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Contents

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Original Scientific Article

SPILLOVER AND QUANTITATIVE LINK BETWEEN CRYPTOCURRENCY SHOCKS AND STOCK RETURNS: NEW EVIDENCE FROM G7 COUNTRIES

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Abstract: *The objective of this article is to analyze the co-movements in the G7 stock markets, such as DJ index, S&P500 (representing the USA stock market), FTSE 100 (United Kingdom), S&P/TSX (Canada), DAX 30 (Germany), CAC 40 (France), Nikkei 225 (Japan), Italy Ds market (Italy) and the cryptocurrencies Bitcoin (BTC), Litecoin (LTC), Ethereum (ETH) and Crypto 10, during the period of February of 2018 to November of 2021. The results show that the cryptocurrencies BTC, ETH, and LTC increase the co-movements between their pairs, while the Crypto 10 index reduces the number of shocks when compared with the sub-period before COVID-19. Regarding the stock markets, DJ index kept the same level of shocks, whereas the Nikkei 225 decreased. For Germany (DAX), EUA (S&P500), Canada (S&P/TSX), United Kingdom (FTSE 100), France (CAC40), and Italy (Italy Ds Market) markets the results show an increase in movements during the global pandemic period. It is then possible to conclude the existence of evidence regarding synchronization and high co-movements, the results put at risk the implementation of efficient portfolio diversification strategies. These conclusions also open space for the market regulators to take steps to ensure better information on the dynamics of the international financial markets.*

Keywords: *Cryptocurrencies; G7 market; Co-movements; Portfolio diversification.*

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1. INTRODUCTION

The effects of the global pandemic of 2020 (COVID-19) have been affecting negatively the economy on a global scale, originating very significant impacts on the financial market across the world, causing significant losses to the investors in a short period of time. In line with all the negative effects, it seems inevitable that the stock market, economic growth, and exchange rates had also been affected in the same way (Dias et al., 2021c; Vasco et al., 2021; Zebende et al., 2022).

During the last decade, the globalization phenomenon has shown that the correlation between international financial markets has increased, namely among developed markets. According to Dias, Alexandre, and Heliodoro (2020a), Dias, Pardal, Teixeira, and Machová (2020c) the synchronizations between the international stock market can be strongly affected during the crisis and quiet periods, which can make difficult the portfolio diversification.

Financial instability is a very important social factor, considering that a financial or a scholarly crash crisis can affect, directly or indirectly, the level of the economic well-being of a country's citizens. If a given financial market is strongly linked to another, then the financial stability of the first will depend, in some part, on the financial stability of the second. For this reason, a narrow or strong link between markets increases the vulnerability to external shocks and, in consequence, influences the economic conditions and the well-being levels of the countries (Dias et al., 2020a; Dias et al., 2020b; Dias et al., 2021a, 2021b; Dias and Carvalho, 2021; Pardal et al., 2021; Vasco et al., 2021).

Considering the above, and accordingly to the authors Silva et al. (2020), Zebende et al. (2022) understanding the degree of linkages and correlations of the assets markets, as well as evaluating the co-movements degree can help the investors to diversify their asset portfolio and consequently reduce their risk exposure, as well as leverage their earnings, since the diagnosis of the degree of the integration will allow the identification of whether the assets have similar returns, if they are assets belonging to integrated markets, or if, due to their exposure to different sources of risk, they have differentiated returns and, therefore, constitute assets that are part of the segmented market.

This article will analyze the co-movements between the G7 stock market, such as DJ index, S&P500 (representing the USA stock market), FTSE 100 (United Kingdom), S&P/TSX (Canada), DAX 30 (Germany), CAC 40 (France), Nikkei 225 (Japan), Italy Ds market (Italy) and the cryptocurrencies Bitcoin (BTC), Litecoin (LTC), Ethereum (ETH) and Crypto 10. The results mostly show that the co-movements between capital markets and the cryptocurrencies increased, which may jeopardize the implementation of an efficient portfolio diversification strategy.

This investigation adds contributions to the literature, namely the global pandemic 2020 accentuated the co-movements between the G7 financial markets, and the cryptocurrencies Bitcoin (BTC), Litecoin (LTC), Ethereum (ETH), and Crypto 10. Authors Aslam et al. (2020) and Nguyen (2021) have focused their research on the impact of the pandemic crisis on the existent correlation between stock markets and the cryptocurrencies, although, they haven't provided robust evidence.

In terms of structure, this article is organized into 5 sections. In addition to the current introduction, Section 2 presents a State-of-the-Art analysis of the article on international financial markets co-movements, section 3 describes the methodology and section 4 contains the data and results. Section 5 presents the general conclusions of the paper.

2. LITERATURE REVIEW

The study of the connection between the cryptocurrencies with the stock market indexes exists, on the one hand, because of the evidence that digital currencies are completely segmented relative to traditional assets and there is, on the other hand, opposing evidence has been showing that the cryptocurrency market is not totally isolated.

Baur et al. (2018) analyzed the statistical properties of the BTC cryptocurrency and present evidence pointing out that this cryptocurrency will not be correlated with certain traditional assets, such as stocks, bonds, and commodities, either in periods of stability or normal times or in periods of financial turbulence (stress in the international financial market).

Ji et al. (2018) examined the degree of the integration between BTC and traditional assets during the period from July 19th of 2021 to January 31st of 2017, they applied the VAR model by opting for the Johansen cointegration test. The authors show low correlations with the global financial system, however, there are indications that the integration process of the BTC may fluctuate with different time scales.

Bouri et al. (2018) by applying the VAR-GARCH model analyzed the links between the BTC and the financial markets, during the period between July 19th of 2010, and October 31st of 2017. The authors concluded that the BTC is integrated with some financial assets, such as commodities.

Umar et al. (2020) used the dynamic asymmetric conditional correlation and wavelet coherence approaches studied the integration between the cryptocurrencies (BTC, ETH, Ripple, Bitcoin cash e Ethereum Operating System) and the stock market of NYSE, NASDAQ, Shanghai Stock Exchange, Nikkei 225 e NYSE Euronext. The authors highlight that the analyzed cryptocurrencies show significant levels of integration with the analyzed stock markets.

Gil-Alana et al. (2020) by applying cointegration models analyzed the bidirectional links between the six largest cryptocurrencies, including the BTC, ETH, LTC, and six stock markets, from May 7th of 2015 and October 5th of 2018. Their results show that there is no relevant evidence to support the existence of cointegration among the six crypto-currencies and stock market indexes.

Nguyen (2021) applied the VAR-GARCH to test the impact of the stock markets in BTC during the time period between January 1st of 2016 and January 1st of 2021, during the period marked by the occurrence of the COVID-19 pandemic. The results provide evidence that during high uncertainty the stock markets and cryptocurrencies are more correlated.

Karim et al. (2022) analyzed the integration between the cryptocurrencies such as BTC, ETH, LTC, XRP, and Stellar, during the global pandemic of 2020 (April 17th of 2019, and September 15th of 2020). The authors highlight that the cryptocurrencies are segmented rather than integrated suggesting that these assets offer a broad opportunity for portfolio diversification.

3. METHODOLOGY

3.1. Data

The analysis of the causality relationships will be based on the daily stock market prices of the G7 member countries, namely the USA, Germany, France, UK, Italy, Japan, and Canada, as well as

the quotes for the cryptocurrencies BTC, ETH, LTC and the Crypto 10 Index. The quotes comprise the time-lapse from February 2018 to November 2021, to provide a bigger robust to the investigation the sample was split into two sub-periods: from February 2018 to December 2019, which we call the pre-pandemic period; while the second subperiod, the global pandemic, has the time between January 2020 to November 2021. In order to provide reliable data for the research, it was decided to pull the time series from the Thomson Reuters platform (DataStream).

Table 1. The name of countries and their indexes used in this paper

Country	Index
United States of America	DOW JONES COMPOSITE 65 STOCK
	S&P 500
Germany	DAX 30
France	CAC 40
UK	FTSE 100
Italy	Italy Ds Market
Japan	NIKKEI 225 AVERAGE
Canada	S&P/TSX COMPOSITE INDEX
Global	USD TO BITCOIN
Global	USD TO ETHEREUM
Global	USD TO LITECOIN
Global	CRYPTO MARKET INDEX 10

Source: Own elaboration

3.2. Methodology

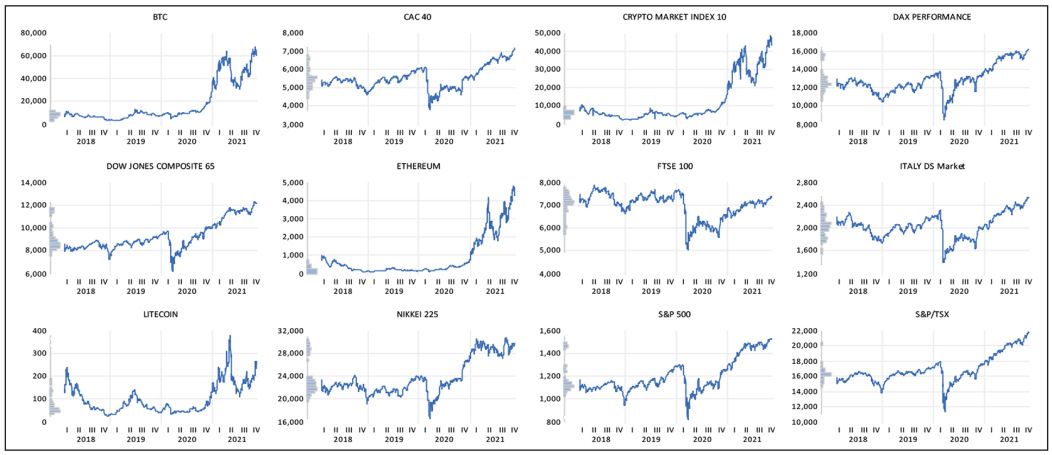
The following section will present the methodology and the tests to be used to answer the two research questions. The methodological process of this article was carried out in several steps. In the first stage, the sample was characterized by applying a set of descriptive statistical methods. Complementarily, in order to analyze the data distribution of the twelve time series and test the normality assumption, the Jarque and Bera (1980) test was applied. In a second step, to validate the stationarity of the times series, the panel unit root tests of Hadri (2000), Breitung (2000), and Levin, Lin, and Chu (2002) were applied. Finally, to answer the research question, we chose the VAR Granger Causality/Block Exogeneity Wald Tests model. This model allowed the detection of causal relations between data series, in the short term, as well as the movements existing in the dynamics of these relations.

4. RESULTS

Figure 1 graphically represent the evolution, in levels, of the twelve financial markets during the period of February 2018 to November 2021, from that observation, it is possible to observe the pre-crisis period and the highly complex period marked by the pandemic crisis.

Regarding the cryptocurrencies' evolution, we can observe that at the time of the announcement of the COVID-19 pandemic there are no accentuated breaks in structure, however, the behavior of cryptocurrencies between the second and third quarters of 2021 shows that there are sharp breaks in structure.

In the behavior of the G7 stock markets at the beginning of the crisis, i.e. between the first and second quarter of 2020, oscillations can be observed that suggest the existence of structural breaks.

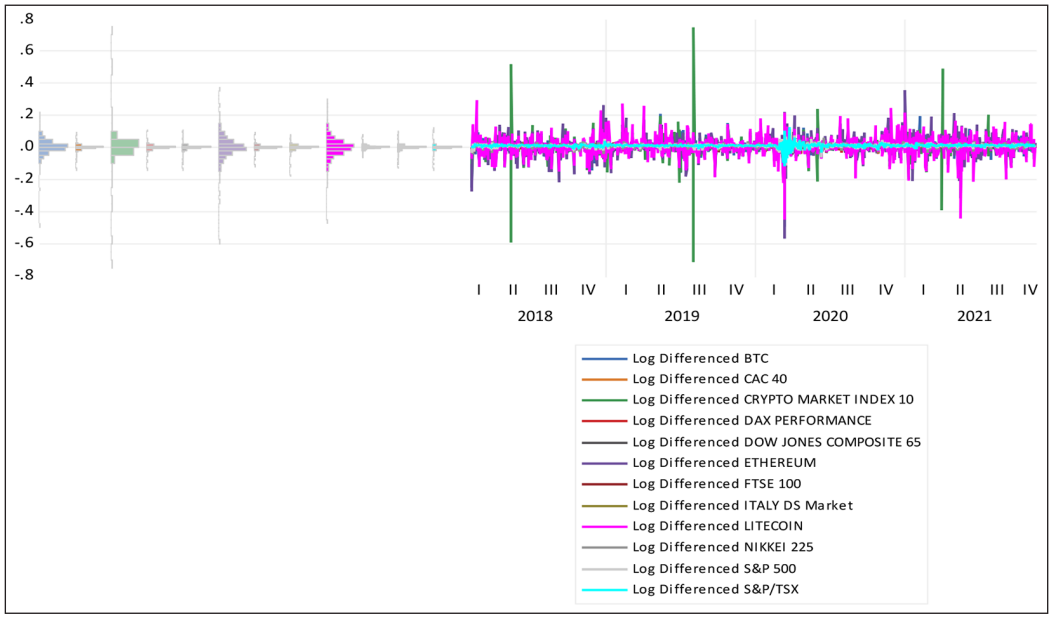


Note: Data worked by the author (software: Eviews12)

Figure 1. Evolution, in levels, of the financial market under analysis, for the period from 1st February of 2018 to 18th November of 2021

Source: Own elaboration

Figure 2 shows the evolution of the returns of the stock market indexes and cryptocurrencies under analysis.



Note: Data worked by the author (software: Eviews12)

Figure 2. Evolution of the returns, of the financial market under analysis, in the period from 1st of February 2018 to 18th November of 2021

Source: Own elaboration

Overall, it is possible to observe synchrony between all series and a generalized dispersion around the mean. However, in comparison with equity markets, the returns of the series representing the cryptocurrency markets show a greater dispersion from the mean. On the other hand, the exist-

ence of high volatility is felt especially in the first months of the year 2020. Complementarily, through the Kernel density, it can be seen that the cryptocurrency markets are more volatile when compared to the stock market under analysis.

Table 2 resumes the main descriptive statistics of the cryptocurrencies under analysis, as well as the results of the Jarque & Bera goodness of fit tests.

The descriptive statistics analysis from table 2 shows that the average daily returns of the cryptocurrencies under analysis register values close to zero, being LTC the digital currency with the lowest average daily return (0.0494), and BTC the digital currency with the highest average daily return over the sample period considered (0.1921). The standard deviation of Crypto 10 allows us to check the level of volatility, overall, of the cryptocurrency market stands at 6.6383%. The LTC and ETH have standard deviations very close to the index reference value.

On the other hand, BTC represents a standard deviation lower (4.7959%), which reveals that, during the considered period, it was the least volatile cryptocurrency. To all the cryptocurrencies, the asymmetry values are different from zero, presenting negative characteristics, with BTC, being the one with the most significant asymmetry levels (-1.228043). Additionally, when the kurtosis is analyzed values much higher than 3 are found. This evidence shows the rejection of the null hypothesis that postulates the normality of the data. To prove the evidence that the returns of the cryptocurrencies data series do not follow a normal distribution, the Jarque & Bera goodness of fit test was applied, which yielded values that lead to rejection of the null hypothesis in favor of the alternative.

Table 2. Descriptive statistics, regarding the cryptocurrencies under analysis, for the period from 1st February 2018 to 18th November 2021

	Mean	Median	Max.	Min.	Std. Dev.	Skewness	Kurtosis	Jarque –Bera	Obs.
BTC	0.001921	0.002055	0.208085	-0.493969	0.047959	-1.228043	16.25200	7500.545 ***	991
CRYPTO 10	0.001545	0.000673	0.747271	-0.715028	0.066383	-0.128788	46.44371	77934.83 ***	991
ETH	0.001450	0.001067	0.355149	-0.575598	0.063070	-0.855004	12.72397	4025.103 ***	991
LTC	0.000494	0.000898	0.289690	-0.457408	0.063079	-0.623852	10.07312	2130.062 ***	991

Note: Data worked by the author (software: Eviews12).
The asterisks *** represent the rejection of the null hypothesis at a significance level of 1%

Source: Own elaboration

Table 3 summarizes the main descriptive statistics of the stock market under analysis, as well as the results of the Jarque & Bera goodness of fit test.

The analysis of the descriptive statistics shows that most of the returns have positive daily averages very close to zero, except for the FTSE 100 stock market index. The DJ index is the index with, on average, the highest daily return (0.0343), as well as the most significant standard deviation (risk) (1.3685%), followed by the S&P 500 stock index (1.3513%). In comparative terms, the G7 stock markets are less volatile than the cryptocurrency market. Also, the stock markets show negative asymmetry values, with the Italian market presenting the sharpest asymmetry (-3.047814). In turn, the kurtosis analysis shows that for all the stock markets the values are greater than 3.

The results obtained indicate that the studied time series does not follow a normal distribution. To validate, the Jarque & Bera goodness of fit test was applied, which postulates the null hypothesis against the alternative. The values obtained, both for a significance level of 1% led to the rejection of the null hypothesis, which confirmed what had already been indicated, regarding the non-normal distribution of the time series for the G7 stock market indexes.

Table 3. Descriptive statistics for the stock market under analysis for the period from 1st February 2018 to 18th November 2021

	Mean	Median	Max.	Min.	Std. Dev.	Skewness	Kurtosis	Jarque –Bera	Obs.
CAC40	0.000274	0.000915	0.080561	-0.130983	0.012696	-1.425271	20.98341	13689.38 ***	991
DAX 30	0.000225	0.000457	0.104143	-0.130549	0.013066	-1.016863	20.09637	12239.76 ***	991
DJ	0.000343	0.000789	0.108264	-0.130942	0.013685	-0.995243	24.44722	19157.07 ***	991
FTSE100	-2.72E-05	0.000345	0.086668	-0.115124	0.011475	-1.231606	19.99246	12173.24 ***	991
ITALY	0.000141	0.000632	0.074081	-0.174311	0.013112	-3.047814	41.32004	62168.00 ***	991
NIKKEI 225	0.000233	0.000000	0.077314	-0.062736	0.012148	-0.162946	8.059633	1061.447 ***	991
S&P500	0.000257	0.000493	0.092341	-0.123650	0.013513	-1.067602	21.21429	13887.19 ***	991
S&P/TSX	0.000314	0.000708	0.112945	-0.131761	0.011704	-2.109583	47.89022	83943.19 ***	991

Note: Data worked by the author (software: Eviews12).
The asterisks *** represent the rejection of the null hypothesis at a significance level of 1%

Source: Own elaboration

In order to apply the econometric methods that will allow answering the research question, it was necessary to analyze the stationarity of the time series. To this end, Hadri (2000), Breitung (2000) and Levin, Lin, and Chu (2002) panel unit root tests were performed. The result of Breitung and LLC tests are respectively represented in Tables 4 and 5, suggesting for each of the tests the rejection of the null hypothesis, for the level of significance of 1%. In this sense, the null hypothesis of both tests that postulated the existence of a root (or inconstant variance) was rejected for the period of time under study.

