis that L_h^t and L_h^- are equal to each other for CAD. Rejecting the null hypothesis indicates the presence of an asymmetric effect in the long run.

As a result of the cointegration test applied to the NARDL model in equation (7), the hypothesis that the lagged level coefficients of the variables are all zero is rejected as the F-statistic value is above the asymptotic critical values. Thus the existence of a long-term cointegration relationship between the examined variables is statistically obtained.

The Akaike informaion criterion is applied to select the most suitable ARDL model, and the following (Table 4) NARDL model is obtained.

Table 4 Short- and long-term NARDL results

Dependent Variable: ΔCPI_t				
Variables	**Coefficient**	**Standard error**	**t-statistics**	**Probability value**
C	1.342	5.196	0.258	0.797
ΔCPI_{t-1}	0.313***	0.070	4.502	0.000
ΔCPI_{t-2}	-0.265***	0.067	-3.936	0.000
ΔCPI_{t-3}	0.197***	0.065	3.033	0.002
CPI_{t-1}	0.013**	0.006	2.116	0.035
ΔDOL	0.018	0.149	0.120	0.904
ΔDOL_{t-1}	0.710***	0.145	4.895	0.000
ΔDOL_{t-2}	0.363**	0.152	2.375	0.019
ΔDOL_{t-3}	-0.253*	0.153	-1.655	0.099
DOL_{t-1}	0.012	0.049	0.249	0.803
RER_{t-1}	-0.021	0.030	-0.703	0.483
CAB^-	4.97E-05	8.06E-05	0.617	0.538
CAB^+	7.21E-05	7.95E-05	0.907	0.366
ΔCAB^+	0.000**	0.000	2.415	0.016
		t-statistics	**Probability value**	
$Wald_{LR,CAB}$		2.383**	0.0181	
$Wald_{SR,CAB}$		-	-	
Diagnostic statistics				
R^2	0.56			
Adj. R^2	0.53			
F_{PSS}	5.49			
AIC	4.28			
SIC	4.50			
Log likelihood	-457.39			
Durbin-Watson Stat	1.87			
JB	0.61			
BG	3.57			
White	1.02			
Ramsey-Reset	0.78			

***,**,* marks indicate significance at the 1%, 5% and 10% level, respectively. F stat shows the value of f statistics developed by Pesaran et al. (2001) for k=4. JB, BG, White and Ramsey-Reset tests show the Jarque-Bera normality test, the Breusch-Godfrey autocorrelation test, the White heteroscedasticity test and the Ramsey-Reset model specification error test, respectively.

Source: The Turkish Statistical Institute and the Central Bank of the Republic of Turkey - Electronic Data Delivery System

When the short-term and long-term NARDL results in Table 4 are examined, while long-term asymmetry exists between the current account balance and inflation according to Wald test results, the coefficients themselves are not statistically significant. On the other hand, the lagged effects of the CPI are all statistically significant and pretty much impact the current value positively. It provides evidence that inflation inertia plays an essential role in explaining the change in the price level. In addition to inertia, expectations about future inflation levels are influenced mainly by the present and past level inflation. Dollarization also portraits the same characteristics with the CPI, except magnitudes. Dollarization impacts inflation more substantially relative to the CPI. Dollarization has lagging effects on the inflation rate due to the existing stocks. After they run out, the firms start to raise their prices due to the pass-through effect.

When the results regarding the other variable in the study are analyzed, a long-term relationship is found to exist between the real effective exchange rate and inflation. However, the coefficient of the real effective exchange rate is statistically insignificant.

5. Conclusion

This paper aims to highlight the relationship between inflation and the current account balance. It is concluded that although there exists long-term asymmetry between the current account balance and inflation, the effect of the current account balance on inflation is not statistically significant and notable. When the main reasons behind the improvement in the current account balance are investigated, it was found that they stem from a decline in gold and energy imports. Since productivity increase can not be achieved during the production process, the effect of the current account balance on inflation is negligible. On the other hand, the lagged effects of the CPI and dollarization are sizeable and statistically significant. Due to inflation inertia and expectations, the lagged effects of the CPI have a considerable impact on current inflation. The transmission mechanism of dollarization to inflation can be explained via the pass-through effect. Firms change their prices more quickly in a dollarized economic environment, where depreciation of a local currency is seen as permanent. Therefore, dollarization leads to a higher pass-through effect from exchange rates to prices via disrupting the pricing behavior of firms. With a view to stabilizing inflation, policymakers should prevent dollarization via the following measures.

First, they should increase the attractiveness of the domestic currency. To do this, they should take successful initiatives and prudential regulations such as holding reserve requirements for FX deposits in a local currency, imposing higher reserve requirements on FX deposits, recompensating the reserve requirement on local currency deposits at a higher rate than for FX deposits, and providing a nominal interest rate over inflation for local currency instruments to avoid the purchasing power loss denoting a positive real interest rate. Second, building a monetary and fiscal policy framework based on credible communication of future actions can help strengthen the attractiveness of the domestic currency through the expectations channel. Third, actions conducive to the use of foreign currencies instead of the local currency should be avoided and government borrowings and savings mostly in the local currency should be encouraged. Fourth, mitigating foreign exchange volatility and making it easier to predict the foreign exchange level in futures and forward contracts would attract foreign investors to make foreign direct investment and portfolio investment.

As to the way forward, several tasks can be envisaged. First, data set enlargement in terms of country and time dimension should be worked to reach out to more generalized results. Second, the dollarization rate should be added to the model as an explanatory variable in future works regarding inflation forecasting models.

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Appendix A

*Table A1 VAR Results**

	D(CPI)		D(REER)		D(CAB)		D(DOL)	
D(CPI(-1))	0.54	7.48	0.14	1.52	-43.9	-0.83	-0.08	-2.46
D(CPI(-2))	-0.30	-3.76	-0.15	-1.39	-68.3	-1.14	0.04	1.03
D(CPI(-3))	0.41	4.93	0.09	0.81	27.1	0.44	-0.04	-1.14
D(CPI(-4))	-0.18	-2.21	-0.19	-1.75	74.7	1.23	0.08	2.14
D(CPI(-5))	0.29	3.56	0.02	0.21	8.83	0.14	-0.02	-0.68
D(CPI(-6))	0.05	0.79	0.00	0.07	5.49	0.10	0.07	2.17
D(REER(-1))	-0.07	-1.29	0.25	3.31	-62.5	-1.46	-0.02	-0.83
D(REER(-2))	0.02	0.40	-0.27	-3.38	-33.5	-0.76	-0.03	-1.35
D(REER(-3))	-0.00	-0.14	0.05	0.67	-33.7	-0.73	0.01	0.34
D(REER(-4))	-0.02	-0.41	-0.06	-0.74	22.01	0.48	-0.05	-1.88
D(REER(-5))	-0.00	-0.14	-0.07	-0.94	-25.1	-0.57	0.00	0.26
D(REER(-6))	0.06	1.21	0.12	1.67	23.06	0.55	-0.05	-2.21
D(CAB(-1))	-0.00	-0.95	-0.00	-0.60	-0.26	-3.57	0.00	0.52
D(CAB(-2))	0.00	1.85	-0.00	-0.27	-0.13	-1.83	0.00	0.41
D(CAB (-3))	0.00	1.10	0.00	0.33	-0.06	-0.83	0.00	0.39
D(CAB(-4))	0.00	0.01	0.00	0.72	-0.12	-1.65	-0.00	-0.63
D(CAB(-5))	-0.00	-1.13	0.00	1.47	-0.16	-2.14	-0.00	-1.14
D(CAB(-6))	0.00	0.53	0.00	1.11	0.05	0.83	0.00	0.99
D(DOL(-1))	0.70	4.23	-0.69	-3.14	-72.1	-0.59	0.13	1.75
D(DOL(-2))	0.17	0.99	0.19	0.84	59.3	0.46	-0.00	-0.04
D(DOL(-3))	-0.19	-1.15	0.16	0.73	198.2	1.57	0.05	0.63
D(DOL(-4))	0.01	0.09	0.10	0.43	-131.5	-1.03	-0.21	-2.61
D(DOL(-5))	0.22	1.30	0.01	0.06	254.5	1.99	0.03	0.42
D(DOL(-6))	-0.27	-1.56	0.60	2.58	18.9	0.14	-0.12	-1.56
C	0.45	2.07	-0.02	-0.09	-6.53	-0.04	-0.07	-0.75

* The first and second column in the cells denote each variable coefficients and resulting t-statistics, respectively.

Source: The Turkish Statistical Institute and the Central Bank of the Republic of Turkey - Electronic Data Delivery System

Orhan Cengiz
Çukurova University, Pozantı Vocational School
Department of Accounting and Taxation
01470 Pozantı/Adana, Turkey
ocengiz@cu.edu.tr

Müge Manga
Erzincan Binali Yıldırım University
Department of Economics
24002 Erzincan, Turkey
mboga@erzincan.edu.tr

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IS THERE ANY RELATIONSHIP BETWEEN GEOPOLITICAL RISK AND CLIMATE CHANGE?

Abstract

Purpose: The aim of this study is to point out the impact of geopolitical risk on climate change. The CO_2 emissions per capita is used as a proxy for climate change.

Methodology: In this study, the data sample covers annual data from 1990 to 2015 for 12 selected Latin American and Asian countries. After standard preliminary tests (Cross-sectional dependence tests, CIPS unit root test, and slope homogeneity test), we employ the second-generation estimator – the AMG (Augmented Mean Group) method to explore the long-run relationship between geopolitical risk and CO_2 emissions per capita.

Results: The AMG findings document that a 1% rise in geopolitical risk escalates CO_2 emissions per capita by 0.001%. In addition, economic growth and fossil energy consumption foster CO_2 emissions per capita, whereas renewable energy contributes to decreasing CO_2 emissions per capita.

Conclusion: In recent years, scholars have attempted to explore the impact of geopolitical risk on environmental degradation. According to our results, in Latin American and Asian countries, decreasing geopolitical risk and conflict can impede environmental degradation. In the long run, a robust clean energy policy should be considered in case of geopolitical conflict by the government. Besides, the government should focus on renewable energy policy and substitute non-renewable energy resources with more technology-intensive resources.

Keywords: Geopolitical risk, climate change, environmental degradation, CO_2 emissions

1. *Introduction*

Climate change is one of the most critical global issues of today. The increase in energy use with the development of economic and commercial activities is the leading cause of climate change. Global energy demand is increasing due to economic growth and population growth. If alternative renewable energy sources do not substitute primary energy demand, it will contribute to global climate change. In addition, the gradual increase in energy consumption complicates the fight against climate change (Our World in Data, 2021a). According to the IEA (2019) report, global energy demand increased by 2.3% in 2018. This increase represents the highest level since 2010. While the share of fossil fuels was 80% as of 2000, if this trend continues, the share of fossil fuels is expected to decrease to

74% with little change in 2030 within the framework of sustainable development goals.

CO_2 emissions, which have a significant share in greenhouse gas emissions, are among the most important causes of global climate change. Approximately 76% of the total greenhouse gas emissions belong to CO_2 emissions (Center for Climate and Energy Solutions, 2021). Greenhouse gas emissions are also closely related to global warming. The global temperature increased by an average of 1.1°C in 2020 compared to 1850 (Our World in Data, 2021b).

IPCC (2018) proves the noticeable assessment for the future in its well-known report.

"Human activities are estimated to have caused approximately 1.0°C of global warming above pre-industrial levels, with a likely range of 0.8°C to 1.2°C. Global warming is likely to reach 1.5°C between 2030 and 2052 if it continues to increase at the current rate. (high confidence)."

In this context, substantial literature exists about the driver of CO_2 emissions, one of the virtual drives of climate change. Moreover, the related literature investigates different factors as determinants of CO_2 emissions, for example, economic growth, energy consumption, foreign direct investment, foreign trade, and renewable energy. In addition to the factors mentioned above, some studies (Adams et al., 2020; Akadiri et al., 2020; Hashmi et al., 2021; Zhao et al., 2021; Anser et al., 2021a, 2021b) that examine the impacts of geopolitical conflicts on climate change have recently come to the fore. Namely, geopolitical risk (GPR) is another dimension of climate change.

Geopolitical risk is increasing day by day. Developments such as conflicts among countries, terrorist attacks, and bomb attacks have an economic, political, social, and environmental impact (Caldara & Iacoviello, 2018; Anser et al., 2021a; Hashmi et al., 2021). Theoretical discussions explain the impact of geopolitical risk on the environment with two opposite approaches. From an optimistic perspective, GPR causes a decrease in economic activity and energy consumption. Thus it negatively affects environmental degradation. In contrast, according to the pessimistic view, GPR diminishes the research and development (R&D) process, discourages innovation policy, and hinders renewable energy investment. So it promotes to raise environmental degradation (Anser et al., 2021b).

In sum, the nexus between geopolitical risk and environmental degradation is not clear. Based on theoretical debates, there is a need for more empirical findings to clarify the relationship between geopolitical risk and environmental degradation. Hence, our study intends to explore the linkage between geopolitical risk and CO_2 emissions in selected Latin American and Asian countries: Mexico, Korea, India, Brazil, China, Indonesia, Argentina, Colombia, Venezuela, Thailand, Malaysia, and the Philippines for the period 1990-2015.

We have selected the Latin American and Asian countries in our analysis for the following reasons: (i) Latin American and Asian countries consume approximately 41.8% of global primary energy; ii) They emit about 47% of global CO_2 emissions; and iii) These countries have higher geopolitical risks, and there are many geopolitical tensions and conflicts in their region.

Our paper contributes to the existing literature in three ways. (i) To the best our knowledge, this is the first analysis to investigate the relationship between geopolitical risk and climate change for 12 Latin American and Asian countries. (ii) Political instability, terrorism, and conflicts are mainly considered risk indicators in the extant literature (Lu et al., 2020). However, we use the geopolitical risk (GPR) index as an indicator of geopolitical risks that consists of comprehensive combinations. (iii) We employ second-generation panel estimators considering cross-sectional dependency and slope homogeneity to explore the long-run relationship among variables.

The rest of this study is organized as follows: Section 2 presents the literature review; Section 3 provides the data, model, and methodology; findings are presented in Section 4, and discussion and policy recommendations based on results are put forward in Section 5.

2. Relevant literature

We categorized the empirical literature into three groups. The first group of studies examines the main driving factor of CO_2 emissions in selected countries. The second group of studies examines the relationship between geopolitical risk and economic performance. The last group investigates the dynamic linkage between geopolitical risk and environmental degradation. Table 1 offers the literature review of the issue.

Table 1 Summary of relevant literature

Study	Sample/ Period	Variables	Method	Finding(s)
Determinants of CO_2 emissions in selected countries				
Lee & Yoo (2016)	Mexico/ 1971 - 2007	Energy consumption (EC), CO_2 emissions (CO_2), real GDP (GDP)	Unit root, co-integration, and the error-correction model (ECM)	A one-way causality real GDP → EC, CO_2 → real GDP; two-way causality EC ↔ CO_2
Sasana & Putri (2018)	1990-2014/ Indonesia	CO_2 emissions (CO_2), population growth (POP), fossil energy (FOS), renewable energy (REN)	Ordinary Least Square (OLS)	FOS and POP positively affect CO_2; REN negatively affects CO_2
Jardón et al. (2017)	1971-2011/20 Latin American and Caribbean countries	CO_2 emissions per-capita (CO_2), real GDP per capita (GDP)	Fully Modified Ordinary Least Squares (FMOLS) and Dynamic Ordinary Least Squares (DOLS)	EKC hypothesis is valid
Hanif et al. (2019)	1990-2013/ Emerging Asian economies	CO_2 emissions per-capita (CO_2), real GDP per capita (GDP), fossil fuels consumption (FFC), foreign direct investment (FDI), population growth (POP)	Panel Autoregressive Distributed Lags (ARDL)	GDP, FFC, and FDI have a positive impact on CO_2
Eriandani et al. (2020)	1980-2018/ASEAN countries	CO_2 per capita (CO_2), foreign direct investment (FDI), GDP per capita (GDP), manufacturing value-added (MAN)	Granger causality	A one-way causality FDI → CO_2
Relationship between geopolitical risk and economic indicator				
Soltani et al. (2021)	1995-2020/15 MENA countries	GDP per capita (GDP), foreign direct investment (FDI), financial development (FD), inflation (INF), trade openness (OPNS) geopolitical risk index (GPR)	Panel Vector Auto-Regression (PVAR)	GPR negatively affects GDP, whereas FD affects GDP in some countries
Soybilgen et al. (2019)	1986-2016/18 emerging nations	Real GDP growth rate (GDP), geopolitical risk index (GPR), human capital (HC), investment expenditure (INV), government expenditure (GOV), trade openness (TRADE)	Fixed effect	GDP harms real GDP
Lee et al. (2021)	2005M1-2017M12/ Selected 16 countries	Tourism demand (Q), per capita income (Y), relative prices (P), Inbound tourists (IT), Exchange rate (EX), Geopolitical risk (GPR)	AMG and Common Correlated Effects Mean Group (CCEMG)	GDP impedes Q
Le & Tran (2021)	1995-2018/9 Asian countries	Geopolitical risk index (GPR), capital expenditures (CAPX/ ASSET), rule of law, investment freedom, GDP growth, inflation	Fixed effect, Two-Stage Least-Squares (2SLS), Generalized Method of Moments (GMM)	GPR strongly affects institutional investment in China and Russia, while small in India and Turkey

Study	Sample/ Period	Variables	Method	Finding(s)
Hailemariam & Ivanovski (2021)	January 1999-August 2020/U.S.	Geopolitical risk index (GPR), world industrial production (WIP), price level (P), net expenditure for tourism exports and imports (TNX)	Structural Vector Autoregression (SVAR)	GPR negative affects TNX
Alsagr & Almazor (2020)	1998-2017/ Emerging nations	Return on assets, Geopolitical risk index (GPR), oil rents, inflation, GDP, exchange rate, Non-performing loan, Bank deposits	Fixed effect	GPR plunges banking sector performance
Bilgin et al. (2020)	1985-2015/18 countries	Government investments (GI), geopolitical risk (GPR), per capita GDP (GDP), population (POP), trade openness (TO), age dependency (AD), urban population (UP), capital formation (CF), FDI, total debt (TD), budget deficit (BD)	Fixed-effects, Least Squares Dummy Variable Corrected (LSDVC)	GPR incentives GI
Olanipekun & Alola (2020)	1975-2018/ Persian Gulf	Oil production (PROD), geopolitical risk index (GPR), natural resources rents (RENT), average damage cost (ACOD), crude oil price (PRICE)	Non-Linear Autoregressive Distributed Lag (NARDL)	Positive shocks in GPR and ACOD negatively affect PROD whereas negative shock in PRICE exerts PROD negatively
Akadiri et al. (2020)	1985Q1-2017Q4/Turkey	Geopolitical risk index (GPR), real GDP (GDP), number of inbound tourists (TOUR)	Toda & Yamamoto causality test (1995)	GPR negatively affects real GDP and TOUR; also a one-way causality GPR → GDP, GPR → TOUR
Geopolitical risk and environmental degradation				
Anser et al. (2021a)	1985-2015/ BRIC	Geopolitical risk index (GPR), carbon dioxide emissions (CO_2), GDP per capita (GDP), non-renewable energy (ENE), renewable energy (REN), total population (POP)	AMG	GPR, GDP, POP, and ENE increase CO_2 while REN impedes CO_2
Anser et al. (2021b)	1995-2015/ Brazil, Mexico, Russia, Colombia, and China	Ecological footprint (EF), GDP per capita (GDP), non-renewable energy (EN), renewable energy (REN), economic policy uncertainty index (EPU), geopolitical risk index (GPR)	Co-integration, FMOLS, DOLS, AMG	EPU and EN foster EF while GPR and GDP decrease EF
Zhao et al. (2021)	1985-2019/ BRIC	Carbon dioxide emissions (CO_2), energy consumption (EC), geopolitical risk index (GPR), government stability (GS), GDP per capita (GDP)	NARDL	An increase in GPR plunges CO_2 in Russia and South Africa; a decrease in GPR decreases CO_2 in India, China, and South Africa
Hashmi et al. (2021)	1970-2015/ Global Level	World carbon dioxide emissions (CO_2), geopolitical risk index (GPR), world GDP (GGDP), world energy consumption (GEN)	Bootstrap ARDL	EKC is valid; GPR negatively affects CO2 in the short run, positively affects in the long run

Study	Sample/ Period	Variables	Method	Finding(s)
Sweidan (2021)	1973Q1-2020Q1/U.S.	Geopolitical risk index (GPR), world oil prices (OP), real gross domestic product (Y), renewable energy (RER), real economic growth (GW) and long-run economic growth (LGW)	ARDL	GPR positively affects RER
Adams et al. (2020)	1996-2017/ Resource-rich countries	CO_2 emissions (CO_2), real GDP per capita (RGDP), energy use (ENC), economic policy uncertainty (EPU), geopolitical risk index (GPR)	PMG-ARDL, Kao cointegration, Dumitrescu and Hurlin (2012) causality test	ENC and RGDP increase CO_2; a bidirectional causality $CO_2 \leftrightarrow$ ENC, RGD $\leftrightarrow$ PEPU, RGDP $\leftrightarrow$ CO_2; a unidirectional causality $CO_2 \rightarrow$ GPR
Alsagr & Hemmen (2021)	1996-2015/ Developing countries	Renewable energy (REC), private credit (PCD), bank credit (BCB), domestic credit (DCP), stock market turnover ratio (TOR), geopolitical risk index consumer price index (CPI), GDP per capita (GDPPC)	Two-step system GMM	Financial development and GPR cause an increase in REC
Rasoulinezhad et al. (2020)	1993-2018/ Russia	Energy transition (ET), inflation (INF), CO_2 emissions (CO_2), exchange rate (EXC), economic growth (GRO), population (POP), financial openness (FIN), geopolitical risk (GEO)	ARDL Bounds Testing	GEO positively affects ET

Source: Authors

After examining the related literature, it is seen that the empirical literature about the relationship between geopolitical risk and climate change is quite scarce. This refers especially to the effect of geopolitical risk on environmental degradation for Latin American and Asian countries, many of which have substantial geopolitical disputes and conflicts on a regional and global scale, for which previous research does not offer extensive empirical evidence.

3. Data and method

3.1 Data

Our paper aims to investigate the impact of geopolitical risk on climate change by using the annual panel data of 12 Latin American and Asian countries (Mexico, Korea, India, Brazil, China, Indonesia, Argentina, Colombia, Venezuela, Thailand, Malaysia, and the Philippines) spanning the period 1990-2015. Data on the GPR index, developed by Caldara and Iacoviello (2018), are extracted from http://policyuncertainty.com and then converted into annual data. The GPR index is calculated via the frequency of newspaper articles involving notions related to geopolitical tension and conflict.

The dependent variable is CO_2 emissions as a proxy for climate change, whereas the control variables are GDP per capita (GDP), total population (POP), fossil energy consumption (FEUSE), and renewable energy consumption (REN), respectively. Annual data for control variables are gathered from World Bank. Table 2 provides the description, scope, and sources of variables.

Table 2 Summary of variables

Variable name	Abbreviation	Scale	Source
Carbon dioxide emissions	CO_2	Metric ton per capita	World Bank
GDP per capita	GDP	GDP per capita (constant 2010 $ US)	World Bank
Population	POP	Total population	World Bank
Fossil energy consumption	FEUSE	Percent of total final energy	World Bank
Renewable energy consumption	REN	Percent of total final energy	World Bank
Geopolitical risk index	GPR	Tally of newspaper articles containing geopolitics related terms	http://policyuncertainty.com

Source: Authors

3.2 Method

This paper explores the long-term relationship between geopolitical risk and climate change. The impacts of the population (P), welfare (A), and technology (T) on environmental degradation were firstly discussed within the framework of the IPAT (Environmental Impact by Population, Affluence, and Technology) model developed by Ehrlich and Holdren (1971). The classical form of the IPAT model is given as follows:

$$I = P.A.T\ (I = PAT) \tag{1}$$

In Eq. (1), I denotes influence (environmental degradation), P is population, A represents affluence or economic development, and T is technology. However, this model cannot fully reveal the effects of external variables that impact the environment individually, handles anthropogenic effects in a limited way, and is based on a simple equation that equally determines the impact of all variables on the environment (Wang et al., 2016, p. 1184). To overcome the limitations of the IPAT model, the STIRPAT (Stochastic Impacts by Regression on Population, Affluence and Technology) model was developed by Dietz and Rosa (1997). The general form of the STIRPAT model is as follows:

$$I_i = aP_i^b A_i^c T_i^d e_i \tag{2}$$

Eq. (2) keeps the general properties of the IPAT model; I, A, and P denote (environmental degradation), affluence or economic development, and population, respectively, as shown in Eq. (1). But, the "i" subscript is added to the STIRPAT model to emphasize that these quantities vary according to the observation units. In Eq. (2), The terms b, c, and d, which express the coefficients of the explanatory variables, are estimated by applying standard statistical techniques. Namely, a denotes the constant term, while b, c, and d are the elasticities that determine the net impact of population welfare and technological changes on the environmental effects, respectively. In the STIRPAT model, the term T (technology) represents technological development and includes all other factors that reveal the impact of social organizations, institutions, culture, and individuals on the environment (Dietz & Rosa, 1997, p. 175). Anser (2019), Destek (2018), and Shahbaz et al. (2016) show in their study that the advantage of the STIRPAT model allows to include related variables in terms of analysis. Thus, we can add the geopolitical risk index into the model based on Anser et al.'s (2021a) study.

The new extended form of STIRPAT is as follows:

$$I_{it} = aP_{it}^b A_{it}^c T_{it}^d G_{it}^f e_{it} \tag{3}$$

In Eq. (3), G denotes the geopolitical risk index (GPR). All variables are converted to a logarithmic form to escape the heterogeneity problem. So the new form of the model can be expressed as follows:

$$\begin{aligned} logI_{it} = {} & a + b(logP_{it}) + c(logA_{it}) \\ & + d(logT_{it}) + f(logG_{it}) + e_{it} \end{aligned} \tag{4}$$

Where a is the intercept; b, c, d, and f are coefficients, with i and t representing cross-section and time, respectively, and e_{it} is the error term. The final empirical model used yields:

$$\begin{aligned} log(CO_{2,it}) = {} & a + \beta_1 \log(GDP_{it}) + \beta_2 \log(POP_{it}) \\ & + \beta_3 \log(FEUSE_{it}) + \beta_4 \log(REN_{it}) \\ & + \beta_5 \log(GPR_{it}) + e_{it} \end{aligned} \tag{5}$$

In Eq. (5), $CO_{2,it}$ is carbon dioxide emissions per capita, GDP_{it} is GDP per capita, used as a proxy for A (affluence). $FEUSE_{it}$ represents fossil energy consumption for non-renewable energy consumption and REN_{it} denotes renewable energy consumption. Both $FEUSE_{it}$ and REN_{it} are utilized as proxies for T (technology). POP_{it} represents total population, GPR_{it} is the geopolitical risk index, and α_i stands for country fixed effects.

Several empirical pieces of evidence (Chen & Huang, 2013; Mesagan, 2015; Uddin & Wadud, 2014; Zhang et al., 2021) show that economic growth positively impacts CO_2 emissions. Non-renewable energy is also one of the critical determinants of CO_2 emissions, and it is positively associated with CO_2 emissions; in contrast, renewable energy has a negative impact on CO_2 emissions (Chen & Geng, 2017; Sharif et al., 2019; Fatima et al., 2021). Furthermore, the relationship between population and CO_2 emissions is unclear (Zhou & Liu, 2016; Zhang et al., 2018; Khan & Yahong, 2021). Recently, a few studies have considered geopolitical risk as a new determinant of environmental degradation (Anser et al., 2021a; Anser et al., 2021b; Zhao et al., 2021).

3.2.1 Cross-sectional dependence

In empirical analyses, cross-sectional dependence (CD) is one of the critical points to obtain robust results. Ignoring CD may lead to inconsistent results. In this framework, before testing stationarity properties of variables, we employ Breusch-Pagan LM, LM_{adj}, and Pesaran CD tests for testing cross-sectional dependence among variables. Breusch-Pagan LM test provides consistent and reliable results in case of relatively small cross-section (N) and sufficiently large time dimension (T), and can be reported as follows (Huang, 2016, p. 253):

$$LM = T\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\hat{\rho}_{ij}^2 \tag{6}$$

In Eq. (6), i indices denote cross-section and T is time.

The Pesaran CD test can be expressed as follows:

$$CD = \sqrt{\left(\frac{2T}{N(N-1)}\right)}\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\left(\hat{\rho}_{ij}-1\right)\sim N(0,1) \tag{7}$$

In the Pesaran (2004) CD test, under the null hypothesis of no cross-sectional dependence with $T\rightarrow\infty$ and $N\rightarrow\infty$, this test statistic is asymptotically distributed as standard normal. However, in some cases, due to the decreasing power of the Pesaran (2004) CD test (Chang et al., 2015a, p. 291) the revised version of the LM test, the bias-adjusted LM, proposed by Pesaran et al. (2008), can be used where N is large, and T is small. The bias-adjusted LM statistic is defined as follows (Pesaran et al., 2008, p. 108; Chang et al., 2015b, p. 1407):

$$LM_{adj} = \sqrt{\left(\frac{2T}{N(N-1)}\right)}\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\hat{\rho}_{ij}\frac{(T-k)\hat{\rho}_{ij}^2-\mu_{Tij}}{\sqrt{v_{Tij}^2}}\sim N(0,1) \tag{8}$$

In Eq. (8), μ_{Tij} and v_{Tij}^2 denote the mean and variance of $(T-k)\hat{\rho}_{ij}^2$, respectively.

3.2.2 Slope homogeneity

Testing slope homogeneity is another critical preliminary stage in panel data econometrics. This study employs the Delta ($\tilde{\Delta}$) test proposed by Pesaran & Yamagata (2008). Under the null hypothesis of slope parameters are homogenous, the slope homogeneity test of Pesaran & Yamagata (2008) can be written as follows:

$$\tilde{S} = \sum_{i=1}^{N}\left(\hat{\beta}_i-\tilde{\beta}_{WFE}\right)'\frac{x_i'M_\tau x_i}{\tilde{\sigma}_i^2}\left(\hat{\beta}_i-\tilde{\beta}_{WFE}\right) \tag{9}$$

In Eq. (9), $\hat{\beta}_i$ is the pooled ordinary least squares (OLS) estimator whereas $\tilde{\beta}_{WFE}$ is the weighted fixed effect pooled estimator, $\tilde{\sigma}_i^2$ is the estimator of σ_i^2, and M_τ is a matrix of T (Pesaran & Yamagata, 2008, p. 54).

3.2.3 Panel unit root

Various panel unit root tests exist that determine the stationary properties of variables. However, the first-generation panel unit root tests do not allow cross-sectional dependence. So in the presence of cross-sectional dependence, the first-generation panel unit root tests do not provide reliable results (Anser et al., 2021a). In this study, we perform the CIPS unit root test, which is one of the second-generation panel unit root tests that consider the presence of cross-sectional dependency heterogeneity (Rath & Akram, 2021).

The CIPS test is a derivative of the CADF (Cross-Sectional Augmented Dickey-Fuller) test developed by Pesaran (2007). The CADF regression is (Pesaran, 2007, p. 269):

$$\Delta Y_{it} = \alpha_i + b_i y_{i,t-1} + c_i \bar{y}_{t-1} + d_i \Delta \bar{y}_t + \varepsilon_{it} \quad (10)$$

Where α_i is deterministic trend, $\bar{Y}_t = \frac{1}{N}\sum_{i=1}^{N} Y_{it}$ and $\Delta\bar{Y}_t = \frac{1}{N}\sum_{i=1}^{N} \Delta Y_{it}$ (Wang et al., 2020).

After running the CADF statistics, the CIPS statistic, which is the mean of the CADF statistics, is calculated as follows:

$$CIPS = \frac{1}{N}\sum_{i=1}^{N} \tilde{t}_i \quad (11)$$

Where $\tilde{t}_i$ represents the OLS t ratio of b_i. The critical values are obtained from Pesaran's (2007) study for testing unit root in all variables (Rodríguez & Valdés, 2019).

3.2.4 Augmented Mean Group (AMG) estimator

The last step of our empirical analysis is to estimate the regression equation (5). The current study estimates the long-run relationship between geopolitical risk and CO_2 emissions using the AMG estimator proposed by Eberhardt and Bond (2009) and Bond and Eberhardt (2013). The AMG estimator is robust across heterogeneity and cross-sectional dependence. Furthermore, the AMG estimator allows estimating of the model with non-stationary variables. In other words, the AMG method does not require the stationarity condition of the series (Destek, 2017), and it contains a two-step stage (Eberhardt & Bond, 2009).

The first stage of the AMG method can be written as follows

$$\Delta y_{it} = b'\Delta x_{it} + \sum_{t=2}^{T} c_t \Delta D_t + e_{it} \quad \Rightarrow \hat{c}_t \equiv \hat{\mu}_t^{\bullet} \quad (12)$$

Then, the second stage of the AMG method yields:

$$y_{it} = a_i + b_i' x_{it} + c_i t + d_i \hat{\mu}_t^{\bullet} + e_{it} \quad \Rightarrow \hat{b}_{AMG} = N^{-1}\sum_i \hat{b}_i \quad (13)$$

Eq. (12) refers to the ordinary least squares (OLS) regression, where ΔD_t illustrates T-1 period dummies in first differences, $\hat{\mu}_t^{\bullet}$ labels year dummy coefficients. In Eq. (13) $\hat{\mu}_t^{\bullet}$ represents the N group-specific regression whereas $\hat{\beta}_i$ shows the mean of the individual coefficient estimates, following the Pesaran and Smith (1995) mean-group approach (Bond & Eberhardt, 2013).

4. Empirical results

In the first stage of the empirical analysis, we investigate the cross-sectional dependence. The results are provided in Table 3.

Table 3 Cross-sectional dependence tests results

	$LnCO_2$	LnGDP	LnFUSE	lnREN	LnPOP	LnGPR
LM	728.8	285.7	311.8	279.7	270.8	696.9
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
CD_{LM}	22.82	5.285	8.963	8.393	4.296	22.27
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
CD	28.499	40.046	11.184	9.943	41.301	14.71
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
La_{mada}	163.2	50.19	59.47	51.8	48.31	155.3
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
		Homogeneity Test	**Test Statistics**	**Probability**		
		Δ	14.458	0.000		
		Δ_{adj}	17.030	0.000		

Source: Authors

The results show that the null hypothesis of no cross-sectional dependence is rejected at 1%. These results show dependence between countries in economic, political, and social fields; in other words, a shock in one country can affect another country. Similarly, the slope homogeneity test results show that the null hypothesis of slope parameters are homogeneous and is rejected at 1%. Given the presence of cross-sectional dependence and slope heterogeneity, the first-generation unit root tests results can be biased and unreliable. Thus we employ the CIPS unit root test that allows the investigation of the stationary properties of variables. The CIPS unit test results are reported in Table 4.

Table 4 The results of the CIPS unit root test

Variables	I(0)	I(1)
LnCO$_2$	-1.612	-4.409***
LnGDP	-1.862	-3.976***
LnFEUSE	-2.057	-4.841***
LnREN	-1.810	-4.229***
LnPOP	-1.718	-2.185**
LnGPR	-2.370***	-

Note: *** and ** denote significance at 1% and 5%, respectively. The critical value at 1% is (-2.34), 5% (-2.17) and 10% (-2.07), respectively.

Source: Authors

As can be seen from Table 4, the null hypothesis of a unit root can be rejected at I(0) only for the GPR index. However, the null hypothesis of a unit root can be rejected at I(1) for CO_2, GDP, FEUSE, REN, and POP, respectively. Thus, it can be said that the variables are stationary at different levels.

This paper employs the AMG method to determine the long-term relationship between the variables since the series have cross-sectional dependence and stationarity at different levels (Destek, 2020). In this regard, Table 5 reports the AMG results.

Table 5 AMG results

Dependent Variable	LnGDP	LnFEUSE	LnREN	LnPOP	LnGPR
LnCO$_2$	0.556***	0.784**	-0.009***	-9.008	0.001**

Note: ***and ** imply significance at 1% and 5%, respectively.

Source: Authors

The AMG results show that GDP, FEUSE, and GPR positively impact CO_2 emissions while REN is negatively associated with CO_2 emissions. The coefficient of geopolitical risk is positive and statistically significant, implying that an increase of 1% in geopolitical risk escalates the CO_2 emissions per capita by 0.001%. This finding is in line with the studies of Anser et al. (2021a), Hashmi et al. (2021), and Bildirici & Gokmenoglu (2020).

5. Conclusion and policy recommendations

In the 21st century, geopolitical risks and debates are increasing worldwide. Although the geopolitical risk significantly affects economic growth, investments, and many macroeconomic indicators; its impact on climate change and environmental degradation is not clear enough. Based on this framework, this study aims to analyse the impact of geopolitical risk, economic growth, fossil energy use, renewable energy consumption, and total pop-

ulation on CO_2 emissions in selected Latin American and Asian countries over the period from 1990 to 2015. The findings from the AMG method confirm that geopolitical risk fosters CO_2 emissions. Furthermore, economic growth and fossil energy use lead to rising CO_2 emissions. As opposed to that, renewable energy consumption is negatively associated with CO_2 emissions.

