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# THE INFLUENCE OF COVID-19 PANDEMIC ON CROATIAN LIFE INSURANCE MARKET

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## **Abstract**

*The novel coronavirus pandemic has had numerous negative consequences on different aspects of human life and the economy. Therefore, the authors wanted to see how the closing of social and economic activities and imposed measures have affected insurance companies' activities conducting life insurance business in Croatia. For this purpose, quarterly panel data for the first three quarters of 2020, 2019, and 2018 are employed. To test how the COVID-19 outbreak has affected the Croatian life insurance market, we have employed quarterly year-on-year gross written premium growth expressed as a percentage, insurance density, and insurance depth that serves as dependent variables level of development of the insurance market. Moreover, independent variables comprise several COVID-19 confirmed cases, number of COVID-19 death cases, coronavirus dummy variable, and year-on-year quarterly GDP growth rate. After conducting static panel analysis, the results reveal that coronavirus*

*dummy variable, taking value one if confirmed cases of COVID-19 disease every quarter are reported and 0 otherwise, negatively affects the level of life insurance market development.*

**Keywords:** coronavirus pandemic, life insurance market, Croatia

**JEL Classification:** G22

## 1. INTRODUCTION

The coronavirus outbreak at the end of 2019 in China and its consequent spread all over the world has forced World Health Organization to declare it a pandemic disease. In Croatia, the first COVID-19 positive case has been registered at the end of February 2020. Although the severity of the epidemiological situation was not as high as in some other European countries, the pandemic itself, as well as the closing of economic and social activities, have affected the economy “leading to a decline in consumption, investment, services, and industrial production activities around the world” (Wang et al., 2020, p. 2350). We can conclude that the Croatian insurance market is seriously affected by the coronavirus outbreak regarding insurance premium growth rates. As seen from Table 1, year-on-year quarterly non-life gross written premium growth in the 1<sup>st</sup> quarter of 2020 equals 7.7%, whereas at the same time, the year before, it accounted for 10.8%. The higher decrease in the life insurance segment is registered in the 1<sup>st</sup> quarter of 2020 compared to the 1<sup>st</sup> quarter of 2019. The differences in growth rates are mainly expressed when comparing growth rates achieved in the second quarters of 2020 and 2019. The non-life segment amounted to 3.5% and 10.6%, respectively, while in the life insurance segment, growth rates amounted to -16.5% and 1.2%, respectively. Year-on-year growth rates of insurance premiums separately for non-life and life insurance markets in the 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> quarters of 2020 and 2019 are provided in Table 1.

**Table 1.** Year-on-year growth rates of insurance premium in the 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> quarters of 2020 and 2019

1 <sup>st</sup> quarter 2020	non-life	7.7%	2 <sup>nd</sup> quarter 2020	non-life	3.5%	3 <sup>rd</sup> quarter 2020	4.3%
	life	-4.9%		life	-16.5%		-15.4%
1 <sup>st</sup> quarter 2019	non-life	10.8%	2 <sup>nd</sup> quarter 2019	non-life	10.6%	3 <sup>rd</sup> quarter 2019	11.6%
	life	-4.5%		life	1.2%		-1.3%

**Source:** compiled by authors based on data from Croatian Financial Services Supervisory Agency (HANFA), Monthly reports, <https://hanfa.hr/publications/monthly-reports/>

We can see from Table 1 that the coronavirus outbreak has seriously hit the life insurance segment that registered a more significant decline and even negative growth rates in the pandemic period than the non-life insurance segment. Therefore, the authors wanted to find out the empirical evidence on the impact of the COVID-19 pandemic on the Croatian life insurance market, presuming its negative impact on its development level. This is because the lockdown imposed in the 1st and 2nd quarter of 2020 partially limited insurance companies, agencies, and banks' insurance sales channels. Social distancing measures that remained in force further on have deterred people from seeking insurance coverage in person. Moreover, an almost complete cessation of economic activity caused an increase in the unemployment rate, resulting in reduced and insecure future income that might negatively affect life insurance demand. Another reason for investigating the influence of the COVID-19 pandemic on the development of companies conducting life insurance business lies in the fact that motor vehicle liability insurance, an obligatory line of insurance, has a significant role in the non-life insurance market with a 32% share (HANFA, September 2020).

This paper employs quarterly panel data for the first three quarters of 2020, 2019, and 2018. The first three quarters of 2020 were chosen because cumulative COVID-19 cases and deaths resulting from COVID-19 infection were registered at the end of these quarters. New knowledge about the pandemic's economic aspects, specifically its impact on insurers, will serve as a basis for providing guidelines for its sustainable recovery and recommendations to avoid or minimize the negative consequences of such events in the future.