Table 4. Breitung tests for the 12 financial markets under analysis for the period from 1st February 2018 to 18th November 2021

Method			Statistic	Prob.***
Breitung			-42.3883	0.0000
	Coefficient	*t-Stat*	*SE Reg.*	*Obs.*
Pooled	-0.49086	-42.388	0.012	11828

Note: Data worked by the author (software: Eviews12).
*** Probability is assumed to be asymptotically normal

Source: Own elaboration

Table 5. Levin, Lin and Chu tests for the 12 financial markets under analysis for the period from 1st February 2018 to 18th November 2021

Method				**Statistic**		**Prob.****
Levin, Lin & Chu t*				-86.9478		0.0000
	Coefficient	*t-Stat*	*SE Reg*	*mu**	*sig**	*Obs.*
Pooled	-1.02128	-75.540	1.004	-0.500	0.707	11840

Note: Data worked by the author (software: Eviews12).
*** Probability is assumed to be asymptotically normal

Source: Own elaboration

Additionally, and to validate the previously obtained evidence, the Hadri tests were applied, which statistical result is presented in Table 6. The result leads to the non-rejection of the null hypothesis, for the level of significance of 1%, meeting what was pointed out earlier, that is that all panel time series is stationary.

Table 6. Hadri tests for the 12 financial markets under analysis for the period from 1st February 2018 to 18th November 2021

Method	**Statistic**	**Prob.****
Hadri Z-stat	-1.60286	0.9455
Heteroscedastic Consistent Z-stat	-2.28213	0.9888

Note: Data worked by the author (software: Eviews12).
*** Probability is assumed to be asymptotically normal

Source: Own elaboration

To determine the causality relationship between pairs of the markets under analysis, the VAR model was used. Given the temporal partition into two periods, namely pre-COVID, and COVID, two models were estimated.

Table 7. Selection criteria for the number of lags of the VAR model, concerning the period 01/02/2018 to 31/12/2019 (pre-COVID 19)

Lag	**LogL**	**LR**	**FPE**	**AIC**	**SC**	**HQ**
0	18557.99	NA	1.85e-48	-75.85271	-75.74983*	-75.81230
1	18835.24	539.7558	1.07e-48*	-76.39769*	-75.06025	-75.87238*
2	18954.08	225.5317	1.19e-48	-76.29479	-73.72279	-75.28459
3	19076.24	225.8384	1.31e-48	-76.20548	-72.39892	-74.71038
4	19169.10	167.1087	1.62e-48	-75.99631	-70.95519	-74.01631
5	19261.73	162.1439	2.01e-48	-75.78620	-69.51051	-73.32130
6	19346.97	145.0331	2.59e-48	-75.54588	-68.03563	-72.59608
7	19450.90	171.7332	3.10e-48	-75.38200	-66.63720	-71.94731
8	19554.62	166.2847	3.73e-48	-75.21724	-65.23788	-71.29765
9	19670.76	180.5110	4.30e-48	-75.10331	-63.88939	-70.69882
10	19798.57	**192.3754***	4.75e-48	-75.03712	-62.58863	-70.14773

Note: Data worked by the author (software: Eviews12). The asterisk * indicates the optimal number of lags selected by each criterion. LR: Modified LR test statistic (5% test). AIC: Akaike's information criterion. FPE: Final Error Prediction. SC: Schwarz information criterion. HG: Hannan-Quinn information criterion

Source: Own elaboration

The first step in estimating VAR model is to determine the optimal number of lags. To determine the number of lags of the VAR model for the pre-COVID period, the criteria used are present in Table 7. Based on the results obtained, the LR criterion was selected, which suggests a model with 10 lags.

Table 8 shows that for the number of lags equal to ten, the null hypothesis is true, rejecting the possibility of autocorrelation of the residuals, thus ensuring the robustness and validity of the estimated model for the first time period under the analysis.

Table 8. VAR residual serial correlation LM tests, concerning the period 01/02/2018 to 31/12/2019 (pre-COVID 19)

Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	144.9419	144	0.4623	1.006844	(144, 2971.8)	0.4629
2	111.3522	144	0.9799	0.769224	(144, 2971.8)	0.9800
3	132.7994	144	0.7384	0.920643	(144, 2971.8)	0.7389
4	136.7018	144	0.6547	0.948310	(144, 2971.8)	0.6553
5	139.5785	144	0.5886	0.968727	(144, 2971.8)	0.5892
6	99.07841	144	0.9984	0.683050	(144, 2971.8)	0.9984
7	148.4463	144	0.3826	1.031786	(144, 2971.8)	0.3833
8	136.9253	144	0.6497	0.949895	(144, 2971.8)	0.6502
9	151.8925	144	0.3100	1.056343	(144, 2971.8)	0.3105
10	119.4495	144	0.9330	0.826267	(144, 2971.8)	0.9331
11	146.9320	144	0.4165	1.021006	(144, 2971.8)	0.4171

Note: Data worked by the author (software: Eviews12)

Source: Own elaboration

To determine the optimal number of lags for the estimation of the VAR model for the COVID-19 period, it was used the criteria present in Table 9. Based on the LR criteria, the results point to a model that considers 10 lags.

Table 9. Selection criteria for the number of lags of the VAR model, for the period 01/01/2020 to 18/11/2021 (COVID-19)

Lag	LogL	LR	FPE	AIC	SC	HQ
0	16871.16	NA	6.75e-46	-69.95501	-69.85100*	-69.91413
1	17223.14	684.9695	2.85e-46	-70.81799	-69.46579	-70.28656*
2	17417.45	368.4664	2.31e-46	-71.02675	-68.42637	-70.00478
3	17572.17	285.6906	2.22e-46	-71.07124	-67.22268	-69.55872
4	17721.25	267.8445	2.18e-46*	-71.09231*	-65.99557	-69.08924
5	17846.84	219.3954	2.37e-46	-71.01593	-64.67100	-68.52231
6	17954.16	182.1269	2.80e-46	-70.86372	-63.27061	-67.87955
7	18065.56	183.5139	3.26e-46	-70.72846	-61.88717	-67.25375
8	18163.38	156.2715	4.03e-46	-70.53685	-60.44737	-66.57159
9	18299.57	210.7815	4.29e-46	-70.50444	-59.16678	-66.04863
10	18441.14	**212.0673***	4.49e-46	-70.49437	-57.90853	-65.54802

Note: Data worked by the author (software: Eviews12). The asterisk * indicates the optimal number of lags selected by each criterion. LR: Modified LR test statistic (5% test). AIC: Akaike's information criterion. FPE: Final Error Prediction. SC: Schwarz information criterion. HG: Hannan-Quinn information criterion

Source: Own elaboration

In Table 10 it is possible to observe the results of the tests, which for the number of lags equal to 10, leads to not rejecting the null hypothesis, which postulates the non-existence of autocorrelation of the residuals. Thus, ruling out the autocorrelation hypothesis, and determining the model with a number of lags equal to 10 ensures that it has a robust and valid estimation for the second time period under analysis.

Table 10. VAR Residual Serial Correlation LM Tests,
for the period 01/01/2020 to 18/11/2021 (COVID-19)

Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	141.3930	144	0.5459	0.981605	(144, 2911.8)	0.5465
2	145.0986	144	0.4586	1.007962	(144, 2911.8)	0.4593
3	151.3530	144	0.3209	1.052521	(144, 2911.8)	0.3215
4	177.8826	144	0.0289	1.242575	(144, 2911.8)	0.0290
5	150.8133	144	0.3320	1.048673	(144, 2911.8)	0.3326
6	168.5635	144	0.0791	1.175622	(144, 2911.8)	0.0794
7	150.4202	144	0.3402	1.045870	(144, 2911.8)	0.3408
8	159.2765	144	0.1816	1.109107	(144, 2911.8)	0.1821
9	143.1611	144	0.5041	0.994177	(144, 2911.8)	0.5047
10	154.8281	144	0.2541	1.077320	(144, 2911.8)	0.2546
11	140.3547	144	0.5703	0.974226	(144, 2911.8)	0.5710

Note: Data worked by the author (software: Eviews12)

Source: Own elaboration

In Table 11, it is possible to observe the results regarding the VAR Granger Causality tests for the period pre-COVID-19. The DJ stock market index and Nikkei 225 have the higher co-movements number, causing, in the Grangerian way, 6 of their pairs (out of 11 possible). Followed by the LTC, the Crypto 10, the S&P 500 and the S&P/TSX, which, in the Granger way, 5 of their pairs (out of 11 possible). The FTSE 100, CAC 40 and the Italian stock market index caused in the Granger way, 4 markets (out of 11 possible). DAX 30 caused in the grangerian sence, 3 pairs (out of 11 possible). And BTC and ETH just caused in the grangerian sence 1 financial market (out of 11 possible).

In turn, Table 12 shows the results obtained in the VAR Granger Causality tests for COVID-19 period. The Italian stock market presented all the 11 possible causal relationships with the financial markets under analysis. Followed by BTC and ETH which caused 8 of the financial markets (out of 11 possible). The LTC, S&P/TSX, FTSE 100 and CAC 40 caused 7 (out of 11 possible) and the two North American indexes, DJ and S&P 500, presented 6 causal relations. Next were the DAX 30 index and Nikkei 225 caused, in the Granger sense, 5 financial markets (out of 11 possible) and finally, the Crypto 10 index, which only caused, in the Granger sense, 4 financial markets (out of 11 possible). Overall, in the period marked by the pandemic outbreak, among the pairs of financial markets analyzed, it was possible to identify 22 bidirectional causal relationships (see table 12).

This methodology allowed us to answer the research question, namely if sharp shocks between markets could jeopardize the portfolio diversification hypothesis? In Table 11 it is possible to see that, in total, during the pre-COVID period, 49 co-movements (out of 132 possible), while in table 12 it is possible to see 81 co-movements (out of 132 possible) during the COVID-19. In comparative terms, it is possible to see a significant increase in the number of co-movements after the shock caused by the 2020 global crisis, triggered by the onset of the COVID-19 pandemic.

During the pre-COVID-19 period, BTC and ETH show no significant evidence of causality with respect to the stock markets, merely exhibiting causality, in the Grangerian sense, with the representative index of the 10 referenced digital currencies (Crypto 10). The LTC and the Crypto 10 market index show some causality relations with the G7 stock markets. Compared to the COVID-19 period, it is possible to see that all the digital currencies under analysis started to cause more markets, both at the cryptocurrency level and at the stock market index level.

Table 11. Granger causality/Block Exogeneity Wald Tests, of the financial markets under analysis, over the period from 02/02/2018 to 31/12/2019 (pre-COVID 19)

	BTC	ETH	LTC	CRYPTO10	DJ	DAX 30	S&P500	S&P/TSX	FTSE 100	NIKKEI 225	CAC 40	ITALY
BTC		1.15998	1.25020	**1.74228*** **	0.94838	0.92758	1.22608	0.96052	1.18408	0.92256	1.28180	1.32159
ETH	0.55950		1.00762	**7.71090*** **	0.85696	0.87424	0.93879	0.86292	1.09337	0.65299	0.75068	0.81883
LTC	0.76779	0.58324		**6.26701*** **	1.56101	1.16423	**2.47545*** **	**2.56234***	1.42022	**2.65272*** **	**1.67606***	1.04418
CRYPTO10	**1.74228***	1.49120	0.87318		0.76503	**2.49679*** **	1.52799	**1.63169***	1.08042	0.69303	**3.04104*** **	**2.43933*** **
DJ	1.20687	1.40438	1.46439	0.59205		**2.17775** **	**1.89890** **	**2.40488*** **	**2.12659** **	**26.8483*** **	**2.90409*** **	1.21391
DAX	**1.99870** **	1.29832	**2.63585*** **	1.25118	0.62454		0.56335	1.19818	0.32145	**11.6049***	0.45163	1.47253
S&P500	1.14441	1.12784	1.33160	0.45567	**2.03337** **	2.19308**		**2.45111*** **	**2.26270** **	**30.5547*** **	**2.86761*** **	1.08588
S&P/TSX	**1.69048***	**1.74197***	1.50786	1.37995	1.47715	1.45494	**2.34621** **		1.34327	**10.6177*** **	**2.14446** **	1.19116
FTSE 100	1.56186	1.08342	0.94669	1.09371	0.68989	0.77623	**3.97691*** **	**2.23184** **		**6.53457*** **	0.87772	**4.66367*** **
NIKKEI 225	1.01592	1.17330	1.28352	0.66787	**2.38234*** **	**1.86545** **	**1.71378*** **	**3.31831*** **	1.50703		**1.89136** **	**1.82883***
CAC 40	**1.93068** **	**1.79852***	**2.47719***	0.70986	0.73338	1.08908	0.56171	1.04154	0.71687	**13.0584*** **		0.87933
ITALY	1.31777	1.11763	**2.17511** **	1.01834	1.13647	1.50913	0.87865	**1.96687** **	1.51175	**8.92464*** **	**1.81099***	

Source: Own elaboration

Table 12. Granger causality/Block Exogeneity Wald Tests, of the financial markets under analysis, over the period from 01/01/2020 to 18/11/2021 (COVID-19)

	BTC	ETH	LTC	CRYPTO10	DJ	DAX	S&P500	S&P/TSX	FTSE 100	NIKKEI 225	CAC 40	ITALY
BTC		**1.74065***	0.98380	**9.06781*** **	**4.87204*** **	1.47707	**4.65791*** **	**4.36851*** **	**2.10458** **	**4.33289*** **	**2.09121** **	0.80608
ETH	1.38788		1,34586	**6,09309*** **	**4,09635*** **	**1,68664***	**4,06131*** **	**3,28679*** **	**2,15063** **	**3,22561*** **	**1,90381** **	0,63946
LTC	**1.70741***	1,36553		**4,88773*** **	**2,58254*** **	1,06624	**2,47545*** **	**2,56234*** **	**1,68916*** **	**2,65272*** **	1,19979	0,65871
CRYPTO10	0.56508	0,78438	1,14168		**2,41286*** **	0,53363	**2,13168** **	**2,03955** **	0,68567	**2,45438*** **	0.71432	0,36877
DJ	1.21138	1,02147	0,96502	1,12171		**5,33727*** **	**1,67572***	**6,70095*** **	**5,00562*** **	**7,27309*** **	**7,62371*** **	7,56227***
DAX	1.22879	1,41733	1,27945	1,14369	**6,99476*** **		**6,58902*** **	**5,16048*** **	1,59852	**10,9128*** **	1,30123	**2,86817*** **
S&P500	1.12557	1,13674	0,88018	1,16307	1,24031	**4,73401*** **		**4,92003*** **	**4,72453*** **	**7,23524*** **	**7,08720*** **	**7,36375*** **
S&P/TSX	0.94345	1,25526	0,78580	0,97445	**7,85903*** **	**3,97272*** **	**6,67276*** **		**3,72907*** **	**6,35176*** **	**4,05811*** **	**6,40451*** **
FTSE 100	0.84497	0,91802	0,94669	1,26496	**3,53071*** **	**3,09420*** **	**3,97691*** **	**2,23184** **		**6,53457*** **	**3,21321*** **	**4,66367*** **
NIKKEI 225	1.08304	0,95363	0,69160	0,78470	**1,92144** **	1,53431	**1,71378***	**3,31831*** **	1,27817		**1,80432***	**2,62510*** **
CAC 40	1.32308	1,51220	1,56819	1,18166	**7,49661*** **	**1,95348** **	**7,36394*** **	**4,38587*** **	**3,51775*** **	**9,63043*** **		**1,99469** **
ITALY	**3.15111*** **	**2,78631*** **	**2,41904*** **	**2,42353***	**10,5762*** **	**6,04379*** **	**11,2372*** **	**9,93237*** **	**6,33681*** **	**11,1406*** **	**5,85702*** **	

Notes: Data worked by the author (software: Eviews12). The markets in column "cause" the markets in row.
The asterisks ***,**,* indicate the significance of the statistics at 1%, 5% and 10%, respectively

Source: Own elaboration

The stock markets analyzed during the pre-COVID-19 period had some influences on the cryptocurrency markets, most notably the DAX index, S&P/TSX, CAC 40 and Italy DS Market. However, during the COVID-19 period, just the Italy DS Market kept some influence under the behavior of all digital currencies. Regarding the causality relations between the stock markets, in general, an increase after the occurrence of the shock is observed.

The results are in agreement, with what is evidenced by Jiang et al. (2017), who suggests an increase in the number of co-movements between the stock market under the occurrence of shocks created by the crisis. The results obtained for the cryptocurrencies are also in line with the evidence recently presented in Karim et al. (2022).

5. CONCLUSION

In this paper, we tested the co-movements between DJ index, S&P500 (representing the USA stock market), FTSE 100 (United Kingdom), S&P/TSX (Canada), DAX 30 (Germany), CAC 40 (France), Nikkei 225 (Japan), Italy Ds market (Italy) and the cryptocurrencies Bitcoin (BTC), Litecoin (LTC), Ethereum (ETH) and Crypto 10. In order to answer the objective, two research questions were formulated: i) The cryptocurrencies versus G7 stock markets tend towards integration during the period marked by the 2020 global crisis; and, ii) The sharped shocks between the markets could jeopardize portfolio diversification assumption.

The results related to the research question suggest that the cryptocurrencies BTC, ETH and LTC increased the co-movements between their pairs, while the Crypto 10 index decreased the shocks when compared to the pre-COVID subperiod. Regarding the stock market, it was found that the DJ index maintained the same level of shocks, while the Japanese index (Nikkei 225) decreased. The German market (DAX 39), EUA (S&P 500), Canada (S&P/TSX), UK (FTSE 100), France (CAC 40), and Italy (Italy Ds market) increased the co-movements during the global pandemic period.

The general conclusion to be retained and sustained in the results obtained through the tests carried out with econometric and mathematical models show that the current global pandemic of 2020 has a significant impact, for the most part, on the memory properties of the analyzed markets. This evidence is relevant for the individual and institutional investors seeking to diversify their investments to mitigate the risk to their portfolios that they are subject to in periods of extreme volatility in international financial markets.

Traditionally, investors seek safe havens for their investments in periods of crisis, with a preference for assets that do not show correlations with other assets or markets, the results obtained do not meet these requirements once the memory properties of the analyzed financial markets fluctuate in the same direction as the global economy.