These countries are exposed to high geopolitical risks. The increase in geopolitical risks increases militarization activities, adversely affecting the environment (Bildirici, 2017). Because within militarization, the use of military equipment and routine military activities require a high amount of energy consumption (Solarin et al., 2018). Building large-scale military infrastructure in terms of national security concerns accelerates environmental deterioration (Clark & Jorgenson, 2012). The impact of economic growth on environment degradation is positive, as expected. In other words, as economic growth increases, environmental degradation increases as well. This outcome is consistent with many studies in the existing literature (Bouznit & Pablo-Romero, 2016; Alam, 2014; Hanif et al., 2019; Nosheen et al., 2021; Koengkan & Fuinhas, 2020). One of the most important reasons for this is that the economic structure heavily depends on the primary sector that requires more energy consumption in these countries. Since economic growth requires high levels of fossil energy, particularly in developing countries, it triggers environmental degradation and climate change (Ali et al., 2021; Li & Yang, 2016; Liu et al., 2020).

Also, renewable energy is negatively associated with climate change in these countries. However, a well-designed renewable energy system contributes to energy efficiency and decreases dependency on fossil energy, reducing the climate change process (Sahoo & Sahoo, 2020; Haldar & Sethi, 2021).

Based on the above findings, we put forward some policy recommendations. First, policy-makers should strive to decrease geopolitical risks and tensions between countries. In this regard, the agreements and treaties have critical roles among nations. Moreover, non-governmental organizations (NGOs) undertake to plunge into geopolitical risks in this process. Secondly, governments expand incentives for renewable energy and tighten the non-renewable energy policy. Latin American and Asian economies still depend on primary energy sources such as fossil energy. Therefore, energy transition should become one of the most preliminary agendas in these countries.

The main limitation of our paper is that we analyse the impact of geopolitical risk on climate change by controlling economic growth, population, fossil energy, and renewable energy consumption. However, various factors affect climate change via interaction with geopolitical risk. For instance, nowadays, institutional quality and globalization are closely related to geopolitical risks. Thus, future studies can focus on the impact of these factors on different countries.

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Besim Beqaj
University of Prishtina
Faculty of Economics
10000 Prishtina, Kosovo
besim.beqaj@uni-pr.edu

Granit Baca
University of Prishtina
Faculty of Economics
10000 Prishtina, Kosovo
granit.baca@uni-pr.edu

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CONSUMER EVALUATIONS OF E-SERVICES: A PERCEIVED RISK PERCEPTION IN FINANCIAL INSTITUTIONS

Abstract

Purpose*:* This research integrates the perceived risk theory and the technology acceptance model to identify the consumer's perception of risk toward electronic banking services. The main purpose of this research is to see how consumers perceive risk and its dimensions in creating attitudes and continuing to use electronic banking services.

Methodology: To assess and measure customer perception, a questionnaire was adapted and distributed at branches of banks in Prishtina, which distributed the questionnaire to their customers. The confirmatory factor analysis and the regression analysis were performed in this study.

Results: From the data obtained we can conclude that, compared to the risk components, the perception of benefits has a greater impact on consumer decision-making when using electronic banking services.

Conclusion: This research has some implications. In theoretical terms, the findings provide a detailed perspective on the impact of risk components and benefits on attitudes and intention to use e-banking services. Whereas on the practical level, it provides recommendations for managers of commercial banks in Kosovo to create strategies and mechanisms aiming to increase security levels and consequently maximize customer trust in e-banking services.

Keywords: Electronic services, TAM, perceived risk, attitude

1. Introduction

Electronic services are interactive services provided by software through the Internet (Featherman & Pavlou, 2003). The development of technology and the globalization of markets have influenced the creation of a fiercely competitive environment between companies in various fields. Technology is constantly offering various electronic services, but it is more important if consumers accept and welcome these services (Ruyter et al., 2001). In the context of e-services, there are some important elements in terms of service quality that have not been relevant in the case of traditional services. These elements are System Quality, Information Quality, Technology Adoption Model (TAM), End-User Satisfaction, and Self-Service Technologies (Vijay, 2012). Therefore, the provision of interactive electronic services, in real time and of high quality, affects the creation of a competitive advantage in the electronic market (Ruyter et al., 2001).

Sousa and Voss (2009) added that the role of interaction with electronic services does not reduce the maintenance of customer loyalty. While Vyas (2012) offers a different view by emphasizing the fact that e-services offer many choices and opportunities, thus consumers tend to be less loyal to a particular brand. Consumers are now less likely to visit bank branches, and services are being executed through various technological forms (Drigă & Isac, 2014). In their research, Arora and Kaur (2018) found that customers are mostly aware of the benefits offered by electronic services. However, many consumers are not satisfied with their experiences with electronic banking services. This is due to a lack of trust, the risk of system failure (Kesharwani & Bisht, 2012), psychological risk (Chen, 2013), privacy and security (Poon, 2008), and lack of appropriate information about electronic services. Therefore, the purpose of this research is to see how consumers perceive risk and its dimensions in creating attitudes and continuing to use electronic banking services in Kosovo. The number of users of electronic services is increasing year by year. In 2020, there were a total of 347,199 e-banking accounts, whereas in 2021 (in the first six months alone), 434,658 new e-banking accounts have been created (The Kosovo Banker, 2021), which reflects a new approach to conducting various banking transactions.

The objective of this study is to examine the impact of risk components on the attitude towards the use of electronic banking. The first objective of this research is to identify the impact of risk factor components on users' attitudes towards electronic banking services. Considering that the risk factor has unique importance when it comes to electronic services, then through this research, we will try to find out its impact on electronic banking.

The second objective of this study is to examine the impact of perceived ease of use on the attitude towards the use of electronic banking. Through ease of use, we will try to understand whether there would be a positive or a negative impact on the attitudes of users if electronic banking services were easy to use.

The third objective of this study is to examine the impact of perceived usefulness on the attitude towards the use of electronic banking. Through the third objective, we will examine the impact of perceived usefulness on the attitudes of users of electronic banking services. If the perceived usefulness is rated higher, will this affect the attitudes of consumers toward the use of electronic banking services?

The fourth objective is to examine the impact of attitude on intention to continue using electronic banking. In the final objective of this research, we will study the impact of consumer attitudes in the intention to use electronic banking services. We will measure the attitudes of users using the elements presented in the preliminary objectives.

2. Theoretical background and the research model

2.1 Perceived risk

The concept of consumer perceived risk was first introduced by Buyer in 1960. The notion of risk is defined as the possibility of physical, social, as well as financial damage (Rohrmann, 2008). When consumers are involved in a buying situation, choosing a particular service or product, they perceive a certain degree of risk. In other words, customers' tolerance, and the level of risk they perceive are aspects that affect their buying behavior (Jafar et al., 2021). According to theory, there are several dimensions of perceived risk, such as financial risk, privacy risk, time risk, and performance risk (Kaplan & Jacoby, 1974). The definitions of the dimensions of risk perception are presented in Table 1. In this research, we will see the impact of these dimensions of risk on the acceptability and continued use of electronic banking services. We will see the impact that these dimensions have on the creation of attitudes that will consequently affect the intention to use or even continue to use these services. Many studies have concluded that perceived risk (financial risk, privacy risk, social risk, psychological risk, time risk, and performance risk) has a negative impact on attitudes about the acceptability and the use of electronic services (Chen, 2013; Ariff et al., 2014; Sanayei & Bahmani, 2012; Lee, 2009). Centered on the prior studies, we will see the impact of risk on consumer behavior towards the usage of electronic banking services, with a specific focus on Kosovo.

Based on previous research, we have set up the following hypotheses:

H1: Performance risk negatively affects attitudes towards continually using e-banking.

H2: Privacy risk negatively affects attitudes towards continually using e-banking.

H3: Time risk negatively affects attitudes towards continually using e-banking.

H4: Financial risk negatively affects attitudes towards continually using e-banking.

Table 1 Dimensions of perceived risk

Dimensions of perceived risk	Definition
Financial risk	It is associated with the possibility of monetary loss to consumers with the initial purchase price of a service and includes the monetary loss that occurs from possible fraud (Pathak & Pathak, 2017).
Privacy risk	It is associated with possible loss of control over personal information, or in cases where your information is used without your knowledge or approval (Featherman & Pavlou, 2003).
Time loss risk	It refers to concerns of consumers about issues such as how much time is needed to learn how to use electronic services, how much time to resolve certain problems about relevant services, and how much time to complete a certain transaction (Khedmatgozar & Shahnazi, 2018).
Functional/ performance	Is accompanied by the fear that product performance will not meet its expectations (Ariff et al., 2014).

Source: Authors

2.2 Technology acceptance model (TAM)

The Technology Acceptance Model (TAM) was introduced by Fred Davis in 1986 and it contains four constructs: perceived ease of use (PEOU), perceived usefulness (PU), attitude toward using (ATU), and behavioral intention to use (BI). TAM explains how technological systems or new electronic services are accepted by users using the above-mentioned dimensions. This model is widely used in various research related to the acceptability and adoption of technological systems to provide information about consumer behavior. In the original TAM model, Davis (1986) suggested examining the effects of external variables on the main construct of TAM. Faqih (2013) suggested that if the services provided online are clear, easy to understand, and require less effort to perform, then this could increase the possibility of acceptance and adoption of these services by users. TAM has been applied in numerous studies testing user acceptance of technology, for example, word processors (Davis et al., 1989), e-learning (Masrom, 2007), e-shopping (Stoel & Ha, 2008), and information technology (Bagozzi, 2007), Also, a considerable number of researches have used this model to see the level of adoption and acceptability in the banking sector, specifically for electronic banking services: (Li & Lai, 2005; Yousafzai et al., 2010; Al-Somali et al., 2008; Ghani et al., 2017; Kesharwani & Bisht, 2012; Featherman & Pavlou, 2003). Considering the importance of this model in the process of acceptance of electronic banking services, and its use in many types of research, this model has been selected by the authors of this study to see the acceptability of electronic services but also include an external variable, perceived risk. According to Nguyen & Huynh (2018) both perceived usefulness and the ease of use of e-services, are determining factors of consumer adoption. Based on other research, perceived ease of use and perceived usefulness have a positive effect on attitude (Masrom, 2007; Li & Lai, 2005; Nayanajith, 2021) On the other hand, attitude has a significant positive impact on the intention to continue using electronic banking services (Li & Lai, 2005).

Therefore, the hypotheses of the study, based on TAM are as follows:

H5: Perceived ease of use positively affects attitudes towards continually using e-banking.

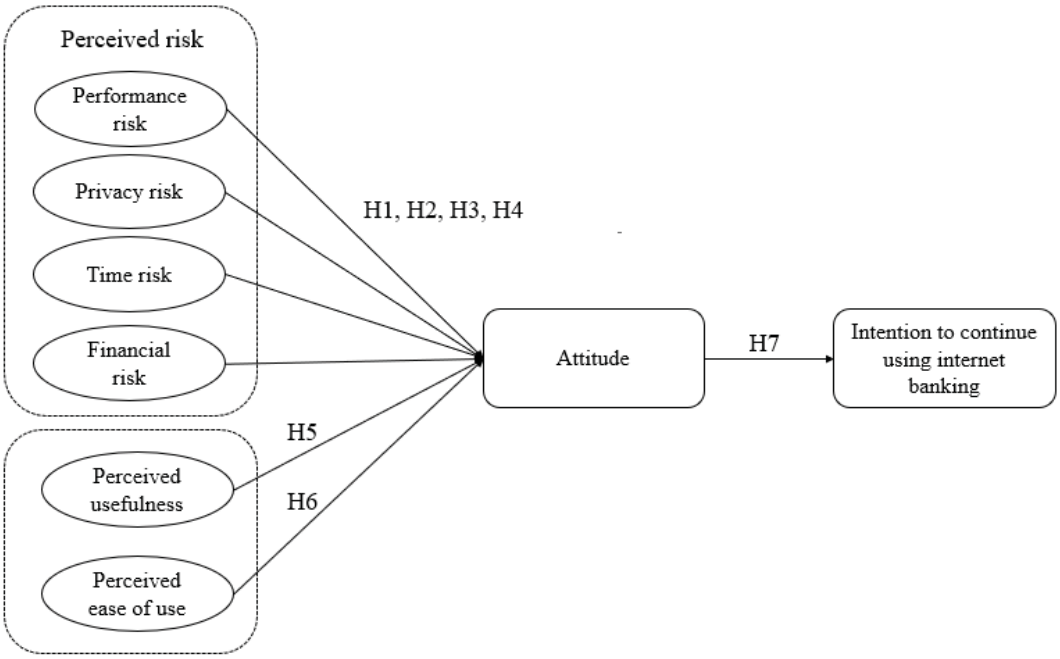
H6: Perceived usefulness positively affects attitudes towards continually using e-banking.

H7: Attitude positively affects intention to continue using e-banking.

2.3 Research model

Based on the reviewed literature and the findings of various research, we have set up the model by presenting the constructed hypotheses, as shown in Figure 1.

Figure 1 Proposed research framework



Source: Authors' illustration

3. Research methodology

3.1 Data collection

Two types of data were used to conduct this research: primary and secondary. Secondary data were collected from the literature to better understand the perceived risk and its dimensions, as well as the consumer perspective about perceived risk in a financial institution. However, the paper is mainly based on the primary data collected through a carefully designed questionnaire. The sample of this study consists of individuals that use electronic banking services in Kosovo. Data collection for this study was performed through a self-administered questionnaire, which used the drop-off and pick-up (DOPU) technique. Through this technique, the questionnaires were distributed to bank branches specifically in the capital city of Kosovo, Prishtina, who kindly agreed to distribute the questionnaire to their customers.

3.2 Research measures

To measure customers' assessment of their perceptions of risk, a questionnaire from the literature was adapted. Excluding demographic questions, the questionnaire consisted of a total of 27 questions (Table 2). All questions were measured on a Likert scale from 1 (strongly disagree) to 5 (strongly agree).

Table 2 Constructs and variables

Constructs	Questionnaire items	Source
Functional risk	The security systems built into Internet Banking are not strong enough to protect my checking account. Internet banking servers may not perform well and process payments incorrectly. Internet banking servers may not perform well because of slow download speeds, the servers' being down, or because the website is undergoing maintenance. Considering the expected level of service performance of Internet Banking for you to sign up for and use.	(Ramayah & Md, 2015)
Financial risk	Using an Internet banking service subjects your checking account to potential fraud. Using an Internet banking service subjects your checking account to financial risk. Using an Internet bill-payment service subjects your checking account to financial risk.	(Featherman & Pavlou, 2003)
Time risk	Signing up for and using Internet Banking would lead to a loss of convenience for me because I would have to waste a lot of time fixing payment errors. Considering the investment of my time involved to switch to (and set up) Internet Banking makes them risky. The possible time loss from having to set up and learn how to use Internet banking bill payments makes them risky.	(Featherman & Pavlou, 2003)
Privacy risk	I believe my Internet banking transaction information will only be used for the original transaction. While using Internet banking, I believe that I control the use of my information. I believe my Internet banking transaction information will not be lost during an online session.	(Ramayah & Md, 2015)
Perceived ease of use	It is easy for me to learn how to utilize this Internet banking site. I find it easy to get this Internet banking site to do what I want it to do. It is easy to remember how to use this Internet banking site. My interaction with this Internet banking site is clear and understandable. I find this Internet banking site easy to use.	(Suh & Han, 2002)
Perceived usefulness	Using this Internet banking site enhances the productivity of my banking activities. Using this Internet banking site makes it easier to do my banking activities. Using this Internet banking site enables me to accomplish banking activities more quickly. I find this Internet banking site useful for my banking activities.	(Suh & Han, 2002)
Attitude	Using this Internet banking site is a pleasant idea. Using this Internet banking site is a positive idea. Using this Internet banking site is an appealing idea.	(Suh & Han, 2002)
Intention	I intend to continue using this Internet banking site in the future. I expect my use of this Internet banking site to continue in the future. I will frequently use this Internet banking site in the future.	(Suh & Han, 2002)

Source: Authors

3.3 Sample profile

Table 3 shows the profile of the respondents. The demographics include elements such as gender, age, education, occupation, and income.

Table 3 Sample profile

Demographics	Categories	Frequency	Percentage
Gender	Male	112	51.9
	Female	104	48.1
Age	20-30	119	55.1
	31-40	67	31.0
	41-50	24	11.1
	51+	6	2.8
Education	High school	3	1.4
	Bachelor degree	98	45.4
	Master degree	107	49.5
	PhD	8	3.7
Occupation	Student	22	10.2
	Self-employed	15	6.9
	Private sector	121	56.0
	Public sector	58	26.9
Income (euro)	0-250	22	10.2
	260-500	79	36.6
	500-750	73	33.8
	760-1000	31	14.4
	1000+	11	5.1

Source: Authors

4. Analysis

To analyse the data of this study, we used SPSS and AMOS statistical analysis packages. The use of SPSS made it possible to perform a regression analysis to measure the impact of independent variables on the dependent variable. Whereas the use of AMOS has enabled it to perform confirmatory factor analysis to test the model and establish discriminant and convergent validity. Table 4 presents composite reliability (CR), and average variance extracted (AVE). As shown in Table 4, the values related to CR are higher than 0.7, whereas the values of AVE are higher than 0.5, which shows that all variables exceeded the recommended 0.7, respectively 0.5 thresholds (Hair et al., 2011).

Table 4 Composite reliability and Convergent validity

Constructs	Composite reliability (CR)	The average variance extracted (AVE)
Finance risk	0.971	0.919
Privacy risk	0.961	0.892
Time loss risk	0.976	0.932
Function risk	0.974	0.926
Perceived ease of use	0.977	0.913
Perceived usefulness	0.947	0.782
Attitude	0.935	0.828
Intention to continue using	0.897	0.744

Source: Authors

The confirmatory factor analysis was performed next. According to Ullman & Bentler (2012), the purpose of the confirmatory factor analysis is to simply assess the measurement model. The confirmatory factor analysis aims to test whether the data fit a hypothesized measurement model (Suhr, 2006).

Table 5 Covariance matrix

	Time loss	Privacy risk	Finance risk	Attitude	Usefulness	Function risk	Ease of use	Intention
Time loss	**0.965**							
Privacy	0.114	**0.945**						
Finance	0.490	-0.076	**0.959**					
Attitude	-0.397	0.015	-0.295	**0.910**				
Usefulness	-0.385	0.069	-0.260	0.621	**0.884**			
Function	0.801	0.072	0.523	-0.395	-0.383	**0.962**		
Ease of use	-0.341	-0.041	-0.323	0.469	0.519	-0.371	**0.956**	
Intention	-0.344	0.082	-0.207	0.587	0.718	-0.330	0.584	**0.863**

Source: Authors

The diagonal (bold) features are the square root values of the AVEs. Off-diagonal features correspond to the correlation between the constructs. For discriminant validity, diagonal features should be larger than the resultant non-diagonal features.

Table 6 Fit indices model

Measure	CMIN	DF	CMIN/DF	CFI	SRMR	RMSEA	PClose
Estimate	512.061	296	1.730	0.971	0.029	0.058	0.056
Threshold			Between 1 and 3	>0.95	<0.08	<0.06	>0.05

Source: Authors

Although the validity of the constructs of perceived risk (privacy risk, financial risk, function risk, time loss risk, perceived usefulness, perceived ease of use, attitude, and intention) had been tested in previous research, their validity was retested in this study as well. A confirmatory factor analysis (CFA) was conducted for all constructs. The model fit indices for CFA are presented in Table 5, through which the suitability of the data with the presented model has been analyzed. From the obtained results, it can be concluded that there is a very good fit of the data with the model.

Table 7 Results of hypothesis

Hypothesis	Beta	t-value	p-value	Supported
H1: Financial→ATT	-.309	-4.753	.000	Supported
H2: Privacy→ATT	.008	1.121	.004	Not supported
H3: Time loss→ATT	-.402	-6.432	.000	Supported
H4: Functional→ATT	-.397	-6.336	.000	Supported
H5: PEOU→ATT	.524	8.990	.000	Supported
H6: PU→ATT	.676	13.412	.000	Supported
H7: ATT→INT	.643	12.276	.000	Supported

Source: Authors

Figure 6 presents the results of the regression analysis. The results show that components of perceived risk: finance risk (β=-.309, p<.000), time loss risk (β=-.402, p<.000), function risk (β=-.397, p<.000) were negatively related to attitude. Whereas privacy risk (β=.008, p>.004) did not show a negative effect on attitude. The hypothesis related to TAM constructs perceived usefulness (β=.676, p<.000), and perceived ease of use (β=.524, p<.000) were positively related to the attitude. The attitude (β=.643, p<.000) was positively related to intention for the continuous usage of electronic banking services.

5. Discussion

The purpose of this study was to examine the effect of perceived risk components integration with the technology acceptance model on consumers' attitudes and intention to continue using electronic banking services. The results indicate that components of perceived risk (finance risk H1, time loss risk H3, function risk H4) have a negative effect on attitude towards the use of electronic banking services. Only one component of perceived risk (privacy risk H2) has no negative effect on attitude towards the use of electronic banking services. Moreover, the hypothesis related to TAM (perceived ease of use H5, and perceived usefulness H6), both have positive effects on attitude, whereas the results demonstrate a strong correlation and positive effect between attitude and intention (H7) towards continuous usage of electronic banking services.

The hypotheses highlighted (H1, H3, H4) correlate favorably and substantiate previous findings in the literature (Ariff et al., 2014; Sanayei & Bahmani, 2012; Chen, 2013; Lee, 2009). Kassim & Ramayah (2015) found that functional risk has no significant effect on attitude towards the use of internet banking. The reasoning behind that is that users with more experience in using electronic banking services better understand the way internet banking websites operate. Therefore, the functional risk is not seen as a problem, consequently, it has a positive attitude towards the usage of electronic banking services. This study, however, finds that there is a negative effect that functional risk (H4) poses on the attitude towards the use of electronic banking. An explanation of this finding might be that users of electronic banking in Kosovo see a high risk of web server interruptions and unsuccessful processing of transactions.

Another interesting finding is that financial risk (H1) negatively affects attitudes towards continually using e-banking. The findings of this study are significantly different from the findings of Kassim & Ramayah (2015). An explanation for our finding might be that users see financial risk as an important component, as they are directly confronted with potential fraud, financial losses from various transactions, as well as daily online connections to their bank accounts. Therefore, banks should offer more security to users in this regard, as well as offer them better ways of recovery in case of banking transaction failures. Moreover, Lee (2009) concluded that time has a negative effect on attitude towards electronic banking services. However, his conclusion only referred to delays in receiving online payments, consequently, the concerns of the length of time involved in waiting for the website to operate. The findings of this study regarding H3, correlate with Lee (2009) and offer another perspective of conclusion that there is a potential time risk, especially in the initial phase of using e-banking services. Additionally, this may also refer to correcting potential errors that may occur during the processing of payments or various financial transactions.

The most surprising result is that privacy risk (H2) does not affect attitudes towards continually using e-banking. Unlike other research carried out in this area, this study did not find a negative effect. This study has not confirmed other previous results reported in the literature (Ariff et al., 2014; Sanayei & Bahmani, 2012; Chen, 2013; Lee, 2009). This can be explained by the fact that users do not perceive the use of their data for other purposes as a risk, either by the respective banks or by other financial institutions. Thus, their perception is that personal information is not only used for financial transaction purposes but also for other internal purposes. H5 and H6 substantiate previous findings in the literature. The ease of using electronic banking services creates positive attitudes toward the continuous use of e-banking services. The more benefits these services offer, the more positive attitudes toward e-banking will be. Thus, H5 and H6 are supported.

H7 confirmed that attitude has a significant positive effect on the intention to continue using Internet banking. The findings of this study are consistent with previous research (Li & Lai, 2005; Masrom, 2007). It is evident that when attitude (feelings) about electronic banking usage is significantly posi-

tive, electronic banking users will have obvious intentions to constantly use electronic banking.

6. Conclusion and implications

In this study, financial risk, time loss risk, and functional risk are found to negatively affect attitudes towards continually using e-banking. Privacy risk, perceived usefulness, and perceived ease of use positively affect attitudes towards continually using e-banking. Additionally, attitudes positively and significantly affect intention to continue using e-banking. The findings of this study encourage bank managers to think more about these factors that have an impact on customers' intention to continue using e-banking. The findings also suggest the creation of strategies to improve and regulate the quality of electronic banking services as much as possible, focusing on the above components that have an impact on the use of e-banking. But also, to create mechanisms to enhance the high security, and consequently increase the trust of users in the use of electronic services.

The results of this study show that both the benefits of using electronic services and the perception of risk have significant effects on attitudes and intent to use these services. However, Lee (2009) found that the security risk compared to the perceived benefit has a greater impact, and thus concludes that the risk factor has a stronger effect on customer decision-making than the profit factor. In contrast to those findings, this study has found that the profit factor has a greater effect on customer decision-making than the risk factor. Consequently, assuming that despite the presented risks of electronic banking services for users, the benefits they receive from the use of electronic banking services are more influential than perceived risk, but in no way completely avoid the risk factors.

The theoretical contribution of this study is related to a deeper explanation of the components of perceived risk, their impact on attitudes, and the purpose of using electronic banking services. Moreover, the theoretical aspect is facilitated by the approach of this research, as it offers a different perspective in addition to other research since it was conducted in a developing country and in a relatively young country that declared independence in 2008.

7. Limitations and suggestions for future research

The main limitation of this research is that the research was conducted only in the branches of banks located in the capital city of Kosovo. Considering that there are a considerable number of branches in other cities as well, it is reasonable that other researchers should also include them in their studies. It is important that in future studies, more variables be implicated that relate to the benefits of using electronic banking services so that a more detailed assessment can be made about the perception of risk and the perception of benefits of using these services.

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Preliminary communications

Antun Biloš
Josip Juraj Strossmayer
University of Osijek
Faculty of Economics in Osijek
31000 Osijek, Croatia
abilos@efos.hr

Ivan Budimčić
31000 Osijek
ibudimcic@efos.hr

Davorin Turkalj
Josip Juraj Strossmayer
University of Osijek
Faculty of Economics in Osijek
31000 Osijek, Croatia
davorin.turkalj@efos.hr

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CONSUMER PERCEPTION OF HIGH-TECH BRANDS AND RELATED PRODUCTS: THE CASE OF THE ICONIC APPLE

Abstract

Purpose: The paper examines the opinions and attitudes of young adults as the target audience towards a high-tech brand on several specific levels. The goal of research is to investigate and explore the perception of both Apple product users and non-users related to the Apple brand, brand loyalty, purchase intention, recommendation intention, and other aspects.

Methodology: The research instrument was created for the purpose of this research and was partially based on several prior studies with different standpoints. The online questionnaire consists of 22 items and was carried out in 2019. Parametric and nonparametric statistical tests were used for testing the difference between sample segments.

Results: The results indicate that the Apple brand has a generally positive image among the respondents. The majority of the respondents use or have used at least one Apple product. Apple users are generally loyal to the brand and willing to recommend Apple products to their friends and family. Users primarily recall Apple as a top-of-mind (first-mention) high-quality smartphone brand. In contrast, non-consumers tend to recall different brand names when thinking about high-end smartphones but also suggest that a brand name is an important factor in the consumer decision-making process.

Conclusion: Collected data and related analysis provide insight into (non)consumer perception of the Apple brand and Apple products in the Croatian market accentuating the main consumer attitudes and brand perception related to a high-tech brand.

Keywords: Brand perception, brand personality, consumer attitudes, Apple, Croatian market

1. Introduction

Many companies strive to create a combination of products, services and environments based on holistic consideration of consumer experience (Machado et al., 2014; Diller et al., 2005). Global markets are becoming highly saturated and "turbulently dynamic" but some brands possess the ability to stand out and are often preferred by users over other brands (Gehani, 2016). Apple was founded in 1976 by Steve

Jobs, Steve Wozniak and Ronald Wayne, and has had a rich and influential history (Isaacson, 2013). Apple Inc. has launched some of the most revolutionary products in modern high technology, such as iMac, iTunes, and the notable smartphone - iPhone. In addition to the significance of Apple products, the company has put a lot of effort into attending to their customers, online and offline presence, user experience, safety, and loyalty of their users. In combination with great marketing communication, Apple's inventions have made them one of the largest brands in the world. Regardless of the source used, Apple is most commonly listed among the top companies. Because of their history related to the introduction of new (and expectedly revolutionary) devices, new product launches usually instigate curiosity on a global level. In combination with massive advertising campaigns and a loyal fan base of customers, this kind of hype made their business endeavors quite successful. According to Bhasin (2019), Apple is one of the greatest brands in the ICT industry in terms of generated revenue as well as its brand ranking. Apple is also the number 1 brand in the market positioning of smartphones, tablets, and laptops. In 2019, Apple's total assets accounted for US$ 309.5 billion and there is only Amazon with greater total assets worth (Handley, 2019).

What is quite unique to Apple Inc. is the synergy between provided hardware and software, a specific ecosystem. Investment in the brand image and various related marketing activities of Apple Inc. is at a high level and continuously increasing. Interestingly enough, Apple does not have a strong brand awareness competitor, but in terms of device market share, Apple has strong competitors for every single device. For example, Apple iPad is facing serious competition from Android tablets, the iPhone's biggest rivals are Samsung and Huawei, while MacBooks have stiff competition from Dell (Farooq, 2019). Platforms like iTunes are facing competition from Spotify, Apple Books competes with Amazon, and AppleTV is an underdog on the market. Samsung Smartwatch is a rival for Apple Watch and part of the Android ecosystem in an attempt to compete with the Apple ecosystem (Graziano, 2017).

The research focus of this paper is set on perceptions and attitudes towards a high-tech brand and its products. The examined perception is related to the strategies and approaches that modern companies use to maximize the potential of the digital environment in the brand-building process. Apple Inc. is used as a benchmark because of its strong brand awareness and a high level of consumer loyalty, but also because Apple is one of the market leaders in ICT development with a functional synergy between offline and online approaches in marketing. Based on the idea that Apple Inc. usually targets upscale or premium market segments, it is both interesting and beneficial to examine (non) consumer perception on the Croatian market with considerably lower purchasing power compared to developed countries in Europe and the world. The paper examines the opinions and attitudes towards Apple on several specific levels, i.e. Apple as a company, Apple as an (iconic) brand, and related to specific Apple products. The research aims to answer several research questions:

- What is the top-of-mind brand in the high-quality smartphone category?
- What is the top-of-mind brand in the high-quality computer/laptop category?
- What is the perceived importance of the brand name when purchasing a smartphone, computer or tablet?
- What is the perceived amount of time needed for making a decision when purchasing a smartphone, computer or tablet?
- How popular are Apple products measured by the number of current and past users and non-users?
- What is the perceived quality of Apple products?
- What is recommendation likelihood of Apple products?
- What is planned purchase likelihood of Apple products?
- What is the perceived market position of Apple and its products?

2. Theoretical background

Literature review suggests numerous scientific-based as well as professional reflections and interpretations of the Apple brand with various brand elements explored, tested, and analyzed. In contrast with the traditional view of brand-building as a result of corporate identity, legacy and stakeholder interactions, Gehani (2016) argued that the corporate brand values are "more closely correlated with the firms' dynamic innovative capability" as opposed to their legacy or identity. However, perceived innovation

and quality may be a harder goal to achieve than delivering actual innovation and quality (Aaker, 2004).

Great public interest in the Apple brand and Apple products, sometimes even described as "Apple frenzy", may be related to a successful incorporation of "a qualia product into consumer identities" (Niu, 2019). The author describes the "qualia" concept as "taste-emphasizing", or "in every sense connected with the consumer's positive emotions and pleasant feelings". Fitzsimons et al. (2008) examined the translation of social priming effects to the consumer brand context via several experiments. Interestingly enough, their experiments supported the theory of brand priming effects on behavior and suggested that participants "responded to brands by behaving in line with the brand's characteristics" with no detectable awareness of the influence. Consumer perception of brands and related opinions, as well as behavior, is a highly complex area subject to additional research exploration, both at macro and micro levels. Several research aspects and various standpoints are discussed in the following subsections, mainly exploring those consumer related research efforts where the Apple brand was at the center of research.

2.1 Brand perception and personality

Vilčeková and Štarchoň (2017) focused on the main characteristic of selected global brands and explored their archetypes related to brand image and brand perception of Slovak consumers. Based on the conducted research, consumers perceive the Apple brand as innovative and inspiring. Machado et al. (2014) focused on the relationship between "experiential marketing and brand advocacy" through brand loyalty, based on Apple consumers. Their study showed that Apple's experiential marketing efforts affect brand loyalty among their users. Moreover, consumers displayed a higher tendency toward becoming brand advocates as the feeling of loyalty increased. Pinson and Brosdahl (2014) studied the three antecedent elements of Apple's brand loyalty (brand identification, brand personality congruence and reputation) using the theoretical foundations of social identity. The results confirmed that Apple brand identity and brand personality congruence is positively related to Apple brand loyalty. In addition, Ranjbarian et al. (2013) argued that product involvement and brand congruity affect an emotional connection with the brand. Baxter et al. (2018) conducted an experiment and showed that the exposure to a specific brand color as opposed to a generic color influenced brand personality perceptions. Furthermore, the authors suggested that personality connected to an iconic brand can be "created by brand managers, learned by consumers, and leveraged by other brands". Namely, exposure to a recognized brand color, such as "Apple grey", influences brand personality perception of an unknown brand.

Several authors explored consumer perception and brand ethical perception of purchase intentions (Tu et al., 2018; Javed et al., 2019). Javed et al. (2019) studied purchase intentions related to ethical perceptions of Chinese consumers and concluded that ethical perceptions of consumers, in fact, "translate into purchase intentions", at both the corporate and the product brand level. In addition, even the country of origin may be related to purchase intention in some specific mobile phone markets (Yunus & Rashid, 2016). A quite unique study by Phillips-Melancon and Dalakas (2014) explored negative consequences of brand identification and found that brand identification with the Apple brand was positively related to "pleasure at the misfortune" (in German, Schadenfreude) towards a competing company.

2.2 Brand logo and exposure

Biricik (2006) explored the role of logo design in creating brand emotion based on the semiotic theory and suggested that "a well-designed emotional logo becomes a visual shorthand for the meanings attached to it". This emotional connection influences consumers to be receptive to the brand message and consequently build brand loyalty through positive brand attributes or associations. Some studies focus on logo recall and recognition related to the impact of brand exposure and brand perception. Iancu and Iancu (2017) argued that, contrary to the expectations, many user attributes such as gender, device ownership, and emotional attachment to the brand, are not significant variables for determining the level of Apple logo recall and recognition. Noble et al. (2013) explored logo related brand metaphors including the Apple logo. Their study analyzed the interactions of several applications of "brand metaphor (linguistic, visual, and symbolic)" and the forms those metaphors can take "(human, animal, or nonmetaphoric)" in affecting outcomes such as brand vividness, brand differentiation, and consumer preference.

2.3 Product perception and attitudes

Considering the complexity of brand perception, it is also important to explore and understand the different types and categories of digital devices as very specific products which create equally specific markets. One of the most competitive digital device markets is the smartphone market. Furthermore, modern wearable devices such as smartwatches may be perceived as both mono- and multifunctional, but also as a fashion product (Nieroda et al., 2018) and this idea may be applied to many other high-tech brand products.

A number of studies focused specifically on a single Apple product, a popular smartphone – iPhone. Tu et al. (2018) explored the "meaning and scope" of perceived value on the Taiwanese smartphone market. The authors suggested five key factors based on respondent experience with the device: "recognition, brand advantage, service quality, usage period and perceived price". Interestingly enough, they continued to conclude that recognition and brand advantage are factors influencing purchase motivation, and perceived price is an influential factor in purchase intention. A similar conclusion can be drawn from a study conducted in Indonesia (Amron, 2018). The author argued that brand image, device design, device features, and price have a positive influence on purchasing intentions in the smartphone market, while the strongest influence related to the price variable. A similar study suggested that device price, features, brand name and social influence affect purchase intention of mobile devices among the university students in Bangladesh (Rakib, 2019). Furthermore, Ndadziyira (2017) explored the dimensions that influence mobile phone brand preferences among the students in South Africa and found that brand popularity, prices, product attributes, social influences, and marketing communications all affect brand preferences. A similar study showed that brand image, brand personality and brand awareness have a significant influence on consumer purchase intention of Apples' smartphone (Wijaya, 2013).

In contrast to the previous studies, Bhalla and Jain (2018) argued that physical attributes and technical capabilities of the smartphone influence purchasing intention the most. Furthermore, Jacques (2013) explored the effect of brand equity on price premium of the Apples' popular smartphone by using 5 dimensions: perceived quality, brand awareness, brand loyalty, brand association, and uniqueness. The author concluded that uniqueness influences the price premium the most, but brand loyalty has no significant influence on the price premium. Kho et al. (2018) studied the relationship between the antecedent elements (features, brand, price, social influence and advertising) and purchase intention towards smartphones among young consumers. Based on the conducted study, the three elements that were found to be related to purchase intention are brand, social influence and advertising, while features and price were, in fact, not.

Wong et al. (2019) examined product consumption value and cognitive benefits related to retail services and their influence on brand commitment and the "switching behavior" of consumers in the smartphone market. Petruzzellis (2010) analyzed consumer behavior of mobile phone users in order to explore the consumption style and the motivation behind the purchase process through a number of dimensions. The author suggests that brand attitudes relate positively to consumer purchase intention of specific mobile phones. An interesting study focused on exploring the effect of vertical brand extensions on consumer perception of both luxury and functional brands of smartphones in the South African mobile phone market utilizing Apple as a luxury brand and Samsung as a functional brand. The same study also explored the effect of vertical brand extensions on four customer-brand relationship constructs: brand attachment, brand trust, brand commitment, and brand identification (Muroyiwa et al., 2017).