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Original Scientific Article

ALCOHOL CONSUMPTION IN THE CZECH REPUBLIC IN THE CONTEXT OF COVID-19 PANDEMIC: IMPLICATIONS FOR PUBLIC POLICY

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Abstract: *The Czech Republic has long been among the countries with the highest alcohol consumption in the world. Almost a fifth of the Czech population is categorised as problematic or high-risk alcohol drinkers. Restrictions taken against the spread of coronavirus have affected the lives of millions of people. Due to economic insecurity and severe mental health consequences, potential changes in behavioural and consumption patterns might also occur. The aim of this article is therefore to analyse available research and data related to alcohol consumption in the Czech Republic during the COVID-19 pandemic (the year 2020). Within this research, methods of time series analyses, comparison and synthesis were applied. Macroeconomic data indicated a decline in overall consumption, which however is affected by reduced tourism. On the other hand, microeconomic data showed an increase in average consumption when people with intense patterns of substance use increased their level of use. If the situation is not sufficiently addressed, serious socio-economic risks might occur, including increased costs for the healthcare system.*

Keywords: *Alcohol, Consumption, COVID-19, Czech Republic, Consumer behaviour.*

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1. INTRODUCTION

The Czech Republic has long been among the top countries with the highest per capita consumption of pure alcohol in the world (WHO, 2022; OECD, 2022). At the same time, the prevalence of risky alcohol use and harmful alcohol use has been increasing (Chomynová, Černíková & Mravčík, 2021) and the prevalence of highly problematic alcohol drinkers reached 8% in 2020 (National Institute of Public Health, 2021). The impact of alcohol on the overall health burden is significant – alcohol is one of the leading causes of morbidity and premature mortality in developed countries (Shield et al., 2020), including the Czech Republic (Mravčík et al., 2019).

The COVID-19 pandemic and related safety measures probably caused serious changes in consumption behaviour and former drinking habits. Some studies showed that overall consumption decreased during the first wave of the pandemic (Kilian et al., 2021) due to reduced availability and affordability of alcohol products, or because of the reduced number of opportunities for social contact, celebrations, and other occasions for alcohol drinking (Rehm et al., 2020). However, despite the decline in overall alcohol consumption, it appears that there has been no decline in consumption across all consumer categories and the lockdown had a polarizing impact on drinking patterns (Vanderbruggen et al., 2020; Oldham et al., 2021). In other words, some drinkers drank less during the pandemic, but others drank more (Panagiotidis et al., 2020; Calina et al., 2021).

Several studies also found that individual changes in consumption depended on pre-pandemic consumer drinking levels - those with initial low consumption tended to report a decrease in drinking during the pandemic, while the group with initial highest pre-pandemic consumption level tended to report an increase in drinking (Bramness, et al., 2021). In addition, patterns of change may also depend on the level of stress experienced during the pandemic. Specifically, people who experienced distress were more likely to consume more alcohol than those who did not, independently of financial income (Kilian et al., 2021).

Moreover, Barbosa, Cowell & Dowd (2021) stated, that alcoholic beverage sales increased significantly after the relaxation of pandemic security restrictions and the US alcohol drinkers consumed more drinks per day with a greater occurrence of binge drinking. Thus, alcohol-related consequences remained one of the major social issues which the pandemic could have deepened (Sugarman & Greenfield, 2021). It is therefore crucial at this point to further monitor any potential changes in consumption behaviour across all consumer categories (especially among the highest risky consumers of alcoholic beverages) to select, create and implement a suitable response to public health policy.

2. METHODOLOGY

The aim of this article is to analyse available data and information related to alcohol consumption which might indicate potential changes in consumers' behaviour in the Czech Republic in the context of the COVID-19 pandemic. Within this research, methods of time series analyses, comparison and synthesis were applied. The following data sources were used:

a) *scientific research outputs* – within the Web of Science and SCOPUS database, using the following search keywords: alcohol, consumption, COVID-19, coronavirus, Czech Republic;

b) *microeconomic, macroeconomic and market data* – publicly available data from the Czech and international institutions, and unique data from the Czech beer industry, as beer is the most frequently consumed alcoholic beverage in the Czech Republic.

Authors consider the synthesis of this information as a necessary next step for further research and moreover as a useful essential step for developing appropriate response of public health policy institutions. As excessive and risky alcohol consumption is a long-term problem in the Czech Republic, it is also desirable to point out the increasing relevance of hazardous or addictive behaviour of the Czech alcohol consumers in light of the COVID-19 pandemic.

3. ALCOHOL CONSUMPTION IN THE CZECH REPUBLIC DURING THE COVID-19 PANDEMIC

3.1. Literature review

Studies focusing on changes in alcohol use among the Czech population during the COVID-19 pandemic and especially during the state of emergency and lockdowns have brought inconclusive results. However, it appears that there may have been a worsening of the situation, especially among heavy alcohol users. Kilian et al. (2021) who analysed the alcohol consumption across twenty-one European countries and conducted a wide survey between April 24, 2020 and July 22, 2020 stated, that overall consumption in the Czech Republic slightly decreased. However, financial distress and distress due to changes in everyday life may increase drinking levels later on. Moreover, Rossow et al. (2021) showed, that the upper decile of Czech drinkers with the highest initial pre-pandemic alcohol consumption level increased their consumption.

Furthermore, respondents reporting the highest frequency of pre-pandemic use of addictive substances, especially alcohol, cannabis, and sedatives, increased their intensity of use during the state of emergency by 5-10% on average, while less intensive users decreased their consumption (survey conducted in May 2020). Moreover, the results suggest a slight increase in overall alcohol and sedative consumption and a significant increase in digital gaming and social media use (Mravčík & Chomynová, 2021).

A repeated nationwide cross-sectional study by Winkler et al. (2020) showed, that the prevalence of alcohol use disorders in May 2020 was approximately on the same level compared to 2017, but there was a significant increase in the prevalence of weekly binge drinking behaviours from 4.07% in 2017 to 6.39% in 2020. More importantly, after the second wave of the pandemic in November 2020, the prevalence of alcohol use disorders as well as the prevalence of alcohol abuse increased significantly compared to the beginning of 2020 (Winkler et al., 2021).

According to Barták et al. (2021), the results of a representative online survey showed some changes in drinking patterns during the COVID-19 pandemic. Generally, most respondents stated that they did not change their consumption level. At the same time, there were more respondents who reported a decrease in alcohol use than respondents who reported an increase. However, in relation to age, the authors observed that people in the younger age categories reported larger increases in alcohol use than those within the older age categories. Respondents in age 18-24 reported more changes on both sides of the curve, i.e., a significant proportion reported a decreased alcohol consumption, but a significant proportion also reported an increase in alcohol consumption. This relates to both frequency and quantity of alcohol consumed. On the other hand, the smallest decrease in alcohol consumption was observed in the age category 45-54. Moreover, 8% of respondents stated, that they now drink alcohol alone more often than before the COVID-19 pandemic and 1% of respondents chose the option that they now drink more often before noon. In addition, more respondents now prefer drinks with lower alcohol content compared to the pre-pandemic situation.

3.2. Results

The macroeconomic point of view on the development of Czech average alcohol consumption is represented in the following Table 1 (within the meaning of the methodological definition by the Czech Statistical Office, where the alcohol consumption is measured by the volume of sales of domestic producers, imports are added, and exports of alcohol products are deducted). The increasing consumption trend between 2017-2019 is followed by a decline in 2020 to 9.7 litres of pure alcohol per capita.

Table 1. Average alcohol consumption in the Czech Republic – Macroeconomic point of view (Litres of pure alcohol per capita, 2016-2020)

	2016	2017	2018	2019	2020
Overall alcohol consumption	9.9	9.8	9.9	10.0	9.7
Beer	4.9	4.8	4.8	4.8	4.6
Wine	2.3	2.2	2.4	2.3	2.3
Liquor	2.8	2.8	2.8	2.8	2.8

Source: Czech Statistical Office (2022)

However, such decline may also be influenced by a significant downturn in foreign tourism, when the number of foreign visitors decreased by 74.4% in 2020 compared to 2019 (Czech Statistical Office, 2021), and also by a possible reduction in cross-border purchases.

Table 2. Occupancy in collective accommodation establishments (number of non-residents, 2016-2020)

	2016	2017	2018	2019	2020
Overall alcohol consumption	9,321,440	10,160,468	10,611,394	10,890,500	2,784,170

Source: Czech Statistical Office (2022)

Thus, overall sales of alcoholic beverages in the Czech Republic declined in 2020 due to these factors. Moreover, excise duty collections on alcoholic beverages fell by CZK 624 million (-4.7%) in 2020, despite an increase in the excise tax rate on spirits effective from the beginning of 2020. Excise duty collections fell for spirits and beer but increased by 10.2% in the case of wine (excise duty collection on wine is much lower compared to other types of alcohol due to the zero-excise duty on still wines).

Table 3. Excise Duty Collection in CZK million (2018-2020)

	2018		2019		2020	
	CZK mil.	*Index 2018/2017*	*CZK mil.*	*Index 2019/2018*	*CZK mil.*	*Index 2020/2019*
Beer	4,776	103.0	4,696	98.3	4,497	95.8
Wine	408	107.2	404	98.8	445	110.2
Liquor	7,943	108.2	8,234	103.7	7,768	94.3
SUM	13,127	-	13,334	101.6	12,710	95.3

Source: Ministry of Finance of the Czech Republic (2021)

On the other hand, the microeconomic point of view on the development of alcohol consumption in the Czech Republic is presented by the annual survey among the representative number of respondents (1,806 respondents in 2020), issued by the National Institute of Public Health of the Czech Republic (Table 3). It can be noticed that the average alcohol consumption followed an increasing trend in 2020 and reached 8.0 litres of pure alcohol per capita (reversely to macroeconomic data).

Table 4. Average alcohol consumption in the Czech Republic - Microeconomic point of view (Litres of pure alcohol per capita, divided by age, 2016-2020)

	2016	2017*	2018	2019	2020
Overall Consumption	6.8	-	7.4	7.7	8.0
15-24	6.3	-	6.6	7.0	7.1
25-44	6.9	-	8.0	8.6	8.4
45-64	7.9	-	8.1	8.6	8.9
65+	5.2	-	6.0	5.4	6.6

* Data for 2017 are not available

Source: National Institute of Public Health (2017-2021)

The COVID-19 pandemic may also have caused some changes in the frequency of alcohol drinking, when more frequent drinkers increased their drinking frequency level during 2020, while less frequent drinkers tended to decrease it. This assumption is confirmed by the National Institute of Public Health data mentioned above, presented in Table 4. The prevalence of respondents who consume alcohol every day or almost every day increased from 8.5% in 2019 to 9.6% in 2020. Similarly, the prevalence of respondents who consume alcohol 3-4 times a week has increased from 8.9% in 2019 to 10.2% in 2020.

Table 5. Frequency of drinking alcoholic beverages (%)

	2016	2017	2018	2019	2020
Every day or almost every day	6.1	-	7.8	8.5	9.6
3-4 times a week	7.7	-	8.9	8.9	10.2
1-2 times a week	19.7	-	20.8	22.0	19.3
2-3 times a month	18.3	-	18.0	17.3	16.9
Once a month	12.1	-	12.9	12.7	11.0
6-11 times a year	5.1	-	5.0	5.4	5.3
2-5 times a year	9.3	-	9.0	8.5	7.0
Once a year	4.4	-	5.0	3.9	4.9
Not at all during last year	13.7	-	9.6	10.3	12.2
Never in my life	3.8	-	3.7	2.4	3.6

* Data for 2017 are not available

Source: National Institute of Public Health (2017-2021)

4. CASE STUDY: BEER PRODUCTION IN THE CZECH REPUBLIC

As an example, in the context of this article authors present the development of beer production in the on-trade (direct sales - restaurants, hotels, etc.) and off-trade trade (indirect sales - shops, chains, etc.) segments based on unique data provided by the Czech Association of Brewers. While in 2019 the production ratio of beer between the on-trade and off-trade segments reached 37/63, in 2020 the ratio changed to 27/73 - meaning that 73% of total beer production went to retail in 2020.

The decline in beer production in the on-trade segment during 2020 is evident (Figure 1), mainly due to the government's pandemic security measures under which restaurants and other hospitality establishments were closed. The biggest declines are evident in March, April, and May, followed by October, November, and December. In total, production in this segment fell by 31.09% compared to 2019.

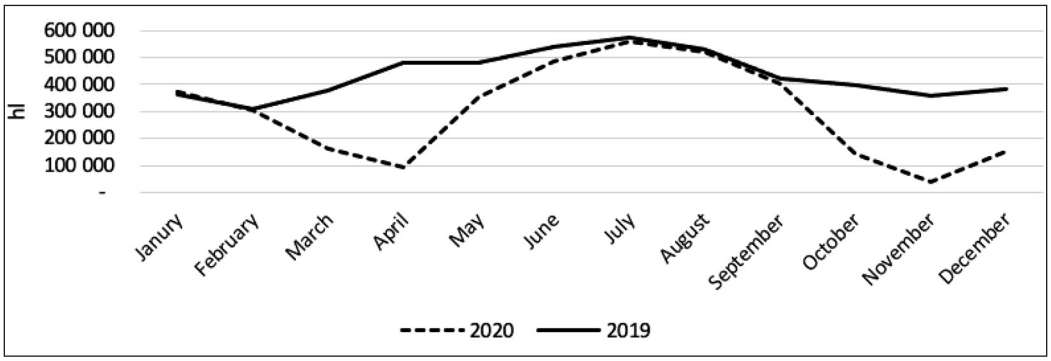

Figure 1. Development of beer production in the Czech on-trade segment – 2019 and 2020 (hectolitres of beer)

Source: Czech Association of Brewers, personal communication, February 2022

On the other hand, the total beer production in the off-trade segment in 2020 increased by 8.2% compared to 2019, with the largest increases during March, April, and May, followed by November and December (Figure 2). In terms of beer packaging types, the largest increases in beer sales during 2020 were in can products (16%), glass bottles (7.2%) and PET bottles (3.7%). Conversely, the largest declines occurred in barrels (29.6%) and beer tanks (45.3%).

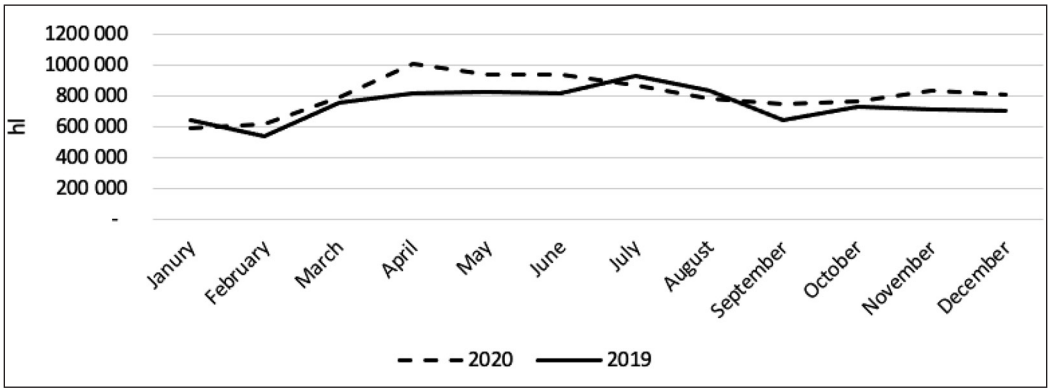

Figure 2. Development of beer production in the Czech off-trade segment – 2019 and 2020 (hectolitres of beer)

Source: Czech Association of Brewers, personal communication, February 2022

5. DISCUSSION

Deep and thorough information on the impact of the COVID-19 epidemic on patterns and levels of alcohol consumption seems to be still limited and ambiguous. Many of the most serious socio-economic impacts may occur not subsequently, but rather over a longer time period. However, it appears that there may have been a worsening of the situation, particularly among intensive alcohol users, who may have increased both frequencies of use and amount of alcohol consumed. Moreover, the COVID-19 pandemic has affected the alcohol market and people's consumption behaviour. Alcohol consumption shifted from public to private places during the states of emergency and the question now is - to what extent will the shift of consumers away from public catering to retail outlets be reflected in the period ahead.

As previous research and alcohol consumption data show, there has been a forced change in consumer market behaviour as a result of restrictions on social contacts, restrictions and bans on public and private events and, in particular, restrictions and bans on restaurants, bars and pubs due to spread of COVID-19. Retail outlets have become a primary source of alcoholic beverages, especially during the state of the emergency period in spring and at the end of 2020. The alcohol market in the Czech Republic has also been affected by a drop in tourists and a reduction in cross-border purchases and sales of alcoholic beverages declined in 2020 due to these factors. Thus, there was also a year-on-year decline in alcohol excise duty collections by CZK 0,6 billion (-4,7 %).

Addictology services have reported increased demand for their services following the relaxation of anti-epidemic security government measures, although this increase is not evident from health statistics data (Mravčík et al., 2021). The COVID-19 pandemic and related restrictive measures have made it more difficult for clients with alcohol dependence problems to contact and access social and addictology services. On the other hand, the provision of online counselling and treatment services has partly developed during the pandemic, which might be a great benefit in the future.

In addition, such changes in this area have direct implications for the cost of the healthcare system, excise duty collections and a range of other socio-economic impacts which may emerge subsequently during upcoming months, but also in the long term. Therefore, it is now crucial to focus primarily on the most at-risk groups of alcohol consumers and to target appropriate prevention and regulatory tools at these consumer groups, through targeted health and regulatory instruments (such as harm reduction programmes, targeted interventions and also strengthening the capacity of addictology and social services).

6. FUTURE RESEARCH DIRECTIONS

One of the important future research directions in the analysis and economic evaluation of targeted prevention tools aimed at reduction of alcohol consumption among at-risk consumer groups, such as screening and brief intervention. This tool is relatively under-used among Czech health professionals, despite WHO recommendations, and it is, therefore, necessary to show what particular benefits this method of prevention can bring to the Czech healthcare system.

7. CONCLUSION

Macroeconomic data indicate a decline in overall consumption, which however has also been affected to some extent by the reduced number of foreign tourists. On the other hand, microeconomic data showed an increase in average consumption among Czech alcohol consumers in 2020 compared to 2019. At the same time, the pandemic has deepened the country's long-term issue with a growing number of high-risk alcohol consumers. Moreover, people with intense patterns of substance use increased their level of use during a state of emergency. The same applies to digital games and social media. Thus, demand for addiction treatment can be expected to increase in the near future.

If the situation is not sufficiently addressed, serious socio-economic risks might occur, including increased future costs for a healthcare system that is already experiencing huge pressure. In particular, the solution may lie in the widespread use of targeted preventive and regulatory tools such as screening and brief intervention as well as awareness-raising campaigns on the benefits of a healthy lifestyle, harm reduction programmes and strengthening the capacity of addictology and social services.

The aim of this article was to synthesize all available data concerning changes in alcohol consumption in the Czech Republic in the context of the COVID-19 pandemic, which was achieved. A limitation of this article is the lack of microeconomic data dealing with specific changes in consumer behaviour, which can also be considered as a further research direction.

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Review Paper

MONETARY STRATEGIES DURING AND AFTER THE GREAT RECESSION: ECB VS NBS

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Abstract: *The last few decades of the world economic structure have been characterized by a trend of global convergence in the context of the exponential interconnectedness of initially divergent financial markets. With deeper trade and financial integration, nationally oriented monetary policy is confronted with serious obstacles and limitations, having in mind higher vulnerability to the external crisis shocks. The focus of this analysis is the heterogeneous monetary responses of the ECB and the NBS to the same external shocks induced by the Great 2008 Recession. The main findings suggest that both monetary systems should rely on discretionary policy taking current macroeconomic health into account. In contrast to the monetary responses to the Global Recession, the analysis shows that the reactions to the COVID-19 crisis remained faithful to unorthodox measures in ECB's case but unrelated in NBS's case.*

Keywords: *Monetary policy, Quantitative easing, ECB, NBS, Inflation targeting.*

JEL Classification E42 · E52 · E58

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1. INTRODUCTION

High levels of macro-integration of financial markets provide numerous economic advantages but at the same time highlight key structural shortcomings. To achieve financial integration, European monetarists have tried to maximize the liberalization of capital flows, which leads to a reduction in transaction costs, but at the same time to a significant complication of the entire system. The very purpose of the currency was economic integration on the surface, but the main goal was to deepen political integration and encourage European harmonization (Stiglitz, 2017).

The creation of the euro fixed the exchange rates of countries and reduced foreign exchange risks, which was the original phenomenon, on the other hand, fixing exchange rates reduces the autonomy of individual central banks. This is a relevant factor primarily due to the differentiation between member states, this difference can be reflected in the economic structure and environment of the members, all the way to the specific values to which different countries attach different importance. The consequence of this is that each country can react differently to the external shock it faces. The problem arises as a consequence of the fact that now in the fixed exchange rate regime, all countries must apply the same monetary policy, regardless of whether it will help their economy or not (Bernanke & Mishkin, 1992).

One of such problems in the form of internal (structural) shock appeared in the context of the mortgage crisis in 2007 that spilled over from American soil to European soil in a record period. When we talk about the Eurozone, we are talking about a fixed exchange rate because the single currency is being introduced between member states, and the situation of the Great Recession has raised fears of declining price competitiveness that cannot be eliminated by spontaneous supply and demand relations (Gali & Monacelli, 2005). As a consequence, current account imbalances are growing and external shocks to the economy are increasing, there is the unsustainability of fixed parity and, like the domino effect, economies that are in the monetary union are falling into a currency crisis and financial collapse. The emergence of a currency crisis in one country in the regime of a fixed exchange rate leads to further spillover effects on the rest of the members, which means that we have a breakdown of the entire economic integration. To prevent such catastrophic events, various central banks have implemented heterogeneous monetary strategies to stabilize economic systems. We will look into the cases of the European Central Bank and National Bank of Serbia trying to shed more light on their strategies under the impact of external shocks.

This paper is structured as follows. After the introduction section, section two deals with the monetary strategy of the European Central Bank, with a focus on quantitative easing. Section 3 covers the monetary strategy of the National Bank of Serbia, namely inflation targeting under crisis circumstances. Section 4 is focused on how ECB and NBS tackled the COVID-19 pandemic crisis by comparing monetary regimes with the Great recession. And, finally, the last section comprises key concluding remarks of the paper.

2. THE MONETARY STRATEGY OF THE EUROPEAN CENTRAL BANK

Since the existence of the European Monetary Union (EMU) and the European Central Bank (ECB), the monetary policy it has pursued has been a policy aimed primarily at preserving price stability in the monetary union. Price stability can be defined as follows (Astin, 1999):

„*Price stability is defined as an increase in the Harmonized Indices of Consumer Prices (HICP) from year to year for the euro area below 2%.*"

As the fundamental argument for selecting price stability as the primary purpose of the European Central Bank, we may look to the German Bundesbank, which, as Germany's central bank at the time, led to the establishment of a single European bank. Germany, taught by the experience with hyperinflation in its past, had a fear of inflation and therefore highly valued price stability. This will be critical in understanding the reasons for the delay in implementing quantitative easing (as they defined this strategy) in the Eurozone. The European Central Bank's monetary policy during the global financial crisis in 2007 was typical, ie. central banks have opted for conventional monetary policy measures to reduce risk and establish liquidity (Cúrdia & Woodford, 2010). The Central Bank of Europe has sought to secure sufficient funding to reduce disruption and stabilize the banking sector.

Then, major central banks make swap arrangements to reduce foreign exchange risk. To boost the banking industry and soothe the financial market panic at the start of the crisis, the European Central Bank provided commercial banks with a loan of 95 billion euros to sustain liquidity. The maturity of liquid assets in the three to the six-month range is also refinanced. As the crisis deepened, the refinancing term was extended to one year to support both the financial and real markets through lending activity. The European Central Bank employs a fine-tuning approach to respond to market developments in a timely and adequate manner. After the escalation of the Great Recession in September 2008 due to the bankruptcy of Lehman Brothers, many financial institutions that were associated with the main culprits of the crisis are getting into solvency problems, which only worsened the situation in the economy. To hedge against risk, banks have amassed inventories and reduced lending, leading to reduced liquidity in the financial market, and the spillover effect on the real sector has led to rising unemployment and declining productivity (Kearns et al., 2018). The European Central Bank is lowering interest rates in this period and this continuous reduction will lead to a drop in the refinancing interest rate from 1.50% to negative levels as shown in Figure 1.

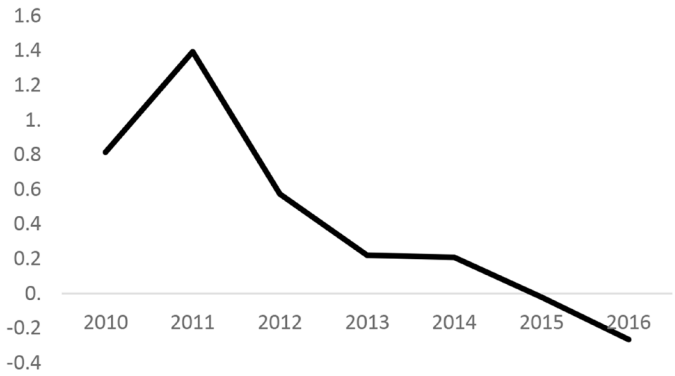

Figure 1. Refinancing interest rate of ECB
Source: Author, based on Eurostat, 2020.

Lowering interest rates alone was insufficient, therefore the European Central Bank implemented unconventional measures such as currency swap agreements, which were Eurosystem currency arrangements with the Federal Reserve that gave liquidity to foreign currencies during the crisis (Jovancai & Stakić, 2013). The European Central Bank has also broadened the list of collateral that banks can use to acquire liquidation funds, allowing banks to utilize the majority of their assets to obtain liquidation money. In 2009, the European Central Bank started expanding the money supply by purchasing safe bonds denominated in euros in the amount of 60 billion euros (Beirne et al., 2011). The primary purpose of this unconventional strategy was to reactivate and revitalize the covered bond market, which was the primary source of bank funding at the time.

2.1. The strategy of quantitative easing

To avert a recession, the conventional monetary policy requires managing the nominal interest rate and, as a result, the real interest rate. This strategy seeks to impact the rate of return on assets, which in turn influences the actions of various market participants. The choice of banks to lend money to other market participants, the decision of the state and firms to raise or decrease investments, and the decision of the public to spend will all be influenced by the interest rate.

Unconventional or non-standard monetary policy measures, as the name implies, are measures that are not commonly utilized and are not widely recognized. However, as previously stated, in times of crisis, it is critical to find a way out at all costs. In line with this, the Europeans found a route out of the crisis by looking to the Americans who used unorthodox monetary policy, notably quantitative easing (QE). They saw the measure as a central bank operation to purchase government debt instruments to increase the money supply and cut interest rates (Andrade et al., 2016). In 2001, the Central Bank of Japan became the first central bank to employ unconventional monetary policy tools. Following Japan, the Federal Reserve and the Bank of England agreed to take this step and began to pursue a quantitative easing program. The European Central Bank decides on the implementation of these approaches after a few years, more specifically in 2015, when it will begin executing the unconventional exit strategy.

There are multiple reasons why the European Central Bank was late in implementing this strategy, which has previously been widely applied in the United States and has had results. The **first** and most important reason is the resistance of the Eurozone's most powerful member and the European Union itself, Germany. As previously stated in this article, Germany has experienced two hyperinflations in the last century, with price stability serving as the primary aim of the German central bank's monetary policy.

The German Central Bank (Bundesbank) has never required unconventional monetary measures in its history since its primary purpose has always been price stability, not productivity and employment growth. Because of these factors, Germany was unable to comprehend the necessity for different monetary policies to be implemented.

Nations in southern Europe and more indebted countries, in contrast to Germany, have campaigned for the use of non-standard monetary measures since such a policy would be suited for repaying public debt owing to lower interest rates. The **second** reason for the delay in adopting quantitative easing was that this policy was completely unknown because it had never been utilized in the monetary union before, and its impact on the economies of Eurozone nations could not be identified. The example of Japan was Germany's key reason that this approach would fail. The Japanese economy was in stagflation, and an attempt was made to alleviate the situation by implementing negative nominal interest rates and purchasing government bonds. The outcomes of these efforts were negative, and the Japanese economy suffered as a result. If quantitative easing were to be implemented, Germany predicted a similar situation in the Eurozone.

The **third** reason for the delay in implementation was the 1992 Maastricht treaty, which stipulated that the central bank was independent, i.e. that it could not be used to finance Eurozone nations**.** In the year's post-U.S. crisis on European soil, there was decreased inflation, and it was substantially lower than the Eurozone's inflation objective of 2%. This constituted a risk of deflation for Eurozone countries, prompting the introduction of the Asset Purchase Program (APP) in reaction to the low inflation rate. The Extended Securities Purchase Initiative, abbreviated as APP, was a

type of quantitative easing program. The Asset Purchase Program entailed infusing cash into the financial sectors to boost liquidity (Kapetanios, 2012). The asset acquisition program was initiated on January 22, 2015, with a monthly budget of 60 billion euros (Koijen et al., 2018). This program encompassed bonds issued by Eurozone nations, as well as assets issued by different European and national institutions and agencies. The program's duration was not specified, although it was intended to be implemented until inflation exceeded the 2% mark.

In March 2016, there was a further expansion of the Assets purchase program, and allocations increased from 60 billion euros to 80 billion euros as seen in Figure 2. The European Central Bank coordinated this strategy, which was carried out by national central banks. The European Central Bank purchased 8% of the money earmarked for the Assets Purchase Program, while national banks from Eurozone member countries purchased 92%. This strategy meant that individual central banks would need to purchase government-issued nation bonds.

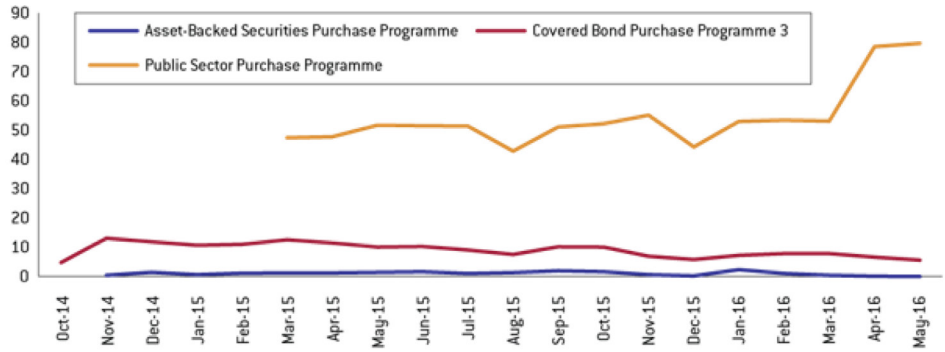

Figure 2. Monthly purchases of securities within the APP
Source: DeMertzis & Wolff, 2016.

When Europe ultimately chose to implement similar policies, a problem occurred when it came to purchasing in the sense that they did not save as much as America in previous periods. And, since it took them longer than the Americans for the implementation, they realized their mistake. This was a lesson for Europe not to hesitate in the future.

The question is whether a policy that costs so much gives the results that are expected of it? The key idea is to transfer the purchase of securities as well as bonds to the money supply. The amount of money from sold shares and bonds reaches the commercial sector, which will have more space to provide loans to the private sector. Bearing in mind that consumer lending increased by 1.6% by 2016 leads us to the conclusion that the credit conditions of the Eurozone have improved. The transmission mechanism of QE is transmitted to the fall in interest rates and in the long run, has an expansive effect on GDP growth (Beckmann et al., 2020). The purchase of long-term uncertain bonds increases their price as a result of higher demand, but there is a decline in yield as a percentage relative to the price (which has increased). Due to the fall in interest rates, there is an inverse trend in inflation, which jumped to around 5% in the Eurozone during the first rounds of QE. The combination of inflation and low-interest rates leads to a decline in competitiveness which affects the decline in demand for domestic currency and ultimately the decline in its value. (Krishnamurthy & Jorgensen, 2011).

3. THE MONETARY STRATEGY OF THE NATIONAL BANK OF SERBIA

Diametrically different economic structure in terms of homogeneity of the country compared to the predominantly heterogeneously economic system of the Eurozone allows for different monetary strategies in similar conditions. After various and numerous analyzes of the advantages and disadvantages of the monetary strategies and regimes, taking into account the environment of the domestic economy, the National Bank of Serbia decided on the inflation targeting regime. A crucial step toward this monetary strategy was taken after taking into account the autonomy of the central bank, which allows for transparency in conducting monetary policy (Šoškić, 2015). In determining the new monetary policy regime, the existence of structural changes that should happen to Serbia in the coming period and that will have effects on inflation growth was taken into account. Given the high levels of integration with the European Union and the strengthening of ties with foreign countries, an increase in the rate of transmission of inflationary shocks was expected. Taking all the above into account at the end of 2006, the monetary policy framework had in mind the implicit targeting of inflation: a) Creating an environment that reflects low and stable inflation; b) Encouraging the strengthening of the domestic currency; c) Strengthening the defense against temporary shocks from the environment.

Therefore, this framework determines that the central bank must actively participate in combating strong and unexpected shocks that will drive inflation out of the then-determined corridors of implicit targeting (Fabris, 2015). On the other hand, the action of monetary policy on exogenous shocks is determined by the nature of the shocks themselves. When the nature of the shock is mentioned, the existence on the demand side or the supply side is meant more. Shocks on the demand side from the point of view of monetary policy are more frequent and imply an identical flow of economic activity and inflation in terms of falling interest rates leading to growth in both economic activity and inflation.

The main goal of the National Bank of Serbia is to achieve price stability, unlike the European Central Bank, whose main goal in the post-crisis period was a relaxed monetary policy in order to stimulate output growth (Fabris, 2006). There are other goals such as financial stability within the strategy of the National Bank of Serbia, but they are being achieved „along the way". What should be said is that Serbia could not suddenly start applying the inflation targeting regime, and for that reason, it is introducing the procedure of the previously mentioned **implicit targeting**, which gradually introduces targets that are realistically achievable in accordance with the economic environment. Achieving implicit targeting enables the achievement of medium-term targeting results. In this period, the inflation targeting regime was implemented based on the principle of annual percentage change in the consumer price index with the consent of the Government of the Republic of Serbia on the implementation of fiscal aspects that do not jeopardize the achievement of monetary goals. Taking into account the monetary and fiscal policy from previous decades, which is relatively relaxed in terms of expansion and which is a factor in encouraging distrust in the currency, it indicates higher levels of the relationship between the exchange rate and inflation (Đukić et al., 2011). The implicit VAR methodology confirms the lack of explicit correlation between the exchange rate and inflation as presented in Figure 3. This points to the fact that the inflation targeting strategy is stable.

The regime of implicit inflation targeting encouraged the transparency of monetary policy until 2009 by managing to achieve the expected changes in interest rates from the point of view of regular business decisions of corporations. In other words, corporations believe that the interest rate will be as high as the central bank says. This is extremely important because they make their fu-

ture business decisions based on interest rate estimates. Once it has established this initial level of transparency (stabilization and confidence), the central bank can move to a full inflation targeting regime where its goal is for those same corporations to now trust it in terms of inflation.

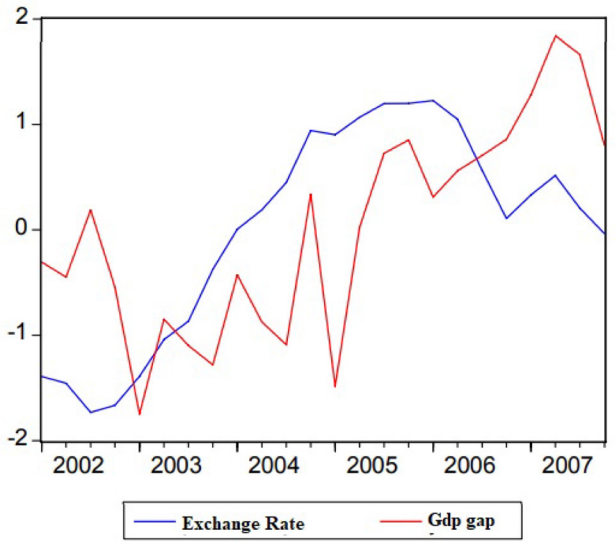

Figure 3. Exchange rate to GDP Gap correlation
Source: Dragutinović, 2008.

The inflation rate and the allowed deviation are defined for each month during the year. This means that the achievement of inflation targets can be monitored at any time, not just in one period. It also contributes to the stabilization of inflation expectations in situations where a strong shock results in a temporary deviation of inflation from the target level. It is now necessary to look at how the NBS has coped with these problems over the past decade.