3. Methodology and findings

The primary goal of research was to investigate and explore the perception of Apple product consumers and non-consumers (or users and non-users) related to the Apple brand, brand loyalty, purchase intention, recommendation intention, and several other aspects. The research instrument was created for the purpose of this research and was partially based on several prior studies with different standpoints (Ndadziyira, 2017; Machado et al., 2014; Petruzzellis, 2010; Muroyiwa et al., 2017). An online questionnaire was constructed using the SurveyGizmo platform. The survey consists of 22 items and was carried out in August and September of 2019 after preliminary pilot testing and minor adjustments. The respondents were recruited using convenience sampling, utilizing social media platforms, and additional digital communication channels. An online survey with a total sample of 233 respondents from Croatia was conducted, out of which 184 responses were valid and analyzed using descriptive and inferential statistical methods,

while 49 responses were omitted from the analysis due to partial, missing, or otherwise unusable data.

This study focused on young and middle-aged segments, with the following distribution of age groups: 20 years and younger - 6.0%, 21-40 years - 70.7%, and 41 years and older - 23.4%. The age range of respondents is between 14 and 64 years, with the mean value x=31.26 (SD=11.74). A large majority of respondents are female (70.1%) and the remaining 29.9% are male respondents. Exactly one half (50.0%) of respondents are employed, additional 41.8% are students, while 3.8% of respondents are unemployed. Almost the entire sample (98.4%) is based in continental Croatia (in nine different counties). These sample characteristics suggest several important research limitations which will be addressed later, in the separate section of the paper. Furthermore, two survey items were used to understand to what extent respondents are familiar with the recent ICT trends and how experienced they are in terms of ICT usage. Both items were recorded on a self-reporting 5-point scale. The majority of respondents (38.0%) perceive themselves as somewhat familiar, and additional 32.1% as very familiar, while 17.9% are slightly familiar with the recent ICT trends. The scale end-points (1 - not at all familiar and 5 - extremely familiar) recorded the same percentage (6%). On the other hand, 45.7% of respondents perceive themselves as very experienced and additional 22.3% as extremely experienced ICT users, while only 0.5% suggest that they are not experienced at all and 2.7% are slightly experienced.

3.1 Research results

At the beginning of the survey, respondents were asked to recall the first brand name that comes to their mind when thinking about high-quality smartphones and (separately) computers/laptops (i.e. the top-of-mind or first-mentioned brand name). Several respondents suggested more than one brand name but due to the nature and description of the survey item, only the first mentioned response was analyzed. The two most popular brand names in the smartphone category with the most frequently recorded first-mentioned answers were Apple and Samsung. Apple was recorded in 45.7% of responses (a combined percentage of the brand name and associated products such as iPhone), while Samsung stood at 40.8%, followed by Huawei at 9.8% and other brand names (3.8%). A more diverse number of brand names were recalled in the computer/laptop category. Apple was once again the most popular one (35.9%), followed by HP (18.5%), Lenovo (9.8%), Acer (9.2%), Dell (8.7%), and others. When considering a purchase of a smartphone, computer or tablet, based on the respondent self-reporting item, it seems that the brand name is clearly important: over half of respondents (53.3%) rated it very important (item 4 on a 5-point scale) and additional 9.8% rated it as most important.

For further analysis, it is important to distinguish the three user segments regarding the ownership of Apple products: 38.6% are current users, 24.5% are former users (with previous usage experience) and the remaining 37.0% are non-users.

Among the current and former Apple product users, the most popular one in terms of current or prior device ownership was predominantly Apple's smartphone - iPhone (92.1%), followed by iPad (32.5%), Mac/MacBook (29.8%), AppleWatch (7.0%) and other devices (6.1%). The majority of users (43.0%) have used Apple products for over 4 years and 21.1% between 2 and 4 years, which suggests that almost two-thirds of users remain loyal to the brand even considering the competition on the given market. When rating the quality of the products used in comparison to the related price, users generally rate Apple products positively, i.e. 46.5% indicate very good quality and 29.8% excellent quality, while additional 14.0% suggest a moderate quality level (rated on a 5-point scale). In other words, over three-quarters of users perceive a product's quality as very good or excellent. Regarding the likelihood of Apple product recommendation, Apple devices recorded an NPS score of 16, suggesting a rather moderate position in comparison with the global ratings (Tim, 2018; Denning, 2011). Current and former users of Apple products were also asked to state their level of agreement with the following statement: I had a negative experience related to the Apple brand, which was resolved with a positive outcome. Interestingly enough, almost 40% of users did not agree with the statement (i.e. 20.2% strongly disagree and 19.3% disagree), and additional 39.5% had a neutral opinion (neither agree nor disagree). These opinions are generally in contrast with the previously described ones (generally positive perceptions), which might imply the existence of a still unexplored area and a possible guideline for future research.

Slightly over 40% of the total sample suggest that they will consider Apple products for their next purchase of a smartphone or a computer, while almost one third of respondents (32.1%) are sure they will not. However, only 17.4% say that they are willing to pay the "premium" price for a new Apple device compared to their competitors. This might

suggest several alternative purchasing options such as mobile plan subscriptions, the older generation, and second-hand devices. Over two-thirds of respondents (68.0%) think that Apple has a positive influence on their competitors (57.1 mostly positive and 10.9% totally positive), while there is a quarter of respondents (24.5%) with a neutral opinion (rated on a 5-point scale).

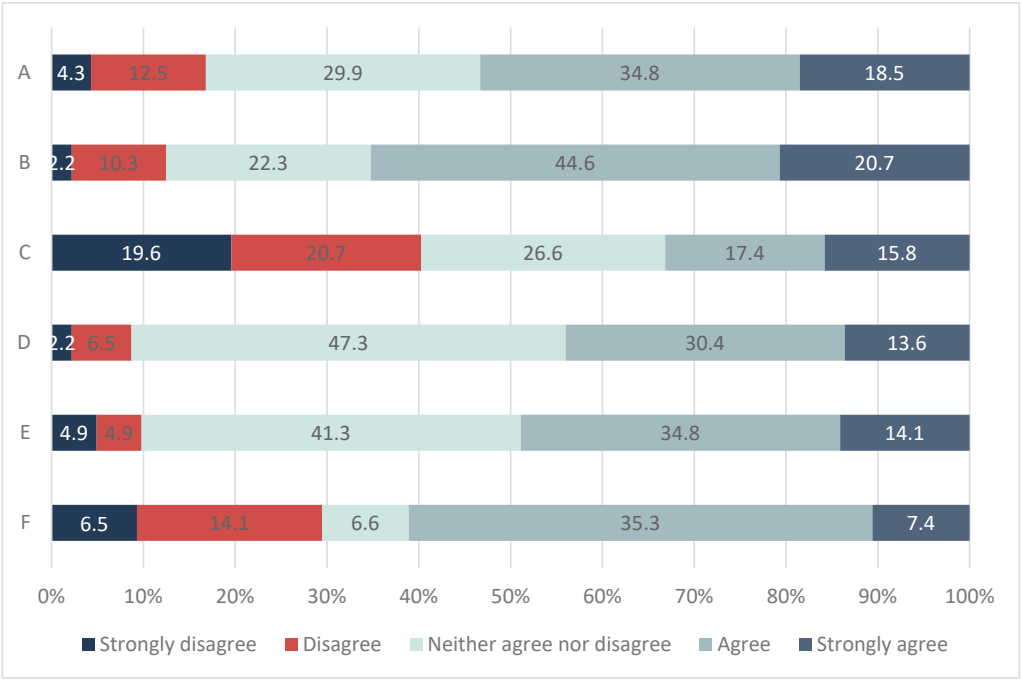
The sample segment of former users was asked to state their level of agreement with the following statement: I had a negative experience related to the Apple brand, which made me buy a competitor's product. Almost 40% of former users agree to some extent (i.e. 18.6% strongly agree and 20.9% agree) with the statement and additional 27.9% have a neutral viewpoint (neither agree nor disagree).

The total sample of respondents suggested the level of agreement with the following six statements:

- A: Apple is a market leader in most markets they are present in.
- B: Apple will have a positive impact on technology development in the future.
- C: I prefer most of Apple products compared to its competitors.
- D: The beliefs that the Apple brand strives to match their behavior.
- E: Apple treats their customers in a satisfactory manner.
- F: The attention of the Apple brand in the public is justified.

The respondents tend to agree with statements A, B, and F, i.e. over 50% of them agree with these statements to some extent (53.26%, 65.22%, and 52.72%, respectively). Respondents were generally undecided about statements D and E, with high percentages of those who neither agree nor disagree (47.3% and 41.3%, respectively), whereas only a minority of respondents expressed disagreement. Statement C recorded somewhat evenly distributed responses between the elements on a 5-point scale with a slightly larger percentage of those who disagree. A detailed overview is available in the following figure.

Figure 1 Level of agreement with the statements (the total sample)



Source: Authors' research

Interestingly enough, over two-thirds of respondents (68.0%) feel that the Apple brand has a positive influence on their competitors (57.1% mostly positive and additional 10.9% totally positive), while about a quarter of respondents (24.5%) suggest a neutral viewpoint. Based on several variables analyzed, the data suggest a generally positive perception of the Apple brand among the respondents.

In the next section, in order to explore possible differences between the two segments, the sample is split into two segments: Apple product users (comprised of current and former users) and non-users. In order to compare several variables between the segments, 5-point scale items were treated as scale measures while considering all the challenges implied by such an approach.

When asked to recall the top-of-mind brand name when thinking about high-quality smartphones, the user segment primarily mentioned Apple (61.2%) and then Samsung (28.4%), while non-users reported the opposite, i.e. Samsung as the most popular one (61.8%), followed by Apple (19.1%). The observed difference is statistically significant, tested with the chi-square test ($\chi2=30.738$, df=2, $p<0.001$). When asked the same question regarding a high-quality computer/laptop, users predominantly recall the Apple brand (42.2%), followed by HP (17.2%), Acer (8.6%), Asus (8.6%), Dell (7.8%) and others. On the other hand, non-users again put Apple at the top (25.8%), but the distribution among other brands is more dispersed, i.e. HP (20.6%), Lenovo (16.2%), Acer (10.3%), Dell (10.3%) and others. The observed difference is statistically significant, tested with the chi-square test ($\chi2=14.040$, df=6, $p=0.029$).

When considering a purchase of a smartphone, computer, or tablet, the brand name is clearly an important element for both users and non-users, even though the brand name is even more important for users than for non-users. Based on a 5-point scale, users recorded a higher mean value (x=3.2, SD=0.90) compared to non-users (x=3.43, SD=0.74). The observed difference is statistically significant, tested with the t-test (t=2.308, df=182, p=0.022). More than half of users (56.0%) suggest that they will consider Apple products for their next purchase of a smartphone or a computer, as many as a quarter (25.0%) are sure they will not and the remaining 19.0% are not sure. In contrast, 44.4% of non-users will not consider Apple products for their next purchase, 39.7% are not sure and only 6.2% will consider these products, which is generally in line with the segment description. The observed difference is statistically significant, tested with the chi-square test ($\chi2=28.300$, df=2, $p<0.001$). However, both users and non-users perceive the influence of the Apple brand on its competitors as a positive one. The influence was measured on a 5-point scale ranging from totally negative (1) to totally positive (5). The difference in the mean scores of users and non-users tested with the t-test is not statistically significant (x=3.78, SD=0.79, and x=3.60, SD=0.69 respectively).

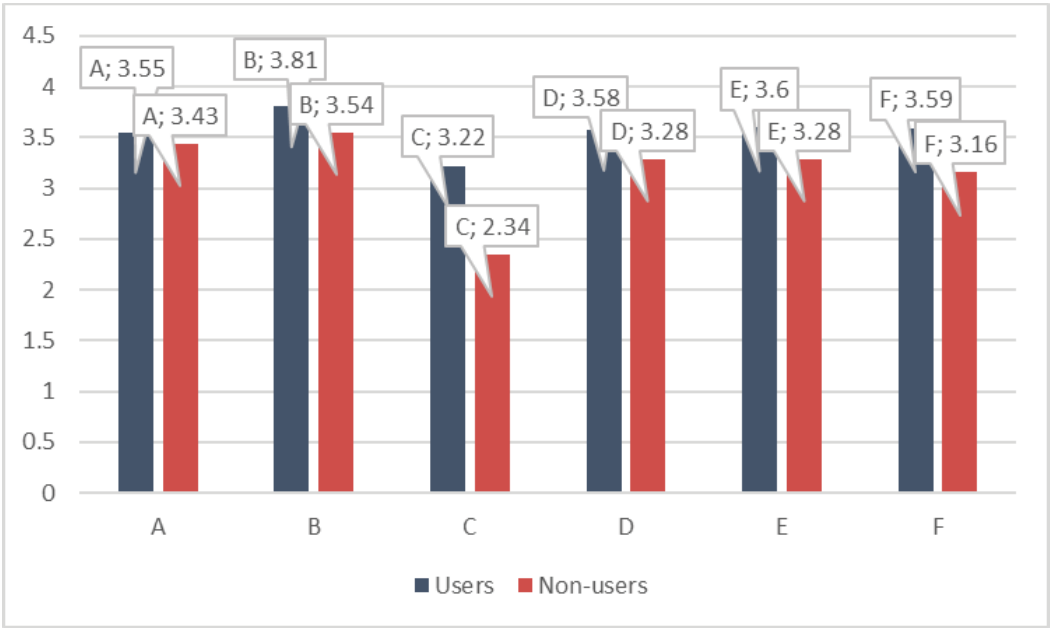
The levels of agreement with the aforementioned six statements (A to F) related to both users and non-users are illustrated in the next section (statements were measured on a 5-point scale). Both users and non-users tend to agree with statements A and B to the same extent as no statistical significance of the difference in their mean scores was recorded. As expected, the biggest difference in the level of agreement was recorded for statement C (I prefer most of Apple products compared to their competitors.). Users tend to agree with the statement (x=3.22, SD=1.38), while non-users do not (x=2.34, SD=1.06). The observed difference is statistically significant, tested with the t-test (t=4.831, df=169.212, $p<0.001$; equal variances not assumed based on Levene's test).

Users and non-users suggested a similar viewpoint regarding the next 3 statements. Both segments tend to agree with statements D, E and F, but the level of agreement expressed by users is somewhat higher. The observed differences in the mean scores between users and non-users are statistically significant, tested with the t-test:

- D: users (x=3.58, SD=0.98); non-users (x=3.28, SD=0.67); t=2.452, df=177.694, p=0.015, equal variances not assumed based on Levene's test;
- E: users (x=3.60, SD=1.07); non-users (x=3.28, SD=0.71); t=2.466, df=179.225, p=0.015, equal variances not assumed based on Levene's test;
- F: users (x=3.59, SD=1.18); non-users (x=3.16, SD=0.99); t=2.497, df=182, p=0.013.

A detailed overview is available in the following figure.

Figure 2 Mean scores by the statements (users and non-users)



Source: Authors' research

Finally, there are several significant differences between the user and non-user segments based on the collected data. Users primarily recall Apple as a top-of-mind (first-mention) high-quality smartphone brand, while non-users indicate Samsung. When considering a purchase of a smartphone, computer, or tablet, the brand name is suggested as an important element for both segments, but it is more important for users than for non-users. In addition, users are more likely to consider Apple products in their next purchase of a smartphone or a computer. Considering the level of agreement with the statements tested, both segments have a generally positive perception of the Apple brand, but a higher level was recorded among users. The biggest difference in the level of agreement was recorded for the statement referring to the preference of Apple products in comparison with their competitors.

3.2 Research limitations and future research guidelines

Research limitations predominantly relate to the sample size, distribution, and sampling techniques. Several sample characteristics such as age, sex, occupation status and location may have influenced the potential level of generalization and should be taken into consideration in the process of drawing conclusions. Future research efforts devoted to this topic should include a more adequate sampling distribution regarding respondent gender, age, place of residence, and preferably other socio-demographic characteristics. The sample recruitment techniques used pose some risks regarding the collected data quality and other sampling options should be explored. Furthermore, self-reporting survey items should be reconsidered due to potential respondent subjectivity or bias. In addition, researchers may focus on a more diversified number of brands and products, expanding the target audience and/or exploring a specific brand element not only related to high-tech brands and products. A variety of brands and industries may serve as a starting point for comparison studies.

4. Conclusion

Apple Inc. is not just one of the leaders from a technological aspect, but one of the leaders from the aspects of communication, providing services and development of modern marketing. The com-

pany created one of the greatest brands in the ICT industry in terms of its revenue generated as well as its brand ranking. What is quite unique to Apple Inc. is the synergy between provided hardware and software, a specific ecosystem. Apple created an ecosystem of successful products with plenty of devices, software solutions, and accessories to make life easier; however, leaving the ecosystem might be somewhat harder. There are numerous scientific-based and professional reflections and interpretations of the Apple brand with various brand elements explored, tested, and analyzed. Brand perception and related opinions, as well as behavior, is a highly complex area subject to additional research, both on macro and micro levels.

The primary goal of conducted research was to investigate and explore the perception of Apple product consumers and non-consumers (or users and non-users) related to the Apple brand, brand loyalty, purchase intention, recommendation intention, and several other related aspects. Research results indicate that the Apple brand has a generally positive image among the respondents. Apple Inc. puts a lot of effort into brand awareness and recognition, as Apple users are generally loyal to the brand and willing to recommend Apple products to their friends and family. Most respondents have used at least one Apple product, with the iPhone being predominantly the most popular one. Apple products tend to be quite expensive for most of the respondents, which implies several possible purchasing options such as mobile plan subscriptions, older generation devices, and second-hand devices. In contrast, non-consumers tend to recall different brand names when thinking about high-end smartphones but also suggest that the brand name is an important factor in the purchase decision-making process. However, non-consumers will generally not consider Apple products in their future purchases and tend to have a more neutral brand-related perception. In addition, users are more likely to consider Apple products in their next purchase of a smartphone or a computer. As to the level of agreement with the statements tested, both segments have a generally positive perception of the Apple brand, but as expected, a higher level was recorded among users. Collected data and related analysis provide some insight into consumer and non-consumer perception of the Apple brand and Apple products on the Croatian market accentuating the main consumer attitudes and brand perception. Future research efforts may focus on brand perception and related opinions of additional brands, products, markets and comparison studies.

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Katerina Fotova Čiković
University North
48000 Koprivnica, Croatia
kcikovic@unin.hr

Violeta Cvetkoska
Ss. Cyril and Methodius
University in Skopje
Faculty of Economics, Skopje
1000 Skopje, Republic
of North Macedonia
vcvetkoska@eccf.ukim.edu.mk

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HOW EFFICIENT ARE BANKS IN CROATIA?

Abstract

Purpose: This paper measures the relative efficiency of commercial banks in the Republic of Croatia in a period of eleven years (2009-2019) by using the leading non-parametric Data Envelopment Analysis (DEA) methodology.

Methodology: In the selection of variables (inputs and outputs) and the DEA model, we have followed Banker et al. (2010).

Results: Based on the results obtained, we have found that the average efficiency of the Croatian banking sector in the observed period is 92%. The highest (96%) and the lowest (90%) mean efficiency score were achieved in 2009 and in 2017, respectively. In addition, we have analyzed several banks that show significant changes in the efficiency scores, and provided targets for improvement of their efficiency.

Conclusion: Croatia is a developing country characterized by a bank-based financial system and this study shows that its banking system is highly efficient, but certain relatively inefficient banks should improve their efficiency. Therefore, our findings provide valuable information for regulators, policymakers and bank management in order to take proper actions to maintain the stability of the key players in the financial system in Croatia.

Keywords: Banking sector, relative efficiency, DEA, BCC, targets for improvement

1. Introduction

Banks play a key role in the stability of the financial system, especially in developing countries, where the financial system is bank-based. In the Republic of Croatia, banks had a share of almost 70% of the total assets of the financial sector in 2018. Due to their crucial role in the stability of the financial system as a whole, it is important to measure their efficiency. There are parametric and non-parametric approaches to measuring banking efficiency in the literature, and in this paper, we have focused on the leading non-parametric Data Envelopment Analysis (DEA) methodology. DEA can handle more than one output and provide information for efficiency scores, sources and the amount of inefficiency, as well as targets for improvement of the identified relatively inefficient DMUs. In this paper, we measure the relative efficiency of 20 commercial banks in Croatia active in the financial market in the period between 2009 and 2019 by using the Banker-Charnes-Cooper (BCC) DEA model (Banker et al., 1984). In the selection of variables and the DEA model we follow Banker et al. (2010). The data for the variables used in research are extracted manually from the Croatian National Bank Bulletin and official financial reports of the banks. We present

results for the mean efficiency of each bank, detailed analyses of several banks that show significant changes in the efficiency, and targets for improvement of their efficiency, as well as the mean efficiency score of the whole Croatian banking system by year.

A significant role of the banking sector in the economic development of any country is the reason why it is considered the backbone of every country's economy (Fotova Čiković & Cvetkoska, 2017). Banks are vital financial intermediaries of any national economy, and especially important in bank-based systems since their management and efficiency play an important role in the banking sector, especially due to processes of globalization and internationalization, as well as the sensitivity of activities between interest groups (Tomičić et al., 2012). Namely, one of the main specifics of banks is a large number of stakeholders with different interests, such as shareholders and managers (whose relations and communication are crucial for "good" corporate governance), deponents and bank creditors (as the most specific stakeholders), as well as employees, the country and the broader community, whose interests are represented by various supervisory and regulatory bodies and judicial authorities (Trifunović, 2009). The efficiency and performance of the banking sector are crucial for the functioning of the financial system of a national economy as it impacts economic stability and growth. Therefore, it should come as no surprise that the measurement of bank efficiency has been of great interest to scholars, academics, practitioners and regulators (Andries & Ursu, 2016). Moreover, the efficiency of the banking sector in developing countries is even more important since the stakes of financial stability are higher.

The Croatian financial market underwent substantial changes during this time frame. At the beginning of the foundation of Croatia's banking system in the early 1990s, there were many problems inherited from the socialist legacy in Croatia, but most of them were resolved over the years and it is safe to assume that this had a lot to do with the majority of bank assets becoming foreign-owned (Galac & Kraft, 2001). After proclaiming its independence in 1990, Croatia had to rebuild its banking system, establishing new standards of market-based banking practice (Jemrić & Vujčić, 2002). At the start of its transition from socialism to capitalism in 1990, Croatia had 26 state-owned banks. In an effort to promote competition, like many other transition countries, Croatia allowed relatively free entry into the banking market, which led to a credit boom, and thus, failure of many of those new banks in 1998 and 1999 (Kraft & Galac, 2007). By 1994, the total number of banks reached 49, and by 1997, there were 60 banks. However, during the banking crisis in 1998/1999, some 14 banks failed and stopped working. By the end of 2000, the number of banks went down to 43. Foreign bank entry and the intensification of competition resulted in an inevitable reduction in interest rates and prices of banking services, together with radical change in the market and the market scene. In the meantime, the banking sector has undergone mergers and acquisitions (M&A) trends, and consequently, the number of banks on the Croatian market continued to decrease as large banks acquired individual smaller banks (Tipurić et al., 2003). Over a period of 20 years, many domestic banks also became foreign banks. At the end of 2010, there were 32 banks in Croatia. The predictions of further M&A processes have come true especially among small and medium-sized banks (Kraft et al., 2002; Kraft & Galac, 2007; Tomičić et al., 2012; Croatian National Bank, 2018). The number of banks in the Republic of Croatia is decreasing, which can be considered as part of a general trend in the European Union, typical of a mature industry in the consolidation phase (due to the crisis, increased competition, challenges of technological change and new regulatory requirements) (Croatian Banking Association, 2020). In 2019, the Croatian banking sector consisted of 20 commercial banks, market concentration was very high and the share of assets of the first five banks, which oscillated at some 75% for a period of several years, increased to 81.4% in 2018, which means that the five largest banks control more than 80% of the total assets in the banking sector. The bank system is dominated by foreign-owned banks, whose share in the total bank assets in 2018 was around 90.2% (Croatian National Bank, 2019).

The Croatian financial system is a bank-based continental system, where banks play a crucial role in transferring funds to the economy by approving loans and enabling payments and are at the center of the financial system that includes other financial intermediaries (funds, leasing, etc.) (Croatian Banking Association, 2020). The banking sector can be considered a pillar of the national economy because of its vital role in the financing of economic activity (Kordić & Višković, 2018). In this paper, we

measure the relative efficiency of 20 commercial banks in Croatia that were active in the financial market in the period between 2009 and 2019 by using the non-parametric DEA methodology.

We have also analyzed the results of 7 commercial banks that show significant changes in the efficiency scores, and we also provide information on what each of these banks identified as relatively inefficient in 2019 needs to do to improve its efficiency.

The rest of the paper is organized in the following way. Section 2 gives a literature review of DEA in banking in Croatia. Section 3 describes the methodology used and data. Section 4 presents the results in a tabular and visual format, supported by their analysis, while Section 5 presents the conclusion.

2. Literature review

A bibliometric analysis of DEA in banking in the period between 1986 and 2019 is done by Cvetkoska & Savić (2021), where the authors analyze papers from the SCOPUS database. They have shown the distribution of DEA articles by year, identified the top journals and authors and the most cited papers, and provided text analytics to identify the interest of researchers in three periods (pre-2000, 2001-2010, and 2011-2019) by visualizing and analyzing keywords. They have also provided directions for future research in this area.

Neralić & Gardijan Kedžo (2019) have written a literature review published by authors from Croatia in the period from 1978 to 2018. In this paper, we focus on measuring the relative efficiency of Croatian commercial banks, hence we have surveyed DEA applications in the banking sector in Croatia and found 7 studies (Jemrić & Vujčić, 2002; Toçi, 2009; Jurčević & Mihelja Žaja, 2013; Tuškan & Stojanović, 2016; Kordić & Višković, 2018; Pavković et al., 2018, and Davidovic et al., 2019).

The author(s), period, variables and models used are presented in Table 1. On average, there are two authors per paper. The shortest period analyzed is 1 year (Kordić & Višković, 2018), while the longest period is 14 years (Pavković et al., 2018). The approach most frequently used in the selection of variables is the intermediation approach. In addition, the most frequently used model is the output-oriented BCC model.

Jemrić & Vujčić (2002) show that in the period 1995-2000, the Croatian financial system succeeded in equalizing the banks in terms of their technical efficiency, and after 1999 they recorded "a rapid catch-up towards the 'normal' levels of efficiency". They found foreign-owned banks to be on average more efficient compared to domestic banks, and new banks to be more efficient than old ones. The average efficiency of peer groups often had a U-shape, i.e. medium-sized banks were mostly less efficient. Smaller banks are globally efficient, but large banks are locally efficient.

Toçi (2009) found out that the average efficiency of the whole sector increased from 0.728 in 2002 to 0.834 in 2003 and remained virtually relatively stable thereafter. Foreign banks steadily increased their intermediation efficiency, while domestic banks did not seem to succeed therein.

Jurčević & Mihelja Žaja (2013) obtained the lowest efficiency scores in 2008 (with only 10 efficient DMUs), but with visible lower values of efficiency already in 2007. As a result of the deteriorating position of the financial market, banks again recorded lower efficiency in 2010.

Based on the results of the Charnes-Cooper-Rhodes (CCR) model, Tuškan & Stojanović (2016) found that the lowest and the highest average relative efficiency were achieved in 2012 and in 2008, respectively. Furthermore, the BCC model shows the lowest average efficiency in 2009. In addition, DEA window analysis shows the lowest and the highest efficiency scores in 2008 and in 2011, respectively.

Kordić & Višković (2018) found 11 out of 24 banks to be overall technically efficient in 2016. Large banks showed greater efficiency than medium and small-sized banks. According to the BCC model, 12 banks were relative efficient. The domestic banks that were inefficient were forced to exit the market and the remaining domestic banks have gradually improved their efficiency over time. The authors found no statistically significant difference in regard to the ownership of banks.

Pavković et al. (2018) found large banks to be the most efficient bank group using the BCC model, while the "medium-sized banks appear most efficient using the CCR model". In addition, they found that "small-sized banks are the least efficient bank group in Croatia" due to their insufficient credit activity on the assets side and the fact that they rely more on deposits as a source of funding.

The most recent study on the Croatian banking sector using the DEA methodology is the study of Davidović et al. (2019), who have found that Croatian banks have largely benefited from the EU membership (through lower interest rates for intra-bank borrowings), and the efficiency score after the EU accession increased by about 45%. State-owned banks are constantly more efficient than privately owned banks. According to their study, the largest banks are also the most efficient ones.

In this paper, we have focused on measuring the relative efficiency of the Croatian banking sector after the global financial crisis in 2007-2009, and it incorporates a timeline of 11 years (from 2009 to 2019). This study also offers valuable information and efficiency data for a period that has not yet been investigated in the Croatian banking sector (the time span 2016-2019). Furthermore, the only study on Croatian bank efficiency that is longer than this one is the study of Pavković et al. (2018), but they used different inputs and outputs in their model (deposits and total equity as inputs, and loans and fee and commission income as outputs). We have also identified outliers by using the Banker & Chang (2006) super-efficiency procedure and present valid results and targets for improvement of several banks identified as relatively inefficient in 2019.

Table 1 Literature review of banking studies with the application of DEA in Croatia

Author(s)	Period	Variables	Model
Jemrić & Vujčić, 2002	1995-2000	**Operating approach:** **Inputs:** interest and related costs, commissions for services, gross wages and other administration costs. **Outputs:** interest revenues, non-interest revenues **Intermediation approach:** **Inputs**: fixed assets and software, number of employees, total deposits received. **Outputs:** total loans extended and CNB bills and MoF treasury bills.	CCR and BCC models, input-oriented
Toçi, 2009	2002-2005	**Intermediation approach:** **Inputs:** deposits and total costs **Outputs**: loans net of provisions and total revenues	DEA (both CRS and VRS) and Malmquist Total Factor Productivity Change Index
Jurčević & Mihelja Žaja, 2013	2005-2010	**Intermediation approach:** **Inputs:** interest expenses, non-interest expenses, other expenses **Outputs:** interest income, non-interest income, other income from business activity	CCR and BCC models, output-oriented
Tuškan & Stojanović, 2016	2008-2012	**Profitability approach:** **Inputs:** interest expenses and total operating expenses **Outputs**: interest income, total operating income	CCR and BCC models, output-oriented
Kordić & Višković, 2018	2016	**Operating approach:** **Inputs:** interest costs, commission and fee costs, and general and administrative costs and amortization; **Outputs:** interest revenues and noninterest revenues, i.e. commission and fee revenues.	CCR and BCC models, input-oriented
Pavković et al., 2018	2004-2016	**Intermediation approach:** **Inputs**: deposits and total equity; **Outputs**: loans and fee and commission income.	CCR and BCC models, output-oriented
Davidović et al., 2019	2006-2015	**Intermediation approach:** **Inputs:** interest and non-interest expenses **Outputs:** interest and non-interest revenues	BCC output-oriented model and Andersen and Petersen super-efficiency model

Source: Authors

3. Methodology and data

In the selection of the DEA model, we follow Banker et al. (2010) and use the output-oriented BCC DEA model. This model is one of the most frequently used models in the DEA literature, as well as in the analysis of banking efficiency in Croatia.

The envelopment form of the model used is given in (1) - (5), (Cooper et al., 2007):

$$(\text{BCC - Oo}) \quad \max_{\eta_B,\lambda} \eta_B \tag{1}$$

$$\text{subject to } X\lambda \leq x_0 \tag{2}$$

$$\eta_B y_o - Y\lambda \leq 0 \tag{3}$$

$$e\lambda = 1 \tag{4}$$

$$\lambda \geq 0\,, \tag{5}$$

where η_B is a scalar. The input data for DMUj (j=1,…,n) are (x_{1j}, x_{2j}, ...,x_{mj}), and the output data are (y_{1j}, y_{2j}, …,y_{sj}); the data set is given by two matrices X and Y, where X is the input data matrix, and Y is the output data matrix, λ is a column vector and all its elements are non-negative, while e is a row vector and all its elements are equal to 1 (Cooper et al., 2007, p. 22, pp. 91-92; Cvetkoska & Barišić, 2017, pp. 33-34). The DMU is BCC efficient if the efficiency score is equal to 1 (100%) and its slacks are equal to 0. For more information about the BCC DEA model, see Banker et al. (1984) and Cooper et al. (2007, pp. 90-94).

Additionally, in the selection of the variables (inputs and outputs) for the DEA model we follow Banker et al. (2010). We use two inputs, i.e. interest expenses and other operating expenses (fee and commission expenses, administrative costs and depreciation and other expenses), and two outputs, i.e. interest revenue and other operating revenues (fee and commission revenue and other revenues). We have collected the data manually from the Croatian National Bank Bulletin and official financial reports of the banks. Our sample consists of 20 commercial banks in Croatia, active in its financial market in the period 2009-2019. We have excluded from the sample banks that have been merged or acquired during the analyzed period. The summary statistics for the inputs and outputs used in the research study is given in Table 2.

Table 2 Summary statistics of inputs and outputs (in 000 HRK)

	Interest Expense	Other Operating Expense	Interest Revenue	Other Operating Revenue
Mean	348,857	445,679	833,699	270,013
Standard Error	44,226	40,761	89,851	27,954
Median	65,609	83,823	130,822	39,754
Standard Deviation	655,976	604,578	1,332,713	414,621
Kurtosis	7.91	1.73	3.98	2.95
Skewness	2.80	1.56	2.11	1.81
Range	3,271,583	3,010,262	5,724,342	2,201,372
Minimum	1,878	14,896	10,910	4,437
Maximum	3,273,461	3,025,158	5,735,252	2,205,809
No. of observations	220	220	220	220

Source: Authors' calculations

4. Results and discussion

After running the BCC DEA model in the MaxDEA software we have obtained the efficiency scores for each bank in the observed period. Based on our analysis of the results obtained, we have noticed unusual results for one bank, i.e. Samoborska banka d.d., which was identified as relatively efficient over the whole observed period, but this bank operated with losses from 2013 to 2018.

When running the BCC DEA model, if there is/are no similar DMU(s) with which one DMU can be compared, the unit will be compared with itself and the BCC algorithm will show that the unit is relatively efficient. Cvetkoska & Savić (2017) used a two-phase approach to validate unusual results by setting weight restrictions in the DEA model by using the most popular multi-criteria method called the Analytic Hierarchy Process (AHP). In our case, we investigate whether there are outliers in our sample of banks by applying the super-efficiency procedure as proposed by Banker & Chang (2006). According to the results obtained, no feasible solution was found for Samoborska banka d.d. and no outliers were identified. Therefore, we have excluded only Samoborska banka d.d. from the analysis and re-run the output-oriented BCC DEA model. In this section, we present the results that refer to the sample of 19 commercial banks in Croatia.

The mean efficiency score for each bank in the observed period of 11 years is presented in Table 3. The mean efficiency score for the whole observed period is 92%. Four banks are relatively efficient in the whole analyzed period, and those are Erste & Steiermaerkische Bank d.d., Hrvatska poštanska banka d.d., Privredna banka Zagreb d.d and Zagrebačka banka d.d., which are all part of the group of large banks consisting of banks with a market share above 5% (Šverko et al., 2012).

These findings are in line with Davidovic et al. (2019), who have found that Zagrebačka banka d.d. and Privredna banka Zagreb d.d. have maintained their unrivaled and outstanding efficiency positions over the years. Furthermore, 10 banks exhibit lower efficiency scores than the average efficiency of 92%.

Table 3 Mean efficiency scores for each bank in the observed period 2009-2019

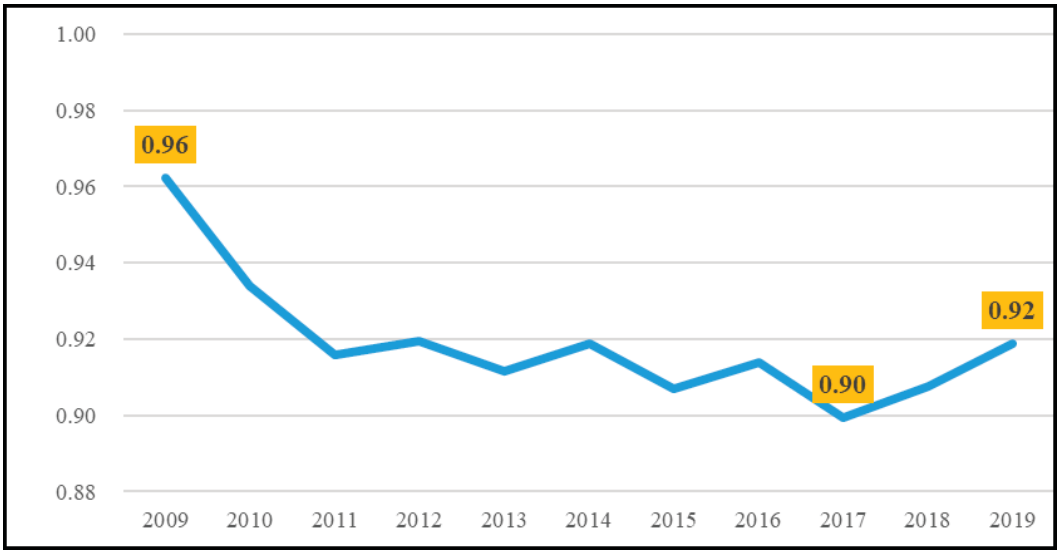
No.	Bank	Mean Efficiency Score
1	Addiko Bank d.d.	81%
2	Agram banka d.d.	87%
3	Banka Kovanica d.d.	91%
4	Croatia banka d.d.	77%
5	Erste & Steiermaerkische Bank d.d.	100%
6	Hrvatska poštanska banka d.d.	100%
7	Imex banka d.d.	91%
8	Istarska kreditna banka Umag d.d.	99%
9	J&T banka d.d.	82%
10	Karlovačka banka d.d.	87%
11	KentBank d.d.	91%
12	OTP banka d.d.	95%
13	Partner banka d.d.	92%
14	Podravska banka d.d.	86%
15	Privredna banka Zagreb d.d.	100%
16	Raiffeisenbank Austria d.d.	99%
17	Sberbank d.d.	91%
18	Slatinska banka d.d.	97%
19	Zagrebačka banka d.d.	100%

Source: Authors' calculations

The annual mean efficiency score of the whole Croatian banking system is calculated as an average of the efficiency scores for each bank in the current year. The mean efficiency of the Croatian banking sector in the analyzed period 2009-2019 is shown in Figure 1 by years as a line chart. According to this chart, the highest and the lowest efficiency score in the banking sector were recorded in 2009 (96%) and in 2017 (90%), respectively. A sharp fall in efficiency from 2009 to 2011 can be explained by the global financial crisis, which diminished the efficiency of the Croatian banks. In the case of a small open economy like the Republic of Croatia, the impact of the crisis comes from abroad in the form of smaller capital (in)flows and weaker export demand (Bokan et al., 2009). According to Davidović et al. (2019), as a result of an external shock, the banks in Croatia have noted slightly decreasing expenses, yet on the other hand, they have accumulated proportionally less revenue due to skyrocketing non-performing loans (NPL) during the crisis period.