With the transition to full inflation targeting after 2008, we see a rapid decline in inflation targets. Inflation targets stabilized at 4 percentage points over a longer period until 2015, when a new reduction of targeting by 1 percentage point to 3 was introduced. So, if we look at post-crisis periods, we will see that the central bank struggled with extremely high levels of inflation of almost 14%. Stabilization from 2014 onwards only shows how effectively the inflation targeting process in Serbia works, this is shown in Figure 4. For a long period, inflation has been under control without any negative repercussions on the economy. However, the government has very often used a well-conducted monetary policy in recent years to increase its spending and be more irresponsible because it knows that the central bank can bail out its deficit and high spending in terms of issuance. Such a transparent policy also creates a fall in inflation expectations and raises the credibility of the entire monetary institution. Furthermore, the standards of price convergence of the European Union, to which Serbia has been striving for years, are being met. The fact that inflation since its stabilization has been moving towards expected targets of almost ideal 2% indicates that a homogeneous monetary policy can find a balance in crises without the need for unconventional policy measures.

One of the reasons why all central banks strategically determine the medium-term horizon of inflation targeting is that there is room for short-term deviations of real from inflation targeting. These deviations are a consequence of various external factors that affect the economy over time, so monetary policy mitigates the secondary effects of these deformations. That is why we have as

our goal the central values of inflation and the corridors as areas of deviation. In other words, it is not realistically feasible at all times for real inflation to be equal to the target, especially in conditions of greater shocks to the economy. Why? First of all, due to the previously mentioned lag in the effects of monetary policy on one hand, and on the other hand, if there is a fast and rapid return of inflation to target in such conditions, there may be structural disruptions in financial markets. For these reasons, temporary deviations are allowed.

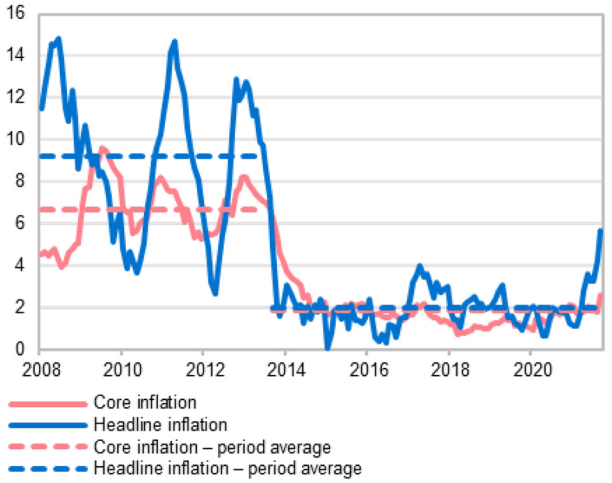

Figure 4. Core and Headline inflation targeting
Source: NBS, 2021.

Effective conduct of monetary policy and its coordination with fiscal policy has successfully reduced inflation by around 10 percentage points over a period of 10 years, from 12% in 2012 to 2.2% at the end of 2020. This reduction is a direct consequence of the tightening of monetary policy in terms of its restriction from this period, but also by reducing the prices of agricultural products, lack of domestic demand, and, of course, falling inflation expectations. The fall in short-term volatility of the dinar exchange rate also contributed to the fall in inflation. The following year (2014) saw the first measures of relaxation, the application of monetary expansion in the form of lowering the interest rate to 8%. According to some economists, the interest rate could have dropped even more here, but even in this context, the central bank is acting wisely and cautiously, bearing in mind the negativity that emerging countries have experienced in terms of volatility in unstable financial markets. During this period, everyone expected the Fed to start easing its quantitative easing measures, which was supposed to cause turbulence in the capital market. For this reason, the NBS in 2015 is launching a further monetary expansion that resulted in an interest rate of 4.5% aimed at creating a basis for lending activity in these low inflationary periods, which should further stimulate overall economic activity. A great contribution to this policy of monetary expansion of the central bank was contributed by the coordination with the government's fiscal policy, which in that period implemented various fiscal consolidation programs. Full coordination of monetary and fiscal policy resulted in simultaneous expansion and restriction in that period, respectively. The Central Bank is opting for further expansion measures in the form of reducing reserve requirements to further deepen credit expansion (deposit multiplier).

What the graph also shows is that Serbia has continued to exponentially lower its interest rate until today. In Figure 5 we see that today, the reference interest rate is at the level that is lowest since the period of 2006, i.e. before the Great Recession. What we can conclude is also that the Nation-

al Bank of Serbia exponentially lowered the interest rate to maintain the end of the inflation target in the post-crisis period. Also, it is extremely necessary to be careful about the low-interest rate because there is a possibility that the instruments in the fight against the next crisis will be exhausted. On the other hand, the fact is that the relative stability of the exchange rate was one of the determinants to which the policy of the central bank contributed to the anchoring of inflation, but in the overall financial system of Serbia. This has also contributed to the fiscal aspects of the economy in terms of the transition from fiscal deficit to fiscal surplus. This further had a reciprocal impact on the investment activities of the country. There was a significant increase in foreign direct investment initially in smaller projects and in the second round there was an increase in the diversity of investments in structure and projects. The competitiveness of the domestic economy has been significantly boosted, leading to a reduction in the current account deficit as a reflection of increased exports relative to imports.

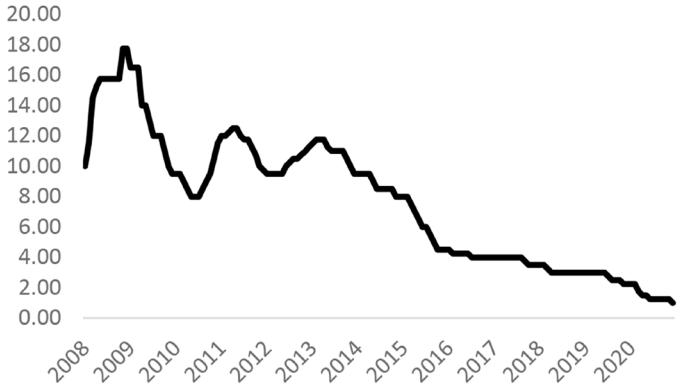

Figure 5. NBS Interest rate
Source: Author, based on NBS data.

4. COMPARATIVE COVID-19 APPROACH

Relative to the Great Recession, which had systemic effects of a structural nature, the COVID-19 crisis was caused by an external shock in the form of a pandemic. Monetary institutions (including the ECB and the NBS) had to implement rapid measures to prevent the monetary spillover of pandemic effects on the real sector. The main problem of the ECB's monetary policy is related to the heterogeneity and divergence of the monetary union members (Beker Pucar & Glavaški, 2020). However, in such specific circumstances, where every country is hit by a recession, monetary policy instruments could help everyone. The main difference concerning the Great Recession in terms of monetary strategy in the Eurozone is the fact that the crisis was greeted with a relatively restrictive monetary policy and an interest rate of 4%. On the other hand, the initial monetary policy of the ECB in the period before the COVID-19 crisis is fundamentally expansionary with an interest rate of 0%. Given that conventional instruments have been used, the ECB is moving to non-conventional aspects in the form of "Asset Purchase Programs" (APP). Unlike the previous time, learning from mistakes or due to the nature of the crisis, the ECB applies unconventional policy on time. This time, a robust expansion of the ECB's balance sheet is required, leading to the formation of the "Pandemic Emergency Purchase Program" (PEPP) (Benigno et al., 2021). This program had the idea of inherently increasing the money supply in circulation and was supposed to act as an absorber of the crisis. The package was approved for the initial 750 billion euros so that by the end of 2021, the value will jump to 1.85 trillion euros (European Parliament, 2021).

In times of crisis, market segmentation suggests that asset purchases are primarily local, with little spillovers to non-targeted areas. Hence, central banks must operate more actively in the markets where they are most required. The elasticity of the PEPP throughout time, across asset classes, and between countries allowed for such targeted acquisitions. The amount of APP during the Great Recession reached 850 billion euros, which only speaks of the chronic effects of the pandemic crisis. One of the relevant instruments in addition to the PEPP was the „Longer-term refinancing operations" (LTRO), mostly used to stabilize the banking system in terms of liquidity (Momirović et al., 2021). This package was not the focus of the ECB during the Great Recession because they were more focused on buying stocks, bonds, and public-sector purchases. As a result of the implemented arrangements, in both cases, after facing the shock, the economy moves from recession to inflation, which speaks of unconventional efficiency, but also of the unknown limit of liquidity injection by the monetary authorities**.**

On the other hand, the NBS, guided by the policy of price stability, welcomed the pandemic crisis with inflation of 2%. In terms of inflation, the NBS was much more prepared in 2020 than in 2008 when inflation was around 14%. In line with other world economies, the NBS has begun to implement an expansionary monetary policy in terms of the inherent lowering of interest rates in the initial periods of the pandemic (Savić et al., 2021). The transition from disciplined monetary policy to a regime of strict expansion is shown in the context of three sets of monetary measures: (i) liquidity control measures; (ii) direct aid measures; (iii) reactions to supply and demand shocks (Narodna Banka Srbije, 2021).

As part of **liquidity control**, the NBS is launching a repo relief initiative in cooperation with the ECB. In this way, excess liquidity is provided to the financial sector in euros in the event of any liquidity crisis. Unlike the period of the Great Recession, the NBS applied deferred payment of tax liabilities within these monetary arrangements. Deferring the payroll tax aims to maintain economic activity but also employment. Measures of **direct aid** refer to direct payments to companies, payment of aid in the amount of the minimum wage for entrepreneurs as well as subsidies to large companies. This set of measures was supposed to be the basis for dealing with the long-term effects of the crisis. **Reactions to supply and demand shocks** are the last set of measures related to the specific economic consequences that could have arisen due to the fall in demand on the one hand, but also the disruption of the supply chain on the other hand caused by the pandemic. These measures include lending to the business and agricultural sectors as well as various guarantee schemes to support the business sector (Lazarević-Moravčević & Kamenković, 2021).

5. CONCLUSION

If we draw something positive out of the increasing number of global crises that have hit us over the years, it is to encourage the economic community to work together to mitigate those crises. This is exactly the case with the monetary policy we have today. Monetary policy survived a whole set of changes from the '80s until today, not changing only the way of its functioning but also the aspects of its coverage, starting from expansive and restrictive, all the way to the unconventional aspects and macro prudence.

It is this broad coverage of monetary instruments that has enabled economies to face the same problems in different ways. The analysis has shown that ECB structural heterogeneity induced the use of unorthodox measures, unlike the conventional NBS approach. On the other hand, NBS's homogeneity allowed the exit strategy to have a conventional character within the framework of the inflation targeting. The divergence of monetary strategies indicates the lack of an optimal

model by which states can be guided. This means that central monetary institutions should pursue discretionary policy-making instead of rigid rules.

This paper aims to fill the gap in the existing literature by presenting the monetary response of the ECB and NBS to the external shocks induced primarily by the Global Recession, along with a brief comparison of the monetary reactions of both monetary authorities to the COVID-19 crisis. Further research could be focused on econometric analysis of monetary transmission mechanisms, namely with the Vector Autoregression Models (VAR) as mostly used techniques for measuring transmission channels as well as dynamic effects of monetary measures.

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Original Scientific Article

PREFERENCES OF BEHAVIOR TYPES OF LEADERS IN THE PUBLIC SECTOR – CASE STUDY MINISTRY OF DEFENSE OF THE REPUBLIC OF SERBIA

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Abstract: *The subject of this paper is to determine the preferred style of leadership behavior in public sector employees. A sample of employees of the Ministry of Defense (hereinafter MoD) was used to conduct the research. The Ministry of Defense, as an extremely organizationally and hierarchically defined entity, is interesting for researching the preferences of leadership style and the leader-follower relationship itself. Numerous leadership studies conducted in this type of organization have not been found in practice, and there is a reported scientific „gap" on this topic. The research aims to determine which the preferred leadership style in the MoD is and whether gender, age, and years of service influence the preferred leadership style and the leader-follower relationship. The empirical research was conducted in 2021 in the Military Social Security Fund of the Ministry of Defense of the Republic of Serbia on the cause of 51 respondents, using the survey method. The results of the research showed that the preferred leadership style among MoD employees is participatory leadership and that years of service and age have an impact on the choice of the preferred leadership style, as well as on the leader-follower relationship.*

Keywords: *Organization, Leadership, Followers, Behavior, Process.*

JEL Classification M12 · J53 · D73

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1. INTRODUCTION

Leadership means the process of influencing and motivating followers to engage in achieving organizational goals (Stojanović-Aleksić, 2007). Leadership is defined as a dynamic force that motivates and coordinates organizational members in the process of achieving goals (Davis, 1942). Leadership is individual behavior that directs group activity toward specific goals (Hemphill & Coons, 1957).

Numerous definitions attempt to describe leadership and they all have the same factors of the leadership process – leaders (McCormick et al., 2019), followers, and goals (Pierce & Newstrom, 2000). In addition to these three factors of the leadership process, as a fourth, invisible factor, the links that connect the leader, followers, and goals can be defined. These connections move in one direction and several directions: from the leader to the followers and goals (the leader exerts his influence and power on the followers, and they act to achieve the goal by their actions or inactions), from the followers to the leader (Stojanović-Aleksić & Krstić, 2016) and goals (followers act by their behavior to the leader and the achievement of goals), as well as from the goals to the leader and followers (goals motivate or demotivate employees to act towards or opposite to them and leaders to take measures to achieve them).

Although all the above factors make up the leadership process, at the same time and to the same extent contribute to the quality of the said process, the leader has been identified as a key determinant responsible for initiating and directing the leadership process. Leadership behavior and leadership influence tactics define the success of the leadership process and the type of relationships that will be formed in the relationship leader - followers – goals (Stojanović-Aleksić, 2016).

The Ministry of Defense of the Republic of Serbia, as well as the Fund for Social Insurance of Military Insured Persons, as its integral part, is a specific organization with a strict structural and hierarchical organization. Procedures and rules of conduct have been codified and there is a system of rewards and sanctions for any violation of the rules, i.e. advocacy above a defined level. Accordingly, the employees in this organization are an interesting subject of research. Motivation to conduct research can be divided into scientific and social motivation. The scientific motivation is that there are not many papers on the topic of leadership in organizations such as the MoD, and there is a certain scientific „gap" in research on this topic. Social motivation is the practical application of research conclusions in the leader-follower relationship in the MoD and the very development of leadership in the MoD. As a theoretical basis for this research, the results of research conducted at the University of Ohio (Hemphill & Coons, 1957) and the University of Michigan (DuBrin, 2013) were taken.

2. BEHAVIORAL LEADERSHIP RESEARCH

Personality theory (Taylor, 1903; Fayol, 1999) explains the phenomenon of leadership exclusively through a set of personality traits of the leader (physical traits, mental traits, and moral qualities). Due to the shortcomings observed in personality theory and the impossibility of measuring certain personality characteristics (e.g. moral quality), a behaviorist approach to leadership emerges. The idea of changing the direction of studying leadership has its roots in Hawthorne's experiments (Villasenor, 2021). The results of these experiments led researchers to take into account the human factor (both leaders and followers) and interpersonal relationships between leaders and followers when studying leadership.

One of the major studies was conducted in 1957 at Ohio State University. As a result of this study, Hemphill & Coons (1957) classified leader behavior into three categories: goal-oriented behavior, interaction-oriented behavior, and support-oriented behavior. The next study of leadership behavior research was conducted at the University of Michigan. Based on the results of these studies, R. Likert defined three leadership styles (DuBrin, 2013): task-oriented leadership, employee-oriented leadership (interpersonal relationships), and participatory leadership.

2.1. Task-oriented leadership

Task-oriented leadership involves leader behavior that concentrates on planning activities and scheduling them. The leader coordinates the activities of subordinates and provides all the prerequisites for the successful execution of the task. He makes every decision exclusively by himself and conducts direct control of the work of employees.

If we consider the above behavior of leaders, we conclude that task-oriented leadership corresponds to the directive behavior of leaders (Howell & Costley, 2001), which is characteristic of working in structured environments, activities with precisely defined roles for all employees, and written procedures describing how to perform assignments (Baker et al., 2021).

2.2. Employee-oriented leadership

Employee-oriented leadership (interpersonal relationships) is characterized by the behavior of leaders by which they develop trust in relations with followers and in mutual relations of followers. He understands the obligations and activities that followers have and provides them with help and support in the realization of tasks. The leader defines the goal and guidelines for the execution of tasks (general deadlines) but also supports the autonomy of subordinates in deciding on how to perform the assigned task.

If we consider the above behavior of leaders, we conclude that it corresponds to the supportive behavior of leaders (Stein et al., 2020), which involves attention and care for followers (employees) and understanding and respect for employees.

2.3. Participatory leadership

Participatory leadership involves encouraging employees to actively participate in the decision-making process, as well as to freely express their opinions on procedures and how to perform the task, as well as suggestions for improving the intended procedures and methods of performing tasks (Suryani et al., 2021). The leader is ready to give up acts of responsibility, and thus acts of power, and transfer that responsibility and power to employees. This behavior is manifested by leaders who are dominated by self-confidence, emotional maturity (stability), and being extrovert (Stojanović-Aleksić, 2007), given that they are ready to give up acts of their power and influence. This behavior of leaders is most influential on followers who require a high degree of independence, both in deciding on the goals of the organization and in the way of performing tasks and activities. By behaving in this way, the leader initiates „brainstorming" in the decision-making process, encouraging creativity and innovation of both employees and his own. In addition, the leader forms a good „base" for the independence of employees and thus the identification of new potential leaders for certain activities that are a component of the process of achieving a common goal.

2.4. Conclusions of behavioral studies

Studies conducted in Ohio and Michigan lead to the conclusion that there is no ideal behavior or leadership style, and that an effective leader must strike a balance between task-oriented leadership and employee-oriented leadership. This depends not only on the defined goal, the tasks to be performed, but also on the characteristics of subordinates.

It is these findings that have led many researchers to continue to examine the effects of leadership behavior on employee performance, motivation, and efficiency. Accordingly, in this paper, a study of the preferences of leaders' behavior from employees in the MoD was conducted.

3. METHOD

In order to conduct the research, a survey was made consisting of questions based on the LMX-7 questionnaire and questions based on the MLQ 5X. The paper uses deductions to define hypotheses from the theoretical framework about the preferred styles of leadership behavior in the MoD. By establishing the trend of responses in relation to gender, age, and years of service, the conclusions of the research are defined through induction. The results of the research were processed through the statistical program SPSS (The Statistical Package for the Social Sciences - version 26), and descriptive statistics were used to draw the conclusions of the research. Accordingly, the researchers used a combination of qualitative analysis (through a theoretical description of the problem framework and a description of the research results) and quantitative analysis (through statistical processing of collected data).

In order to examine the preferred behavior of leaders by MoD employees, a survey of 51 members of the MoD was conducted, with the following structure:

Table 1. Respondent Structure

Gender		**Years of Service**	
Male	16	< 25	9
Female	35	5 – 9	6
Age		10 – 14	4
< 25	1	15 – 20	6
25 – 34	5	> 20	26
35 – 44	11	**Level of Education**	
45 – 54	24	High School	15
55 – 65	10	College	4
		University	32

Source: Authors' research

The questions were modeled on the LMX and MLQ questionnaires, and grouped into 10 statements. All respondents were given a choice deciding between three answers that correspond to some of the leader's behaviors. For the purposes of testing, hypotheses were formed as claims that will be the subject of research.