In addition, even though 11 banks were relatively efficient in 2017, three banks showed the lowest efficiency in 2017, and these are Croatia banka d.d., KentBank d.d. and Podravska banka d.d. These are all small banks with a market share 0.56%-0.82%. Their inefficiency results could be explained by their size as well as the extraordinary crisis of the largest concern in Croatia, which was reflected in the banking market in general, as well as in credit operations of corporate clients of these banks and their impairment provisioning expenses.

Figure 1 Mean efficiency scores for the banking sector in Croatia in the period 2009-2019



Source: Authors' calculations

In Figure 2, we present a line chart for the efficiency scores of 7 banks (Banka Kovanica d.d., Croatia banka d.d., Imex banka d.d., J&T banka d.d., Karlovačka banka d.d., KentBank d.d. and Partner banka d.d.) that show significant changes in their efficiency over time. What can be drawn as a conclusion from their efficiency scores is that it seems that these seven banks have regrouped into two groups. Namely, Banka Kovanica d.d., J&T banka d.d. and Karlovačka banka d.d. were relatively inefficient by 2014, 2017, and 2016, respectively, and thereafter they were relatively efficient. Unlike them, the group consisting of Imex banka d.d., KentBank d.d. and Partner banka d.d. were relatively efficient up to 2016, when their efficiency started to decrease. Croatia banka d.d. was relatively inefficient in the whole observed period.

Banka Kovanica d.d. experienced a decrease in efficiency as a result of the global crisis, but to a lesser extent (from 80% in 2009 to 69% in 2011, when it started to increase its efficiency to 93% in 2013, and started to be efficient from 2014 to 2019). This is a

rather untypical result for a bank with a 0.3% market share and a member of the group comprising small banks. This rise in efficiency and maintaining efficiency for five years can be explained by their business performance improvement (ROE - 13.4% in 2019), a high capital adequacy ratio (18.0% in 2019) and prudent investment policy and effective uncollected debt recovery policy of the bank as well as further automation of company processes to optimize back and middle office functions.

Croatia banka d.d. recorded 86.14% efficiency in 2009 and experienced a rather dramatic fall to 73% in 2013. It increased efficiency to 82-85% from 2014 to 2016, but its efficiency started to decline once again in the period 2017-2019, ending the year 2019 with a score of 69%. This can be explained with impairment of loans and advances to customers as well as the process of consolidation of the liquidity structure at the level of the entire bank. Croatia banka d.d. was the least efficient bank in the whole observed period and it is fully (100%) owned by the state.

Imex banka d.d. recorded some rather untypical scores of efficiency, which are contrary to the banks analyzed earlier. Namely, it recorded an efficiency score of 100% in the whole post-crisis period, and its efficiency started to decline from 87% in 2016 to 71% in 2019. These efficiency scores could be explained with the new business strategy of the bank from 2015-2020, which defines its orientation towards citizens, craftsmen, small and medium-sized enterprises with a focus on an individual approach to the client and the quality and speed of service as the main advantages. The essence of the changed business model refers to the reduction of the bank risk profile and the reduction of concentration risk with primary orientation and emphasis on the growth of the citizen portfolio. Their strategic goals were to increase the share of retail loans in the total loan portfolio and increase the number of clients with a loan or deposit and eventually increase the number of products per client. By analyzing the balance sheets of Imex banka d.d., it is evident that the bank used to achieve growth of profit by 2011, when it started to decrease gains and record losses. The efficiency scores imply that the effects of the new business model do not bring the desired effect.

J&T banka d.d. experienced a dramatic fall in efficiency in the post-crisis period (from 83% in 2009 to 61% in 2013). However, it recorded an increase in efficiency since then and has restored efficiency since 2017. This increase is a result of a change in business strategies in 2017 and a shift of focus towards bigger corporate clients. As part of the change in strategy, J&T banka d.d. has optimized its business processes, altered its organizational structure and reduced the number of employees.

Karlovačka banka d.d. was relatively efficient in 2009. After that, it experienced a decrease in efficiency to 70% in 2011 and 74% in 2015, and restored its efficiency from 2016 by the end of the observed period, which was explained by its management by the exit of Croatia from recession in 2015.

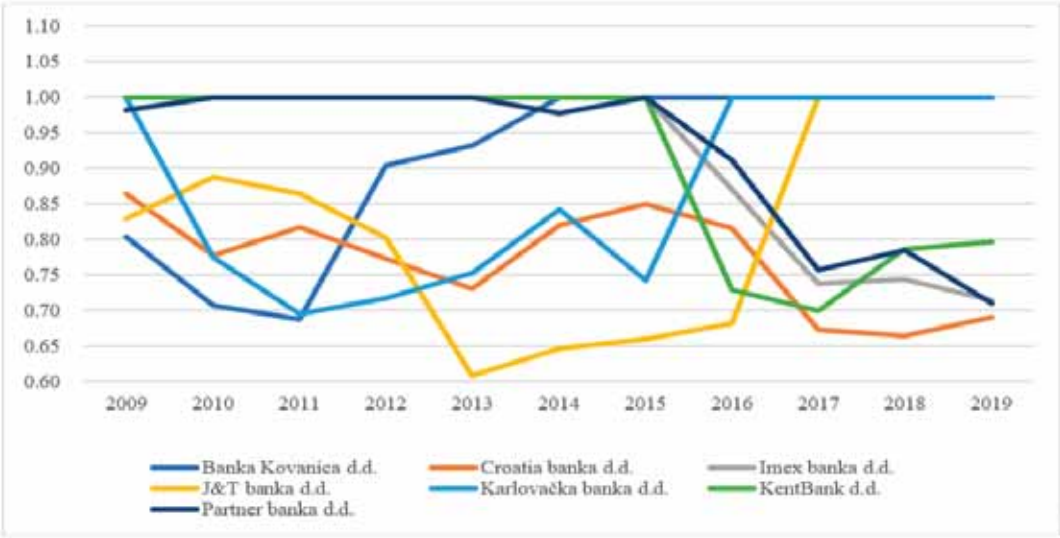
KentBank d.d. was relatively efficient in the post-crisis period by 2016, when its efficiency score was 73% and 70% in 2017. Its efficiency increased in 2018 and 2019 (to 79% and 80%, respectively), but it remained relatively inefficient. This could be a result of the banking operation modernization process and business network expansion.

Partner banka d.d. showed rather untypical efficiency results, i.e. its efficiency score in 2009 was 98%, and after that, it was relatively efficient from 2010 to 2013 and in 2015, following a sharp decrease in efficiency from 91% in 2016 to 76% in 2017 and 71% in 2019. The decline in efficiency in 2017 cannot be attributed to the collapse of the Agrokor Group since the Management Board of Partner banka d.d. had previously made a decision on a gradual decrease the total exposure of the Bank to the Agrokor Group. The Management Board of Partner Banka d.d. stated in the 2017 Annual Report that they "increased placements and loans to more quality and more stable clients with reliable cash flows and high-quality collaterals since 2017 and in that way significantly decreased its credit risks, thus providing with new profitability" (Partner banka d.d., 2017).

The group of small banks in Croatia recorded lower efficiency scores than the group of large banks and these findings are consistent with previous research studies conducted by Kordić & Višković (2018), Pavković et al. (2018) and Davidović et al. (2019).

Most analysts question the sustainability of small banks and thereby announce possible further consolidation processes. The consolidation of small banks has long been cited as an inevitable scenario for the development of the banking sector (Šverko et al., 2012).

Figure 2 Efficiency scores over time for 7 commercial banks in Croatia



Source: Authors' calculations

Four out of the seven banks analyzed, i.e. Croatia banka d.d., Imex banka d.d., KentBank d.d. and Partner banka d.d. were relatively inefficient in 2019. In Table 4, the authors present the benchmarks for those banks and their λ. As can be seen from this table, Banka Kovanica d.d. is a benchmark for all inefficient banks. Based on λ for Croatia banka d.d., we can see that in calculating the targets for its improvement, Slatinska banka d.d. will have the highest impact because it has the largest value for λ (0.8960) followed by Banka Kovanica d.d., OTP banka d.d. and Zagrebačka banka d.d.

Table 4 Benchmarks for four inefficient banks in 2019

Banks	Benchmarks with λ
Croatia banka d.d.	Banka Kovanica d.d. (0.0967); OTP banka d.d. (0.0045); Slatinska banka d.d. (0.8960); Zagrebačka banka d.d. (0.0028)
Imex banka d.d.	Banka Kovanica d.d. (0.5614); Istarska kreditna banka Umag d.d. (0.0805); Slatinska banka d.d. (0.3580)
KentBank d.d.	Banka Kovanica d.d. (0.7822); Istarska kreditna banka Umag d.d. (0.1932); OTP banka d.d. (0.0247)
Partner banka d.d.	Banka Kovanica d.d. (0.9485); Privredna banka Zagreb d.d. (0.0015); Slatinska banka d.d. (0.0500)

Source: Authors' calculations

In Table 5, we present the targets for improvement for the same four banks based on which they can achieve the efficient frontier and be relatively efficient. According to the calculations for the inputs and the outputs, we can see that the analyzed banks need to increase their outputs, while Partner banka d.d. also needs to decrease the input interest expense.

Table 5 Projection for four inefficient banks in 2019 to achieve the frontier in future

(in 000 HRK)

	Interest Expense	Projection	Other Operating Expense	Projection	Interest Revenue	Projection	Other Operating Revenue	Projection
Croatia banka d.d.	10,910	10,910	60,803	60,803	53,109	76,967	19,694	28,541
Imex banka d.d.	12,483	12,483	48,475	48,475	53,213	74,499	7,049	16,339
KentBank d.d.	15,443	15,443	77,607	77,607	88,839	111,511	7,175	26,813
Partner banka d.d.	16,540	15,782	47,311	47,311	60,793	85,720	8,975	12,655

Source: Authors' calculations

5. Conclusions

Banks play a vital role in the economy of each country and their importance is emphasized in developing countries, where the financial system is characterized as a bank-based system. Therefore, measuring their performance is important for maintaining the stability of the financial system.

In this paper, we measure the efficiency of commercial banks in Croatia in a period of 11 years (2009-2019) by using the leading non-parametric DEA methodology. In the selection of the variables and the DEA model, we have followed Banker et al. (2010).

Based on the results obtained, the average efficiency of the Croatian banking system is 92%. Four banks were relatively efficient in the analyzed period and they are as follows: Erste & Steiermaerkische Bank d.d., Hrvatska poštanska banka d.d., Privredna banka Zagreb d.d. and Zagrebačka banka d.d. Croatia banka d.d. was identified as the least efficient bank with a mean efficiency score of 77% in the whole analyzed period. In addition, we have analyzed seven banks that show significant changes in the results in the observed period, and for those that were relatively inefficient in 2019, we provide benchmarks and targets for improvement (a decrease in inputs and/or an increase in outputs). By following these targets, relatively inefficient banks could improve their efficiency and be projected onto the efficient frontier.

In further research we plan to investigate the determinants of efficiency by using the DEA+OLS (ordinary least squares) procedure proposed in Banker & Natarajan (2008), which is also applied in the Korean banking sector (Banker et al., 2010).

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Vesna Buterin
University of Rijeka
Faculty of Economics and Business
51000 Rijeka, Croatia
vesna.buterin@efri.hr

Barbara Fajdetić
University of Rijeka
Faculty of Economics and Business
51000 Rijeka, Croatia
barbara.fajdetic@efri.hr

Martina Mrvčić
51000 Rijeka, Croatia
martina.mrvcic@gmail.com

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IMPACT OF MIGRATION AND POPULATION AGING ON ECONOMIC GROWTH IN THE REPUBLIC OF CROATIA

Abstract

Purpose: Migrations are a complex economic variable that is highly influenced by conditions such as social, societal, economic, political, environmental, and the like. The preferences of the population vary and in accordance with their own needs, the population decides to migrate. Many economies of the world are facing the problem of out-migration of the young population. Moreover, the elderly population is increasing as a percentage of the total population. The aim of this research is to show the gender and age structure of the population, the state of migration and the impact on the economic growth in the Republic of Croatia.

Methodology: Data on the population structure and migration in the Republic of Croatia are analyzed for the period 2004-2019.

Results: The research conducted suggests that the population of the Republic of Croatia is facing a large outflow of young people and a decline in the birth rate.

Conclusion: In the Republic of Croatia, the age structure of the population follows global trends, which means that there is a larger proportion of the elderly population. Such changes have serious consequences for sustainable economic growth for any country, including the Republic of Croatia.

Keywords: Migration, population aging, labor market, Republic of Croatia

1. Introduction

The outflow of people from a country means loss of a country's very valuable human capital, especially if they are young, educated people. On the other hand, the aging population is putting tremendous pressure on the country's pension and health care systems. The life expectancy of the population is being extended due to better living conditions, medical care and better accessibility to services that provide more comfortable living conditions for the elderly population. Throughout history, migrations have shaped society and changed its appearance. Population movement is one of the very important economic determinants that determines the future growth and development of any economy. The Republic of Croatia joined the European Union in mid-2013, gaining access to

the European market. However, one of the direct effects of joining the European Community and the related redistribution of domestic factors was significant migration from the Republic of Croatia to the European Union. The main hypothesis that will be researched in this paper is that migration and population aging have a negative impact on economic growth. Furthermore, the consequence of such situation will have negative implications for the labor market, the pension system and the health care system. That is why it is of great importance that the Government adopts economic policies which will encourage demographic renewal. The purpose and aim of this paper are to present and analyze data on migration and population structure and to explain the impact on a country's economic growth. In what follows, current data on migration in the Republic of Croatia and the age of the population are presented, which were obtained from the Central Bureau of Statistics, Eurostat, and World Bank databases.

2. The impact of migration and population aging on economic growth

Economic growth can be defined as an increase in the quality and quantity of goods and services produced and consumed in an economy over time. It is usually measured as a percentage rate of increase in real gross domestic product (GDP) or real GDP per capita. (Roser, 2013). Growth is usually calculated realistically, that is, in line with inflation, to eliminate the distorting effect of inflation on the price of manufactured goods. Economic growth is measured by calculating national income (Bjork, 1999, p. 251). "Economic growth rate" refers to the geometric annual growth rate of GDP between the current year and the previous year over a given period. GDP growth caused only by an increase in available inputs, such as population growth or new land, is called large-scale growth (Bjork, 1999, p. 256). A country's productive capacity and economic characteristics are likely to change as its population ages, because different age groups have different needs. A standard approach to assessing these changes is to assume constants in the behavior of age groups with respect to consumption, savings, and employment. In addition, it is important to assess the impact of these changes in the relative size of different age groups on national income (Akrap, 2013, p. 15). However, this simple approach can lead to flawed assumptions, as changes in norms and expectations alter individual behavior in ways that will affect the economic consequences of an aging population. In particularly, longer life expectancies relative to previous generations may lead individuals to remain in the labor force longer and withdraw their savings at a later age. Moreover, the relationship between population aging and aggregate economic performance is a result of the institutional context. Bussolo et al. (2015) conducted research on population aging and came to the conclusion that the main cause of population aging is a decline in fertility rates. With increasing longevity and an aging population, pension policy schemes, pension, and health care systems, labor market and capital market efficiency, and the structure of regional and global policies are very likely to adapt to new changes. The extent of these changes may in turn depend on the electoral and political behavior of the older electorate, whose needs and interests may differ from those of the younger population (Deren-Antoljak, 2002, p. 222).

Human capital is an important dimension in economic growth. In his research, Kwon (2009) listed some definitions used by different authors to explain what human capital is. It can be summarized that human capital is a combination of knowledge, skills, competencies, behavior, and education of an individual. It is an investment that increases the productivity of people. The impact of human capital can be divided into three areas - individual, organization and society. From the individual's perspective, human capital affects his/her employment opportunities - the better a person's skills and knowledge, the easier he/she is to employ. From the perspective of the organization, human capital has an impact on the organization's competitiveness, its routines, and its culture. The social perspective of human capital synthesizes the individual and organizational perspectives. Human capital increases social awareness. A better educated population is more aware of social problems that affect modern society (Kwon, 2009).

Kwon (2009) also presented three approaches to measuring human capital stock: output-based, cost-based, and income-based. The output-based approach analyzes the relationship between human

capital and economic growth and is expressed in terms of enrollment rates. The cost-based approach measures how much an individual has invested in their education and training. The income-based approach is based on the returns that individuals make to the labor market after their education.

Wen-Hsin et al. (2019) emphasize that empirical findings indicate that human capital is essential for productivity growth and that an aging workforce and population is negatively related to the GDP growth rate.

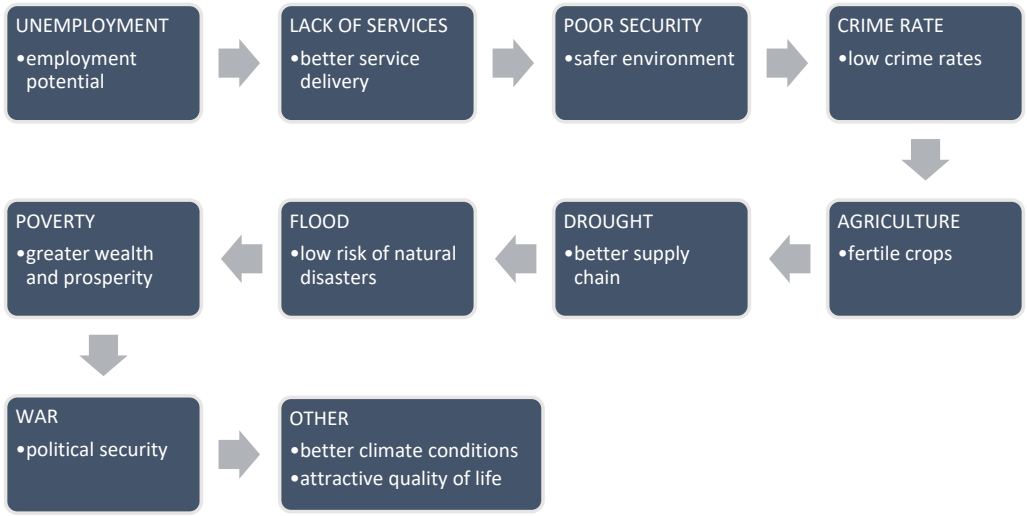
2.1 Basic characteristics and causes of migrations

Migrations can be defined as population movements from one place to another, with the intention of settling permanently or temporarily in a new place or geographical region. Movement is often over long distances and from one country to another, but internal migration is also possible and it is the dominant form of human movement on a global scale (International Organization for Migration, 2020). Populations may migrate as individuals, in family units, or in large groups (International Organization for Migration, 2020). Population movement can be natural, through births and mortality, or mechanical, through emigration and immigration. In modern times, the management of migration is closely linked to state sovereignty. States retain decision-making power over both the entry and residence of non-residents, as migration directly affects some key elements of the state economic policy. Bilateral and multilateral agreements are features of migration management, and there are several global agreements in the form of international treaties in which states have agreed to apply human rights and related responsibilities. Historically, population migration is the movement of a population from one place to another, possibly to another state, with the intention of settling temporarily or permanently in a new place. It usually involves a long-distance move from one country or region to another. Migrations can be voluntary or forced. Voluntary migration refers to a self-initiated move for personal reasons, while forced migration refers to leaving one's former place of residence for political, social, economic, religious and similar reasons. Furthermore, migrations can be internal, external, emigration, immigration, return migration and seasonal migration.

Walmsley et al. (2017) present contemporary theories of international migration which suggest that people usually move because they expect higher wages, employment, better health care, and education. They state that migrations due to a financial crisis are temporary and do not affect the demographic story. Liberalization in migration policies will accelerate migrations and reduce negative effects of population aging. The causes of migration are shown in Figure 1. Internal migration refers to the movement of population within a country, state or continent, while external migration refers to the movement to another country, state or continent. Emigration is a term that means leaving a state and moving to another state. Immigration is moving to a new country. Return migration refers to returning to the country, state, or region which one left earlier. Seasonal migration is the movement of population depending on climate or working conditions in a particular area as well as tourism needs. Accordingly, emigrants are residents who leave one state or country to live in another. Immigrants are people who enter a country from another state or country to live there permanently. Refugees are people who have been forced to leave their permanent residence due to political, economic, and other circumstances (Mikac & Dragović, 2017, p. 147). Population migrations occur continuously and are motivated by various reasons. In poorer parts of the world, populations migrate in search of better living conditions, such as food, water, and other basic needs. In developing countries, populations migrate due to inadequate economic, political, and social conditions. In developed countries, the reasons for migration may be personal preferences of the residents and their individual need to change their place of residence. The economic and political situation in the country can play a very important role in the reasons for population migration. Due to better economic opportunities, many leave their current place of residence but already choose to go to more developed countries that offer better social and societal opportunities.

Research in South Asia showed that countries which receive more migrants are experiencing increased production and greater returns to capital. This leads to increased investments and capital growth over time. Positive migration flows and increased capital will increase real GDP (Walmsley et al., 2017).

Figure 1 Causes of population migration



Source: Jaccob (2013)

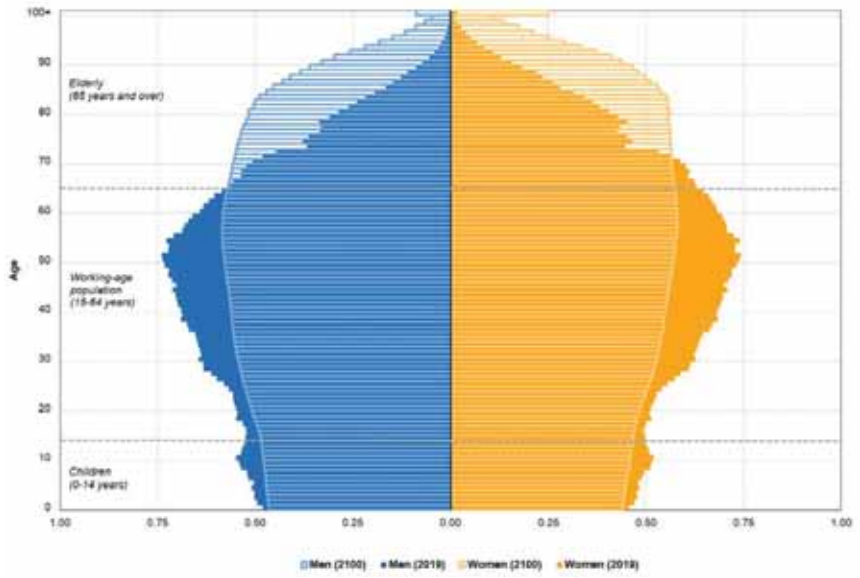
2.2 Population aging as a consequence of demographic transition vs. economic growth

Population aging is the concept of an increasing proportion of the middle-aged population in the total population of a country or area, due to declining birth rates and increasing life expectancy. Most countries have increasing life expectancy and an aging population. According to research conducted by Žokalj (2016) in all EU countries, life expectancy is expected to increase, with the highest growth in the countries with the shortest life expectancy in 2013 (the Baltic countries, Romania, Bulgaria and Hungary). At the EU level, life expectancy of men will increase from 77.6 (2013) to 84 years (2060), and life expectancy of women in 2060 will be 89.1 years (in 2013, it was 83.1).

Thach and Duc (2019) emphasize that in most developing countries, a combination of declining fertility rates and mortality rates and increasing life expectancy led to a rapidly aging population.

These are trends that first appeared in developed countries and are now seen in almost all developing countries. The inevitable consequence of the demographic transition and the move to lower birth and death rates is an evolution in the age structure of the world's population. Many societies, especially in developed countries, have already reached older population age structures than ever before in the past. Many developing countries are experiencing a sudden change in the midst of demographic transition, that is, the transition of a relative number of children, the working population and the elderly. The number of people over 60 years of age was 605 million in 2000 (Mirkin & Weinberger, 2000, p. 41). It is estimated that this number will exceed 2 billion people by 2050, which will be equal to the number of children under the age of 14.

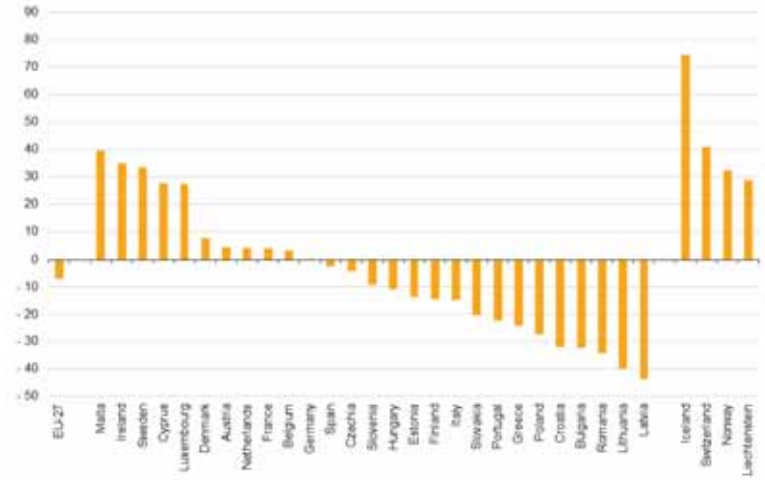
Figure 2 Population pyramid in EU27 in 2019 and 2100 (% of population)



Source: Eurostat (2021). https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Population_projections_in_the_EU

Figure 2 shows the age and gender structure of the population in the European Union for 2019 and the projections for 2100. There is a clear age difference in both population pyramids. It is estimated that the change in the age and gender structure of the population will lead to a decreasing share of children and young people in the total EU population. However, the working age population (15-64 years) is also projected to be significantly smaller. These projections result from assumptions about future fertility, mortality and net immigration.

Figure 3 Projected population change in the period 2019-2100 (in %)



Source: Eurostat (2021). https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Population_projections_in_the_EU

According to Eurostat (2021), all EU Member States will age, but the pace will vary across countries. Malta and Ireland are countries with the biggest growth in population by 2100 with more than 35%. On the other hand, in Latvia, Lithuania, Romania, Bulgaria and Croatia, the number of inhabitants will fall by more than 30% by 2100. Current data show that two thirds of the total population in the European Union is of working age. However, this proportion is decreasing steadily, and it is projected that the working age population will reach 55% in 2100. These projections are based on the current median age and age dependency ratio, which varies from country to country. The demographic dependency ratio is used as an approximate indicator of the relative size of the working age population and the non-working age population. The youth dependency ratio, i.e. the number of children per 100 working-age people aged 15 to 65, and the old-age dependency ratio, i.e. the number of people aged 65 and over per 100 working-age people, indicate the dependency burden on the workers and how this type of dependency shifts from the younger to the older age group during the demographic transition (Mirkin & Weinberger, 2000, p. 47). It is predicted that Germany and Portugal will have the highest young-age dependency ratio by 2100. In contrast, the biggest old-age dependency ratio is predicted for Germany and Luxembourg. It is also interesting to note that the old-age dependency ratio will be above 50% in most EU Member States by 2060, meaning that there will be two people of working age for every person over 65 (Eurostat, 2021). These predictions clearly indicate a negative feeling about the future of the labor market. The United Nations (2019) indicated that the number of persons over 80 nearly tripled between 1990 and 2019. Moreover, the largest increases were recorded in Eastern and South-Eastern Asia, Northern Africa and Western Asia. These regions have the fastest pace of population aging. Life expectancy also increased by additional 19 years.

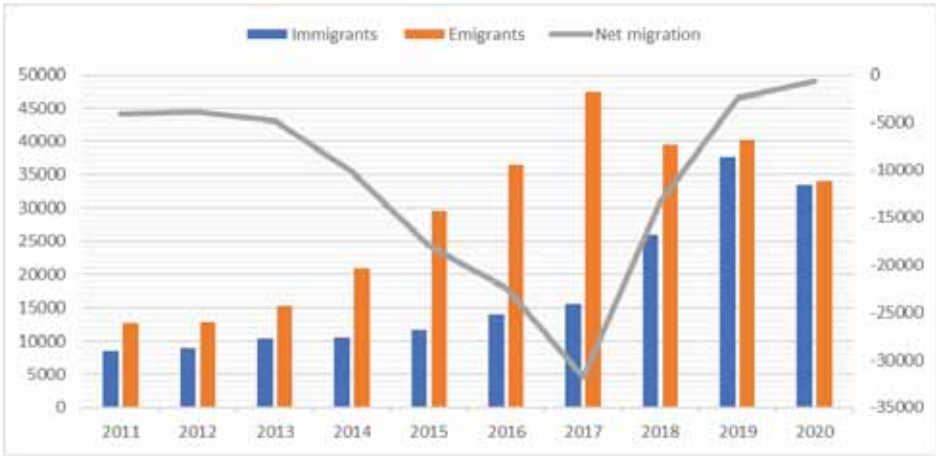
Rapid changes in the age structure of society can make it difficult to adapt to changes that spread over time because the rate of aging has very important implications for government policy, the pension system, health care, and economic growth (Bloom et al., 2011, p. 56). Population aging is not gender neutral according to basic demographics. The trend in the structure of the elderly population changes in terms of gender, that is, it changes the balance of men and women in the total population. The higher mortality of men during their lifetime means that women on average outnumber men in old age, and the difference widens towards older age. Demographic change and population aging is a serious issue for modern society that might have a negative impact on economic growth. The proportion of working-age people in the population is a key indicator of a region's or a country's potential to reap a demographic dividend. A high proportion of working-age people is only beneficial if those people are employed. If they are unemployed, the outcome is likely to be problematic. That is the reason why market policies should encourage employment by improving access to health care and education, so the working-age population is well-prepared for the demands in the labor market. If a government does not provide infrastructure and efficient employment policy, the social and income inequalities will increase (Bloom et al., 2010).

3. Data and methodology

The global financial crisis has hit Croatia hard, and the effects of the deep and prolonged recession have influenced the economy for a long time, despite its accession to the European Union. Judging by the experience of other new EU Member States after the accession, the exodus should not be surprising as it is a direct consequence of joining the free European market, so migration to more developed parts of Europe with higher income is predictable (Murgić, 2009, p. 20). Other EU Member States, such as Bulgaria and Romania, experienced a very similar scenario. The analysis of the data available in the Croatian Bureau of Statistics, Eurostat and World Bank databases will show the effect of migration and population aging and connect the impact on the economic growth of the Republic of Croatia.

Figure 4 shows the movement of the net migration balance of Croatia from 2011 to 2020. As can be seen from the figure, the net migration balance is negative in the observed period, but after the accession of the Republic of Croatia to the European Union a negative net migration balance became even more significant. The lowest point of net migration was recorded in 2017, when most European countries facilitated the employment of workers from the Republic of Croatia.

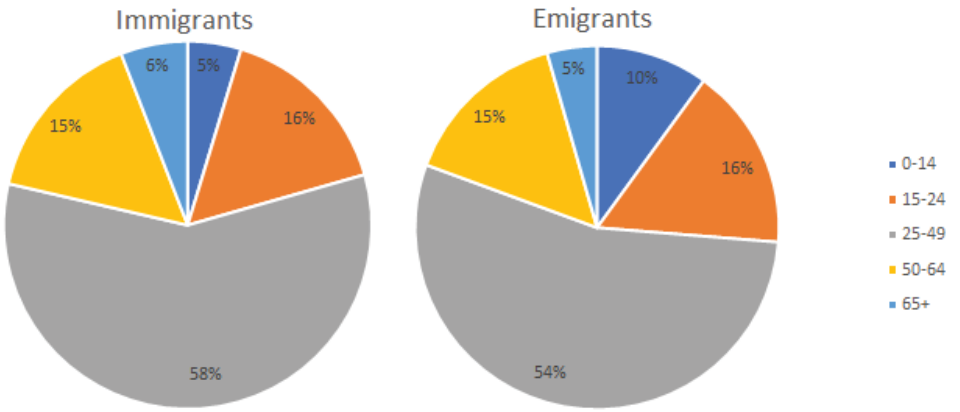
Figure 4 Net migration balance of Croatia from 2011 to 2020



Note: Net migration balance = Number of immigrants – number of emigrants, in thousands.
Source: Authors, based on CBS data (2021)

For years, the largest number of emigrants came from the working population, mostly between the ages of 25 and 50. It is worrying that in recent years whole families have emigrated from Croatia, reducing the number of the working population. Figure 5 gives a detailed overview of the age structure of immigrants into and emigrants from Croatia in 2020. It can be seen that most emigrants and immigrants are between 25 and 50 years old. It indicates that the working-age population migrates most. The data indicate that young citizens with children will emigrate permanently. This out-migration is considered irreversible as it is assumed that the integration of children into the destination country's system will greatly hinder the return of migrants.

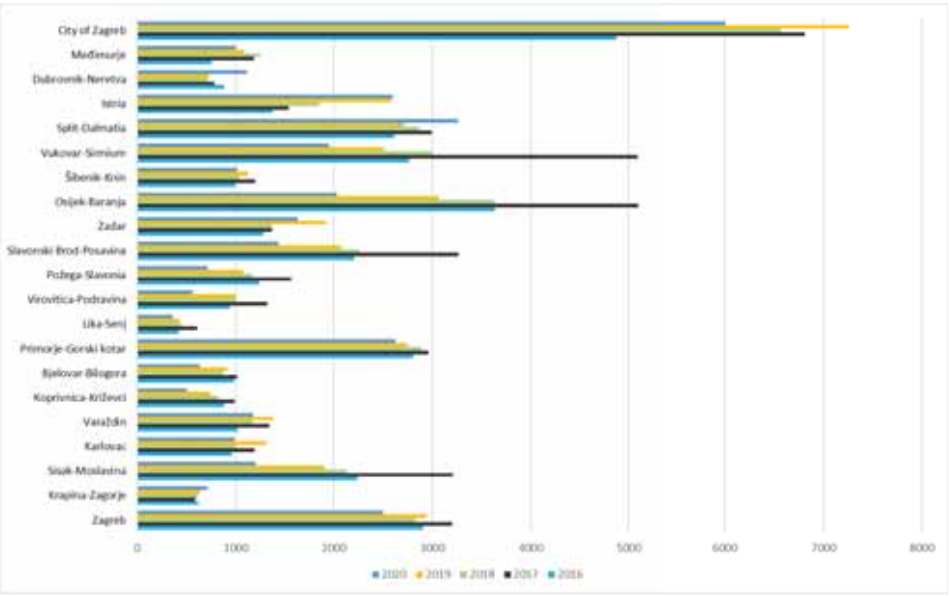
Figure 5 The age structure of immigrants and emigrants from Croatia in 2020



Source: Authors, based on CBS data (2021)

Figure 6 shows the structure of international emigrants from Croatia by counties in the period from 2016 to 2020.

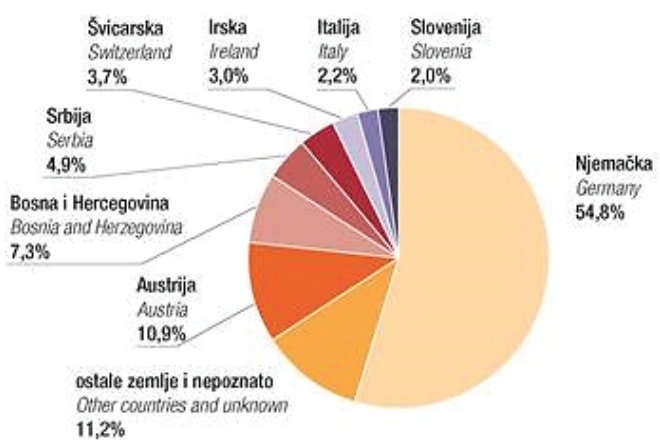
Figure 6 Number of international emigrants from Croatian counties in the period 2016-2020



Source: Authors, based on CBS data (2021)

The highest number of emigrants in all observation periods was recorded in the city of Zagreb. This is related to the number of inhabitants, as the city of Zagreb is the most densely populated part of Croatia. However, in 2017, Osijek-Baranja and Vukovar-Sirmium counties recorded a higher number of international emigrants. This emigration trend is typical of the Eastern Croatian counties, which are less developed and most affected by the migration trend. Emigration flows were much stronger in the regions with the highest unemployment rate, such as Eastern and Central Croatia and Lika and Gorski Kotar. According to the Croatian Bureau of Statistics (2018), more than 85% of immigrants from Croatia went to three Member States after joining the European Union, namely Germany and Austria, as can be seen in Figure 7.