4. RESULTS

4.1. The preferred style of leadership behavior is task-oriented leadership

Considering the MoD as a specific organization with a „rigid" hierarchical organization and superior-subordinate relations, which is the embodiment of the leader's directive behavior, the preferred style of leader behavior among MoD employees is task-oriented leadership. In order to draw a conclusion, a descriptive analysis of the collected data (arithmetic mean, median, mode, and standard deviation) was performed in SPSS. The results of these analyzes are shown in Table 2.

Table 2. Statistical presentation of results

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
Number of respondents	51	51	51	51	51	51	51	51	51	51
Mean	2.1569	1.6667	1.9804	1.8235	2.1765	2.3333	2.0000	2.4706	2.9020	2.8824
Standard Deviation	.41821	.62183	.24415	.51791	.47774	.47610	.20000	.50410	.30033	.32540
Median	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	3.0000	3.0000
Mode	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	3.00	3.00

Note: Q – Question

Source: Authors' research

As can be concluded from the table above, in 8 out of 10 defined statements, respondents prefer employee-oriented leadership, while in two defined statements they prefer participatory leadership.

Taking into account the standard deviation for all questions, the highest dispersion in the answers is on the second question (0.62183), which means that the leader in performing tasks should independently set deadlines for performing both activities and the entire task. The frequency of the answer to the second question is shown in Table 3.

Table 3. Responses' Frequency

Response	Frequency	%
1.00	21	41.2
2.00	26	51.0
3.00	4	7.8
Total	51	100.0

Source: Authors' research

From this it can be concluded that as many as 41.2% of respondents prefer task-oriented leadership when it comes to tasks and activities with deadlines, that is, they prefer the leader to define deadlines and guidelines for execution, which is partially correlated with the characteristics of the MoD as organizations. As we can see from the table above, 51% of respondents prefer employee-oriented leadership.

In addition to question number 2, the largest standard deviation is in the fourth (0.51791) which implies that coordination and communication should take place exclusively „through" the leader, and the eighth (0.50410) question which implies that the employee should improve their knowledge in cooperation with a leader or independently and to „spread" this knowledge to other members of the team, which is shown in the following Table 4.

Table 4. Responses' Frequency

	Q4		Q8	
Response	**Frequency**	**%**	**Frequency**	**%**
1.00	12	23.5	0	0.0
2.00	36	70.6	27	52.9
3.00	3	5.9	24	47.1
Total	51	100.0	51	100.0

Source: Authors' research

The conducted research did not confirm the analysis of a set of questions related to the types of followers. The questions are defined to represent certain types of followers, and the variables are grouped according to the types of followers (alienated, conformist, passive, and effective). The following results were determined by descriptive statistics of newly formed variables.

Table 5. Descriptive Statistics

	Alienated	**Conformist**	**Passive**	**Effective**
Number of Respondents	51	51	51	51
Mean	1.8431	3.0539	2.8824	3.8203
Standard Deviation	.85467	.61708	.89771	.69829
Median	1.6667	3.0000	3.0000	3.8333
Mode	1.00	3.00	3.00	4.33

Source: Authors' research

As can be deduced from the previous Table, most of the followers in the examined sample belong to the type of effective followers. Taking into account the characteristics of effective followers, an explanation was given as to why the preferred leadership style in the examined sample was employee-oriented leadership and participatory leadership style. Effective followers are ready for critical thinking, they are ready to take active participation, and even initiative in the realization of tasks. Consequently, the task-oriented leadership style is not suitable for this type of follower, because they, with their knowledge, ability, and willingness to engage in the execution of tasks, require a certain degree of independence in work, and constant involvement in leader decisions.

From the above, it can be concluded that the MoD, as a specific organization based on orders, defined task execution procedure, and defined strict hierarchical structure, consists of employees who are highly qualified for the tasks they perform, ready to take risks and initiatives and ready to actively participate in the task. Based on the results of the research, it is concluded that most employees are ready to show leadership skills and grow into a leader if necessary.

4.2. Gender does not affect the preferred choice of leadership style

The analysis of responses by sex of the respondents showed that the results are almost identical to the aggregate sample.

Based on the results from the Table 6, we can conclude that gender does not determine the preference of the leader's behavior (Kuhnert, 2018), i.e. the preferred leadership style. Based on the above, we conclude that gender does not have a deterministic role in the leadership style that followers prefer.

Table 6. Descriptive Statistics by Gender

		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
Male	No. of Respondents	16	16	16	16	16	16	16	16	16	16
	Mode	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	3.00	3.00
	Std. Dev.	.34157	.61914	.00000	.47871	.44253	.34157	.36515	.51235	.34157	.44721
Female	No. of Respondents	35	35	35	35	35	35	35	35	35	35
	Mode	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	3.00	3.00
	Std. Dev.	.45282	.63113	.29563	.52979	.49024	.50210	.00000	.50709	.28403	.23550

Note: Q – Question

Source: Authors research

4.3. The length of service influences the preferred choice of leader behavior

By analyzing the answers of the respondents by the length of service, it was found that there is a difference in the answers in relation to the answers from the aspect of the aggregate sample.

Table 7. Descriptive Statistics by Years of Service

Years		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
< 5	No. of Respondents	9	9	9	9	9	9	9	9	9	9
	Mode	2.00	1.00[b]	2.00	2.00	2.00	3.00	2.00	2.00	3.00	3.00
	Std. Dev.	.44096	.70711	.00000	.33333	.44096	.52705	.33333	.52705	.44096	.00000
5–10	No. of Respondents	6	6	6	6	6	6	6	6	6	6
	Mode	2.00	1.00[b]	2.00	2.00	2.00	2.00	2.00	2.00	3.00	3.00
	Std. Dev.	.00000	.54772	.00000	.00000	.40825	.00000	.00000	.51640	.40825	.51640
11–15	No. of Respondents	4	4	4	4	4	4	4	4	4	4
	Mode	2.00	1.00[b]	2.00	1.00[b]	2.00	2.00	2.00	2.00	3.00	3.00
	Std. Dev.	.00000	.57735	.00000	.57735	.00000	.50000	.00000	.50000	.00000	.00000
16–20	No. of Respondents	6	6	6	6	6	6	6	6	6	6
	Mode	2.00	1.00	2.00	2.00	2.00	2.00	2.00	3.00	3.00	3.00
	Std. Dev.	.51640	1.0328	.40825	.75277	.40825	.51640	.00000	.51640	.00000	.40825
> 20	No. of Respondents	26	26	26	26	26	26	26	26	26	26
	Mode	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00[b]	3.00	3.00
	Std. Dev.	.46410	.53349	.27175	.56704	.53349	.48516	.19612	.50990	.27175	.32581

Note. Q – Question

[b] There are more values. The lowest value is displayed.

Source: Authors' research

As can be seen from the table above, the difference in the answers of persons with different years of service can be summed up by the fact that employees with age gain greater knowledge and independence in work and want to be more involved in decision making, defining deadlines for tasks and defining the man-

ner of realization of activities within the task. In addition, the results are correlated with the results obtained in the research that years of service increase the effectiveness of employees, their ability and willingness to actively participate in the implementation of tasks, and their willingness to take the initiative.

4.4. There is a positive correlation between the preferred style of leader behavior and the leader-follower relationship

After entering the survey results, the reliability of the questionnaire was checked, and the value of Cronbach's Alpha 0.891 was obtained.

Table 8. Descriptive Statistics of a Survey

	Q1	Q2	Q3	Q4	Q5	Q6	Q7
Number of Respondents	51	51	51	51	51	51	51
Mean	4.3529	4.5490	4.3529	4.5098	4.2157	4.4510	4.7255
Standard Deviation	5.0000	5.0000	5.0000	5.0000	5.0000	5.0000	5.0000
Median	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Mode	.89047	.75667	1.03583	.92461	1.10116	.83220	.60261

Note. Q – Question

Source: Authors' research

As can be seen from the results shown in the table to all the questions offered, the respondents completely agreed with the statement, which means that the leader-follower relationship is extremely positive. Given that the preferred leadership style in the examined sample is employee-oriented leadership and participatory leadership, by induction, we can conclude that the combination of employee-oriented leadership and participatory leadership has a positive correlation with the leader-follower relationship. Accordingly, the previous theoretical findings that only a combination of leadership styles leads to an effective leader-employee relationship are confirmed. There is no perfect leadership style that guarantees success in the leader-employee relationship, but the leadership style should be adapted to the types of employees, as well as the situation in which it is applied and the set goal to be achieved.

4.5. The leader-follower relationship is positively correlated with the age of the follower

By analyzing the responses of respondents by age, descriptive statistics are shown in Table 9.

Table 9. Descriptive Statistics by Age

Years		Q1	Q2	Q3	Q4	Q5	Q6	Q7
< 25	No. of Respondents	1	1	1	1	1	1	1
	Mode	5.00	4.00	5.00	5.00	3.00	3.00	4.00
	Std. Dev.	.00000	.00000	.00000	.00000	.00000	.00000	.00000
25–34	No. of Respondents	5	5	5	5	5	5	5
	Mode	5.00	4.00	4.00	4.00	3.00	3.00	5.00
	Std. Dev.	1.67332	.83666	1.64317	.83666	1.34164	1.00000	.44721
35–44	No. of Respondents	11	11	11	11	11	11	11
	Mode	4.00[b]	5.00	5.00	5.00	5.00	5.00	5.00
	Std. Dev.	1.00000	.50452	.68755	.50452	1.03573	.68755	.40452

45–54	No. of Respondents	24	24	24	24	24	24	24
	Mode	5.00	5.00	5.00	5.00	5.00	5.00	5.00
	Std. Dev.	.57578	.76139	1.01795	1.17877	1.07339	.77903	.53161
55–65	No. of Respondents	10	10	10	10	10	10	10
	Mode	5.00	5.00	5.00	5.00	5.00	5.00	5.00
	Std. Dev.	.69921	.96609	1.13529	.069921	1.15950	.97183	.96609

Note. Q – Question

Source: Authors' research

According to the results shown in the table, with the number of years of age, the leader-follower relationship improves. The biggest difference is in statements 5 and 6, which refer to trust in the leader and cooperation with the leader. These facts speak in favor of the fact that with age, followers mature, form a relatively unchanging opinion, and are aware of what kind of leadership style they want. In addition, the „youth revolt" is reduced and the decisions of the leaders are viewed from a more rational point of view. Consequently, trust in the leader grows, and thus the quality of the leader-follower relationship.

4.6. The leader-follower relationship is positively correlated with the years of work experience of the follower

By analyzing the responses of respondents by years of service, descriptive statistics are shown in the following table:

Table 10. Descriptive Statistics by Years of Service

Years		Q1	Q2	Q3	Q4	Q5	Q6	Q7
< 5	No. of Respondents	9	9	9	9	9	9	9
	Mode	5.00	4.00	5.00	5.00	3.00	5.00	5.00
	Std. Dev.	1.41421	.70711	1.36423	.7248	1.20185	.927696	.44096
5–10	No. of Respondents	6	6	6	6	6	6	6
	Mode	4.00	5.00	4.00	5.00	5.00	5.00	5.00
	Std. Dev.	.75277	.51640	.51640	.51640	1.21106	.81650	.51640
11–15	No. of Respondents	4	4	4	4	4	4	4
	Mode	4.00	4.00	5.00	5.00	4.00	5.00	5.00
	Std. Dev.	.50000	.57735	.00000	.50000	.57735	.00000	.00000
16–20	No. of Respondents	6	6	6	6	6	6	6
	Mode	4.00	5.00	5.00	5.00	5.00	5.00	5.00
	Std. Dev.	.54772	.00000	.51640	.51640	1.21106	.81650	.51640
> 20	No. of Respondents	26	26	26	26	26	26	26
	Mode	5.00	5.00	5.00	5.00	5.00	5.00	5.00
	Std. Dev.	.81240	.90554	1.15092	1.16883	1.11562	.85934	.73589

Note. Q – Question

Source: Authors' research

According to the results shown in the table, with the number of years of service, the leader-follower relationship improves (Stojanović-Aleksić et al., 2016). These facts speak in favor of the fact that daily cooperation with employees, builds trust in the leader, and thus improves the relation-

ship between leader-follower. By working together, followers learn from the leader, but the leader also learns from the followers and adapts his leadership style to the needs and types of followers. This inevitably brings about an improvement in the quality of the leader-follower relationship.

5. DISCUSSION

In the conducted research on leadership styles from the behavioral aspect, it was concluded that there is no ideal behavior of leaders that can lead to certain effectiveness in relation to subordinates. The effectiveness of the leadership style depends on the behavior of the leader, as well as on the type of task being performed (highly formalized and the frequent task or new and unknown task) and on the type of followers (their independence, knowledge, training, etc.).

The conducted research on a sample of persons from the Ministry of Defense confirms the research conducted so far (studies conducted in Ohio and Michigan). Employees least prefer task-oriented leadership, i.e. directive leadership style. The most preferred leadership style is employee-oriented leadership. It is this conclusion that supports the importance of behavioral leadership theory. No matter how much the leader with his appearance, knowledge, moral qualities and intelligence provokes respect from the followers, in most cases the leader will be more effective who understands the employees, influences their self-confidence, and „gets" the most out of each employee with his support.

The limitation of this research is reflected in the small number of respondents in relation to the number of persons employed in the public sector, i.e. persons employed in the Ministry of Defense. Another limitation is the specificity of the Ministry of Defense as an organizational unit, and the existence of justified concerns that the sample does not reflect the factual situation in the entire public sector.

The Ministry of Defense has a much „stricter" hierarchical and organizational structure and highly codified rules of operation and conduct than other organizations in the public sector, and the question can justifiably be asked whether the Ministry of Defense can be taken as a representative sample of the public sector for leadership testing. A limitation of the research is the potential giving of „socially desirable answers" by the respondents. This does not reflect the true attitude and opinion of the respondents and does not give valid research results.

The scientific contribution of this research can be viewed from three aspects. The first aspect is to confirm the results of previous research which show that there is no ideal leadership style but that leadership behavior and style should be adapted to the situation, followers, and defined goal. Another aspect is the determination of the examined sample, that members of the Ministry of Defense prefer people-oriented relations and participatory behavior of leaders, although this is a whole in which, according to historical facts and organizational structure, a greater presence of task-oriented leadership is expected. The third aspect is the lack of numerous articles on the issue of leadership in organizations similar to the Ministry of Defense, and there is a certain scientific „gap" in research on this topic. The social contribution of the research is the fact that a step forward has been made in understanding the leader-successor relationship in the Ministry of Defense, and the practical application of the conclusions of this research can improve this relationship.

6. CONCLUSION

In leadership, the leader is not the only and most important factor. As defined at the beginning of the research, the leadership process is the cohesion between the leader, the follower, and the goal. The success of the leadership process depends on the existence of a correlation between the behavior of the leader, the characteristics of the employees, and the goal that is defined. We can have an ideal directive leader with a high degree of organizational ability, a precisely defined work plan, and deadlines for the execution of tasks, who constantly control the work of employees. Such a leader will be extremely effective in an organization where employees have a low degree of independence, depending on the control of their superiors, and perform tasks that they have not fully mastered. In contrast, in an organization where employees are independent with high knowledge of the processes they implement on a daily basis and which they have fully mastered, such behavior of leaders would at some times be counterproductive.

As the research concluded, the Ministry of Defense is not „immune" to the leadership process, i.e. to the establishment of a leader-follower relationship. Through the evolution of the leadership process and the emancipation of followers, "traditional leadership styles" (directive style or task-oriented leadership) are increasingly neglected and employee-oriented leadership styles are beginning to dominate. The Ministry of Defense, although historically a „rigid" organization, has recognized the need for evolution. This is evidenced by the fact that in 2008, the Ministry of Defense for the first time defined the personnel service as a general service of the MoD, that is, officers and non-commissioned officers of the personnel service were defined. Until that moment, the staff in the Ministry of Defense was dealt with by officers of other branches and services (infantry, artillery, quartermaster service, etc.). By defining the human resources department, importance is attached to human resource management, and thus importance is given to the leader-follower relationship. The leader (commander of the unit or institution) uses the personnel service as a link between him and his followers (employees in the MoD).

In accordance with all the above, in leadership, as well as in everything in life, it is necessary to find a measure. It is necessary to recognize the moment when the behavior of the leader needs to change (even to the detriment of the power that the leader has until that moment). If the moment is not recognized and the behavior is not adjusted to the situation or followers, the erosion of the leader's power is inevitable and perhaps irreversible.

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Original Scientific Article

RELATIONSHIP AMONG WORK CONTRACT SATISFACTION, JOB SATISFACTION, AND PRODUCTIVITY: AN ANALYSIS IN HOTEL INDUSTRY IN CROATIA

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Abstract: *In the last couple of decades, non-standard forms of work contracts increase. Usually, non-standard work contracts are connected with higher job insecurity and lower level of job satisfaction which can lead to lower productivity. In accordance with that, the main aim of this research is to explore the correlation between job satisfaction, productivity, and satisfaction with a work contract in the hotel industry in Croatia. The research results are based on the primary data collected by the survey carried out in the hotel industry in Croatia during the summer season of 2018. An ANOVA test is used to achieve the objective and the purpose of the study and to test the set hypotheses. The main finding of this paper points to the conclusion that employees who achieve high productivity show greater satisfaction with the work contract and greater job satisfaction in all dimensions. The obtaining results in this scientific debate can be helpful for hotel managers for enhancing labor productivity.*

Keywords: *Work contract, Job satisfaction, Productivity, Hotel industry.*

JEL Classification O15

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1. INTRODUCTION

Changes in the European labor market and the increasing representation of non-standard work contracts (ILO, 2016) are a consequence of globalization, computerization, development of the service sector, changes in the workforce, and strong growth of the knowledge society. There are fewer permanent contracts and more flexible forms of work contracts are prevailing in the workforce (Kessler, 2018). Flexibility has an impact on the quality of work and employment, but also on the quality of life in general (Waaijer et al., 2017). That doesn't have to be a negative impact (Arthur & Rousseau, 1996; Marler et al., 2002). Part-time jobs, self-employment, or some other non-standard form of work contract can be attractive for both employers and individual employees and their families. Non-standard forms of work contracts give employers the flexibility to match the required number of people with the planned production (Pupavac, 2018) while employees get a chance to achieve better harmony between work and private life, greater life satisfaction, and better self-control. In order for non-standard forms of work contracts to be positive for all parties, they should be regulated in a socially acceptable way (Kulušić, 2009). All this points to the necessity to adapt employment law to emerging circumstances in the labor market. Also, there is a need to explore the impact of satisfaction with work contracts on job satisfaction and consequently on productivity.