Figure 7 Main European emigration destinations for Croatian residents in 2020

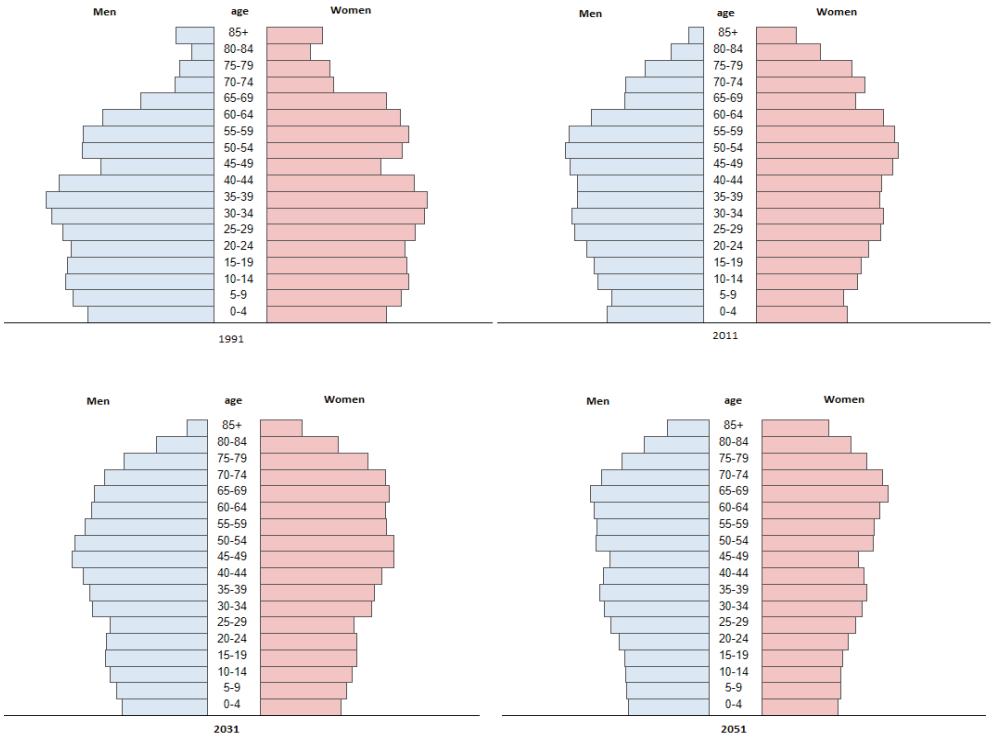


Source: CBS (2021). https://www.dzs.hr/Hrv_Eng/publication/2021/07-01-02_01_2021.htm

Figure 7 shows the main emigration destinations before and after joining the European Union. Although the overall flow of emigrants has increased, the composition of the main destination countries has remained almost unchanged, with the sole exception of Ireland. Considering the decision of Germany and Austria on the transitional regime for Croatian citizens until June 2018, emigration to these two members was even higher. One of the main consequences of emigration is the loss of human capital, i.e., the loss of a highly educated population that chooses to move to another country after leaving school. Accordingly, aggregate demand falls as less money is available in the market. Although total employment declines, there is higher unemployment and lower wages for complementary occupations. There is less competitiveness, but there is also a direct negative impact on market productivity and therefore GDP growth.

Figure 8 shows the age and gender structure of the population of the Republic of Croatia in the period 1991-2051. Large changes in the structure can be observed already in the period 1991-2011. During that period, the proportion of male and female population was equal in all age groups, but in 1991, a larger number of newborns and adolescents was noticeable. After 2011, the gender pyramid changes its shape with age, implying that the population in the Republic of Croatia is getting older and the number of newborns is decreasing. Projections for 2031 and 2051 follow global trends and predict a drastic decrease in the number of newborns and adolescents.

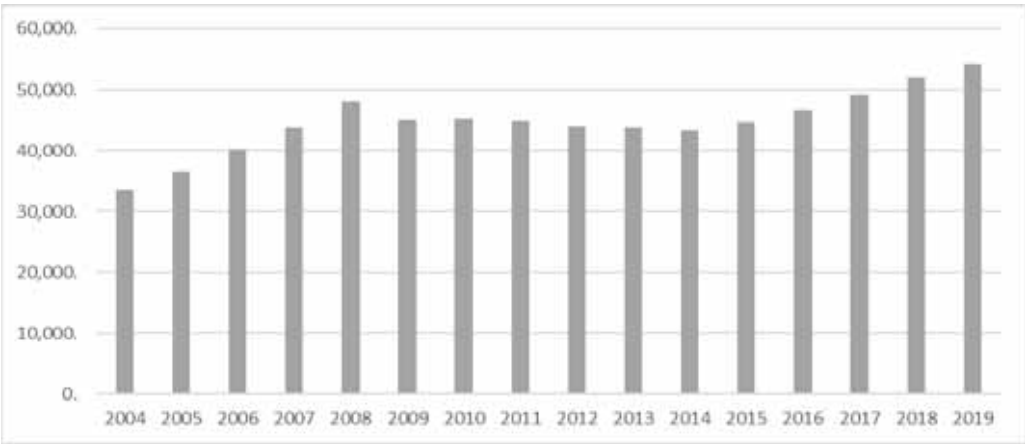
Figure 8 Age and gender structure of the population in Croatia from 1991 to 2051



Source: Croatian Bureau of Statistics (2020). https://www.dzs.hr/app/rss/piramida-stanovnistva.html

It is inevitable that such age and gender structure of the population will have an impact on economic growth in the future, both in the Republic of Croatia and globally.

Figure 9 Gross domestic product in Croatia from 2004 to 2019 (mil. €)



Source: Authors, based on Eurostat data (2020)

Figure 9 shows the movement of the gross domestic product in the period 2004-2019, in current prices. It can be seen that the value of GDP fluctuates in the observed period. GDP grew until 2009, when the Republic of Croatia was hit by the economic crisis. This situation is even better illustrated in Figure 10, which shows the growth rates of GDP in the observed period.

Figure 10 GDP growth rate in Croatia from 2004 to 2019

Source: The World Bank (2020). https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=HR

A drastic decrease in GDP is a result of the economic crisis that affected the whole world and Croatia as well. Due to a poor economic situation, a certain part of the population decided to look for better economic conditions in other European countries (mostly due to the lack of jobs), especially after Croatia joined the European Union, which facilitated the departure of the Croatian population for other countries. Accordingly, the number of emigrants from Croatia is growing, i.e. the value of GDP depends on the movement of the population within the country. From 2015 to 2019, the value of GDP grew, but the number of emigrants also decreased, which in turn indicates that the first wave of emigration has stopped, and the situation is slowly but surely stabilizing.

4. Results and discussion

Population movement has a major impact on the economic situation and health of every country in the world. Migrations represent the movement of population in or out of the country and accordingly affect numerous economic indicators. In addition to population movements, the economy is also affected by population aging. Migrations affect the structure and population of the country as it is mostly the movement of highly educated and younger people in search of better social and economic opportunities. Each state has its own policies, strategies, and measures to keep the population in its country. The consequences of outmigration are usually felt when there is economic instability in the country. All three countries examined in this study faced this situation. Some of the suggestions to encourage the younger population to stay in the country are a minimum wage increase, reduced public benefits (taxes, surcharges, VAT, etc.), support to young parents, subsidized loans for young families and young married couples as first-time homebuyers, extended stay of children in kindergartens and schools, free kindergartens, more flexible working hours, employment after graduation, internships and subsidized employment for young people without work experience, organization of career fairs and employment fairs several times a year, organization of meetings between employers and employees, and the like. What measures and strategies each country will implement mostly depends on the possibilities and the current situation in the country. These are just a few examples that can facilitate and reduce the outflow of population from the country, and practically every country can introduce and adapt measures according to its needs. Related to this is population aging, which can promote rejuvenation by the same or similar measures. In addition to encouraging the population to remain in the country, all of the above measures can also contribute to population rejuvenation. All these measures enable the population of the country to enter into the rejuvenation process. Accordingly, the economic power of the country, i.e., gross domestic product, increases, migration to the country also increases, immigration decreases, and wealth and well-being are created, which enables better economic progress in the future. Migration and population aging have very similar consequences for the economy and the business cycle. Their negative movement correlates negatively with the economic performance of the country's economy, which was evident from the research presented. Actually, this research clearly shows and confirms the research question that population aging and migration have a negative impact on the economic growth and that the consequence of such situation will have huge negative implications for the national economy as a whole if adequate economic policies are not adopted. The Government should adopt economic policies which will encourage demographic renewal and mitigate the effects of an aging population. The country will achieve more progress by adopting measures, policies, strategies and tactics that create positive trends in population movement and the age structure, and accordingly, the desire of the population to create and participate in future progress of the country will be satisfied, without searching for a better life in foreign countries. Some of them may focus on active employment policies to increase labor force participation and employment rates, then legal reforms that will focus on preventing early retirement, or subsidies paid to employers who hire citizens aged 65 and above. All countries in the world, including the European Union, are facing these problems and have developed their own strategies and tactics to address these problems, with varying success in the implementation and the results that these measures achieve in the economy. Immigrants bring new knowledge, ideas and innovations to the country in which they reside, thus representing the positive side of migration, while the outflow of the population from the country represents a loss in the form of human and scientific capital, which is realized in other countries or in Europe. This problem is faced

by almost all more developed countries, although not at the same intensity. Population aging is a problem of modern society, not just of the world economy. It is a problem that affects the whole world, and the question arises as to how this problem can be adequately solved. It is a burden on the whole economy and dealing with this problem is an extremely sensitive issue for any country.

5. Conclusion

There is no doubt that changes in age distribution have complex economic and social implications at the societal and individual levels. For example, an oversupply of workers can turn into an acute shortage of entrants within a few years. Similarly, the retirement of older workers is a source of serious pressure on the state economy through its impact on the pension system. An important question that arises is how to best allocate limited resources within the private and public sectors. It is a problem that plagues almost every economy both in the world and in Europe. Every economy combats these problems in the best possible way and by applying the best possible measures and policies. Therefore, planning must be more sensitive to expected demographic changes. This is particularly important in light of an increasingly competitive and integrated international economic environment and a rethinking of the limits of the welfare state. It is a common rule that countries can adapt more easily to change if change is slower. As the experience of developed countries shows, adapting to challenges such as an aging population is not easy, even though the aging process has been underway for decades. Given the major changes in the age structure that have taken place in developing countries in a short period of time, these countries have less time to adapt to the changes and problems arising from the change in the age structure compared to developed countries. This actually raises the question of what an adequate way is to adapt to these changes in the aging population without causing harmful consequences for every participant in the economic system. At the individual level, there is a need to ensure that older people maintain their dignity, self-confidence, and mental and physical health to enable their continued participation in society and to recognize their valuable contribution to family and community. A challenge for every country is to create conditions that promote the quality of life and increase the ability of older people to work and live independently of others as long as possible. Croatia is a country facing the problems of migration and population aging. Every country has different strategies and views on these issues, but it is inevitable that these changes will take place faster than before. The elderly population can certainly contribute to the community in which they work by doing simpler and less physically demanding work, which is helpful in carrying out other activities in the public or private sector. This relieves some of the workable contingent, which then has the opportunity to focus on a more important part of their business obligations. Migration causes the outflow of human capital to other countries where better economic, social, political, societal and health conditions prevail. The pressure of an aging population on the pension and health care system further slows down economic growth, which largely depends on the working-age population, which is declining due to stagnation or falling birth rates. Croatia will have to take the issue of sustainability of the pension and health care system more seriously. Finally, there is a legitimate question of how migration and population aging can be exploited for the benefit of economic growth, which can be a research question for new scientific findings.

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Sanja Knežević
University of Slavonski Brod
35000 Slavonski Brod, Croatia
sanja.knezevic@unisb.hr

Hrvoje Sivrić
University of Slavonski Brod
35000 Slavonski Brod, Croatia
hsivric@unisb.hr

Danijel Kušljić
ImPPPact – Civil & Social Organization
35000 Slavonski Brod, Croatia
d.kusljic@impppact.org

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CRITICAL BUSINESS PROCESSES OF PROCESSING COMPANIES IN THE CONDITIONS OF THE CORONAVIRUS PANDEMIC

Abstract

Purpose: The aim of this research is to identify the most exposed business processes in the pandemic era and investigate how the COVID-19 pandemic affected these processes in the processing companies in Brod-Posavina County.

Methodology: The questionnaire was sent electronically to the official e-mail addresses of 49 processing companies in Brod-Posavina County according to the FINA register. The questionnaire was filled in by 102 respondents from 35 processing companies. The survey included employees of companies with more than 3 years of work experience in the considered company who are employed in management, commercial, financial or technical positions.
The study uses descriptive statistical analysis and multivariate factor analysis.

Results: The most exposed business processes were selected. Based on respondent's perceptions, research results confirm the exposure of all mentioned business processes to the coronavirus pandemic. "Work organization" and "commercial and financial area" are recognized as the most exposed business process and business area significantly exposed to the risk of unsustainability in Brod-Posavina County processing companies, respectively.

Conclusion: The research findings confirmed the hypotheses of the paper, which propose that the disruption caused by the coronavirus pandemic had an impact on all business processes in processing companies and there was a business area significantly exposed to the risk of unsustainability in the conditions of the coronavirus pandemic. The identified business process and business area may serve as a basis for comparison in similar future cases.

Keywords: Pandemic, economy, processing sector, risk of unsustainability

1. Introduction

"Coronavirus (COVID-19) is an infectious disease caused by a newly discovered coronavirus" (World Health Organization, 2021). COVID-19 has become an event that completely surprised the world, influencing a number of social and economic activities and the consequences of the coronavirus will be felt in both business and everyday life. "The first coronavirus case in Croatia was confirmed on 25 February 2020" (Government of the Republic of Croatia,

2020). "This is a crisis like no other and that there is considerable uncertainty about its impact on the lives and existence of people" (International Monetary Fund [IMF], 2020).

The global spread of the COVID-19 pandemic has caused numerous negative impacts on the business and market position of the entire economy of both Europe and Croatia. "Croatia's economy experienced a 15.1% GDP decline in the Q2 2020 as a result of the corona crisis" (Central Bureau of Statistics of the Republic of Croatia, 2020). "It is clear that coronavirus is causing economic changes, and numerous studies indicate that the COVID-19 pandemic is likely to generate growth losses for many economies and force millions into poverty unless effective and timely measures are taken" (Barua, 2020).

COVID-19 caused many industries to change the way they operate. "The COVID-19 crisis has, in the near future, required organizations to look for digital replacements or identify ways of delivering their products and service with minimal physical contact and safely" (Seetharaman, 2020). "The COVID-19 pandemic has forced many organizations to undergo significant transformation, rethinking key elements of their business processes and use of technology to maintain operations whilst adhering to a changing landscape of guidelines and new procedures" (Dwivedi et al., 2020). It has forced many companies to pause or reduce the manufacturing system and their operational activities for extended periods of time and seek sustainable solutions to ensure uninterrupted supply and business. Furthermore, the pandemic situation forces working with a reduced/limited workforce, which reduces manufacturing productivity.

"These dramatic declines in production are caused by a combination of several factors. First, lockdown and the effective closure of large sections of the economy have led to a drastically reduced demand, and a sharp decline in consumption of consumer durables" (Harris et al., 2020). Gajdzik and Wolniak (2020) believe that COVID-19 is a global problem for all industries and must be analyzed in different areas: economy, society, and enterprises.

Due to the characteristics of their business, processing companies are particularly sensitive. This pandemic impact on the processing industry caused many production processes to cease. Problems in the processing industry have led to reduced demand and disrupted supply chains. Disruptions in business processes are likely to cause difficulties in the activities of companies.

Although there are many studies related to COVID-19 and the manufacturing industry, there is a lack of analysis of processing companies in Croatia. To our knowledge, this is also the first study to investigate the impact of the coronavirus pandemic on business processes in Brod-Posavina County processing companies. The present study was conducted because Croatia has registered a high number of COVID-19 cases in EU (on 19 November 2021 – ranked fourth in Europe) (Statista, 2021). The most important economic activity of Brod-Posavina County is the processing industry, which generates 48% of the income of the county's economy, employs 50% of employees and accounts for 80% of total exports" (Croatian Chamber of Commerce, 2020, p. 74). Finally, the study also contributes to a better understanding of the exposure of all identified business processes in processing companies to the risk of unsustainability in the conditions of the coronavirus pandemic. In order to achieve our research goal, business processes that can be affected by the coronavirus pandemic are identified. This is followed by the recognition of the most exposed business process according to the risk of unsustainability. Consequently, business processes with similar exposures to the risk of unsustainability are grouped into appropriate business areas. This is followed by development of a business area that is significantly exposed to the risk of unsustainability. The paper ends with a conclusion and an outline for future research.

2. Literature review

The research topic of relevant empirical research papers related to the impact of COVID-19 on processing companies is extremely modest. Therefore, the intention is to unite foreign and domestic research papers which are related to the topic of the impact of COVID-19 on processing and manufacturing companies and economy in global.

According to Okechukwu et al. (2020), there is no literature available to manufacturing practitioners that identify the barriers and enablers of manufacturing resilience, especially with regards to pivoting the manufacturing sector in response to a pandemic.

Roška et al. (2021) analyze the effect of the COVID-19 pandemic on the Croatian economy observed through declining employment, the required recov-

ery years, and declining GDP. The article explains that the COVID-19 crisis has had and will have more significant consequences than the financial crisis of 2007-2008 and many entrepreneurs cannot survive without greater support from their governments.

Sataić (2020) examines the attitudes of Croatian micro, small and medium entrepreneurs towards the economic impact of COVID-19 during the lockdown period in Croatia and the importance of change management for the future of their business. The author identifies financial and other problems that entrepreneurs face during the epidemic (financial problems and reduction of orders, disrupted logistics, increased difficulty in financing and the inability to deliver existing orders).

Stojčić (2020) analyzes the impact of the COVID-19 pandemic on changes in export competitiveness of firms from the Croatian manufacturing industry. The results show that the effects of the pandemic in practically all sectors have led to a decline in revenues, capacity utilization and problems of financial nature with liquidity and relations with customers and suppliers.

Looy (2020) analyzes the way in which the COVID-19 pandemic can stimulate more radical business process improvements. The author proposes a BPM tree to outweigh incremental process improvements from more radical ones, in order for organizations to exploit good practices but also to better explore emerging opportunities.

Shafi et al. (2020) analyze the impact of COVID-19 on micro, small, and medium-sized enterprises operating in Pakistan. The authors indicate that most of the participating companies have been severely affected and they are facing several issues such as financial, supply chain disruption, a decrease in demand, a decline in sales and profit, among others. In addition, they propose different policy recommendations to mitigate the adverse effects of the pandemic on MSMEs.

Zhitao et al. (2020) mention the importance of global supply chains. Their study shows that the COVID-19 pandemic has resulted in unprecedented disruptions throughout all their stages with major turbulences in manufacturing, processing, transport, and logistics, as well as significant shifts in demand.

Mohammed et al. (2021) discuss the enterprise's non-viable manufacturing due to its poor external and internal resilience profiles. It is emphasized that if an enterprise fails to develop internal capabilities such as readiness and sensing, it could also fail to manage external resilience. A resilient supply chain requires a blend of internal and external resilience.

Peng et al. (2020) analyze the impact of the COVID-19 pandemic on firms in China. The article explains that many companies have maintained overall stability, while others have experienced a halt in their operations or faced closure. Almost all companies in the survey are willing to transform into online and remote office work. Most firms barely maintained production, facing a shortage of materials or lack of supply. Many companies have faced higher labor costs, which have forced them to consider reducing the number of employees, cutting wages, and postponing recruitment until the effects of the pandemic are over.

Rapaccini et al. (2020) present the results of a unique study of industrial firms in Northern Italy regarding the impact of the COVID-19 pandemic on their businesses. In their survey, the authors discuss impacts of disruption on company operations and the supply chain, for both goods production and delivery (production, material supply, and distribution) and product-related service delivery (travel restriction, interruptions in the spare parts supply chain, and discontinuities with the service).

This review of the existing literature reveals several features of the current level of knowledge about the effects of the COVID-19 pandemic on the business processes in companies although it is clear that research into the effects of the COVID-19 pandemic at the microeconomic level in Croatia is still in its infancy.

3. *Business processes in processing companies*

The impacts of the COVID-19 pandemic are far-reaching and they have affected all sectors. COVID-19 has forced many processing companies to make significant changes to their normal business processes. These changes in the market have highlighted the importance of adaptability and flexibility.

"The business system consists of related components (departments) that work together to transform input (raw materials) into output (finished products) and its goal is to make a profit" (Varga & Strugar, 2016). One of the basic activities of every business system is the execution of business processes. "A business process is a series of logically

connected activities in which an organization's resources participate to satisfy customer's needs for products or services and create value for the company" (Davenport, 1993). As part of company organization, different business processes can be formed depending on the specifics and requirements of each company. "The economic efficiency of a company is based on the optimization of key processes that are internalized and optimized with regard to the range of activities and organization of the process and the separation and contracting of those processes in which the company does not have adequate competitiveness or significant strategic interest" (Kaštelan, 2005).

The COVID-19 pandemic disrupted global production and the supply chain system as well as most transportation links and distribution mechanisms between suppliers, manufacturing facilities and customers. "Currently, most of the manufacturing and supply chain organizations are struggling to anticipate the negative consequences of COVID-19. Most of the global markets are shrinking, and industrial managers are searching for new materials and process methods to maintain production" (Cohen, 2020).

"The present COVID-19 outbreak affects the global and national production systems and trade on a larger scale. The supply chain network showed poor resilience to this pandemic, and nearly 35% of the manufacturers reported their supply chain network failure due to the global coronavirus pandemic" (Kumara et al., 2020).

"Many organizations have been forced to adopt new ways of remote working using new digital systems for communication and to completely rethink their business models to adapt to the realities of the COVID-19 environment" (Carroll, 2020).

According to the above, business processes that are assumed to be most exposed to the effects of the coronavirus pandemic are as follows: product sales management (PSM), adjustment to regulatory restrictions (ARR), resource procurement management (RPM), product delivery organization (PDO), cost optimization (CO), cash flow management (CFM), work organization (WO), optimizing business communication (OBC), product promotion organization (PPO), and machine park maintenance organization (MPMO).

PSM is an essential business process in processing companies because there is a strong connection between sales promotion and organizational performance (Tandoh & Sarpong, 2015). Sales promotion increases profit in the organization as well as shareholder returns. Since efficient product sales are essential for competitive businesses, they should be fully implemented during a pandemic.

ARR implies the adjustment of all aspects of business to the new regulations adopted in the conditions of the COVID-19 pandemic due to the expected difficult regulatory conditions in the market. Regulatory restrictions in varying degrees affect the implementation of the company's business activities.

RPM implies the timely provision of sufficient quantities of all necessary resources for the production of products due to expected disruptions in supply chains and reduced availability of raw materials from suppliers due to crisis conditions. "As a limited definition of supply, procurement is today a strategic factor in a company's profitability and increasing shareholder value, and the importance of procurement for the company stems from its two sources, namely cost and operational efficiency" (Krpan et al., 2015).

PDO implies timely delivery of products to the end customer due to expected disruptions in the transport of products to the customer due to crisis conditions. Furthermore, according to Mikić (2009), medium-sized processing companies are paying more and more attention to modern cost management models and combining different models in order to increase their business efficiency.

CO means reducing all business costs of the company due to the expected disproportion between revenues and costs due to the pandemic. According to Akeem (2017), cost control and cost reduction techniques are considered very important for the growth and survival of any organization in a highly competitive environment, effective cost management is essential to a competitive business and cost optimization in all business segments should be fully implemented during the pandemic.

CFM is extremely important for business efficiency, and understanding the relationship between business occurrence and cash inflow/outflow is extremely important for financial business planning and, for this reason, it is essential to implement quality cash management during a pandemic. "A company with proper cash flow management can increase its financial results, while improper management can lead to financial failure" (Rahman & Sharma, 2020).

WO includes sustainable working conditions and working methods of employees in the company due to the expected difficult working conditions due to the pandemic, which make it impossible to work according to the usual working patterns of employees.

"Included employees boost organizational and individual performance. Improving employee involvement strategies is key to an organization's profitability" (Osbourne & Hammoud, 2017).

OBC implies sustainable ways of communication between employees within the company and with third parties outside the company due to the expected difficult conditions of human mobility and increased risk of coronavirus transmission by direct contact between people and during travel due to the pandemic. "Companies that understand that communication is an integral part of their strategic success will not only create a competitive advantage, but will also maintain it despite poor conditions" (Nwabueze & Mileski, 2018).

PPO implies sustainable communication with the market in order to inform consumers about the product and create consumer interest in buying products due to the expected difficult conditions of the usual promotion at fairs and exhibitions and other promotional channels due to the pandemic. "It has been empirically proven that innovative marketing conducted in the context of Industry 4.0 makes companies more competitive" (Ungerman et al., 2018).

MPMO implies the sustainability of repairs and service of machines and equipment used in the production process due to difficult servicing conditions and emergency repairs due to a pandemic. "Maintenance is crucial to the sustainability of many processing organizations because equipment maintenance status has a direct impact on production performance" (Muganyi & Mbohwa, 2017). Since the efficiency of the production process depends on the functionality of machinery and equipment, and failures of machinery and equipment cause delays in the production process leading to production inefficiencies, it is essential to have efficient maintenance of machinery and equipment during a pandemic.

4. Research methodology

Sample of respondents

The sample consists of 102 entities (89 male and 13 female) from 35 processing companies (71.42%) in Brod-Posavina County. Processing companies of Brod-Posavina County are analyzed, which belong to the categories of small, medium and large enterprises in the processing sector. Micro-companies and crafts are not taken into consideration. "The size of the companies on which the research is conducted is determined according to the criteria of the European Commission" (Recommendations of the European Commission, 2003).

A total of 64 respondents work in small, 18 in medium and 20 in large enterprises. All companies were operational during the pandemic. Respondents aged 31-40 account for the largest share of respondents (36.3%), followed by respondents aged 41-50 (22.5%), those aged 18-30 (18.6%) and there are only 2% of respondents aged 60 and over. Each respondent has 3 or more years of work experience in the company under study and is employed in a managerial, commercial, financial or technical position. The largest number of respondents (35.3%) holds the position of manager (leaders, supervisors), 28.4% the position of technical expert (calculations, design, engineering, supervision), 15.7% the position of officer (administration, commercial, secretariat), 9.8% the position of director (general, executive, operational, financial, technical), and 9.8% the position of financial expert (accounting, finance). Each respondent completed at least a professional study program, i.e. 42.2% of respondents completed a university graduate study/postgraduate specialist study program, 27.5% an undergraduate university study program, 24.5% a professional study program, and 5.9% a postgraduate master's study/postgraduate university doctoral study program. The average work experience of all respondents in the companies under study is 7.61 ± 3.98, while the average work experience of all respondents is 12.36 ± 6.29. Therefore, it is considered that each respondent has enough knowledge, experience and competencies to adequately understand the research issues.

Sample variables

The questionnaire contained 10 questions. It assessed business processes that are most exposed to the effects of the coronavirus pandemic. A clear explanation and instructions related to the research and its purpose were sent together with the link to the online survey. The survey was conducted from 1 January 2021 to 1 February 2021, and the observed period was from March 2020 to 1 February 2021. The survey was conducted voluntarily and a total of 102 responses were collected. The opinion of the respondents expressed in the questionnaire is a set of qualitative data for the collection of which the Likert scale was applied with an interval of 1 to 5 (1 - not exposed at all; 2 - partially exposed; 3 - moderately exposed; 4 - significantly exposed;

5 - fully exposed). Respondents were asked to circle the number that best described the level of business process exposure to the risk of unsustainability in the event of the COVID-19 pandemic for each business process.

Data processing methods

The data collected by the questionnaire were analyzed to test the following hypotheses:

H1: Disruption caused by the coronavirus pandemic had an impact on business processes.

H2: There is a business area that is significantly exposed to the risk of unsustainability in the conditions of the coronavirus pandemic.

Statistical analysis of results is performed (descriptive statistical analysis and multivariate factor analysis). Statistical data were analyzed by the STATISTICA statistical software package and the SPSS software package.

5. Results and discussion

Determining the exposure of individual business processes to the risk of unsustainability in the conditions of the coronavirus pandemic, the basic statistical parameters have been calculated using descriptive statistics and the results can be seen in Table 1.

Table 1 Descriptive indicators measuring variables (AS - arithmetic mean, SD - standard deviation, MIN -minimum value, MAX - maximum value, SKEW - asymmetry degree, KURT - curvature degree, STD.ERR - standard error)

	AS ± SD	Median	Mode	Min	Max	Skew	Kurt	Std. Err.
PSM	3.62 ± 0.87	3.50	3.00	2.00	5.00	0.19	-0.79	0.08
ARR	3.56 ± 0.87	4.00	3.00	1.00	5.00	-0.09	-0.21	0.09
RPM	3.63 ± 0.92	4.00	4.00	1.00	5.00	-0.35	-0.32	0.09
PDO	3.59 ± 0.99	4.00	4.00	1.00	5.00	-0.60	-0.02	0.10
CO	3.65 ± 0.85	4.00	4.00	1.00	5.00	-0.62	0.26	0.08
CFM	3.68 ± 0.89	4.00	4.00	1.00	5.00	-0.51	-0.01	0.09
WO	3.79 ± 0.81	4.00	4.00	2.00	5.00	-0.28	-0.35	0.08
OBC	3.64 ± 0.89	4.00	4.00	1.00	5.00	-0.34	-0.14	0.08
PPO	3.54 ± 0.93	4.00	4.00	1.00	5.00	-0.76	0.65	0.10
MPMO	3.12 ± 0.94	3.00	3.00	1.00	5.00	-0.46	-0.25	0.10

Source: Authors

It can be seen in Table 1 that the employees in processing companies in Brod-Posavina County consider "work organization" as a business process most exposed to the risk of unsustainability in the conditions of the coronavirus pandemic with exposure of 3.79 and statistical significance of 99%, which can be interpreted as a business process significantly exposed to the risk of unsustainability in the conditions of the coronavirus pandemic. Since the outbreak of the pandemic in Croatia, "the unemployment rate in February was 5.9%. The number of the unemployed in the next few months showed a growth trend, so the unemployment rate rose to 6.4% in March, 7.8% in April and 8.5% in May. In September, there was a slight decline when the rate was 8.0% and in December the rate was 7.5%" (Eurostat, 2021). Despite a slight decline, Croatia is one of the EU countries with the highest growth in the unemployment rate. It is obvious that in the conditions of increasing unemployment employees perceive the impact of the pandemic primarily through the organization of their work in the company in order to preserve jobs.

"The coronavirus pandemic has changed the way people communicate and how the economy works by encouraging people to reduce their direct, personal interaction with others." (Evans, 2020) This is one of the reasons why "work organization" is the

most exposed business process in terms of the risk of unsustainability in the conditions of a coronavirus pandemic. It also determines the perception of exposure of all business processes to the risk of unsustainability due to the effects of the coronavirus pandemic with a statistical significance of 99% ranging from 3.12 to 3.79, or in the interval from being moderately to significantly exposed to that risk. For the entire observed population with a statistical significance of 99%, it can be said that none of the considered business processes will have assigned exposure to the risk of unsustainability due to the coronavirus pandemic less than 3.12, which means that all considered business processes are at least moderately exposed to the risk of unsustainability due to the coronavirus pandemic. The overall mean 3.58 ± 0.18 shows that there are no significant deviations of all arithmetic means from the average, while the standard deviation from the arithmetic mean of the standard deviations is very small 0.90 ± 0.05, which shows that the differences in the opinions of the respondents are minimal.

The processing industry sector is particularly sensitive to the effects of the coronavirus pandemic. The processing industry is one of the most important sectors in the national economy and in Croatia it is the economic sector with the largest share in the structure of GDP and total employment and the largest share of total exports. According to CBS (2020), the total number of employees in Croatia in 2019 was 1,081,111, of whom 269,396 work in the processing industry. In 2019, the processing industry generated HRK 185.5 billion in total revenues and a share in GDP of 14.8%.

To understand the business areas in the processing industry that are most exposed to the risk of unsustainability due to the influence of the coronavirus pandemic according to perceptions of employees in processing companies in Brod-Posavina County, dimensionality of business process unsustainability was reduced by applying multi-criteria factor analysis with principal component analysis for data extraction. Before conducting factor analysis, the conditions for its application were met: Kaiser-Meyer-Olkin's sample adequacy indicator has a value of KMO of .884, while Bartlett's spherical test shows $\chi 2=639{,}293$; df=45; p<0. A correlation matrix is made and shown in Table 2.

Table 2 Correlation matrix for 10 interdependent variables from the conducted survey

Variable	Correlations, marked correlations are significant at p < .05000 N=102									
	PSM	**ARR**	**RPM**	**PDO**	**CO**	**CFM**	**WO**	**OBC**	**PPO**	**MPMO**
PSM	1.00									
ARR	0.77	1.00								
RPM	0.60	0.57	1.00							
PDO	0.59	0.65	0.68	1.00						
CO	0.57	0.61	0.68	0.66	1.00					
CFM	0.61	0.64	0.57	0.70	0.75	1.00				
WO	0.41	0.55	0.49	0.47	0.54	0.59	1.00			
OBC	0.51	0.60	0.55	0.55	0.60	0.50	0.54	1.00		
PPO	0.36	0.44	0.43	0.50	0.42	0.44	0.44	0.60	1.00	
MPMO	0.28	0.32	0.41	0.47	0.50	0.40	0.25	0.55	0.60	1.00

Source: Authors

Principal component analysis generates 2 factors with eigenvalues greater than 1 that explain more than 69% of the variance and can be used in further analysis based on the Kaiser-Guttman criteria, as shown in Table 2. Varimax raw rotation was applied in order to get a clearer picture of factor structures and interpretation of factors, as shown in Table 3.

Table 3 Eigenvalues of derived factors

Factors	Initial eigenvalues extraction: Principal components			
	Eigenvalue	% total variance	Cumulative eigenvalue	Cumulative %
1	5.84	58.38	5.84	58.38
2	1.08	10.76	6.91	69.15
3	0.67	6.70	7.58	75.85
4	0.60	6.01	8.19	81.86
5	0.44	4.38	8.62	86.24
6	0.42	4.23	9.05	90.47
7	0.30	3.01	9.39	93.48
8	0.27	2.73	9.62	96.22
9	0.21	2.14	9.84	98.36
10	0.16	1.64	10.00	100.00

Source: Authors

Table 4 Varimax raw rotation of derived factors showing factor loads

Variable	Factor loadings (Unrotated) Extraction: Principal components		Factor loadings (Varimax raw) Extraction: Principal components	
	Factor 1	Factor 2	Factor 1	Factor 2
PSM	-0.75	0.37	0.83	0.11
ARR	-0.82	0.29	0.84	0.21
RPM	-0.79	0.11	0.72	0.34
PDO	-0.83	0.06	0.72	0.41
CO	-0.84	0.07	0.74	0.40
CFM	-0.82	0.19	0.79	0.29
WO	-0.69	0.12	0.64	0.28
OBC	-0.78	-0.26	0.51	0.65
PPO	-0.67	-0.53	0.26	0.81
MPMO	-0.61	-0.66	0.14	0.88
Expl. var.	5.84	1.08	4.39	2.53
Prp. total	0.58	0.11	0.44	0.25

Source: Authors

Loading factor values of 0.7 or higher are used for factor interpretation as a derived dimensional structure, indicating that a particular factor separates enough variance from the considered variable. It can be determined that factor 1 carries 58.38% of the total variance of all business processes and includes business processes related to the procurement of resources, sales and delivery of products, cost and cash flow optimization and a regulatory business framework. Due to its characteristics in the context of the analysis of the business area of the processing company, this factor can be called the commercial and financial area of business. Factor 2 carries 10.76% of the total variance of all business processes and includes business processes related to product promotion and maintenance of machinery. Due to its characteristics, the interpretation of this factor does not have any meaning in the context

of the analysis of the business area of the processing company and will not be further considered as a single-dimensional structure. Although considered to be the business process most exposed to the risk of unsustainability in the conditions of the coronavirus pandemic work organization of employees is not associated with any factor. It is obvious that employees believe that this business process should be considered as a separate important business area.

In the context of macroeconomic conditions, before the COVID-19 pandemic, Croatia recorded a GDP growth trend. "The trend of real GDP growth of 2.4% in 2015, 3.5% in 2016, 3.1% in 2017, and 2.7% in 2018 continued until 2019" (Croatian National Bank, 2021). Although the GDP growth rate in 2020 was initially estimated at 3.0%, in the new circumstances after the appearance of the coronavirus, the Croatian economy experienced an extremely large decline in GDP. "The first estimate shows that quarterly GDP in the third quarter of 2020 was 10% lower compared to the same quarter of 2019. This is a slightly milder decline than in the second quarter, when it was 15.4%" (CBS, 2021). It was realistic to expect a large decline in GDP for the whole year of 2020. However, "in January 2021, the World Bank estimated that the Croatian economy fell by 8.6 % in 2020, and sees Croatia's GDP growing by 5.4% in 2021, and by 4.9% in 2022" (World Bank, 2021).