Job satisfaction is directly related to more important types of job-related behaviors such as productivity (Kazanas, 1978), fluctuation (Clark, Georgellis & Sanfey, 2012), and absenteeism (Arnold et al., 2016). This kind of research has prevailed in the domestic and foreign scientific and professional literature. However, there is a lack of research on the relationship between satisfaction with a work contract, job satisfaction, and more important types of job-related behaviors. The purpose of this paper is to point out how important it is for the workers to be satisfied with their contract regarding their job performance and their satisfaction.

The shift from standard to non-standard work contracts raises the question about their effects on work productivity. Accordingly, this research aims to find answers to the following three questions:

- *Is there a connection between work contract satisfaction and job satisfaction?*
- *Is there a connection between job satisfaction and work productivity?*
- *Is there a connection between work contract satisfaction and work productivity?*

Accordingly, this paper investigates the relationship between work contract satisfaction, job satisfaction, and work productivity in the Croatian hotel industry. As the economic growth of Croatia depends on the hotel industry in which non-standard work contracts dominate, this is more of a reason to analyze employee satisfaction with the work contract and the impact of the level of satisfaction with the work contract on job satisfaction and work productivity (Rezagholi, 2018).

2. LITERATURE REVIEW

A work contract establishes an employment relationship – permanent or fixed-term employment contracts. Učur (2017) points out that a fixed-term work contract is a non-standard work contract according to labor law theory and labor legislation. According to Aldrich and Ruef (2006), most organizations have core employees on permanent contracts with a flexible supply of temporary workers. In this way, organizations try to adapt the workforce according to the economic climate and reduce costs. A recent study (OECD, 2015) of standard (permanent contract) and non-standard forms of work contracts (part-time contract, fixed-term contract, self-employed) that included 26 OECD countries confirms the growing trend of non-standard forms of work contracts. 43 million people were part-time employed across the European Union in 2018 (10.5 million men

and 32.5 million women). This is 4.8 million more than ten years ago (https://www.pesnetwork.eu/2019/11/05/lmb5-part-time-employment). As precarious work (Standing, 2011) is associated with non-standard forms of work contracts, it seems appropriate to focus the research on satisfaction with work contracts as a factor that determines job satisfaction and more important types of work-related behaviors. There are likely to be differences in terms of job satisfaction and productivity between standard and non-standard contract employees.

For example, Petilliot (2016) explores the importance of the type of work contract to the satisfaction of agency workers. De Cuyper et al. (2008) find that workers who are employed on flexible contracts, such as fixed-term contracts, agency contracts, and seasonal contracts, on average report a lower level of job satisfaction as a group than workers who are employed on a permanent contract. Chadi & Hetschko (2016) provide evidence that employees with a fixed-term contract are significantly less satisfied with their job than employees with a permanent contract.

Job satisfaction can be defined as a positive attitude about the job, which arises from the assessment of the characteristics of that job (Robbins & Judge 2019). Vroom (1964), Yi (2008), Lee, Tan & Javalgi (2010), Chen and Silverthorne (2008), Zimmerman and Darnold (2009), and Dizgah, Chegini & Bisokhan (2012) proved that job satisfaction leads to higher work productivity. Job satisfaction is a multidimensional and multidisciplinary concept that encompasses the emotional state, attitudes, feelings, or level of well-being that individual associates with their employment, which, in turn, stems from a greater or lesser discrepancy with previous or current employee expectations regarding bonuses, and the importance of their workplace, as well as the extent to which their expectations are effectively met (Sánchez & Sánchez, 2017). Measuring job satisfaction is important because of the cost of dissatisfaction manifested through a fluctuation, absenteeism, and reduced work productivity.

According to the claims with which respondents should have expressed the degree of their agreement/disagreement, research hypotheses have been set:

H1: There is a significant effect of work contract satisfaction on job satisfaction.
H2: There is a significant effect of work contract satisfaction on work productivity and *vice versa*.
H3: There is a significant effect of job satisfaction on work productivity and *vice versa*.

3. METHODS

In this scientific discussion, satisfaction with a work contract (WCS) is measured by the statement, *I am satisfied with the existing work contract* (De Cypper & De Witte, 2006). Employees were asked to rate the statement on a five-point Likert scale ranging from "1-Strongly disagree" to "5-strongly agree".

Job satisfaction for the purposes of this research will be measured using five statements (particles). A typical statement is "*Most of the working time I feel enthusiastic about my job*".

The reliability of the measuring instrument was analyzed using Cronbach's alpha coefficient, which was 0.816. This value (cf. Table 2) suggests good internal consistency and stability of the factors and high-scale reliability.

In order to gain insight into the performance of each employee, a method of self-evaluating was applied. The surveyed employees should evaluate their own work with a score of 1 to 5 and assess which assessment their superiors, their colleagues, and guests would rate their performance (Pupavac, 2020).

Table 1. Operationalization of job satisfaction construct

Literature	Construct	Particles	Ordinal scale type
Kim, Price, Mueller & Watson, 1996; Gutić, Hak, Kuzmanović, 2016	Job satisfaction	1. Most of the working time I feel enthusiastic about my job. 2. I have been appropriately rewarded for my work 3. I enjoy working in this hotel company because I feel I can learn a lot. 4. My superiors are always available and ready to help. 5. The hotel company in which I work has an appropriate and fair human resources policy.	Likert scale (1-5)

Table 2. Reliability of the measuring scale

	Mean if - deleted	Var. if - deleted	StDv. if - deleted	Itm-Totl - Correl.	Alpha if - deleted
Elan	14,12168	12,37679	3,518066	0,575613	0,789405
Reward	14,66372	11,20550	3,347461	0,592843	0,785732
Enjoy_W	14,25664	11,31467	3,363728	0,682948	0,757344
Supervisors_help	13,78097	12,12681	3,482356	0,548771	0,796719
Fer_HRMP	14,48673	11,30292	3,361982	0,639189	0,770003

Summary for scale: Mean=17,8274 Std.Dv.=4,17907 Valid N:452 Cronbach alpha: 0,816110
Standardized alpha: 0,817171 Average inter-item corr.: 0,474829

Source: Authors research

Table 3. Operationalization of productivity construct

Literature	Construct	Particles	Ordinal scale type
Martin & Whiting, 2016, p. 151	Productivity	1. With what grade will you mark your work success in the preceding period? 2. What do you think with which mark will your guest grade your work success? 3. What do you think with which mark would your colleagues grade your work success? 4. With which mark would your supervisor grade your work success?	Grade from 1 to 5

In order to ensure the objectivity of the obtained data, the productivity will be shown as 1) high productivity (HP) – this stratum consists of employees who have rated their work with a grade 5, and believe that all other stakeholders (guests, colleagues and superiors) would rate their performance same as they did; 2) moderate productivity (MP) - this stratum consists of employees who have rated their work lower than grade 5, and believe that all other stakeholders (guests, work colleagues and superiors would rate their performance with the same grade and 3) low productivity (LP) - this stratum consists of employees who have rated their work with a different score than the rating they feel other stakeholders (guests, colleagues and superiors) evaluated. In line with the previously mentioned, a conceptual research model is set (cf. Figure 1).

Field research was based on a survey questionnaire filled in by hotel industry employees. The questionnaire with 34 questions was used as the research instrument. The questionnaire was divided into six parts. The first part consisted of 7 questions about the socio-demographic characteristics of the respondents (sex, age, domicile, residence, education, type of contract, and union membership). The second part of the questionnaire consisted of 5 items focusing on attitudes toward working in the hotel industry. The first of five claims concerned the degree of satisfaction of employees with an existing employment contract. The third part of the questionnaire also consisted of five claims, relating to job satisfaction. The

fourth part of the seven-claims questionnaire measured work preoccupation. The fifth part of the seven-claims questionnaire measured the organizational commitment of hotel industry employees, while the sixth part of the questionnaire was tasked with assessing the work productivity of employees in the hotel industry. The survey was conducted in the period from May until October 2018. It was anonymous, employees had no obligations whatsoever in filling in the survey. 523 questionnaires were collected out of which 452 questionnaires were filled correctly. The structure of survey participants is given in Table 4.

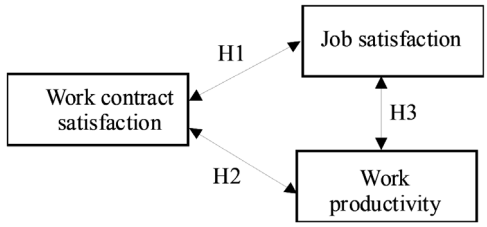

Figure 1. Conceptual model of the relationship between work contract satisfaction, job satisfaction, and work productivity in the hotel industry

Source: Authors

Table 4. Demographic characteristics of the sample

Characteristics	Employees with a standard type of contract		Employees with a non-standard type of contract		Total	
	N	%	N	%	N	%
Sex						
Male	33	36,26	146	40,44	179	39,60
Female	58	63,74	215	59,56	273	60,40
Total	91	100,00	361	100,00	452	100,00
Age						
≤ 25	15	16,48	170	47,09	185	40,93
26-35	35	38,46	112	31,03	147	32,52
36-50	31	34,07	59	16,34	90	19,91
50+	10	10,99	20	5,54	30	6,64
Total	91	100,00	361	100,00	452	100,00
The place of work and residence						
Same	71	78,02	151	41,83	222	49,12
Different	20	21,98	210	58,17	230	50,88
Total	91	100,00	361	100,00	452	100,00
Level of Education						
Elementary school	8	8,79	13	3,60	21	4,65
Secondary school 3 years	24	26,37	112	31,02	136	30,09
Secondary school 4 years	34	37,36	186	51,52	220	48,67
Faculty	25	27,47	50	13,85	75	16,59
Total	91	100,00	361	100,00	452	100,00
Type of contract						
Full time	91	100,00	-	-	91	20,13
Part-time (full-time schedule)	91	100,00	308	85,32	308	68,14
Part-time (less than full-time schedule)			9	2,49	9	1,99
Civil contracts, students			33	9,14	33	7,33
Self-employment			2	0,55	2	0,44
Independent contractors			7	1,94	7	1,54
Cash paid job			2	0,55	2	0,44
Total			361	100,00	452	100,00
Member of Unions						
Yes	23	25,27	30	8,31	53	11,72
No	68	74,73	331	91,69	399	88,28
Total	91	100,00	361	100,00	452	100,00

Source: Authors research

4. RESULTS

Strong, competitive profiled companies in the hotel industry base their success on professional, trained, motivated, and satisfied employees. Due to the pronounced seasonal character of the work and the need for a significant number of seasonal workers, satisfaction with the employment contract seems to be a fundamental prerequisite for the satisfaction and motivation of employees. Satisfied and motivated employees will show positive behavior towards work. The results of the survey (Table 5) suggest that there is a neutral contract satisfaction among employees in the hotel industry (M=3.48; SD=1.13).

Table 5. Descriptive statistics of the contract satisfaction of employees in the observed sample

	Contract satisfaction-CS
MEAN case 1-452	3,48
MEDIAN case 1-452	4- Moderatly agree
SD case 1-452	1,13
VALID_N case 1-452	452
SUM case 1-452	1574
MIN case 1-452	1- Strongly disagree
MAX case 1-452	5- Strongly agree
_25th% case 1-452	3- Neither agree nor disagree
_75th% case 1-452	4- Moderately agree

Source: Authors research

Based on data in Table 5, it is clear that the first quarter of respondents strongly disagree or disagree with the statements. Last quarter fully agree and half of the employees are neutral (neither agree, nor disagree) or moderately agree with these statements. The median value (moderately agree) suggests that 50% of surveyed employees show a low level of satisfaction with the existing work contract.

Park and Kang (2017) found that the average level of job satisfaction of non-standard workers is lower than that of standard workers. The results of our research (cf. Table 6) confirmed the existence of a statistically significant difference in satisfaction with the work contract between employees with standard work contracts (M = 3.75) and employees with non-standard work contracts (M = 3.41; t = 2.6; p = 0.009).

Table 6. T-test results

T-tests; Grouping: Work contract Group 1: Standard 2: Non-standard											
	Mean (std)	Mean (non std)	t-value	df	p	Valid N (std)	Valid N (non std)	Std Dev. (std)	Std Dev. (non std.)	F-ratio Variances	p Variances
CS	3,75	3,41	2,60	450	0,009	91	361	0,99	1,16	1,36	0,07

Source: Authors research

The results show that workers with a standard contract are on average more satisfied with their job than those with a non-standard contract.

5. DISCUSSION

In order to verify the hypothesis, an ANOVA test was carried out. It should confirm or reject the hypothesis with 95% of reliability.

H1: There is a significant effect of work contract satisfaction on job satisfaction.

Labor market theory shows temporary employment to have a conspicuous negative influence on job satisfaction (Waaijer et al., 2017). Based on the data in Table 7, it is evident that when satisfaction with the work contract increases, the degree of employee satisfaction with work in the hotel industry also increases. Since the p-value is less than the significance level of 0.05, the H1 hypothesis is accepted.

Table 7. ANOVA work contract satisfaction and job satisfaction

LS Means, Wilks lambda=,63240, F(20, 1470,2)=10,892, p=0,0000 Effective hypothesis decomposition						
WCS	**Elan**	**Reward**	**Enjoy_W**	**Supervisors_help**	**Fer_HRMP**	**N**
Strongly disagree	M=3,34 SE=0,17	M=2,17 SE=0,19	M=2,55 SE=0,18	M=3,48 SE=0,19	M=2,31 SE=0,18	29
Moderately disagree	M=3,21 SE=0,12	M=2,27 SE=0,13	M=3,13 SE=0,12	M=3,75 SE=0,13	M=2,60 SE=0,12	61
Neither agree nor disagree	M=3,49 SE=0,08	M=2,70 SE=0,09	M=3,30 SE=0,09	M=3,83 SE=0,09	M=3,01 SE=0,09	112
Moderately agree	M=3,84 SE=0,07	M=3,54 SE=0,08	M=3,71 SE=0,07	M=4,16 SE=0,08	M=3,60 SE=0,07	163
Strongly agree	M=4,19 SE=0,10	M=3,98 SE=0,11	M=4,29 SE=0,10	M=4,49 SE=0,11	M=4,12 SE=0,10	87

Source: Authors research

Employees who show the highest degree of satisfaction with the employment contract also show the highest job satisfaction in all dimensions. In the first place, they emphasize the willingness of superiors to help them (M = 4.49), enjoy work (M = 4.29), feel enthusiastic about work (M = 4.19), and believe that the hotel company pursues a fair HRM policy (4.12). They are the least satisfied with the reward (M = 3.98). However, their average rating according to this statement is significantly higher compared to all other employees who show lower satisfaction with the current work contract.

H2: *There is a significant effect of work contract satisfaction on work productivity and vice versa.*

To test hypothesis H2, it was first necessary to classify the surveyed employees in the hotel industry into three groups according to work productivity (cf. Table 8).

Table 8. Work productivity in the Croatian hotel industry

Frequency table: Productivity				
	Count	Cumulative - Count	Percent	Cumulative - Percent
High productivity	77	77	17,0354	17,0354
Normal productivity	152	229	33,6283	50,6637
Low productivity	223	452	49,3362	100,0000

Source: Authors research

Afterward, it was possible to test hypothesis H2 by the method of variance analysis. The analysis of variance revealed significant differences in the level of satisfaction with the work contract with regard to the productivity of employees (cf. Table 9).

Based on Table 9, it can be seen that employees with the highest productivity show the highest level of satisfaction with the work contract (M = 3.83), while employees with the lowest productivi-

ty show the lowest level of satisfaction with the contract (M = 3.35). As the observed differences are statistically significant, which is confirmed by the low p-value (p = 0.006), hypothesis H2 is accepted with 95% confidence.

Table 9. ANOVA work productivity and work contract satisfaction

Productivity; LS Means Current effect: F(2, 449)=5,1401, p=,00621 Effective hypothesis decomposition						
	Productivity	WCS - Mean	WCS - Std.Err.	WCS - -95,00%	WCS - +95,00%	N
1	HP	3,831169	0,128380	3,578869	4,083469	77
2	MP	3,493421	0,091374	3,313848	3,672994	152
3	LP	3,354260	0,075438	3,206005	3,502516	223

Source: Authors research

H3: *There is a significant effect of job satisfaction on work productivity and vice versa.*

Job satisfaction significantly and positively affects the performance of employees (Bragas & Riyanto, 2020). Based on the data in Table 10, it is evident that employees who achieve high productivity also show the greatest job satisfaction in almost all dimensions. Only in the dimension where they needed to grade willingness to help their manager, employees who show moderate productivity show greater satisfaction (M = 4.25 vs. M = 4.12). The reason for this probably lies in the fact that they need more help in performing their tasks.

Table 10. ANOVA work productivity and job satisfaction

Productivity; LS Means, Wilks lambda=,95230, F(10, 890)=2,2019, p=,01590 Effective hypothesis decomposition						
Productivity	Elan - Mean	Reward - Mean	Enjoy_W - +95,00%	Supervisors_help - Mean	Fer_HRMP - Mean	N
HP	3,922078	3,389610	3,915667	4,129870	3,584416	77
MP	3,697368	3,256579	3,881588	4,250000	3,440789	152
NP	3,636771	3,022422	3,580691	3,878924	3,188341	223

Source: Authors research

Since the p-value is less than the significance level of 0.05, the H3 hypothesis is accepted.

6. CONCLUSION

The increase of non-standard flexible forms of work is a contemporary phenomenon in the EU labor market too. Non-standard forms of work refer to work without long-term security. This type of work is most prevalent in activities that include catering, transportation, and other activities in the hotel and entertainment industry, agriculture, construction, and retail. Non-standard forms of work contracts don't *a priori* refer to bad jobs, and for some employees, they are often desirable. Accordingly, satisfaction with the existing work contract becomes a very important issue for both employees and employers. Satisfaction with the existing work contract increases desired behavior and decreases employee-related counterproductive behavior. The results of the research conducted in the hotel industry in Croatia confirmed that employees who show a higher degree of satisfaction with the work contract at the same time show above-average job satisfaction. The results of the research also confirmed the strong connection between satisfaction with the work contract and labor productivity. Namely, employees who achieve the highest labor productivity show the greatest satisfaction with the work contract. The opposite is also true. As the level of satisfaction with the work contract increases, so does employee productivity. Finally, this scientific discussion also confirmed the existence of the connection between job satisfaction and labor productivity.

The limitation of this research is the sample size structure in which employees with non-standard employment contracts are predominate. Future studies can address the effects of different types of non-standard contracts on labor productivity in the hotel industry.

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Review Paper

LEGAL CONTRIBUTION TOWARD A GREENER EUROPEAN UNION

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Abstract: *European Union has a diverse environment and recently the awareness of the importance of sustainable development has increased significantly. Subsequently, the greener and more sustainably oriented narratives have been used in documents and legislation produced by the European Union. The European institutions have established a legal framework to facilitate sustainable investments. Consequently, member states of the European Union have been implementing more sustainably prone legislation, but have chosen different legal approaches on how they will tackle the challenges associated with the adoption of more sustainably prone legislation. One of the successful ways how member states encourage more sustainable choices are tax abatements. This article compares and evaluates the best approaches by member states with better-developed tax abatements for sustainable choices and their results. The findings of this article are that various approaches have been developed and suggest how other countries can mirror proven ways towards improvement.*

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1. INTRODUCTION TO DIVERSE ENVIRONMENT AND SUSTAINABILITY

European Union is known for its diverse environment, which enables and enriches people's lives as well as their everyday life. Even though many people do not take the shrinkage of biological diversity as quite important, they probably should begin to worry about it. If not because of its intrinsic value and assurance or at least because of the expectation of better (and greener) life, they should look at it from the economic viewpoint of view. It is estimated that the shrinkage of biological diversity caused by humans causes the replacement of around 3% of global GDP each year (European Environment Agency, 2020).

Many people also think that pollution is just throwing waste around or gas emissions. While they are partially correct, there are also other aspects of pollution. The majority of the population in the European Union lives in urban areas and that number is only expected to grow. Biological diversity is also important since it ensures security on important topics, such as food and health, but also protects livelihoods and enables people to live in the countryside instead of being forced to move to the more populated areas to find new jobs due to unstable conditions in rural areas (Quinney, 2020). That makes different ways of pollution even more important to recognize and mitigate, such as noise or light pollution, since pollution regardless of the kind, decreases people's lives expectancy and effectively leads to more health problems irrespective of whether they live in rural or urban areas (Ten Brink et al., 2016).

2. GREENER ORIENTED NARRATIVES USED IN LEGISLATION

European Union has always been progressive and eager to improve in all areas including the care for the environment, nature and biological diversity. This can be seen early, in the beginnings of greener oriented documents, when European Union already passed the Council Directive 79/409/EEC that has been amended in 2009 and is now known as the Directive 2009/147/EC, more commonly known also as "the Birds Directive" (European Commission, 2021 a; European Commission, 2021 c). The directive complemented and supplemented the Organisation for Economic Cooperation and Development's The Polluter Pays Principle, which was established in 1972 (OECD, 1992). The OECD's principle burdens those whose actions produce pollutants with contributing adequately to the prevention of any hazards for (human) health or the environment.

Another important directive that aims to protect natural habitats and wild fauna and flora is Council Directive 92/43/EEC, which is also known as the "Habitats Directive" (European Commission, 2021 b). One of the outcomes of the Habitats Directive has been a widely known and successful project that established a network of protected areas around the European Union, Natura 2000. The project is ambitious with the intention to protect more than 1000 animal and plant species as well as more than 200 types of habitat (European Commission, 2021 b). Even though the objectives of the Natura 2000 were seen as very optimistic at the beginning, the project has proved to be the right tool for ambitious plans for the protection of the native biosystem and species.

2.1. The ambitious goals and their funding for the future

European legislative narrative has been getting progressively protective of natural habitats, biological diversity and protecting green areas and the trend will most likely continue since awareness of how important care for the environment and biodiversity is just keeps growing. That is supported also by a recently passed set of policy initiatives by the European Commission, widely known as The European Green Deal. The main objectives of the Green Deal are to transform the

European Union into a competitive economy that is also modern and efficient with its resources, including probably the most ambitious goal of the Green deal: for the European Union to be neutral at greenhouse gases emissions by 2050 (European Commission, 2022 a).

The European Green Deal is seen as a major investment by the European Union and one of the priorities in the years 2019 to 2024. Since the Covid-19 pandemic, the Green Deal has also been seen as a part of the recovery plan. As for every strategic project, and Green Deal that definitely is, the funding has to be well prepared and sufficient. Green Deal's funding comes from European Union's seven-year budget and the NextGenerationEU Recovery Plan (at an estimated 600 billion euros) (European Commission, 2022 a).

European Green Deal has eight major actions: climate, environment and oceans, energy, agriculture, finance and regional development, industry, research and innovation, and transport (European Commission, 2022 a). Transport is then furthermore divided into two main sectors: Sustainable and Smart Mobility Strategy and Connecting Europe Express. The main objective of the first one is to lower greenhouse gas emissions caused by transport by 90% by 2050 as well as improve connectivity and access (European Commission, 2022 c) and the main objective of the second one is to connect Europe with long-distance train connections, as train travel is one of the safest, environmentally friendliest and cheapest possibilities of travelling across Europe. To emphasise its importance, the year 2021 was named as European Year of Rail (European Commission, 2022 b).

3. THE LEGAL FRAMEWORK

European Union has been making space for more sustainable choices for some time now, but probably the most of the attention and impact on everyday lives that everybody has noticed has received the Directive of the European Parliament and the Council (EU) 2019/904. This directive aims to reduce the impact of certain single-use plastic products on the environment. An important reason why the European legislator argumented the need for such an impactful Directive is the astonishing finding that a lot of the marine litter is plastic, and about half of that plastic is single-use plastic products. Furthermore, this directive is aligned and contributes positively to United Nations' Sustainable Development Goal 14 (European Union, 2019).

The Court of Justice of the European Union tackles a wide range of areas connected to environmental issues. Areas that produce the most cases at the Court of Justice of the European Union are air, water, waste, nature and horizontal legislation, particularly Environment Impact Assessment (known also as EIA) (European Commission, 2021 b). Horizontal legislation is mainly procedural providing mechanisms and methods that are aimed at improvement of decision-making, legislative development and implementation (Berglund and von Raggamby, 2007). Environmental Impact Assessment is a process of evaluating the likeliness of environmental impacts of a proposed project or development, taking into account inter-related socio-economic, cultural and human-health impacts, both beneficial and adverse (Secretariat of the Convention on Biological Diversity, 2020). The judgements of the Court of Justice of the European Union bind member states of the European Union based on their membership in the Union.

The European Court of Human Rights and the European Convention on Human Rights also cover important topics on the environment. Even though the European Convention on Human Rights is a treaty originally drafted in 1950 by the Council of Europe, which is not a part of the European Union, it still binds member states of the European Union, because all member states of the European Union signed the treaty. This convention aims to protect human rights and political

freedom, therefore impacts member states' legal approach by following its articles and later adding protocols to the convention. Furthermore, the cases by the European Court of Human rights are applicable too, so countries have to follow Courts' decisions if they are relevant to them. Most commonly argued cases about environmental matters are regarding Article 2 (right to life), Article 3 (Prohibition of inhuman or degrading treatment), Article 5 (right to liberty and security), Article 6 (right to a fair trial), Article 8 (right to respect for private life and family life and home), Article 10 (Freedom of expression / Freedom to receive and impart information), Article 11 (freedom of assembly and association), Article 13 (right to an effective remedy) and Article 1 of Protocol 1 to the convention (right of property) (European Court of Human Rights, 2022).

3.1. More sustainably oriented legislation

All of the mentioned in the text above brought countries to more sustainable thinking about development. With help of various incentives countries and the European Union as a whole try to encourage more environmentally friendly solutions as well as worsen the possibilities for less sustainable things and projects. This is enabled by EU regulation 691/2011 of the European Parliament and of the Council, which was later amended with EU Regulation 538/2014 of the European Parliament and the Council (Eurostat, 2015, p.7).

Most commonly used environmental measures include environmental subsidies, price support, regulatory support mechanisms and environmental tax abatements. The latter is especially relevant for potentially environmentally damaging subsidies and policymaking in this sector (Eurostat, 2015, p.12). Environmentally friendly or at least friendlier products compete with well-established products that tend to have a worse impact on the environment, and they are usually more convenient and/or cheaper than their greener counterparts.

Environmental tax abatements alongside environmental subsidies and transfers alike aim to lower the cost of production or use of more environmentally mindful products (Eurostat, 2015, p. 12). This is usually done within the national budget, but not marked specifically, which indicates that the countries are willing to cover the additional cost of implementing more sustainable choices to ensure that their development in the future would not be endangered and would enable better prospects for their people and environment.

4. TAX ABATEMENTS AND COMPARISON OF THE APPROACHES

European Union defines environmentally related tax as a "*tax whose tax base is a physical unit (or a proxy of a physical unit) of something that has a proven, specific negative impact on the environment, and which is identified in ESA 95 as a tax*" in Article 2 of the Regulation (EU) No 691/2011 of the European Parliament and the Council (European Union, 2011), with ESA being the European System of Accounts. Tax abatements are similar, but they are meant to reduce costs of environmentally better choices, compared to environmentally-related taxes. Tax abatements come in different forms but could be frequently seen as tax exemptions. However, they are not limited to only exemptions but could be recognized as allowances, credits, rate reliefs, or deferrals (Eurostat, 2015, p.17).

One of the popular, yet potentially environmentally problematic commodities in the European Union are vehicles. They importantly contribute to pollution and are an area that most countries already started taking measures, so different tax systems are comparable and there are various equivalents of choices that are slightly better or worse for the environment. In 2020, the trend of

an increasing number of vehicles, particularly passenger cars did not stop and have not been stopping in the past few years. Despite the COVID-19 pandemic, many travel restrictions and a significant increase of work from home for the majority of the professions as well as most of the education system being online for at least part of the year, the passenger car fleet in the European Union still grew for 1,2% compared to the year before. This percentage may not seem as much, but when considering that there were 246,3 million cars on the roads (European Automobile Manufacturers' Association, 2022) and around 448 million people in the European Union (Eurostat, 2020), that equals one passenger car per less than two people.

Countries in European Union are tackling the increasing passenger car fleet, and since there will likely be even more cars on European roads in the future, they are trying to at least ensure that cars that are used are as much environmentally friendly as possible. This could be divided into two groups; CO_2 – based motor vehicles (eg. petrol and diesel) and electric vehicles (that include battery-electric, plug-in hybrids, hybrids, extended-range electric, fuel cell electric, liquified petroleum gas, and compressed natural gas among other electrified options of engines in the vehicles)

4.1. Taxes for CO_2 – based motor vehicles

CO_2 – based vehicles are increasingly considered a bigger burden for the environment, than their electric counterparts, even though due to all materials used for the production of vehicles, none can be considered as really environmentally friendly, just as more or less damaging and burdening for the environment.

Members of the European Union have different taxes to compensate for the use of CO_2 – based motor vehicles. The most frequently used approach is taxation at the acquisition of the vehicle and during ownership (most commonly charged each year), but some countries vary from this method and have just one of these taxes or even none at all (Estonia, Lithuania and Poland). To allow transparency and better comparability in taxation, most taxes are calculated based on emissions of grams of CO_2 per kilometre, while some countries take into account also when the vehicle has been registered (Latvia) or the registered value of the vehicle (Malta and Croatia). Vehicles with lower emissions are usually subject to lower tax rates. There are very few tax abatements for CO_2-based vehicles, and even those that exist, are reserved only for vehicles with extremely low or zero emissions.

4.2. Taxes for electric vehicles

Tax abatements and even purchase incentives are however very frequent for electric vehicles. At either acquisition or during the ownership of the electric vehicle, many countries offer tax benefits compared to the CO_2 – based vehicles, not rarely for both occasions. If the emissions are very low, some countries provide tax exemptions for such vehicles to stimulate investment into new and environmentally friendlier vehicles. Surprisingly, some countries do not have any encouragement for purchasing or owning electric vehicles.

Variants of tax bases for vehicles in selected countries are presented in tax bases and incentive schemes that are used in selected countries, mentioned in the first column (Table 1). It can be easily noticed how each country utilizes a different system that is tailored to its needs. Estonia does not use a specific system of differentiation between vehicles but has an optimistic percentage of electric vehicles. Germany utilizes a complex and precise incentive scheme which results in almost double amount of electric cars when looking at the percentages of all vehicles, but the absolute number

is much higher since it has comparatively much more cars than Estonia or Slovenia. The percentage of electric passenger cars shows that countries with more developed tax abatements and incentive schemes have better and faster development towards a green future (Figure 1 and Table 1). Germany (3,6%) can be used as a great example of how to help people transfer to greener choices based on its success with these environmentally mindful transfers. Croatia (0,6%) has implemented promising incentive schemes, but the effect will be probably seen in a few years since it joined the EU at the latest and will need some time to see the results of implemented schemes.

Table 1. Variants of tax bases for vehicles in selected countries

Country	The tax base for the acquisition of CO_2 – based vehicles	Tax base during the ownership of CO_2 – based vehicles	Tax for the acquisition of electric vehicles	Tax base during the ownership of electric vehicles	Purchase incentive for electric vehicles
Austria	VAT deduction for zero-emission Fuel consumption tax (NoVa), calculated by CO_2 emission in g/km	None	VAT deduction and tax exemption for zero-emission	Tax exemption for zero-emission	Bonus, only for new cars with a value less than 60.000 EUR
Croatia	CO_2 emissions, purchase price, fuel type of the vehicle	None	No excise duties	Exemption from environmental tax	Incentive scheme, up to 9,333 EUR once a year
Estonia	None	None	None	None	None
France	Bonus/malus scheme (bonus for less than 20g CO_2/km, malus for 138g CO_2/km or more)	Annual malus for cars emitting over 190g CO_2/km	Regions provide various exemptions (half or full)	None	Incentive schemes, based on CO_2 emissions and household income
Germany	Bonus for purchase of low emission vehicle, but not directly linked to its CO_2 emissions	Only for cars registered from 1.7.2009, but excludes cars emitting less than 90g CO_2/km	None	10-year tax exemption	Bonus up to 9.000 EUR for cars valued up to 40.000 EUR and 7.500 EUR for cars valued over 40.000 EUR
Slovenia	CO_2 emission and fuel type	None	The minimum tax rate for cars emitting less than 110g CO_2/km	None	Incentive schemes with a value of up to 7.500 EUR
Spain	CO_2 emission	Since 2018, higher emitting vehicles pay higher taxes for the first 3 years	Tax exemption from special tax for cars emitting less than 120g CO_2/km	75% reduction electricity vehicles in main cities	Incentive schemes up to 7.000 EUR for cars

Source: European Automobile Manufacturers' Association, 2020; European Automobile Manufacturers' Association, 2021

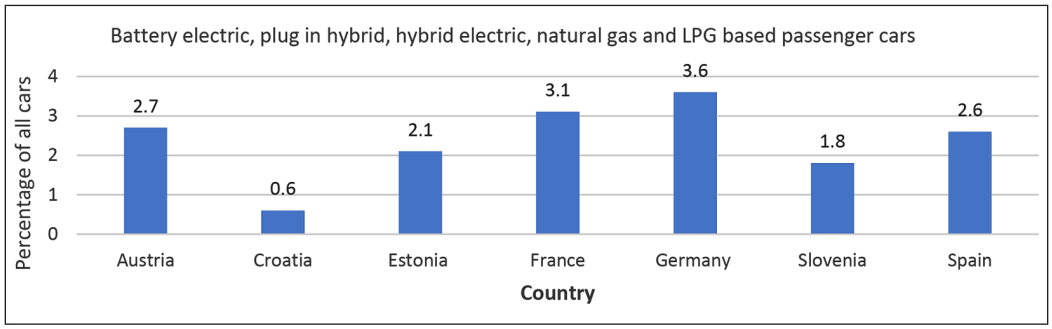

Figure 1. Percentage of electric vehicles in selected countries

Source: European Automobile Manufacturers' Association, 2022, p.14

Spain is one of the most important countries in the European Union regarding car production. Perception of vehicles is important because it puts additional motivation on companies that produce cars to produce models that are not CO_2-based if there is a strong demand for them. Spain succeeded in making electric cars more attractive even though they tend to be more expensive with scheme Moves III which offers incentives up to 7000 EUR for the purchase of environmentally friendly cars. Alongside initial incentives to buy more environmentally friendly cars, some cities, like Madrid implemented that cars with stickers proving that they are low or zero emission, can park in the special zones in the city centre without having to pay for parking (Jimenez and Flores, 2015). Such regulations are very simple, easy to implement, make usage of low emission cars more enjoyable and therefore boost the popularity of such cars and care for the environment. Even though Spain is already above the average (shown in Figure 1, the average for shown countries is 2,36%), and with such smart and easy regulations, this could result in a much higher percentage of electric vehicles in the upcoming years.

5. CONCLUSION AND FINAL THOUGHTS

It can be concluded that countries with more developed tax incentive schemes have a higher percentage of electric passenger cars, which is a promising result that shows that environmentally friendlier development is faster and more accessible with tax abatements and incentive schemes as well as that people and companies choose greener options if they are available and have some encouragement from national and international legislation. Taxes and incentive schemes can be daunting, so countries trying to implement new and environmentally better choices should try to focus on simplifying the explanation of how everything works, so it will be easily understood by everyone and be patient with the results of these projects, because such shifts towards green future are important, but need some time to show the outcomes. Even though tax abatements are crucial for development, important steps toward a greener European Union can be also supported with simple regulations like no need to pay parking fees.

One of the most popular and widely available types of cars that are not CO_2-based and one of the most environmentally friendly are electric cars. But following the most basic concept of engine and mechanics, these are in essence big batteries. While the concept is innovative and a big and important step toward zero emissions travel goals, there must also be a discussion regarding how environmentally problematic can be batteries. Just some major concerns about batteries are that they require rare elements to be produced, the efficiency decreases over time, with every discharge the battery capacity decreases (Koenigsberg, Kohli and Montoya, 2011) and the question remains, on how environmentally friendly can such car batteries be repaired and recycled.

Undoubtedly, electric cars have a lot of advantages, but one of the aspects that is still questionable is their longevity compared to for example diesel cars with internal combustion engines. While batteries and output, or in terms of transport their range, decreases in a couple of years, their diesel counterparts can produce the same output and retain the same range over a much longer period of time, even a decade leaves no noticeable decrease in output and range. Buying new and innovative things is a good thing for industry and support towards green transition, but we should be careful not to fall into replacing cars early, just because they do not last long, but are more environmentally friendly during their shorter usage period. We should take into consideration that although emissions might be low while driving, there are also a lot of emissions produced during the manufacturing process and recycling, which means that if the usage period of low emissions is short, overall emissions, might still be higher with electric cars than CO_2–based cars.

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