Since the processing industry contributes to GDP growth, the efficiency of the commercial and financial area of business in processing companies is of great importance for the efficiency of the economy as a whole. The confirmed employee perception of exposure of this business area leads to the conclusion that one of the important management prerequisites for achieving efficient operation of processing companies has been achieved. According to a decline in GDP and a rise in unemployment, it is clear that the coronavirus pandemic is having an impact on the entire economy. Although Croatia got out of the 2008 crisis seven years ago, some companies still bear the brunt of the crisis. For such companies, which already have certain technological backlogs, this pandemic could further deepen their problems. "The impact of COVID-19 motivates small and medium-sized enterprises to reconsider their core competencies, look for new opportunities and redefine sustainable business models more intensively and in a timely manner" (Gregurec et al., 2021). All this can be applied to large companies.

6. Conclusion

The coronavirus pandemic is leading to unprecedented changes and businesses transformations by requiring new operational and production processes. This research examines how sudden disorders, such as the coronavirus pandemic, affect business processes in processing companies in Brod-Posavina County. Business processes affected by the coronavirus pandemic are identified.

According to respondents' perceptions, the coronavirus pandemic affected all business processes. The impact of the coronavirus pandemic was investigated using descriptive statistics, and hypothesis 1 was confirmed. Statistical data analysis confirmed moderate to significant exposure of all considered business processes in processing companies to the risk of unsustainability. This is the result of awareness of employees working in processing companies in Brod-Posavina County of the inevitable impact of the coronavirus pandemic on businesses. The "work organization" business process is perceived as a business process most exposed to the risk of unsustainability, which is expected because the effect of the coronavirus pandemic on work organization implies a direct link between the coronavirus pandemic and employees. Many companies are now reinventing flexibility and sustainability. The need to ensure business sustainability has made companies keep focus through reorganization especially work organization. One of the significant observations is related to the adaptability of workers to change their communication and workplace. Many employees work from home and remote work should be promoted during the pandemic, but also all employees working remotely should have all prerequisites for doing business in such a way. Companies with these redesigns can exploit values in new ways. It is logical to assume that the demand for this method of doing business will continue to expand in the time ahead. Working remotely emerges with pros and cons that should be acknowledged in future research.

The most important result of this study is the business area that is significantly exposed to the risk of unsustainability in the conditions of the coronavirus pandemic for the processing industry. Factor analysis was used as it is considered an appropriate method for dimensionality reduction.

Factor analysis derived factor 1, which includes commercial and financial aspects of business. Con-

sequently, hypothesis H2 is accepted, which states that there is a business area that is significantly exposed to the risk of unsustainability in the conditions of the coronavirus pandemic.

Factor 1 indicates that employees in processing companies in Brod-Posavina County consider the commercial and financial business area as a segment of business most exposed to the risk of unsustainability under the influence of the coronavirus pandemic, which can be interpreted as employee awareness of the importance of commercial and financial aspects for business sustainability and which shows the existence of an understanding of the principles of entrepreneurship in society.

There is no doubt that one of the most critical challenges in dealing with the COVID-19 pandemic is to save the economy especially through a digitally transformed business.

The implication of this research should provide a better understanding of the influences of COVID-19 on processing companies and help companies to know which business area they should focus on in relation to the pandemic influence. The long-term effects of the coronavirus pandemic have yet to be determined as its immediate impact on processing companies is important.

The research has a number of limitations that can serve as guidelines for future research. The analysis was conducted in only one county in Croatia, which explains a small number of respondents. The questionnaire does not contain information whether all organizations in the sample have the same set of business processes or they are defined differently, but business processes covered in this research outline general processes in the manufacturing industry.

In future research, analysis should be conducted at the national level and then due to multiple respondents per organization, an inter-rater agreement should be concluded and single scores for each organization should be provided. Finally, within the framework of future research, analysis should be conducted in other sectors of the economy, not just the processing sector.

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Ivana Jadrić
University of Split
21000 Split, Croatia
ivana.jadric@unist.hr

Ana Ćosić
University of Split
21000 Split, Croatia
ana.cosic@unist.hr

Đurđica Miletić
University of Split
21000 Split, Croatia
durdica.miletic@unist.hr

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THE IMPACT OF THE COVID-19 PANDEMIC ON INTERNATIONAL STUDENTS' PERCEPTION OF SERVICE QUALITY (CASE STUDY OF THE UNIVERSITY OF SPLIT)

Abstract

Purpose: Development opportunities of higher education institutions (HEI) arising from international activities are constantly evolving, increasing at the same time their complexity. Consequently, numerous activities have been created to connect different higher education institutions across Europe, where the biggest challenge of internationalisation today is the European Universities Initiative. In that context, it is important to measure whether the European Union initiative created better resilience to the COVID-19 pandemic.

Methodology: Empirical analysis was conducted that included international students who studied at UNIST for one semester during the pandemic. The following descriptive statistics methods were used for data analysis: percentages, mean, frequency distribution, the standard deviation correlation method, as well as the independent-samples t-test and the correlation method.

Results: The results show that from the perspective of international students, there is a positive relationship between perceived service quality and internationalisation during the COVID-19 pandemic period. A case study was presented on the internationalisation of the University of Split as one of the first universities that joined the European Universities Initiative.

Conclusion: Internationalisation is one of the keys to success if the perceived quality of higher education can be considered as a key to student satisfaction.

Keywords: European University, COVID-19 pandemic, perceived service quality, internationalisation, satisfaction of international students

1. Introduction

One of the biggest challenges facing educational institutions around the world is the internationalisation process, which is essential for every modern higher education institution (HEI). In Europe, HEIs are strongly motivated to participate in various international projects and improve the quality of study conditions in order to be able to host foreign students and teachers and cooperate with other in-

ternational HEIs and organisations. A significant number of students, teaching and non-teaching staff participate in mobility programmes and their number is constantly increasing. According to the Erasmus+ Annual Report (2018), Erasmus+ funded nearly 470,000 higher education student and staff mobilities in Europe and beyond in the 2017/2018 academic year. Di Pietro (2020) noted that the new Erasmus programme (European Region Action Scheme for the Mobility of University Students), Erasmus+, had a budget of €14.7 billion for the 2014-2020 Erasmus implementation period, i.e. a 40% increase compared to the previous planning period. These initiatives have had an impact on HEIs and have accelerated the process of opening up towards the international education market. De Wit (1998) argues that the driving force of European activities for cooperation and exchange in the fields of research, technology and education were programmes for research and development, such as COMETT and ERASMUS.

According to Qiang (2003), there are numerous reasons why internationalisation is becoming an integral part of the development of the higher education sector. The academic and professional background must meet the needs of the globalised world, which employs graduates. In order to better resolve the challenges and all the consequences of increasing internationalisation, HEIs are striving for a thorough understanding of the concept of internationalisation. The goal is to ascertain the benefits arising from this process, without compromising the quality level of HEIs. Internationalisation should be a tool that enhances the quality of higher education. Thus, a tendency to the quality of HEIs and the challenges of internationalisation are two constructs of the 21st century. Following the aforementioned and the strong intention to support international networking of HEIs, the mission developed a new programme called the European Universities Initiative, which started in 2019. This project, presented as the highest level of internationalisation efforts in higher education, had a budget of nearly €85 million.

The University of Split has declared internationalisation as one of the fundamental principles of its development strategy and decided to join the European Universities project. Together with five other universities – the University of Cádiz (Spain), the University of Western Brittany (France), the University of Kiel (Germany), the University of Gdańsk (Poland) and the University of Malta (Malta) – it formed one of the first 17 alliances selected for funding from 54 project applications. In the current research, the University of Split is described as part of the European University of the Seas, where the first year of the implementation of project activities was marked by the COVID-19 pandemic and the lockdown phenomenon. Therefore, although this is the case study of the University of Split, the findings of this study could serve as an indirect indicator of the negative impact of COVID-19 on the mobility within the European Universities Alliance. Given that the main actor of the internationalisation process are students themselves, it is crucial to identify the main understanding they have when it comes to mobility, especially in the COVID-19 pandemic period. The research was conducted at the very beginning of the pandemic, so it is important to keep in mind the implementation period. It is equally important to understand that a small body of literature was available then, as it is today, on the impact of the pandemic on student mobility.

1.1 Theoretical and conceptual background

To conduct an in-depth analysis of the construct of internationalisation in higher education, it is important to understand numerous rationales for fostering internationalisation of higher education. Although the concept evolved in the 1980s, internationalisation of higher education is a new theory of the 21st century (De Wit, 2002). According to De Wit (1998), internationalisation represents the rebirth of the medieval university, in a context where economy, knowledge and society are interwoven. Taking into account different stakeholders in higher education (government, private sector, and education sector), De Wit (1998) recognises four kinds of rationales for internationalisation: academic, social/cultural, political, and economic. The two most common concepts that characterise the 21st century higher education system are internationalisation and globalisation. Internationalisation refers to all actions, policies, and practices taken by various academic staff (individuals) and systems, i.e. institutions, to deal with the global academic environment. The motivations for internationalisation include commercial advantage, knowledge and language acquisition, enhancing the curriculum with international content, and many others (Altbach & Knight, 2007). Globalisation is the context of economic, societal and political forces pushing 21st

century higher education toward greater international involvement (Altbach & Knight, 2007). Thus, internationalisation is changing the world of higher education, and globalisation is changing the world of internationalisation (Knight, 2004). According to Uralov (2020), one of the most important strategies for the development of higher education is internationalisation. In addition, it has become a main factor in the development of the national economy and mechanisms, and a tool for promoting cultural diversity and the national education system. Maringe and Sing (2014) assert that globalisation led to enhanced internationalisation of higher education.

A different point of view is offered by Knight (2004), who analyses internationalisation as a process that takes place at different levels: national, sectoral and institutional, all of which aiming to integrate an international, intercultural, or global dimension into the purpose, functions, or the delivery of post-secondary education. However, De Wit (1998) points out that the internationalisation of higher education is in most cases reduced to just a few activities, such as academic mobility, global or multicultural education, and study abroad, but it is much more than that. The range of services in the internationalisation of higher education has recently expanded. These include a growing international market for academic and scientific personnel, curriculum internationalisation, and also the commercialisation of international higher education, particularly, as Altbach and Knight (2007) note, the growing influence of the for-profit higher education sector.

In reviewing a wide range of publications of research and studies on the issues of internationalisation in higher education, Kehm and Teichler (2007) identified seven broad themes of higher education that support internationalisation. These include the perspective of the internationalisation of teaching, then learning, and research, institutional strategies of internationalisation, knowledge transfer, cooperation and competition, national policies, and last but not least, supranational policies with regard to the international dimension of higher education.

Ho and Foon (2012) reported that quality management is a measure of the performance standard referring to both products and services. It is extremely important to measure the perceived service quality of all stakeholders in higher education, as each has their own view of quality depending on their particular needs. Nevertheless, emphasis should be placed on measuring the service quality of higher education perceived by students, as they are the primary customers and active stakeholders in the development of their education service quality. Yeo (2009) emphasises that the higher education sector must be based on quality management to remain competitive. It has been observed that due to the development of internationalisation and globalisation principles, there is stronger international competitiveness among HEIs (Yeo, 2009). The most commonly used instruments for measuring service quality are SERVQUAL, SERVPERF and HEdPERF scales.

Parasuraman et al. (1998) developed the SERVQUAL scale. The scale determines service quality by measuring the difference between perceived service quality and consumer expectations of service. In 1992, Cronin and Taylor developed the SERVPERF scale, based on the SERVQUAL scale, from which they eliminated the element of expectations and decided to measure service quality. Both scales measure quality through five dimensions, organised through 22 questions. The dimensions are tangibility, reliability, responsiveness, assurance, and empathy.

Abdullah (2006) developed a new scale called the HEdPERF scale, which is specialised to measure the perception of service quality from the perspective of students at HEIs at the international level. The HEdPERF questionnaire contains 41 statements about service quality in higher education, which are divided into dimensions explained by Dužević et al. (2015) as follows:

1) Non-academic aspects (this factor refers to the obligations of non-academic staff);
2) Academic aspects (this factor refers to the responsibilities of academics);
3) Reputation (this factor refers to the conveyance a professional image);
4) Access (this factor refers to approachability, ease of contact, availability and convenience);
5) Programme issues (this factor refers to the wide ranging and reputable academic programmes/specialisations with a flexible structure and syllabus);
6) Understanding (it includes items related to understanding the specific needs of students in terms of counselling and health services).

It is important to emphasise that the last dimension has been excluded over time as a separate quality dimension and its statements have been added to the existing dimension of access. According to

Oliver (2010), it is important to analyse perceived service quality because it is significantly related to student satisfaction, as the dimension of perceived service quality is used for measuring satisfaction as feedback information to the service provider.

Student satisfaction can be defined as a short-term attitude resulting from an evaluation of students' educational experience, services and facilities (Weerasinghe et al., 2017). Every HEI strives to create satisfied students. In this way, the HEI itself benefits from the satisfaction of its students. It becomes more attractive and builds a long-term positive image. This is especially important because it leads to long-term loyalty (Navarro et al., 2005). Creating satisfied students is not a simple process, as it is influenced by many internal and external factors, which may be beyond the control of the HEI. According to Mihanović et al. (2016), many authors have tried to analyse whether personal satisfaction is related to student satisfaction with the higher education institution, but no reliable relationships have been confirmed. Perceived service quality is closely related to student satisfaction. Some authors equate one with the other, and others state that positive perceptions of service quality lead to student satisfaction. According to Ammigan and Jones (2018), international student satisfaction data have been used as a channel to influence change on campus. They can also be seen as strengthening support services for this community, while Astin (1993) argues that student satisfaction is presented as the subjective experience of studying and perceived quality of educational services acquired while studying, where the dimensions of satisfaction and perceived service quality are intertwined.

Since, according to some authors, internationalisation, with its policies and procedures, has developed spontaneously without really taking care of ensuring quality processes (Van Damme, 2001), it is time to fill this gap. It is therefore necessary to change the intertwining of these two concepts based on scientific research. Moreover, it should be kept in mind that internationalisation in higher education was one of the most affected concepts during the COVID-19 virus pandemic. It is likely that it will recover this time, so this may be an opportunity for the future to create a new, international, humane higher education (Fukuyama, 2011). To understand how to move forward and what concepts to develop for the future, policymakers need to analyse how students felt during the pandemic.

2. Method and research questions

2.1 Method

Based on the presented theoretical foundations provided by previous research studies, hypotheses were made to be tested in this paper. Komotar (2018) states that the most important trends shaping the higher education area are internationalisation and quality assurance of higher education. Nonetheless, both concepts are still often treated as two separate fields of research in current policy discourses, although in the context of European higher education it is logical to consider them as a whole. In this context, the collected data shall serve as a basis for finding a correlation between these two constructs. In order to collect data, an online survey was conducted.

The collected data were analysed using the data management SPSS (Version 23) programme. The following descriptive statistics methods were used for data analysis: percentages, mean, frequency distribution, the standard deviation correlation method, as well as the independent-samples t-test and the correlation method. Due to the small sample, the Spearman coefficient was used in correlation analysis.

2.2 Research questions

The effort made by the European Union in relation to higher education institutions operating in the European Education Area is to achieve the highest possible degree of internationalisation. Bearing this in mind, the question arises as to whether higher education institutions that have a higher degree of internationalisation have a higher perceived level of quality. According to De Jager and Soontiens (2015), there is a relationship between the degree of internationalisation and the perceived level of quality. Therefore, the first H1 hypothesis is established to test a positive correlation between perceived service quality of international exchange students who spent a semester at the University of Split and internationalisation.

Hypothesis 1 (H1): There is a positive correlation between service quality perceived by international exchange students and the degree of internationalisation (under pandemic conditions).

Long et al. (2014) showed a correlation between perceived service quality and student satisfaction which is now being tested in the context of international students during the pandemic. There are numerous other studies (Athiyaman, 1997; Abu Hasan et al., 2008; Raghavan & Ganesh, 2015) that found a correlation between the perceived level of

quality and satisfaction, so the question arises as to whether this correlation can be confirmed with international students.

Hypothesis 2 (H2): There is a positive correlation between service quality perceived by international exchange students and their satisfaction (under pandemic conditions).

Just like the rest of Croatia and Europe, the University of Split was affected by the pandemic in mid-March 2020. Regular face-to-face classes were interrupted and switched to online for both domestic and international students. Some students stayed in Split and took courses delivered online by the University of Split, while some returned to their home countries.

Since we are talking about a specific point in time, the question arises as to how much the perceived level of quality of international students is related to their satisfaction with online study, since they were mostly studying online at that time. Based on the above, the following hypothesis is established to test the correlation between students' perceived service quality and satisfaction with online learning.

Hypothesis 3 (H3): There is a positive correlation between international exchange students' perceived service quality and their satisfaction with online study (under pandemic conditions).

Internationalisation is an important phenomenon that higher education institutions faced in the second half of the 20th century. In addition, the significance of increasing the degree of internationalisation lies in the numerous benefits that students derive from increasing the degree of internationalisation of higher education (Qiang, 2003). Therefore, based on the above, the question arises as to whether international student satisfaction with their study increases with the increase of internationalisation, which is especially true for the conditions of the pandemic. Since previous research showed that one of the main benefits of internationalisation is the interaction between domestic and international students (Jones, 2010) and that internationalisation increases student motivation (Kuznetsov & Kuznetsova, 2011), the question arose whether there is a correlation between internationalisation and international student satisfaction. Internationalisation means a greater presence of various international elements in higher education institutions (HEI), the assumption is: the higher the degree of internationalisation at a HEI, the better students feel and the more satisfied they are with their studies. H4 hypothesis is established based on the aforementioned.

Hypothesis 4 (H4): There is a positive correlation between the perceived degree of internationalisation and the satisfaction of international students under pandemic conditions.

3. Empirical data

3.1 Research instrument

In this research, a questionnaire was created consisting of three main parts. An introductory part (basic demographic questions and questions about constituent units of the University of Split where students studied) and the main part which assessed a degree of internationalisation of the University of Split. The final part, which measured the impact of the COVID-19 pandemic on studying, i.e. the time spent physically at the University of Split, the time spent in online classes, the level of satisfaction with studying at the University of Split and the level of satisfaction with online classes.

Perceived service quality was measured using the HEdPERF scale (Abdullah, 2006), which consists of 6 variables with 41 items. A degree of internationalisation was measured using the Lasagabaster et al. (2013) scale. The segment used to measure the degree of internationalisation consisted of 10 questions adapted to the context of the University of Split. The scale included questions on various elements of internationalisation in higher education: the level of English proficiency of various stakeholders, the number of international students, different nationalities studying at the University of Split, international university rankings, promotional activities organised by the University aimed at attracting international students, etc.

An online questionnaire was created and was available through the *Limesurvey* platform from 23 June 2020 to 24 July 2020. The opinion of the international students was evaluated by using the Likert scale with values from 1 to 5, where 1 - strongly disagree, 2 - disagree, 3 - undecided, 4 - agree, 5 - strongly agree.

When measuring the level of satisfaction, students were offered a scale with five levels (from very satisfied to very dissatisfied).

For the purpose of measuring the time spent at the University of Split, students were offered a scale with several dimensions that measured the time spent (less than one month, one to two months, two to three months, three to four months, more than four months).

3.2 Sample

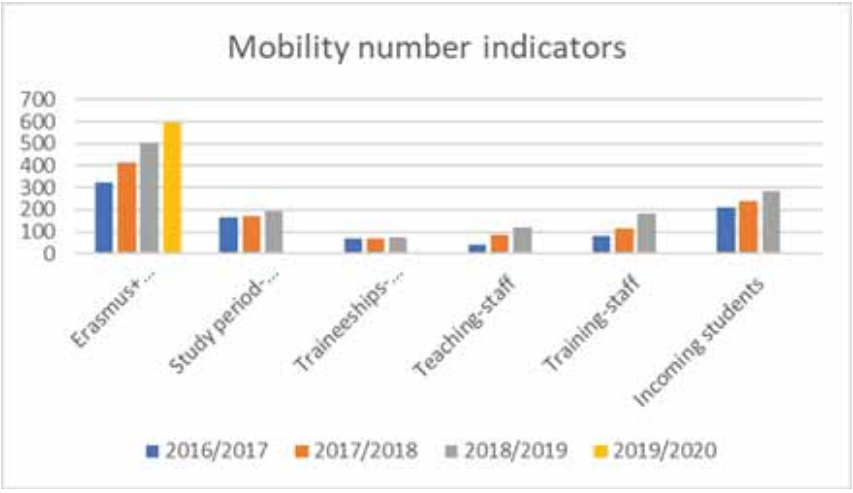
The sample consisted of international exchange students studying at the University of Split in the summer semester of 2020. This is the semester that coincided with the COVID-19 pandemic. During that period, a total of 136 international exchange students at the University of Split were invited to take part in the online survey via email. The questionnaire was accessed by 133 students and 60 students completed the survey. Only complete responses are analysed. The sample is considered sufficient as it represents almost 50% of the target population, of whom 21 were male and 39 were female students. The respondents were international exchange students spending the summer semester of the 2019/2020 academic year at the University of Split.

Although the limitation in this study is a small sample, as Bojanić (1991) states, it is more important for a sample to be representative than to be large. Since 97% of students who studied at the University of Split during the quarantine period caused by the spread of the COVID-19 virus participated in this study, the sample is considered representative. However, only fully completed responses (44% of them) were analysed in more detail in the research study.

3.3 The degree of internationalisation at the University of Split

In order to assess the degree of internationalisation of the University of Split, it is necessary to present data on the degree of internationalisation in the form of a case study. The University of Split officially started its internationalisation process shortly after 2000, when the institution began to participate in international projects such as Tempus. The possibility of sending students abroad was opened in 2009, when the University of Split joined the Erasmus mobility scheme. The possibility to host first international exchange students was opened in 2011. Since then, the University of Split has been actively participating in Erasmus+, Ceepus, Erasmus Mundus, bilateral cooperation and other smaller exchange programmes. The first study programme in English was verified in 2011. The University of Split supports a continued increase in mobility and signed inter-institutional agreements, as can be seen in Figure 1, which shows the growth of the most important mobility indicators in recent years.

Figure 1 Mobility indicators per year



Source: Authors' analysis

This is in line with the objectives of the European University of the Seas project, which aims for a 5% increase in student and staff mobility. A great step forward towards internationalisation processes was made in late 2019 and early 2020, when the University of Split became a member of the European University of the Seas. The impact of the COVID-19 pandemic on the mobility of the University of Split is still difficult to measure, but it is possible to observe the ratio between planned (approved) mobilities and realised mobilities during the last academic years (one that was not affected and one that was affected by COVID 19). Most of the remaining 1/3 were postponed to the summer semester and a small part of them were cancelled.

4. Research results and discussion

The research initially focused on the constituent units of the University of Split where the students were enrolled. Of the total number of respondents (N=60), the largest number of students was in the third year of study (48.33%), then the fourth (26.67%), fifth (11.67%) and second (11.67%). Only one student reported being in the first year of study.

When analysing the responses related to perceived service quality, it is noticeable that the highest average values were assigned to the academic dimension, followed by the dimension related to the programme, reputation and finally non-academic dimension. The lowest value was given to the dimension of approach. The skewness and kurtosis test were applied in the research to measure the degree of distortion and the sharpness of the curve. According to Hair et al. (2017), the distribution of results is normal if it is between +1 and -1. When analysing the values of skewness and kurtosis, it is noticeable that the distribution is normal as all values are between +1 and -1.

Table 1 Descriptive analysis of the dimensions of perceived service quality

	Min	Max	Mean	Std. Deviation	Skewness	Kurtosis
Access	2.36	5.00	3.92	0.54	-0.20	-0.01
Non-academic	2.73	5.00	4.02	0.53	0.12	-0.28
Academic	2.22	5.00	4.08	0.63	-0.29	0.04
Programme	2.00	5.00	4.04	0.61	-0.66	0.92
Reputation	2.00	5.00	4.02	0.62	-0.53	0.84

Source: Authors' analysis

An analysis of the dimension of the degree of internationalisation, observed through various statements, shows that the highest average values in responses were assigned to the statement about the use of the English language as the main means of communication tool in the research. The other statement related to internationalisation, which has a high mean value is "*There are many different nationalities studying at the University*".

Table 2 Descriptive analysis of internationalisation

	Mean	Std. Deviation	Kurtosis	Skewness
There are many English language classes.	4.13	0.99	0.010	-1.01
A lot of English language is used in the research.	4.38	0.66	-0.614	-0.62
The University promotes several foreign languages.	3.63	0.90	-0.74	-0.05
The University has many international students who complete all or part of their studies at our University.	4.12	0.76	-0.40	-0.44
There are many different nationalities studying at the University.	4.32	0.79	-0.17	-0.85
The University has a high international ranking among universities.	3.60	0.90	-0.78	0.04
All University bodies are willing to use English.	4.20	0.75	-0.18	-0.59
All administrative and technical support staff speak Croatian and at least one foreign language.	3.95	0.74	-1.17	0.08
The University promotes itself in many ways to attract international students (e.g. a website, student recruitment events, printed advertisements, etc.).	3.75	0.95	-0.89	-0.20
Students must be proficient in English by the end of their studies.	4.15	0.75	-0.03	-0.50

Source: Authors' analysis

An analysis of the degree of satisfaction with studying at the University of Split shows that most international exchange students are very satisfied or just satisfied with their studies at the University of Split (80%). An analysis of the time spent physically at the University of Split during the pandemic shows that the highest percentage of respondents (70%) spent less than one month in in-person classes. In terms of time spent attending online classes and the level of satisfaction with online study, it is observed that the highest percentage of respondents (almost half, i.e. 48.33%) studied online.

Table 3 Analysis of the time spent studying online at UNIST during the pandemic

Time spent studying online at UNIST during the pandemic	Percentage of respondents
Less than a month	8.3%
Between one and two months	8.3%
Between two and three months	28.33%
Between three and four months	48.33%
More than four months	6.67%

Source: Authors' analysis

Regarding satisfaction with online classes, the highest percentage of respondents were satisfied with their online learning at the University of Split (46.67%), 31.67% were more or less satisfied, and only 6.67% were either not satisfied or not satisfied at all.

One of the objectives of this research was to assess the impact of the COVID-19 pandemic on the level of satisfaction during the pandemic with respect to the time spent at the University of Split. In order to measure the impact of the COVID-19 pandemic, two groups of respondents were formed to test whether there was a difference in their responses depending on the amount of time spent at the University of Split during the pandemic, using the independent-samples t-test.

The first group of respondents consisted of students who spent up to one month at the University of Split (the lockdown started in mid-March 2020 and the semester started in early March 2020), and the other group were students who stayed at the University of Split during the lockdown (for a month or an entire semester). The results showed no statistically significant difference between the responses of students who physically spent up to one month at the University of Split and students who physically spent their entire study period in Split (more than one month as from March 2020).

Table 4 Analysis of the time spent at UNIST and student satisfaction

	Time spent in Split	N	Mean	Std. Deviation	Std. Error Mean
Overall satisfaction	Up to one month	42	4.14	0.68	0.11
	More than one month	18	3.83	0.99	0.23
Satisfaction with online teaching	Up to one month	41	3.73	0.81	0.13
	More than one month	18	3.50	0.92	0.217

Source: Authors' analysis

4.1 Hypothesis testing

In order to test H1 hypothesis, a correlation was made between perceived service quality and the degree of internationalisation. By using the Spearman coefficient, the research showed a statistically significant positive correlation, indicating the value 0.533.

Table 5 Correlation test (quality and internationalisation)

Construct	Quality	Internationalisation
Quality	1	0.53**
Internationalisation	0.53**	1

** Correlation is significant at the 0.01 level (2-tailed)

Source: Authors' analysis

In order to test H2 hypothesis, a correlation test was made between service quality perceived by international exchange students and their satisfaction. In order to test H2 hypothesis, an analysis was conducted, which indicated that H2 hypothesis could be accepted, as it showed a statistically significant positive correlation between these two constructs (0.56**).

Table 6 Correlation test (quality and satisfaction)

Construct	Quality	Overall satisfaction
Quality	1	0.56**
Overall satisfaction	0.56**	1

** Correlation is significant at the 0.01 level (2-tailed)

Source: Authors' analysis

A correlation method was used to test hypothesis 3. Based on the research results, we can conclude that there is a positive correlation between the level of perceived service quality and satisfaction with online studying that replaced traditional in-person classes during the pandemic period.

Table 7 Correlation test (quality and satisfaction with online studying)

Construct	Quality	Satisfaction with online studying
Quality	1	0.42**
Satisfaction with online studying	0.42**	1

** Correlation is significant at the 0.01 level (2-tailed)

Source: Authors' analysis

Hypothesis 4 was tested by means of a correlation test using the Spearman coefficient. According to the test results, it can be seen that there is a positive correlation between internationalisation and satisfaction of international exchange students in the pandemic period (0.43).

Table 8 Correlation test (internationalisation and satisfaction)

Construct	Internationalisation	Overall satisfaction
Internationalisation	1	0.43**
Overall satisfaction	0.43**	1

** Correlation is significant at the 0.01 level (2-tailed)

Source: Authors' analysis

5. Discussion

Based on previous research, four hypotheses were established to analyse the relationship between quality and internationalisation, as well as their connection with satisfaction. To collect data, an online survey was conducted among international exchange students. The survey revealed that the quality perceived by the international students was positively correlated with the internationalisation processes. In addition, the dimension of quality related to academic issues, followed by programme issues, was rated the highest average scores by the students. It is important to mention that the students assigned low average scores to the dimension related to access. These results differ from those obtained by Dužević et al. (2015) in their research, which showed that the dimension of access was the most important for domestic students, and the dimension of programme had the weakest evaluation results, which is in line with Lazibat et al. (2013). They also confirmed that the academic dimension and the programme related dimension had the best and the worst evaluation results, respectively. The reason for these differences from previous research could be the impact of the COVID-19 pandemic during the study. The difference could be that different dimensions of quality are important for domestic or international students.

Regarding the internationalisation processes at the University of Split, students gave the highest average scores for the statements related to the level of English language use in research and the percentage of international students in each unit of the University of Split. It is interesting to note that the lowest degree of internationalisation assessed by international exchange students is a particle that implies that the University of Split has a high rank among international universities.

The relationship between internationalisation and quality is clear and irrefutable, since internationalisation is one of the elements evaluated in the accreditation of higher education institutions (Wit & Knight, 1999). In this study, it was interesting to test whether this link exists in the eyes of international exchange students, especially in the context of the period that was affected by the pandemic. The second hypothesis was established to examine whether there is a positive correlation between the perceived level of service quality and the perception of the degree of internationalisation by the international exchange students. The results of the research showed that these two constructs are positively related, i.e., the higher the degree of internationalisation of a higher education, the higher the perceived quality level, which is certainly an important contribution to the theory that studies all factors related to the perceived quality level. As the degree of internationalisation of the higher education institution increases, the perceived quality level of the students also increases. It is important to mention that in this case, the perspective of international students was studied, i.e. those who offer a truly realistic perspective of the degree of internationalisation of a HEI because they have experienced most elements of internationalisation.

Numerous other authors have written about the relationship between quality and satisfaction (Razinkina et al., 2018; Teeroovengadum et al., 2019). Their positive relationship was confirmed in this case. For this reason, a high perceived level of quality is often equated with satisfaction (Mavondo et al., 2004). The contribution in this paper is that here this relationship was retested from the perspective of international exchange students.

Since a large number of students were forced to switch to the system of online education during the pandemic period, the third hypothesis was established that specifically observed the relationship between perceived quality levels and satisfaction with online classes (not the level of overall satisfaction, but only with the online segment). The results showed that there was no significant discrepancy between a specific segment of satisfaction with online classes compared to overall satisfaction.

The final hypothesis tested the relationship between internationalisation and satisfaction of international exchange students. The research showed that there is a positive relationship between these two constructs, which indicates that it is in the interest of every higher education institution to expand the degree of internationalisation to increase satisfaction of international students. The findings are in line with previous research, since internationalisation is shown to be one of the most important factors influencing international students when choosing a HEI (Roga et al., 2015). This relationship was observed during the pandemic period, so it is expected that it should be even greater in "normal" times.

6. Conclusion

This paper is a scientific contribution to a better understanding of the constructs of quality and internationalisation from the perspective of international students within the framework of the European Universities Alliance. The purpose of this paper was to investigate service quality perceived by international students during their studies at the University of Split during the COVID-19 pandemic, as well as the construct of internationalisation from the perspective of international exchange students.

In terms of application, it represents a contribution to a better understanding of the views and perspectives of international students. Internationalisation is a must for any HEI operating in the modern education market. Therefore, it is undoubtedly important for HEI management structures to better understand the perspectives of international students. It is important to understand the level of service quality perceived by them in order to improve the quality dimensions they consider important, as they are one of the main target groups of internationalisation.

This research was conducted on the case study of the University of Split, which is one of the first universities in Croatia that joined the European Universities Initiative. Since this initiative represents the highest degree of internationalisation, it was interesting to investigate the perceived level of quality and its relationship with the degree of internationalisation during the COVID-19 pandemic. Although the COVID-19 pandemic is a situation that could not have been predicted in any way, its long-term impact on internationalisation is inevitable. Some of the aspects are related to residence permits, the personal economy of students who decided to spend part of their study at another higher education institution abroad (Slotte & Wikström-Grotell, 2020), and some others to anxiety and stress (UN News, 2020). But surely the implications are even greater and more significant, and we will feel them in the time ahead. Therefore, it is undoubtedly important to work on the continuous development of resilience of higher education institutions to better prepare them for unforeseen situations that may face higher education institutions in the future. This paper presents the impact of the pandemic on the University of Split as one of the universities that has a strong desire to increase internationalisation (as is evidenced by its participation in the Alliance of European Universities). Based on the research results, it can be noticed that internationalisation is related to the perceived level of quality, overall satisfaction and satisfaction with online study, but for fully objective results, the research needs to be repeated in the post-pandemic period.

One of the limitations of this research study is that not all international students responded, which resulted in a small sample. In addition, it is important to mention that service quality and internationalisation perceived by international students are related to the period of study during the COVID-19 pandemic (which was an exceptional situation), so for a long-term perception of students it would be necessary to repeat the research and compare the results. Finally, it would be recommended to include all partner universities of the European University of the Seas alliance, in order to be able to measure the overall impact of the pandemic on mobility, which is one of the main objectives of the whole alliance.

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Ivana Stanić
Osijek-Baranja County
31000 Osijek, Croatia
ivana.stanic@obz.hr

Ksenija Lukić
Osijek-Baranja County
31000 Osijek, Croatia
ksenija.lukic@obz.hr

Silvija Hinek
Nursing home Đakovo
31400 Đakovo, Croatia
silvija.hinek@gmail.com

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EFFICIENCY OF MANAGEMENT COMPETENCIES OF DIRECTORS DURING THE COVID-19 PANDEMIC

Abstract

Purpose: At global and national level, the COVID-19 pandemic is influencing the public to increasingly speak of and recognize the importance of preserving the healthcare system. In addition to the solutions found in the formation of new healthcare policies, legal regulations, the role of the director is increasingly recognized, which is important for achieving goals and success as well as for preserving the healthcare system.

Methodology: The study involved 27 respondents, i.e. directors of healthcare institutions at the primary level in the Republic of Croatia. All collected data were processed using the IBM SPSS Statistics statistical software.

Results: Research results and the theoretical framework of the paper will present the factors influencing the management process of directors in the health system and the importance of the need to revise legislation and the education system aimed at ensuring the sustainability of public health.

Conclusion: The paper will present which competencies of directors of healthcare institutions are crucial for crisis management during the COVID-19 pandemic.

Keywords: Directors of healthcare institutions, system management during the COVID-19 pandemic, management competencies

1. Introduction

Today, under the influence of the COVID-19 pandemic, we are witnessing numerous changes in all spheres of human activity. Change has become inevitable, and change management has become a key instrument in any organization and represents one of the most important aspects for its functioning (Žibert & Starc, 2018). At the heart of this organizational process is teamwork and management of individuals who possess managerial competencies to make an institution or organization successful and recognizable, but also to remain sustainable. Although organizational success largely depends

on leadership, there is no universally accepted and unique definition of leadership in the literature (Grabovac, 2021). According to Northouse (2011), there are four components that appear in almost all definitions of leadership: 1) leadership is a process; 2) leadership involves influence; 3) leadership appears in a group context; 4) leadership involves achieving goals (Northouse, 2011). However, some researchers also look at leadership from a relational, data processing, or trait-based perspective s (Požega et al., 2012). A simpler definition of leadership is explained as a process in which one person influences others to achieve a specific goal (Mayer, 2003). According to this definition, leadership is a transactional event between a leader and a follower and occurs in the context of groups, i.e., it involves influencing a group of individuals who share a common goal, either in a small working group, a community group, or a large group encompassing the entire organization (Gotal, 2013). Therefore, in the process of managing a healthcare institution, the role of the director is important, who is recognized both as a leader through business communication and as a manager through his/her achievements.

The healthcare sector represents a long-standing challenge for leadership, i.e., healthcare management (Dubovečak et al., 2019). Healthcare management encompasses a set of knowledge and skills in the areas of planning, decision-making, management, and supervision within the healthcare system. In the Republic of Croatia, healthcare management is not defined by the existing Healthcare Act, but only the concept of narrow administration is described (Dubovečak et al., 2019). Accordingly, it can be seen that healthcare management in the Republic of Croatia, as well as in many other countries, is in the initial stage of development. This is also confirmed by the fact that there is very little research on this topic (Dubovečak et al., 2019). Nevertheless, this does not belittle the thesis that management capacity is an important prerequisite for the efficient and effective functioning of the healthcare system. Namely, it is necessary to establish systematic training and strengthen the competencies of management staff of healthcare institutions, especially staff dealing with human resources management. Indeed, a quality management system includes a motivational climate, interdisciplinary cooperation, organizational trust, and value-based management with trust building and communication among employees (Ministry of Health, 2015). According to the Strategic Plan for Human Resources in Healthcare 2015-2020 (Ministry of Health, 2015), a quality management system implies:

- a management system with qualified and high-quality system managers who have acquired skills and knowledge through postgraduate or specialist study programs,
- selection and appointment of managers as well as leading experts according to the criteria of excellence, continuous additional training in leading domestic and international business schools and centers,
- re-election based on work results and efficiency (Ministry of Health, 2015).

Furthermore, the execution of management duties and responsibilities requires specific knowledge and competencies and full-time management (Ministry of Health of the Republic of Croatia, 2012). According to the National Strategy for Health Development, organizational-financial and medical management are different. Namely, organizational and financial managers work full-time to perform their management tasks, they do not primarily require medical training, but have specific expertise (economic, legal, managerial) that qualifies them for this job, while for medical management, it is not appropriate or realistic for physicians who take on managerial responsibilities to quit their clinical practice (Ministry of Health of the Republic of Croatia, 2012). Many healthcare professionals are not adequately trained to manage institutions, which has been reflected in inadequate leadership and inadequate managerial competencies (Townsend, 2012). Indeed, quality management must be autonomous, efficient and well-trained (Dubovečak et al., 2019). Numerous studies confirm that, in addition to medical knowledge, healthcare competencies should include personal competencies, interpersonal skills, critical thinking, planning, communication, initiating change, motivation, knowledge of the healthcare system, and developed management and business skills (Kovačić, 2015). According to Rogers (2012), physicians' management potential should therefore be developed in the early stages of their careers, i.e., as early as during their education. Namely, an early investment in physicians' management knowledge would ensure that they

acquire the necessary skills to act as open-minded and collaborative leaders (Rogers, 2012). According to Lee (2010), it is not easy for physicians to accept teamwork, but team building is a key management function in all types of healthcare providers (Lee, 2010). The most successful healthcare leaders are those who are able to continuously study internal and external factors and effectively combine their strategy with the necessary readiness and sense to respond to change (Sabbag, 2021).

1.1 Directors in the management process affected by the COVID-19 pandemic

Crisis leadership is a skill (Shingler-Nace, 2020). In 2020 and further in 2021, the whole world was under the influence of the COVID-19 pandemic, which is the biggest burden on the healthcare system from the very beginning. Every crisis and unforeseen situation produces leaders. Good leaders are characterized by the fact that they believe that their skills and characteristics are not fixed and that they are able to change and adapt (Popović, 2021). During a crisis, the first important implication for healthcare management is to become familiar with the conditions necessary for effective employee performance. These include job satisfaction under difficult crisis conditions, creating a safe working environment and working conditions, providing support and reducing stress (Jankelová et al., 2021). Another important implication is the indication that employee performance in times of crisis is directly influenced by management skills related to communication, leadership, and decision-making. Employees demand honesty and openness, credible and transparent explanations, guidelines for managing the spread of the virus, but also empathy, encouragement, and hope. An important aspect of leadership is creating a sense of control, trust and stability (Jankelová et al., 2021). The key competencies of leaders in a crisis relate to the ability to respond appropriately, quickly, and thoughtfully (Myer, 2007), and for teams to be effective, they must make quick decisions based on the ability to perceive and critically evaluate information in context (Jankelová et al., 2021). In addition, many respondents from different countries noted that the strength and quality of leadership, the effectiveness of communication strategies, and a degree of population support in adherence to guidelines influence outcomes and the achievement of goals (Goodyear-Smith et al., 2021). The importance of communication is also highlighted in a research study conducted by Boin et al. (2016), who cite reliable explanations of what is happening, providing guidance on how to prevent the spread of viruses, communicating hope, emphasizing positivity and positively portraying success in problem solving, and expressing empathy for their patients, their families, healthcare workers, and other health system staff as key features of directors' communication during the crisis. In addition, directors must constantly signal that they are in control of the situation; they must accept their own responsibility and take appropriate steps to overcome the crisis (Boin et al., 2016). This points to the recognized role of the director and his/her indispensable competencies that are important in crisis management during the COVID-19 pandemic.

Aiming at a more comprehensive approach, this research sought to integrate the existing theoretical and empirical knowledge of the importance of quality leadership in healthcare institutions. Consequently, the purpose of this scientific research is to show the importance of competencies of directors contributing to healthcare management during the COVID-19 pandemic.

H1: Management competencies of healthcare system directors contribute to successful crisis management during the COVID-19 pandemic.

H2: Management competencies of healthcare system directors contribute to timely solutions for maintaining the healthcare system and employee discipline during the COVID-19 pandemic.

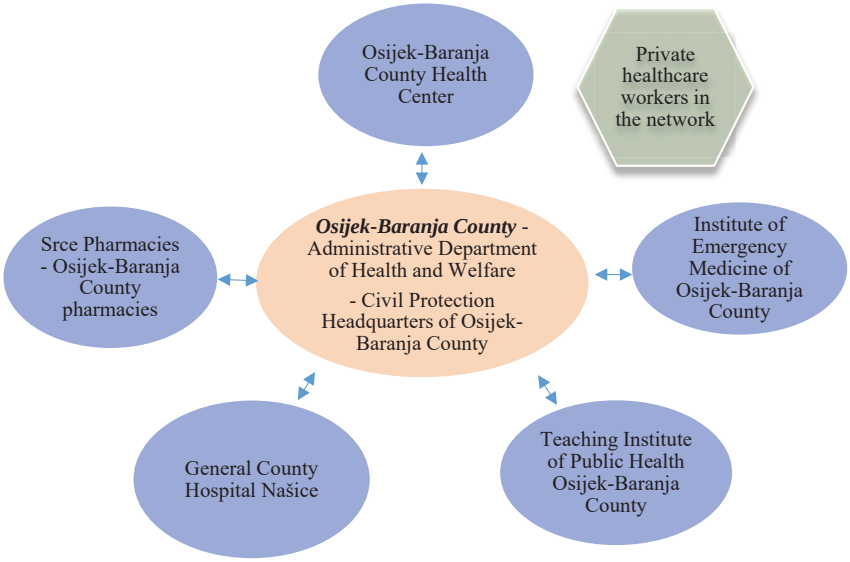
1.1.1 The organization of work of healthcare institutions founded by Osijek-Baranja County during the COVID-19 pandemic

Responses to the COVID-19 pandemic, and, in particular, considerations of its impact on healthcare workers, point to the importance of different political and healthcare systems and cultural approaches to creating and allocating overburdened capacities. Namely, systems with central government coordination, led by policy makers open to recommendations based on scientific evidence, point to the need for better coordination. At the same time, they point to the need to avoid administrative proce-

dures that make it difficult to make decisions about changes in healthcare delivery that are needed immediately. There is a delicate balance between a model with a central command and control system and one that allows for more local authority and decision-making (Bourgeault et al., 2020). The limited economic resources of the public sector, combined with citizen demands for quality healthcare during the COVID-19 pandemic, force the government to introduce innovations in management, which must be more effective (Martínez-Córdoba et al., 2021). However, in order to analyze health management, it is necessary to include exogenous factors that can strongly affect its effectiveness (Cordero-Ferrera, 2011). In order to better understand public health decisions and health management, the following four multidisciplinary hypotheses are identified that influence decision-making related to healthcare systems: *social policy*, which is important for crisis management and its recovery, the *type of regime*, where it is noted that democratic regimes, as opposed to authoritarian regimes, provide better information flow and public trust, *formal political institutions*, which are divided into federalism and the presidency depending on which decisions are made that shape health and social outcomes, and the *capacity of the state*, which includes control over healthcare systems, is essential for all response elements and shapes what policymakers perceive as available options (Greer et al., 2020). A survey conducted by Martínez-Córdoba (2021) aimed to assess health management implemented to date and the levels of efficiency of health resource management. The results showed that countries that use more resources in the healthcare system perform worse in pandemic management. Accordingly, European and American countries are less efficient than Asian and African countries. Furthermore, effective management has proven to be a fundamental element in resolving the health crisis, whereas the use of more resources does not imply better management. Accordingly, policy makers need to pay attention to the appropriate use of resources, taking into account public sector budget constraints. Finally, a very important aspect of effectiveness is learning from the past, with countries that have had similar crisis management situations in the past and achieved the best economic and social results (Martínez-Córdoba et al., 2021).

The Civil Protection Headquarters of Osijek-Baranja County has been actively involved since the very beginning of the pandemic. Through the aforementioned headquarters, each director offers constructive solutions in his or her area of activity, communication is immediate, and any observed problem is solved at daily meetings at headquarters. Osijek-Baranja County Health Center has established the COVID clinic, which engages employees who work in institutions and private practices, organizes work of mobile teams responsible for collecting samples, and participates in the work of vaccination points. "Srce" Pharmacies procure disinfectants and issue certificates to vaccinated citizens. The Teaching Institute of Public Health of Osijek-Baranja County, as a coordinator, organizes the work of vaccination points, procures and distributes vaccines, conducts antigen testing and PCR testing, monitors the vaccination status, but also provides guidelines for the implementation of measures. General County Hospital Našice became a COVID Center that admits some of the patients in order to relieve the burden on the Osijek University Hospital system, which is becoming overburdened in its attempts to maintain the healthcare system. In addition, relief was needed because of a shortage of staff who become sick themselves or are quarantined because they have been in contact with sick people. The Institute of Emergency Medicine of Osijek-Baranja County participates not only in the transport of a potentially infected patient, but also in the implementation of vaccinations. The Administrative Department of Health and Social Welfare and Croatian War Veterans monitors the work of healthcare institutions on a daily basis and provides guidelines for further solutions imposed daily as the healthcare system is confronted with the COVID-19 pandemic for the first time. This well-rounded unit demonstrates the importance of a coordinated management process in times of crisis, but also yields results in reducing the number of patients and the implementation of measures. The role of the director during the pandemic has become highly emphasized as daily decisions must be made due to new, unpredictable situations and changes that require consideration of a broader context aimed at preserving the health of all patients and protecting the healthcare system and all its employees.

Figure 1 Coordination of the healthcare system in Osijek-Baranja County



Source: Authors

For this reason, it is important to see self-assessment of professional and personal competencies of directors of healthcare institutions which they believe they have acquired through education. This will provide an insight into the need to create new study programs and lifelong learning and training programs, as well as the need to diversify existing programs with the aim of acquiring knowledge and skills in the process of healthcare management that will contribute to more successful management of healthcare institutions, which bear the biggest burden in the midst of the COVID-19 pandemic. In accordance with the speed of changes surrounding us and the demands that these changes place on organizations in a dynamic environment, a successful leader must be aware of the importance of lifelong learning and strive for continuous improvement (Gotal, 2013). All of this supports the confirmation of hypothesis H1 that the competencies of directors in the healthcare system contribute to successful crisis management during the COVID-19 pandemic. Furthermore, this paper further presents the results of research conducted by the authors that indicate the importance of competencies possessed by directors who contribute to healthcare management during the COVID-19 pandemic.

2. Methodology

Data collection was performed via an anonymous questionnaire developed by the authors to determine the advantages and disadvantages of management competencies of directors of healthcare institutions at the primary level in the Republic of Croatia, which is an integral part of healthcare management during the COVID-19 pandemic. The time frame of the survey was from April 6 to June 6, 2021. The research was conducted on a convenient sample of 27 directors of healthcare institutions at the primary level in the Republic of Croatia. The questionnaire was sent to 45 primary level health institutions (health centers) founded by regional self-government units in the Republic of Croatia. A total of 45 questionnaires were sent. We received 27 questionnaires from directors of the institutions mentioned above. The response rate was 60%. All collected data were processed using the IBM SPSS Statistics statistical software. In addition to sociodemographic characteristics, the questionnaire also contained 21 closed-ended Likert scale items that represented the dependent variables. The research was conducted online via a Google Forms survey during the COVID-19 pandemic. For the purpose of this research, the analysis method was

used, which in this case analyzed the attitudes of directors of healthcare institutions and pointed out the importance of acquiring competencies. Furthermore, the synthesis method was used to draw new conclusions regarding indicators important for crisis management of the healthcare system during the COVID-19 pandemic, the proving method was used in this research to try to prove the truth of the hypotheses, the survey method was used that was based on the written collection of attitudes and opinions using a questionnaire, and the statistical method was used to statistically process and graphically display the data collected by the questionnaire, which also confirmed the hypotheses.

3. Results and discussion

The study included 27 respondents, directors of primary level healthcare institutions in the Republic of Croatia. The analysis of socio-demographic data revealed that out of the total number of respondents (N = 27), 13 (48.1%) were women and 14 (51.9%) were men. Regarding age, two respondents (7.4%) were aged 30 to 39 years, 9 respondents (33.3%) were aged 40 to 49 years, 10 (37%) were aged 50 to 59 years, and six respondents (22.2%) were aged 60 to 65 years. The level of education indicates that 16 respondents (59.3%) have a university degree, three respondents (11.1%) have a master's degree, two respondents (7.4%) have a PhD degree, three respondents (11.1%) are senior lecturers with a PhD, two respondents (7.4%) are associate professors with a PhD and one respondent (3.7%) is a professor with a PhD. Furthermore, regarding work experience in the position of director of a healthcare institution, the analysis showed that eight respondents (29.6%) have held that position for up to 5 years, 11 respondents (40.7%) have been directors for 6 to 10 years, four respondents (14.8%) have been directors for 11 to 15 years, two respondents (7.4%) have been directors for 16 to 20 years, and two respondents (7.4%) have been directors of a healthcare institution for over 25 years. In addition, 10 respondents (37%) stated that this was their first term of office as director, seven respondents (25.9%) were in their second term, six respondents (22.2%) were in their third term, and four respondents (14.8%) have served for more than three terms.

Furthermore, in Table 1 and Table 2, directors of healthcare institutions rated their personal and professional competencies acquired through education on a Likert scale from 1 (completely disagree) to 5 (completely agree). Table 1 shows professional competencies in terms of administrative skills, leadership skills, communication skills, organizational skills, team leadership skills, and time management skills. Data analysis shows that the average score of the participants in professional competencies self-assessment ranges from 3: I neither agree nor disagree, to 4: I mostly agree. Namely, directors of healthcare institutions considered administrative skills M = 3.22; SD = 1.39 and leadership skills M = 3.33; SD = 1.33 on average as the skills least acquired through education, and communication skills M = 3.85; SD = 1.26 and time management skills M = 3.70; SD = 1.23 on average as the skills best acquired through education.

Table 1 Professional competencies acquired through education

Item	I completely disagree	I mostly disagree	I neither agree nor disagree	I mostly agree	I completely agree	M	SD
Administrative skills	4 (14.8%)	4 (14.8%)	8 (29.6%)	4 (14.8%)	7 (25.9%)	3.22	1.39
Leadership skills	3 (11.1%)	5 (18.5%)	5 (18.5%)	8 (29.6%)	6 (22.2%)	3.33	1.33
Communication skills	2 (7.4%)	2 (7.4%)	5 (18.5%)	7 (25.9%)	11 (40.7%)	3.85	1.26
Organization skills	2 (7.4%)	4 (14.8%)	7 (25.9%)	5 (18.5%)	9 (33.3%)	3.55	1.31
Team leadership skills	2 (7.4%)	4 (14.8%)	5 (18.5%)	9 (33.3%)	7 (25.9%)	3.55	1.25
Time management skills	2 (7.4%)	3 (11.1%)	4 (14.8%)	10 (37%)	8 (29.6%)	3.70	1.23

Source: Authors

Table 2 shows the personal competencies acquired through education, including innovation, self-criticism, visionary/strategic thinking, kindness, and understanding. Data analysis shows that the average score of self-assessment of personal competencies ranged from 3: I neither agree nor disagree, to 4: I mostly agree. Namely, directors of healthcare institutions considered innovation M = 3.62; SD = 1.18 and visionary/strategic thinking M = 3.92; SD = 1.07 as the skills least acquired through education, and kindness M = 4.18; SD = 1.11 and understanding M = 4.18; SD = 1.03 as the skills best acquired through education.

Table 2 Personal competencies acquired through education

Items	I completely disagree	I mostly disagree	I neither agree nor disagree	I mostly agree	I completely agree	M	SD
Innovativeness	1 (3.7%)	5 (18.5%)	4 (14.8%)	10 (37%)	7 (25.9%)	3.62	1.18
Self-criticism	1 (3.7%)	2 (7.4%)	1 (3.7%)	12 (44.4%)	11 (40.7%)	4.11	1.05
Visionary / strategic thinking	1 (3.7%)	2 (7.4%)	4 (14.8%)	11 (40.7%)	9 (33.3%)	3.92	1.07
Kindness	1 (3.7%)	2 (7.4%)	2 (7.4%)	8 (29.6%)	14 (51.9%)	4.18	1.11
Understanding	1 (3.7%)	1 (3.7%)	3 (11.1%)	9 (33.3%)	13 (48.1%)	4.18	1.03

Source: Authors

The data presented suggest that the directors of healthcare institutions perceive their personal and professional competencies acquired during their education to be inferior to those they currently possess while serving as directors. This points to the opportunity to create new study programs and lifelong learning and training programs that will contribute to successful leadership of healthcare institutions and improve the readiness of future directors to assume leadership roles. Namely, the ability to lead is not a static competence, but lifelong learning designated for continuous development (Senge, 2003). The director is the key person to steer the institution in a positive direction and make the work of employees effective. Indeed, changes in the economic, social, political, and technological context require changes in educational policies so that directors can acquire various competencies and be able to influence the quality of the work at the institution. Such a role leads to the fact that the function of the director grows and needs to be regulated as a profession (Kokanović, 2021). Namely, the need to emphasize lifelong learning requires a new learning culture for which individuals are not adequately prepared during formal education. Accordingly, the continuous development of individual competencies is essential to successfully meet the modern demands of today's society (Šagud, 2011), and especially the challenges posed to healthcare institutions and directors by the COVID-19 pandemic. Namely, the most successful leaders in the field of healthcare are those who are be able to continuously study internal and external factors and effectively combine their strategy with the necessary readiness and sense to respond to change (Sabbag, 2021), and in order to be prepared, they must receive the necessary professional and practical training to face the challenges in the most appropriate and efficient way and meet the requirements of modern healthcare management. The results of this research show that directors of healthcare institutions rate their personal and professional competencies acquired during their education lower than the competencies they possess during the period in which they serve as directors. These findings can be used as a starting point for the creation of new study programs and lifelong learning and training pro-

grams. In particular, they should include programs related to crisis management and competencies related to adaptation to new challenges and working conditions, which proved to be a key indicator of successful leadership during the COVID-19 pandemic.

Furthermore, Table 3 shows self-assessment of management competencies that led a successful director during the COVID-19 pandemic to maintain the healthcare system and work discipline that directors of healthcare institutions are likely to possess and that make them successful directors. Management skills include strategic management, human resource management, team management, time management, project management, and financial management. Data analysis shows that the average score of self-assessment of management competencies that make a successful director ranges between 4: I mostly agree and 5: I completely agree, which may indicate that they assess their current competencies as high. The directors self-assess themselves as least successful in the categories of strategic management M = 4.25; SD = 0.94, and time management M = 4.25; SD = 0.90, while human resources management M = 4.51; SD = 0.93, team management M = 4.44; SD = 0.97, and project management M = 4.44; SD = 0.93 are the categories in which the directors self-assessed themselves with the highest grades.

Table 3 Self-assessment of management competencies that make a successful director during the COVID-19 pandemic for preserving the healthcare system and work discipline

Items	I completely disagree	I mostly disagree	I neither agree nor disagree	I mostly agree	I completely agree	M	SD
Strategic management	1 (3.7%)	0	3 (11.1%)	10 (37%)	13 (48.1%)	4.25	.94
Human resources management	1 (3.7%)	0	2 (7.4%)	5 (18.5%)	19 (70.4%)	4.51	.93
Team management	1 (3.7%)	1 (3.7%)	0	8 (29.6%)	17 (63%)	4.44	.97
Time management	1 (3.7%)	0	2 (7.4%)	12 (44.4%)	12 (44.4%)	4.25	.90
Project management	1 (3.7%)	0	2 (7.4%)	7 (25.9%)	17 (63%)	4.44	.93
Financial management	1 (3.7%)	1 (3.7%)	1 (3.7%)	8 (29.6%)	16 (59.3%)	4.37	1.00

Source: Authors

The results obtained by the survey questionnaire items confirm the established hypothesis 2. Every successful manager should have the ability to select and use the right tools and resources to achieve the goals of the institution (Buble, 2010), which is especially important in times of crisis. For the process of crisis management to be successful, it is necessary to integrate the knowledge and experience of various areas of management (Coombs, 2012).

Table 4 Correlations between management competencies that make a successful director during the COVID-19 pandemic and the level of education

		Level of education	Strategic management	Human resources management	Team management	Time management	Project management	Financial management
Level of education	Pearson correlation	1	-.221	-.421*	-.300	-.204	-.181	-.213
	Sig. (2-tailed)		.267	.029	.129	.306	.366	.285
	N	27	27	27	27	27	27	27
Strategic management	Pearson correlation	-.221	1	.756**	.790**	.821**	.780**	.867**
	Sig. (2-tailed)	.267		.000	.000	.000	.000	.000
	N	27	27	27	27	27	27	27
Human resources management	Pearson correlation	-.421*	.756**	1	.835**	.746**	.783**	.810**
	Sig. (2-tailed)	.029	.000		.000	.000	.000	.000
	N	27	27	27	27	27	27	27
Team management	Pearson correlation	-.300	.790**	.835**	1	.826**	.832**	.846**
	Sig. (2-tailed)	.129	.000	.000		.000	.000	.000
	N	27	27	27	27	27	27	27
Time management	Pearson correlation	-.204	.821**	.746**	.826**	1	.816**	.907**
	Sig. (2-tailed)	.306	.000	.000	.000		.000	.000
	N	27	27	27	27	27	27	27
Project management	Pearson correlation	-.181	.780**	.783**	.832**	.816**	1	.883**
	Sig. (2-tailed)	.366	.000	.000	.000	.000		.000
	N	27	27	27	27	27	27	27
Financial management	Pearson correlation	-.213	.867**	.810**	.846**	.907**	.883**	1
	Sig. (2-tailed)	.285	.000	.000	.000	.000	.000	
	N	27	27	27	27	27	27	27

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

Source: Authors

Table 4 shows the correlations between management competencies which make a successful director during the COVID-19 pandemic and the level of education. The results show that none of these competencies are related to the level of education of a director. Since the respondents were university graduates, PhD degree holders and professors, it is concluded that the aforementioned crisis management competencies may not have been acquired through education at all or at least not sufficiently. The COVID-19 pandemic has placed great demands and challenges on the directors of healthcare institutions, who, in addition to professional and medical knowledge, also require crisis management knowledge (Jankelová et al., 2021). According to research conducted by Jankelová et al. (2021) during the COVID-19 pandemic, there is a need to acquire and expand managerial and crisis competencies of directors in the healthcare system, as confirmed by many other scientific studies (Jankelová et al., 2021). The results of this research lead to the same conclusion and indicate the need for lifelong learning of directors of healthcare institutions.

4. Conclusion

The healthcare system was in an emergency situation when the management competencies of healthcare system directors became crucial to the survival of the system and the suppression of the pandemic. The hypotheses in this paper indicate the potential shortcomings of competencies acquired by directors, but also the recognized need to acquire them through education or lifelong learning. The role of a director who manages, coordinates and communicates during the crisis caused by the COVID-19 pandemic is extremely important and has an impact on the healthcare system. That is why organizations must be able to communicate the positive elements of a crisis situation to show that a crisis situation can be a productive process and not just an unpleasant and negative phenomenon. Crisis management strategies must include the development of the present and the future. They also require abandonment of daily, routine activities, i.e., the introduction of innovative activities that require a high level of management readiness (Mihaljević & Mihalinčić, 2011). The situation caused by the COVID-19 pandemic described above has shed light on shortcomings caused by bureaucratic procedures, and lack of competencies or skills needed by directors of healthcare institutions. In addition, it is concluded that it is important for directors of healthcare institution to know the elements of crisis management of the institution in unforeseen situations. Therefore, the solutions are reflected in the role of directors who will acquire the necessary competencies, knowledge and skills through the educational process. At the same time, we want to present the success of the process of management in healthcare institutions during the COVID-19 pandemic with regard to the acquired initial education. Therefore, the need for further research related to health institutions at the primary, secondary and tertiary levels of medical care was identified. Namely, as the COVID-19 pandemic continues to unfold and evolve, there is a need to strategically consider how to influence human resources and restructure healthcare institutions so that crisis management during and after the COVID-19 pandemic can take effect in a timely and effective manner.

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Professional paper

Josip Juračak, Petra Lovre

Reward and incentive programs and employee satisfaction: Case study of dm-drogerie markt d.o.o.

Josip Juračak
University of Zagreb
Faculty of Agriculture
10000 Zagreb, Croatia
jjuracak@agr.hr

Petra Lovre
10000 Zagreb, Croatia
petra.lovre46@gmail.com

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REWARD AND INCENTIVE PROGRAMS AND EMPLOYEE SATISFACTION: CASE STUDY OF DM-DROGERIE MARKT D.O.O.

Abstract

Purpose: Since reward and incentive programs play a key role in attracting new employees and motivating existing ones, we decided to investigate which programs are used by highly desirable employers and how satisfied their employees are with these programs.

Methodology: A survey on employee satisfaction with work and reward and incentive programs was conducted among 160 (10%) employees of the company dm-drogerie markt d.o.o. The obtained data were processed using methods of descriptive statistics and non-parametric tests.

Results: The average satisfaction of employees with the reward and incentive system is 4.39 on a scale from 1 to 5, where 5 means "completely satisfied". The average job satisfaction is 4.47, and a moderate positive correlation was found between job satisfaction and satisfaction with the reward and incentive system (r_s=0.523, p<0.010). Differences in the level of satisfaction were found in relation to the department and salary level of the respondents: more satisfaction was expressed by employees in the Sales Region department and by those in the highest salary level.

Conclusion: The analysis revealed a high average satisfaction level, but also a gap between the importance that employees attach to a particular program and their satisfaction with that program. The results confirm the importance of the reward and incentive system for overall job satisfaction and can be used to improve this system within the company.

Keywords: Employee rewards, job satisfaction, dm-drogerie markt, motivation

1. Introduction

Attracting and retaining qualified employees is one of the biggest challenges for modern companies. More and more companies put human resources (HR) in the foreground, while their material and financial resources take a back seat (Jambrek & Penić, 2008). Successful companies are desirable as employers, which is often linked to a well-designed system of employee motivation. Motivation conditions people's behaviour and depends on various factors of material, social and psychological nature. Dessler (2015) states that business strategies should be built and developed taking into account needs and expectations of employees, and this is especially true

for reward and motivation strategies. A motivated employee is a satisfied employee, and employee satisfaction is a good predictor of business success.

The MojPosao internet portal has been conducting the Employee Satisfaction Survey in Croatia since 2008, based on which it identifies the best employers in three categories of companies by size (MojPosao, 2019). In the thirteen years that the survey has been conducted, the best ranked company is dm-drogerie markt d.o.o. (hereinafter: DM). This company has been declared the Employer of the Year seven times and the runner-up six times. Due to the observed high level of satisfaction among the DM employees, we decided to investigate the extent to which the employees of this company are satisfied with its reward and motivation programs and whether there is a relationship between satisfaction with these programs and overall job satisfaction. In addition to this main objective, we investigated the relationship between satisfaction with reward programs and job satisfaction with employee demographic and job characteristics.

The results of the study may help the management of the observed company and other employers to find and develop effective ways to reward and encourage employees to increase their job satisfaction, which should lead to positive selection and greater work efficiency.

2. Theoretical framework

The HR of an organisation represent the totality of the knowledge, skills, abilities, creativity, motivation and loyalty of its employees. Unmotivated employees have lower productivity and work performance, are not interested in the quality of products and services, do not identify with the organisation and are ready to leave it (Bahtijarević Šiber, 1999).

According to Heckhausen (1965), personal motivation is the desire to increase or maintain one's own performance at a high level. Bahtijarević Šiber (2014) describes motivation as an internal instinct that leads an individual to behave in a way that ensures the achievement of personal goals, i.e. the fulfilment of needs. The psychological nature of the concept of motivation makes it an internal variable of an individual's behaviour, the presence of which is difficult to determine, so we can only assume it on the basis of observed behaviour (Marušić, 2006). Management constantly studies the needs and expectations of employees and tries to meet them in order to maintain work motivation. The motivation process itself consists of the quality of "...communicating, setting examples, encouraging, spurring, soliciting feedback, involving others in work, delegating, developing and training, informing, reporting, and ensuring fair rewards" (Deny, 2000).

2.1 The most influential motivation theories in HR management

Various and numerous behavioural and motivation theories developed over nearly a hundred years have had a significant impact on the emergence of modern systems of employee motivation. Here we will briefly describe some of these theories, which are considered to be the most important ones.

One of the most influential motivation theories is based on Maslow's model of the hierarchy of human needs. In the pyramidal model, human needs are divided into two groups: deficiency needs and growth needs. As for the first group of needs, people are motivated to avoid their non-fulfilment (Reeve, 2018). Growth needs are higher-order needs that are not caused by a lack of something. They arise from the human need for personal development. Self-actualisation is at the top of the pyramid and all people could achieve it, but many do not due to a variety of life circumstances.

From an HR management perspective, employers should provide their employees with opportunities for self-actualisation so that they can reach their full potential at work. An organisation can support employee self-actualisation in a number of ways by following these steps (Kaur, 2013):

1. recognising employee achievements;
2. providing financial security for the employee;
3. providing opportunities for socialisation;
4. maintaining and promoting employee health.

The literature on the application of motivation theories often refers to the problem of employees unable to express their desires and expectations for work. In practice, therefore, managers often act not on what their employees would say, but on what they believe most employees would want under similar circumstances (Gawel, 1996). In such cases, decisions and offers are made based on Maslow's pyramid of needs.

Alderfer elaborates Maslow's hierarchy of needs and develops the theory of existence, relationship, and growth (ERG theory), which attempts to explain the factors that contribute to an individual's behaviour and motivation (Caulton, 2012). It is a process theory that focuses on the needs for esteem and job performance. According to ERG theory, lower-level needs do not have to be met for an individual to advance to a higher level (Alderfer, 1969). An important contribution of this theory from a management perspective is the introduction of the term "frustration-regression". Alderfer explains that a person who is unable to satisfy a higher-level need will refocus their attention on lower-level needs. This means that an employee who is not allowed to develop could focus their energy on social needs and spend their time at work socialising instead of working. Another important element of ERG theory is the finding that monetary incentives can only indirectly satisfy an employee's work-related needs and recognition, depending on the employee's perception of the value of that incentive (Arnolds & Boshoff, 2002).

Herzberg's (1966) two-factor theory is probably the most influential motivation theory in the field of HR management and is often referred to in the literature as hygienic motivation theory. It is based on the concept of an individual's satisfaction and their effort to achieve that satisfaction. Herzberg assumes that job satisfaction and dissatisfaction do not have the same causes. According to his theory, motivational factors are divided into two groups: extrinsic or hygienic factors and intrinsic factors or motivators. Hygienic factors include conditions which must be met to avoid job dissatisfaction (e.g. salary, job security, and working conditions). Motivators are factors that affect employee satisfaction and hence motivation. They cause more or less job satisfaction among employees (Gutinić et al., 2018). In Herzberg's theory, motivation is divided according to the type of incentive into:

- Extrinsic (external) motivation;
- Intrinsic (internal) motivation.

Extrinsic motivation is based on formal incentives like material rewards, a certain status, a high grade from a supervisor or a promotion (Delaney & Royal, 2017). Intrinsic motivation is based on the innate motivation of individuals to pursue their own interests and to seek challenges that enable the development of skills and abilities (Reeve, 2010).

Organisations that seek to attract, motivate, and retain good employees apply motivation theories in practice and attempt to identify employee wants, needs, preferences, and values. Employee motivation and satisfaction are increased by encouraging and rewarding desirable behaviours through a combination of extrinsic and intrinsic motivators (Brnad et al., 2016).

Early motivational concepts were replaced by cognitive concepts in the 1970s. The cognitive approach emphasises mental processes and cognitive constructs and de-emphasises environmental and biological constructs (Reeve, 2018). Vroom's cognitive model is probably most significant in the development of modern motivation theories. It was developed precisely in an effort to understand motivation and behaviour within the organisation (Bahtijarević-Šiber, 1999). Unlike need-based theories of motivation, Vroom's expectancy theory is based on the premise that people make decisions about their actions based on the expected outcome. It is assumed that people make conscious decisions to achieve the greatest satisfaction or the least pain. In the context of work, this would mean that a person will work harder if they expect a higher reward. Furthermore, an employee will be motivated and productive if two conditions are met:

1. the employee believes that he/she will successfully complete the task;
2. the employee believes that he/she will be rewarded for successful performance.

There is a relationship between the effort made, the performance achieved and the reward received, therefore three variables are used in this model: expectancy, instrumentality, and valence (Dessler, 2013, p. 394). According to this theory, an employer must know an employee well enough to set achievable goals and provide a reward that has an appropriate value in the employee's opinion.

McClelland's "acquired needs" theory is one of the most influential theories in organisational and personality research. According to this theory, people are motivated by three basic factors: achievement, affiliation, and power. Accordingly, McClelland divides total human needs into three dimensions: achievement needs, affiliation needs, and power needs (Royle & Hall, 2012). All three dimensions of needs affect a person's motivation and behaviour, and one of them is always more dominant than the

other two. Therefore, in the context of HR management, these types of needs are considered as factors that affect employee motivation. If the employer recognises the dominant needs of the employee, it will be easier for him/her to assign a role to the employee that matches his/her ability to contribute most to the organisation. A manager will also be able to adjust elements of the reward system to effectively motivate employees. The main theme of McClelland's theory is that needs are learned or adopted in an individual's confrontation with his/her environment. As a result, a rewarded behaviour will recur more frequently in the individual (Pardee, 1990).

In his goal-setting theory, Locke defines a person's goals as the primary drivers of his/her behaviour. In this regard, people who set challenging and specific goals achieve better results than those who set easier goals (Locke & Latham, 2006). There are five critical principles of goal setting: clarity, challenge, commitment, feedback, and complexity. Simply put, those who set goals while adhering to these five principles increase their chances of achieving those goals, first at the individual level and then at the organisational level. This theory has been developed over decades based on empirical research that contributes to its applicability in practice (Locke & Latham, 2006). This application is reflected in the guidelines for integrating goals into incentive programs to increase motivation in work organisations.

2.2 Job satisfaction and its measurement

There is no single definition or measurement of job satisfaction, but most of them are based on the relationship between employee expectations of work and what the work actually provides (Gutinić et al., 2018). Various standardised methods and indicators are used to measure employee job satisfaction, such as the Job Description Index, the Minnesota Satisfaction Questionnaire, the EEM-Employee Survey, etc. (Spector, 1997). Job satisfaction or dissatisfaction is indirectly related to motivation, but it is wrong to equate these two concepts. Namely, while motivation refers to the desire and effort to achieve desires or goals, satisfaction refers to the feeling of accomplishment due to the realisation of a desire. Thus, motivation implies a desire for results, whereas satisfaction is a consequence of achieving results (Weihrich & Koontz, 1998). Only if we separate the concept of motivation from the concept of job satisfaction, we can understand the situation of motivated employees who are dissatisfied with the job and similar seemingly illogical situations (Buble, 2006).

An effective motivation system within HR management must encourage 4 types of desirable behaviours: (1) attraction and retention of quality employees, (2) quality execution of work tasks, (3) creativity and innovation at work, and (4) identification with the company and interest in its development (Bahtijarević Šiber, 1999).

Numerous surveys on job satisfaction and work motivation of employees can be found abroad and in Croatia. Zagreb Institute of Economics (2000) conducted a survey on job motivation and job satisfaction. In a sample of employees from 10 companies, they found that the greatest motivators were a salary level and good managers, while education ranked lowest along with work and company status (image). According to the results of a survey conducted among workers in the wood and furniture industry in Croatia, the most important factors motivating workers are job security and regular wage payments (Brnad et al. 2016). The same conclusion is reached by Jelačić (2010), who found that industrial workers are most satisfied with job security, while they are most dissatisfied with the level of wages and the possibility of their growth, as well as the lack of promotion opportunities. Salopek (2019) analysed the system of rewards and motivation of employees in a company and found that the greatest influence on employee motivation is the amount of salary and the regularity of receiving it, followed by interpersonal relations, a pleasant working environment and job security. Research on the motivation of seasonal workers in tourism has shown that they are motivated to acquire new knowledge and experience because they believe that it will be easier to find permanent employment (Gutić Martinčić, 2017). In the same study, the main motivating factors for full-time employees were various material incentives, and it was shown that employment status influences the importance of certain motivational factors among employees. Employee motivation can also be influenced by interpersonal communication and employee interaction and especially recognition and praise from supervisors (Brooks, 2007). The importance of intangible rewards is also confirmed by research conducted among employees in fast food franchise (Peterson, 2006). Therefore, a good incentive and reward system must include tangible and intangible incentives, as not all employee expectations and needs can be met through tangible rewards.

3. Methodology

For the purpose of this research, data were collected through a survey using a self-completion questionnaire. The survey was administered online to a sample of 160 DM workers in September 2020. Workers were invited to participate in the survey via an internal email system.

The survey questionnaire contains 20 questions arranged in two parts of the questionnaire. The first part of the questionnaire relates to the socio-demographic characteristics of the respondents and their jobs, and the second part contains scales expressing their satisfaction with company incentive and reward programs, then their satisfaction with the incentive and reward system, and overall job satisfaction. Five-item scales were used to measure satisfaction with the reward and benefit system and job satisfaction. Seven-item scales were used to measure satisfaction with each of the 14 types of rewards and benefits. The questionnaire is available from the authors upon an e-mail request.

Based on the information about the observed company and literature review in this paper, we investigated the following assumptions:

1. The degree of job satisfaction of the respondents and the reward and incentive system are above the average on the scale applied (above 2.5);
2. The level of satisfaction with the reward and incentive system is positively correlated with job satisfaction;
3. The level of satisfaction of employees differs in relation to their socio-demographic characteristics and the characteristics of their jobs.

Non-parametric tests were used to examine differences in employee satisfaction in relation to their socio-demographic and job characteristics. Depending on the type of variables and the number of modalities, the following statistical tests were used:

1. Mann-Whitney U for dichotomous nominal variables: gender, type of household (multi-person or single-person), minors in the family (yes/no), type of employment contract (permanent/temporary), and working hours (full-time/part-time),
2. Kruskal-Wallis H for categorical variables with three or more modalities: age (4 groups), educational level (3 groups), organisational unit (3 types), net monthly salary (4 classes),
3. nonparametric correlation (Spearman rs) for numeric and ordinal variables: total work experience (years), and work experience at DM (years).

Data were processed and analysed using SPSS v. 17.0 statistical data processing package.

4. Results and discussion

4.1 dm-drogerie markt d.o.o. company

The Croatian company dm-drogerie markt d.o.o. was established in 1994 and is a part of the German DM Group, which was founded in 1973. The DM Group is an international drugstore chain, which has its stores in 13 European countries (DM, 2020a). The whole group employs more than 62,000 people and has more than 3,600 stores (2019). In Croatia, DM employs 1,592 people and has 160 stores. DM is organised into 4 sales regions, 23 departments and 5 sectors. The sales assortment includes more than 17,000 products from various categories: from cosmetics and dietary supplements to baby and household products. DM has 32 own brands covering almost all assortment categories.

DM sales revenues increased steadily from HRK 1,576 million to HRK 1,822 million from 2016 to 2019 (Dun & Bradstreet Hrvatska, 2021). The value of the company's assets ranged between HRK 370 million and HRK 479 million in the same period and increased to HRK 1,128 million in 2020 due to the purchase of construction assets. EBITDA varied between HRK 130 million (2018) and HRK 192 million (2020) in 2016-2020, while net profit varied between HRK 31 million (2020) and HRK 74 million (2015). Return on assets (RoA) was above 10% until 2020 and then it decreased to 3% as the value of assets increased sharply in that year.

At DM, they point out that the key to their successful business is to "put people first", be it customers or employees. Business strategies are designed to

meet the needs of customers while encouraging employees to collaborate and provide opportunities for improvement and advancement in order to operate as an exemplary community (DM, 2020b).

The motivation and reward system in the company consists of various tangible and intangible programs, which are shown in Table 1. This study investigated how satisfied employees are with the system and each program, and the importance employees attach to each of the 14 programs. In addition, job satisfaction of the employees was investigated.

Table 1 Reward and incentive programs for DM employees

No.	Description of the program
01	Gift voucher for kids (up to 15 years) on holidays
02	Gift voucher for a new-born or adopted child
03	Jubilee awards
04	Salary supplement for the length of service in DM
05	Commuting subsidies
06	Free consumption of fruit, juice and hot beverages
07	Financial assistance in the event of death
08	Company car and mobile phone for managers
09	Flexible work schedule
10	Opportunity for career advancement
11	Possibility of further education and training
12	In-house training and education at all levels
13	Foreign language courses
14	'Corporate Family Day' and 'Corporate Christmas Dinner'

Source: Tudor (2010)

4.2 Sample characteristics

A total of 160 DM workers were interviewed, 137 of whom were women and 23 were men. The age of respondents ranges from 22 to 59 years, with an average of 37.14 years (Table 2). The highest proportion are respondents with higher or tertiary education (50%), followed by those with secondary or lower education (46%) and workers with postgraduate education (4%). The percentage of respondents with minor children is 42% and there are 58% of respondents without minor children. Most respondents live in families with 2 or more members (90%), and others live in single-person households. Respondents were evenly distributed into 5 classes according to the overall length of service (between 5 and 22 years) and length of service in DM (between 3 and 22 years). The average total length of service is 13.74 years (SD=8.85), and the average length of service in DM is 10.68 years (SD=6.62).

According to the average net monthly salary, most respondents (i.e. 46%) earn between HRK 6,001 and 9,000. After that, there follow employees with a salary ranging between HRK 9,001 and 12,000 (28%), and then those with a salary of more than HRK 12,000 (15%). There are 10% of those with a monthly salary of up to HRK 6,000, and 1% of respondents have a salary of up to HRK 3,000. The average monthly net salary in Croatia for the period January-August 2020 was HRK 6,724 (CBS, 2020).

Table 2 Socio-demographic characteristics of respondents

Variable & values		Frequency	Percent	Mean	St. dev.
Gender	Male	23	14%		
	Female	137	86%		
Age groups, years	Less or equal to 29	35	22%	37.14	8.61
	30-35	29	18%		
	36-39	37	23%		
	40-45	29	18%		
	46 or more	30	19%		
Education	Secondary school or lower	74	46%		
	Bachelor level	38	24%		
	Master level	41	26%		
	Postgraduate level	7	4%		
Family size	Single person	17	11%		
	Multi-member	143	89%		
Minors	Yes	67	42%		
	No	93	58%		
Organisational unit	Finance/Accountancy	11	7%		
	Informatics	6	4%		
	Logistics	17	11%		
	Commerce and Marketing	17	11%		
	Human Resources	3	2%		
	Sales Region (Retail)	106	66%		
Net monthly salary, HRK	≤ 3,000	2	1%		
	3,001 – 6,000	15	9%		
	6,001 – 9,000	74	46%		
	9,001 – 12,000	45	28%		
	≥12,000	24	15%		
Employment contract	Permanent	26	16%		
	Temporary	134	84%		
Weekly working hours	10–19 h	2	1%		
	20–29 h	9	6%		
	30–39 h	9	6%		
	40 h (full time)	140	88%		
Years of service, total	≤ 5	32	20%	13.74	8.85
	6 – 12	32	20%		
	13 – 15	34	21%		
	16 – 21	32	20%		
	≥ 22	30	19%		
Years of service at DM	≤ 3	33	21%	10.68	6.62
	4 - 9	32	20%		
	10 – 12	33	21%		
	13 – 17	30	19%		
	≥ 22	32	20%		

Source: Authors

As many as 84% of employees have permanent employment contracts (employment contracts for an indefinite period), while 16% have fixed-term employment contracts. Furthermore, the vast majority (88%) are full-time employees working 40 hours per week, while only 1% work less than 20 hours per week. The remaining 11% work between 20 and 40 hours per week.

They work mainly in retail shops (66%, Sales Region), and 22% of respondents work in logistics, retail and marketing. The rest work in finance and accounting, information technology and HR (7%, 4% and 2%, respectively). In terms of functions, foremen (24%) and salespersons (23%) are the most represented in the sample. They are followed by clerks (19%), deputies (13%), assistants (11%), managers (6%), and other functions (4%).

According to their work experience, 46% of respondents have spent their entire working life in DM, indicating low turnover and absenteeism: a prerequisite for organisational success (Bahtijarević Šiber, 1999).

4.3 Employee satisfaction with the incentive and reward system and job satisfaction

DM employees who responded to the survey are well or very well acquainted with the company's motivation and reward programs. Only 10% reported that they knew little about these programs, while 90% reported that they were well or very well acquainted with these programs (Table 3). Satisfaction with the reward and incentive system is very high: the average is 4.39 on a scale of 1 to 5 (SD=0.82). None of the respondents are 'completely dissatisfied' and only six respondents are 'dissatisfied' (3.8%), while 57.5% of them are 'completely satisfied' with the system. The results confirm the assumption that the majority of DM employees, as one of the most sought-after employers in Croatia, will be satisfied with the system of rewards and incentives in the company.

Table 3 Employee satisfaction with the reward system and overall job satisfaction

Level of satisfaction	Satisfaction with the reward and incentive system		Job satisfaction	
	Frequency	Percent	Frequency	Percent
1 Completely unsatisfied	0	0	0	0
2 Unsatisfied	6	3.8	1	.6
3 Neither satisfied nor unsatisfied	17	10.6	9	5.6
4 Satisfied	45	28.1	64	40.0
5 Completely satisfied	92	57.5	86	53.8
Total	160	100.0	160	100.0
Mean	4.39		4.47	
SD	0.825		0.634	

Source: Authors

Similar results were obtained in the assessment of overall job satisfaction in DM. There are no 'completely dissatisfied' respondents, and the average satisfaction level is 4.47 on a scale of 1 to 5 (SD=0.63), which is even higher than satisfaction with the system of incentives and rewards (Table 3). In this regard, there are less 'dissatisfied', 'undecided' and 'completely satisfied' respondents (scores 2, 3 and 5, respectively), and more 'satisfied' respondents (score 4). As in the case of satisfaction with the reward system, it can be said that the results are consistent with the status of DM as one of the most desirable employers in the country.

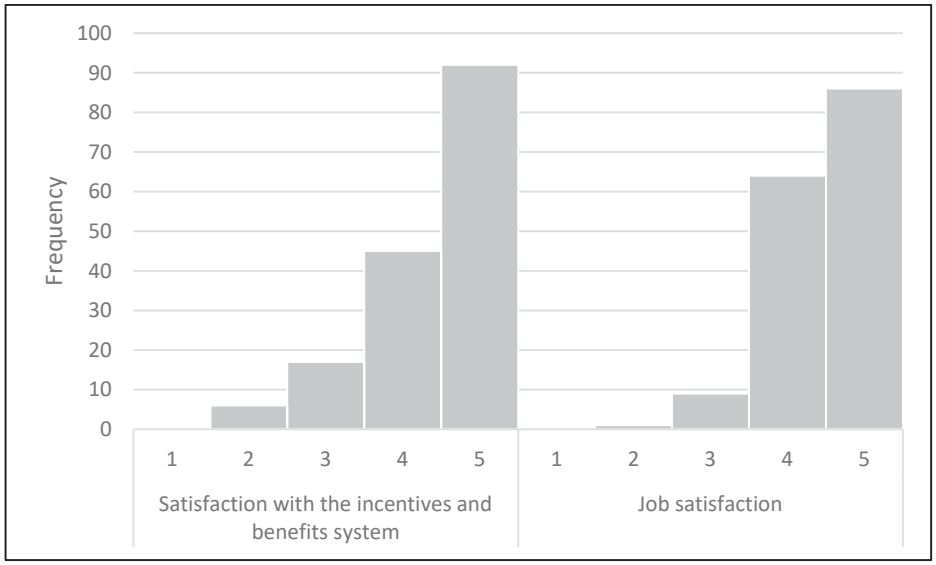
Using nonparametric binary correlation, we tested the relationship between employees' level of familiarity with the reward system, their satisfaction with the system, and their overall job satisfaction. A strong positive correlation was found between

employees' familiarity with the reward and incentive system and their satisfaction with the system (r=0.740, p<0.01). A statistically significant positive but moderate correlation was found between satisfaction with the reward and incentive system and overall job satisfaction (r_s=0.523, p< 0.01), indicating that there is a positive relationship between a high quality motivation system in the form of incentives and rewards and overall job satisfaction.

4.4 Employee satisfaction with the reward and incentive system in relation to socio-demographic and job characteristics

Certain types of rewards and incentives in DM are tied to specific socio-demographic characteristics of employees. These are perks and bonuses (e.g., family days, gifts for children). Other benefits are tied to an employee's job or status (e.g., anniversary payments, company cars). In addition, employee expectations and needs are likely to vary with age, education level, and marital status. Based on all of the above, we examined whether there was a relationship between respondents' socio-demographic characteristics and job characteristics and their satisfaction with compensation and incentive programs. Since the distribution of scores obtained for satisfaction with the reward and incentive system and job satisfaction deviated greatly from the normal distribution (Figure 1), we used the non-parametric Mann-Whitney U and Kruskal-Wallis H tests in the analysis. For the numerical variables referring to years of service (total and in DM), we calculated the Spearman correlation coefficient.

Figure 1 Frequency histograms for DM employee satisfaction with the reward and incentive system and job (N=160; 1='Completely dissatisfied', 5='Completely satisfied')



Source: Authors

The results of the analysis showed that the level of satisfaction with reward and incentive programs related to two of the 11 variables tested, namely the organisational unit variable (H=22.378, p=0.000) and monthly net salary (H=11.072, p=0.010) (Table 4). Mean rank scores for satisfaction with the reward system of employees in the Sales Region unit, employees in administration units, and employees in logistics and procurement are 91.31, 65.08, and 55.87, respectively. In terms of net salary classes in HRK, the mean ranks are 96.12 for class 9,000-12,000, 84.46 for class >12,000, 75.74 for class <6,000, and 70.81 (the lowest) for class 6,000-9,000. To recall, most respondents are in salary class 6,000-9,000 (46%), while the smallest number of respondents are in class <6,000 (11%).

Table 4 Results of non-parametric tests for the relationship between the level of satisfaction with the reward and incentive system and socio-demographic characteristics and job characteristics.

Variable	Statistics	Value	p-value
Gender (male/female)	Mann-Whitney U	1,253.000	0.077
Age (4 groups)	Kruskal Wallis	0.686	0.879
Education level (3 groups)	Kruskal Wallis	0.903	0.639
Family type (multi-person/one-person)	Mann-Whitney U	911.000	0.054
Minors in the family (yes/no)	Mann-Whitney U	3,093.500	0.934
Type of employment contract (permanent/temporary)	Mann-Whitney U	1,619.500	0.532
Employment type (full-time/part-time)	Mann-Whitney U	1,352.500	0.775
Organisational unit (3 types)	Kruskal Wallis	22.378	0.000
Net monthly salary (4 groups)	Kruskal Wallis	11.072	0.010
Years of service, total, years	Spearman's *r*	-0.016	0.842
Years of service at DM, years	Spearman's *r*	-0.024	0.765

Source: Authors

We also tested the relationship between overall job satisfaction and the same set of variables using non-parametric tests (Table). A significant relationship with job satisfaction was found only for the variable net monthly salary in HRK (H=12.163, p=0.006). The mean rank is highest for groups >12,000 (95.63) and 9,000-12,000 (91.69). The lowest mean rank for job satisfaction is in group 6,000-9,000 (70.81), and it is slightly higher in group <6,000 (75.74). Based on these data, we can infer that employees in higher salary groups are more satisfied with their jobs, which is confirmed by the Spearman correlation coefficient between net salary and overall job satisfaction, which is r_s=0.235 (p=0.003).

Table 5 Results of non-parametric tests for the relationship between the level of job satisfaction and socio-demographic and job characteristics

Variable	Statistics	Value	p-value
Gender (male/female)	Mann-Whitney U	1,298.500	0.125
Age (4 groups)	Kruskal Wallis	4.175	0.244
Education level (3 groups)	Kruskal Wallis	5.528	0.061
Family type (multi-person/one-person)	Mann-Whitney U	1,053.000	0.303
Minors in the family (yes/no)	Mann-Whitney U	2,994.000	0.620
Type of employment contract (permanent/temporary)	Mann-Whitney U	1,501.000	0.209
Employment type (full-time/part-time)	Mann-Whitney U	1,242.000	0.379
Organisational unit (3 types)	Kruskal Wallis	4.260	0.117
Net monthly salary (4 groups)	Kruskal Wallis	12.163	0.006
Years of service, total, years	Spearman's *r*	0.095	0.234
Years of service at DM, years	Spearman's *r*	0.096	0.226

Source: Authors

The fact that most of the tested characteristics were not associated with satisfaction with reward and incentive programs and overall job satisfaction can be explained by high mean scores and a high concentration of scores around the mean, with extremely negatively asymmetric distributions.

4.5 Satisfaction with specific reward and incentive programs

Individual reward and incentive programs differ in terms of award criteria. For example, some programs are implemented according to family status (gifts and vouchers for children, financial assistance in the event of death), others depend on the job and length of service (supervisor bonus, anniversary bonus, long service award), and some are available to all or depend on the commitment of the individual (commuting subsidies, free food and beverages, opportunities for training and career advancement, etc.). Given the differences between programs, employee socio-demographic characteristics, and the workplace, we conducted an analysis of satisfaction with each reward and incentive program. Non-parametric tests were used to examine a correlation of each program with the observed socio-demographic and workplace variables.

Significant differences in satisfaction levels were found for seven of the fourteen programs. Differences were found in relation to three of the programs (03, 04, 05) with respect to one workplace variable, another three programs (10, 11, 12) with respect to two workplace variables, and one program (14) with respect to two workplace variables and one demographic variable. In terms of satisfaction with the programs of long service anniversary allowance (03), long service salary allowance (04) and commuting subsidies (05), respondents from the Sales Region unit have higher mean scores than respondents from the other two units. Satisfaction with promotion opportunities (10), training opportunities (11), and in-house training and education programs (12) depended on both the organisational unit and a net salary class. In terms of the organisational unit, employees at Sales Region (retail units) expressed the highest level of satisfaction with these three programs. In terms of a salary class, employees from HRK 9,000-12,000 class and those from HRK 6,000-9,000 class show the highest and the lowest level of satisfaction, respectively.

Table 6 Results of non-parametric tests for the relationship between the level of satisfaction with a particular reward and incentive program and socio-demographic characteristics and job characteristics

Variable	Statistics	*p-values*[¤]						
		1	2	3	4	5	6	7
Gender	M.-W. *U*	0.381	0.310	0.356	0.469	0.805	0.439	0.157
Age	K.-W. *H*	0.635	0.627	0.770	0.789	0.056	0.671	0.393
Education level	K.-W. *H*	0.646	0.854	0.499	0.772	0.318	0.762	0.906
Household (multi- or one-person)	M.-W. *U*	0.403	0.733	0.418	0.239	0.696	0.331	0.491
Minors in the family (yes/no)	M.-W. *U*	0.381	0.852	0.551	0.487	0.839	0.735	0.573
Type of employment contract (permanent/temporary)	M.-W. *U*	0.514	0.160	0.868	0.529	0.828	0.543	0.706
Employment type (full-time/part-time)	M.-W. *U*	0.330	0.291	0.516	0.855	0.073	0.398	0.802
Organisational unit	K.-W. *H*	0.373	0.406	.018*	.003**	.048*	0.115	0.149
Net monthly salary (classes)	K.-W. *H*	0.051	0.088	0.051	0.181	0.060	0.445	0.070
Years of service, total	Spearman's *r*	0.255	0.329	0.752	0.473	.024*	0.530	0.279
Years of service at DM	Spearman's *r*	0.589	0.474	0.954	0.783	0.062	0.674	0.525

Source: Authors

Table 6 – continued Results of non-parametric tests for the relationship between the level of satisfaction with a particular reward and incentive program and socio-demographic characteristics and job characteristics

Variable	Statistics	*p-values*[¤]						
		8	**9**	**10**	**11**	**12**	**13**	**14**
Gender	M.-W. *U*	0.819	0.300	0.692	0.631	0.532	0.516	0.821
Age	K.-W. *H*	0.756	0.684	0.107	0.122	0.505	0.862	0.992
Education level	K.-W. *H*	0.216	0.959	0.669	0.882	0.863	0.987	0.733
Household (multi- or one-person)	M.-W. *U*	0.190	0.970	0.122	0.312	0.326	0.533	.030*
Minors in the family (yes/no)	M.-W. *U*	0.959	0.534	0.629	0.403	0.398	0.531	0.933
Type of employment contract (permanent/temporary)	M.-W. *U*	0.829	0.703	0.600	0.415	0.794	0.462	0.901
Employment type (full-time/part-time)	M.-W. *U*	0.316	0.961	0.444	0.345	0.232	0.320	0.221
Organisational unit	K.-W. *H*	0.151	0.478	.000**	.000**	.009**	0.523	.047*
Net monthly salary (classes)	K.-W. *H*	0.776	0.311	0.047	0.003	0.006	0.086	0.020
Years of service, total	Spearman's *r*	0.680	0.778	0.221	0.333	0.815	0.607	0.383
Years of service at DM	Spearman's *r*	0.455	0.692	0.562	0.632	0.876	0.625	0.382

**Significant at the 0.01 level.

*Significant at the 0.05 level.

¤ Code list: 01-Gift voucher for kids on holidays; 02-Gift voucher for a new-born and adopted child; 03-Jubilee awards; 04-Salary supplement for the length of service; 05-Commuting subsidies; 06-Free consumption of fruit, juice and hot beverages; 07-Financial assistance in the event of death; 08-Company car and mobile phone for managers; 09-Flexible work schedule; 10-Opportunity for career advancement; 11-Possibility of further education and training; 12-In-house training and education at all levels; 13-Foreign language courses; 14-'Corporate Family Day' and 'Corporate Christmas Dinner'

Source: Authors

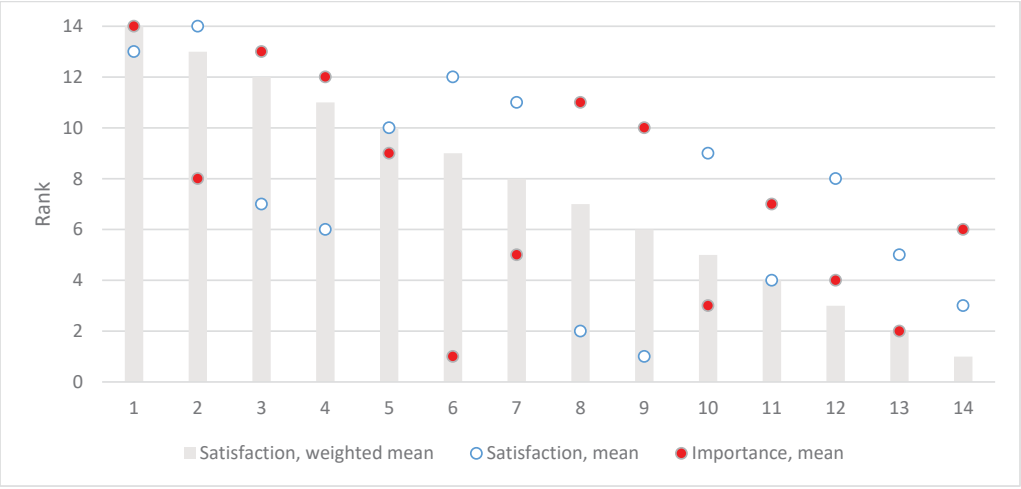
The respondents differ most in their satisfaction with the program organised by the company (a 'Corporate Family Day' and a 'Corporate Christmas Dinner'). There is a significant difference in satisfaction with respect to salary classes, with the highest mean rank in HRK 9,000-12,000 class and the lowest in HRK 6,000-9,000 class. Satisfaction with this program is significantly lower among respondents living in a single household (mean rank=59.47) than among respondents living in multi-person households (mean rank=83.00). Finally, employees who work in the Sales Region unit recorded a significantly higher mean rank (85.89) than those who work in Administration (77.40) and Logistics and Procurement (65.53) units.

4.6 Satisfaction with a particular reward and incentive program and perception of its importance

DM employees come from different family and wider social backgrounds and have different personal and business goals that give rise to the needs they seek to meet in order to get as close as possible to their goals. With respect to working conditions, salary and salary supplements, and various other reward and motivation programs offered in the workplace, employees will seek out those that meet their needs best. Due to differences in personal preferences, goals, and needs, employees will place different levels of importance on each reward and incentive program. The perceived importance of the program is critical to the effectiveness of its implementation. In fact, a high level of satisfaction

with a reward program that employees consider unimportant is likely to have a smaller effect on motivation than satisfaction with a program that is important to employees. Therefore, in the survey, we asked respondents to rate not only their satisfaction with a particular reward and incentive program, but also the importance of that program from their perspective. A comparative plot of the average satisfaction level and the assessment of the importance of each program shows that there is no correlation between these values (Figure 2). The figure shows the ranking of the mean scores of program satisfaction, program importance rating, and weighted program satisfaction. The perceived program importance was used as the weight in calculating the weighted mean for satisfaction with a particular program. The programs are ranked highest to lowest based on the weighted mean satisfaction. It is immediately apparent that the ranks of the satisfaction mean scores and the weighted satisfaction mean scores are quite different. The exceptions are the company car and cell phone (1) and foreign language courses (5) programs, where the differences between satisfaction and importance ranks are only 1 point.

Figure 2 Arithmetic means of the level of satisfaction and perceived importance, and the weighted mean of the level of satisfaction with reward and incentive programs at DM (In ascending order, by weighted mean of the level of satisfaction)



Code list: 1-Company car and mobile phone for managers; 2- Flexible work schedule; 3-Free consumption of fruit, juice and hot beverages; 4-'Corporate Family Day' and 'Corporate Christmas Dinner'; 5-Foreign language courses; 6-Commuting subsidies; 7-Opportunity for career advancement; 8-Gift voucher for kids on holidays; 9-Gift voucher for a newborn and adopted child; 10-Possibility of further education and training; 11-Jubilee awards; 12-In-house training and education at all levels; 13-Salary supplement for the length of service; 14-Financial assistance in the event of death.

Source: Authors

When considering changes and improvements to reward and incentive programs, attention should be focused primarily on those programs which employees attach great importance to and which they are less satisfied with. In the case of DM, these are programs 03, 04, 08, and 09 in the figure above. For example, the results suggest that programs related to employees' children and newborns should be maintained because of their importance, but the reasons for a low level of satisfaction with these programs should also be considered if the employer wants to improve the existing reward and incentive system.

5. Conclusion

It is one of the basic principles of modern HR management that motivated and satisfied employees are a prerequisite for long-term corporate success. Based on the findings of motivation theories, companies therefore create and develop measures to

attract and motivate employees, and they include monetary and non-monetary, as well as tangible and intangible rewards or incentives. This survey confirmed on a sample of 160 respondents that employees working for a desirable employer are highly satisfied not only with their jobs but also with the system of rewards and incentives. Moreover, satisfaction with this system is positively correlated with job satisfaction. For most of the socio-demographic variables of employees, there are no differences in satisfaction with the reward and incentive system. However, differences were found in relation to the organisational unit in which an employee works and the amount of the employee's salary. These differences are due to differences in satisfaction with various programs offered by the reward and incentive system scheme. This is particularly true for the 'Corporate Family Day' and 'Corporate Christmas Dinner' program, as well as for programs related to promotion opportunities, training opportunities and in-house training.

An analysis of the relationship between the perceived importance of each of the 14 reward and incentive programs and satisfaction with particular programs showed that there are programs that employees consider important and which they are relatively less satisfied with. This result suggests the possibility of improving the system based on the assumption that the employer should aim for greater satisfaction with programs that employees consider more important.

This research analyses the data collected in a company that has a high long-term rank in Croatia according to the level of employee satisfaction. This is one of the reasons why the obtained results cannot be generalised to all companies in this sector or beyond. Therefore, although we consider this research an important contribution to a better understanding of the functioning of the reward and incentive system, we also believe that similar research needs to be conducted in other companies. It can be said that this research can primarily serve as a basis for improving the reward and incentive system in the company that has been proven to have a high level of employee satisfaction.

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Book review

Tihana Škrinjarić
Croatian National Bank
10000 Zagreb, Croatia
tihana.skrinjaric@hnb.hr

BOOK REVIEW "USING PYTHON FOR INTRODUCTORY ECONOMETRICS"

Authors: Florian Heiss and Daniel Brunner
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Economists today need to have knowledge and skills in quantitative tools that enable the analysis of many different economic phenomena and their relationships. It is almost impossible to write a research paper, complete a project, or carry out day-to-day tasks without econometrics and computer support. One popular software is *Python*, because it is a free resource and relatively user-friendly. If readers are already somewhat familiar with *R* (see the book review "Using R for introductory econometrics"), learning *Python* will be faster compared to those who know nothing about it. However, the authors of this book focus on some introductory aspects of *Python* thinking and programming before moving on to econometrics and its applications. The book is available as a hard copy, as a pdf (both must be purchased), and as a free version available at: http://www.upfie.net/read/index.html. Thus, authors are motivated to teach these topics in the best way possible, so if anyone is interested in these topics, there is no excuse not to it.

There is a similar motivation for learning econometrics in *Python* to what I mentioned in my previous book review referring to *R*. That it is free is a great argument, important for students and young researchers who do not have access to financial resources. Moreover, many difficult tasks that need to be calculated and estimated daily in real-world economic applications cannot be done with software that contains click-only options. The mindset of programming and defining objects in *Python* is very natural, and the online help community is enormous.

Like its *R* counterpart, this book includes online files that allow the reader to reproduce all the examples given in the book, and again, the authors follow the econometrics textbook by Wooldridge (2019). This is something very commendable. In fact, most textbooks focusing on a research area like econometrics do not include examples done in software, with data alongside the book. As a result, young people learning new concepts sometimes struggle, as theoretical concepts are often difficult to grasp without something "tangible". This does not mean that you should learn econometrics exclusively through books like this one using examples. After all, when you are solving real-world problems at work, you will be dealing with issues that are not covered in books like this (assumptions about models that you need to know before you use them, the use of more sophisticated methods than those presented in the books, etc.). But if you are learning econometrics, it is very helpful to read a book like this in parallel

so that you learn how to deal with real data and use them to estimate models in specific software.

The structure of this book follows the previous one dedicated to *R*, and since I have already reviewed that book, I will not repeat the same structure. The ideas are the same: you should take an econometrics textbook and learn econometrics there (a good example is the aforementioned book by Wooldridge, if you want to follow the examples in this book). The basic concepts are the same: you learn which modules are used so that certain commands can be activated; the layout of windows in *Python* is similar to that of *R*, and numerous examples and interpretations are given throughout the book.

If you are covering an area in an econometrics textbook, pick up this book and review the examples to fully understand the concept at hand. If you are asking me which book is better, or if it is better to learn R or *Python*, well, that depends. I started with *R*, so learning *Python* was much easier than I expected. I suppose it would be similar the other way around. This is because the mindset is similar in terms of defining objects, models, variables, and getting the results you need in econometrics. I would recommend this book, similarly to my previous review, to those who already have some knowledge of econometrics and need to expand their software skills in tackling real-world tasks, and to those who are beginning to learn econometrics to be prepared to use these tools in their work.

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Conference review

Jerko Glavaš, Ivana Unukić:
Interdisciplinary Management Research Conference – IMR 2022

Jerko Glavaš
Josip Juraj Strossmayer
University of Osijek
Faculty of Economics in Osijek
31000 Osijek, Croatia
jerko.glavas@efos.hr

Ivana Unukić
Josip Juraj Strossmayer
University of Osijek
Faculty of Economics in Osijek
31000 Osijek, Croatia
ivana.unukic@efos.hr

INTERDISCIPLINARY MANAGEMENT RESEARCH CONFERENCE – IMR 2022

The IMR 2022: 18th International Conference on Interdisciplinary Management Research aims to bring together academics, researchers, and practitioners to exchange and share their research findings and (business) experiences on all aspects of management and related fields. IMR is an interdisciplinary platform for academics, practitioners, and educators to present and discuss the latest trends and issues, as well as practical challenges encountered and solutions adopted in the field of management, but also in areas such as Business, Financial Economics, Industrial Organization, Law and Economics etc. The IMR 2022 is specially designed for postgraduate students to allow them to present and discuss their research and get reactions to their work from fellow postgraduate students, academics, and practitioners. The conference environment is friendly and relaxed, offering PhD students the opportunity to network with academics and practitioners and develop their professional relationships. This year was the 18th conference, which had a special significance due to the post-pandemic situation. The Faculty of Economics in Osijek awarded 30 excellent students by traveling to the conference based on achieving academic success (average rating) and recommendations of student associations working at the Faculty.

As part of this conference, an additional program is organized in the form of a scientific and expert thematic discussion focusing on current topics in cooperation with the academic and business community and public sector institutions. In 2022, the focus was on the focus was on the introduction of the euro in The Republic of Croatia.

1st day of the Conference

The conference started on Thursday (May 5, 2022) at 5 pm with the project presentation and panel discussion: Crovizone – "The impact of climate change in The Republic of Croatia on viticulture management", in the NAVA hall. After that, the Faculty of Economics prepared a welcome and networking party, with the music by Dominik Heštera, at LIBURNIJA hall.

2nd day of the Conference

The second day of the conference (May 6, 2022) started at 10:15 am, with the opening ceremony of the Interdisciplinary Management Research XVII. Kristina Hodak from the Faculty of Economics in Osijek moderated the programme. The speakers were distinguished leaders of the PhD study and the conference: **Boris Crnković**, PhD, Full Professor, Dean, Faculty of Economics in Osijek, Josip Juraj Strossmayer University of Osijek, and Željko **Turka**lj, PhD, Professor emeritus, Faculty of Economics in Osijek, Josip Juraj Strossmayer University of Osijek. Also, a keynote speaker, **Zvonimir Savić**, PhD, Special Adviser to the Prime Minister of the Republic of Croatia for Economic Affairs and President of the Steering Committee for the Intro-

duction of the EURO, had a Zoom Presentation about this subject. Panel discussion named "Euro – an opportunity or a threat to Croatia's economy" started at 11:00 am with very special guests: **Ljubo Jurčić**, Ph.D., Croatian Society of Economists; **Ivan Miloložа**, Ph.D., Vice Dean at Faculty of Dental Medicine and Health in Osijek, Josip Juraj Strossmayer University of Osijek, Munja d.d.; **Damir Zorić**, Ph.D., Croatian Employers' Association; **Krešimir Bubalo**, B. Sc. econ., Pevex d.d.; **Andrej Kopilaš**, M.A., Slatinska banka d.d., and **Ivica Crnković**, M. Sc., PROJEKTGRADNJA plus d.o.o. The Moderator was **Marina** Šunjerga, from Media Intelligence d.o.o.

From 2 to 5.30 pm, three parallel sessions were held in different halls where 30 participants gave their presentations live, which was a great success after two pandemic years and hybrid presentations. At 5.45 pm, one more project was presented: "Creating social impact through customized digital teaching formats" by Aleksandar Erceg, Ph.D., Associate Professor, from the Faculty of Economics in Osijek, Josip Juraj Strossmayer University of Osijek.

The first doctoral workshop was held from 6 pm by Josip Mesarić, Ph.D., Full Professor, Boris Crnković, Ph.D., Full Professor, Dean, and Jerko Glavaš, Ph.D., Full Professor, Faculty of Economics in Osijek, Josip Juraj Strossmayer University of Osijek. After the doctoral workshop, a gala dinner with networking was held for all conference participants, as well as networking night, again with music by Dominik Heštera.

3rd day of the Conference

The third day of the conference (May 7, 2022) was set aside for one more doctoral workshop, which took place at 9 am in the Faculty of Tourism and Hospitality Management, University of Rijeka, and was held by Suzana Marković, Ph.D.

The latest issue of Conference Proceedings, i.e., "Interdisciplinary Management Research XVIII" (ISSN 1847-0408), includes 56 papers by 139 authors from different countries. The sections of the proceedings and the articles have been divided into six topics such as Management (19 papers), Marketing Management (9 papers), Finance Management (8 papers), Health, Education and Welfare Management (6 papers), Economic Development and Growth Management (14 papers). The Proceedings were published by Josip Juraj Strossmayer University of Osijek, Faculty of Economics in Osijek, Croatia, Postgraduate Doctoral Study Programme in Management, Pforzheim University, Business School, Germany, and Croatian Academy of Sciences and Arts; for the Publishers: Boris Crnković, PhD (Dean, Josip Juraj Strossmayer University of Osijek, Faculty of Economics in Osijek, Croatia), and Thomas Cleff, PhD (Dean, Hochschule Pforzheim University, Germany); with the following editors: Aleksandar Erceg, PhD (Faculty of Economics in Osijek), and Željko Požega, PhD (Faculty of Economics in Osijek), and the Editorial Board: Aleksandar Erceg, Ph.D. (Faculty of Economics in Osijek), Jerko Glavaš, Ph.D. (Faculty of Economics in Osijek), Karl – Heinz Dernoscheg, Ph.D. (International Business School Styria, Austria), Norbert Pap, Ph.D. (University of Pecs, Hungary), Bodo Runzheimer, Ph.D. (Pforzheim University, Business School, Germany), and Dirk Wentzel, Ph.D. (Pforzheim University, Business School, Germany) Proceedings of the IMR conferences can be found in the following databases: Clariavate Web of Science, EconLit, Thomson ISI, RePEc, EconPapers, and Socionet. This makes the IMR conference even more important and exciting for many academics, entrepreneurs, business people, researchers, and visitors. The publication of the conference proceedings is partly funded by the Ministry of Science and Education of the Republic of Croatia.

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