The rest of the paper is organized as follows. After introducing the background of the topic investigated, the literature review follows in section two. Section three explains the variables used in the analysis, the way of their calculation, their sources, and their potential effect. The fourth section provides empir-

ical research presenting descriptive statistics, correlation matrix, heteroscedasticity tests, and parameter estimates of the static panel model with fixed effects. The fifth section concludes.

## 2. LITERATURE REVIEW

In academia, the number of scientific papers dealing with the impact of the COVID-19 disease on various life aspects is growing. However, considering that this is a new virus, whose activity and spread did not stop even when writing this paper, there are relatively few papers dealing with the impact of this pandemic on insurance markets. Though, papers are dealing with unemployment insurance during COVID-19 pandemics such as Farrell et al. (2020), Acs & Karpman (2020), and Bell et al. (2020).

Moreover, there are also papers dealing with the effects of coronavirus outbreak on financial markets, including

Al-Awadhi et al. (2020) and Ali et al. (2020). Paper by Al-Awadhi et al. (2020) discusses the impact of COVID-19 disease on Chinese companies' stock returns, while Ali et al. (2020) debate whether coronavirus infectious disease creates a threat for financial markets as an epidemic or a pandemic. The latter is discussed below.

Ali et al. (2020) investigate how the novel coronavirus outbreak has affected the financial markets worldwide. Stating that the COVID-19 disease eroded a quarter of wealth in approximately a month, the authors investigate financial markets' response globally, specifically of major stock markets and commodity markets, in the context of their volatility and decline as the pandemic progressed from China to Europe and then consequently to the US. The authors have divided their analysis period into two subsamples, encompassing the period from December 2019 to March 10, 2020, called "epidemic", and the other one relating to the post-March 10, 2020 period called "pandemic". Furthermore, the authors distinguish three phases, one in which deaths associated with coronavirus are limited to China only, phase two relating to Europe, while phase three refers to North America. Findings suggest that the Chinese markets have stabilized and that they showed lower volatility during both analyzed periods. On the contrary, the average stock market volatility in Germany, the UK, South Korea, and the US increased as COVID-19 disease progressed from epidemic

to pandemic. Moreover, the European indices registered the highest volatility rate in the US phase, and even the reasonably safer commodities have experienced a decline with the pandemic moving to the US.

The papers which are, to at least some extent, dealing with the effects of the COVID-19 outbreak on the insurance industry are provided below, suggesting that, to the best of the authors' knowledge, this is the first paper to study the influence of COVID-19 pandemic on the insurance market in Croatia as well as in Europe.

Wang et al. (2020) investigated the impact of the outbreak of the COVID-19 pandemic on the level of insurance market development of twenty-nine municipalities, provinces, and autonomous regions in mainland China using monthly panel data in the 1st quarter of 2020 comparing them to that of 2019 and 2018. As a robustness check, the authors have performed an analysis using monthly data from January 2018 to March 2020. The findings reveal, among others, the statistically significant and negative influence of COVID-19 pandemic expressed with confirmed ratio, i.e., the cumulative number of confirmed cases per 10 000 residents, on all insurance market measures of development employed in the models. The authors suggest that the rise of social security and digital insurance promotion can lessen the adverse effect of the pandemic in the insurance market.

Babuna et al. (2020) studied the effect of the COVID-19 pandemic on the Ghanaian insurance industry from March to June 2020 using questionnaires submitted to three groups of parties involved. The first one involved statutory actuaries, the second one included insurance officers, while the third group comprised clients, stakeholders, policyholders, and insurers' partners. This paper finds decreasing profits of insurers and an increase in claims due to coronavirus outbreak through qualitative. The authors suggest adapting insurers to working under social distancing measures from remote locations, enhancing cybersecurity protocols, and simplifying the premium collection and claims processing using e-payment channels. Moreover, the authors compare the current pandemic outbreak to previous pandemics, including H1N1, MERS, and SARS-CoV.

Harris et al. (2020) investigated whether the COVID-19 pandemic changed life insurance offerings since the theory proposes that life insurers might be forced to significantly modify life insurance premiums or offerings to account for the increased risk. Data on term life insurance policies every month encom-

passing about 100 insurers and 800 000 insurance policies through October 2020, the authors' estimated event-study models were finding, opposite of expected, partial evidence that life insurance companies decreased policy offerings or increased premiums due to COVID-19, i.e., due to an increase in mortality risk and significant uncertainty. However, the authors found evidence that low price leaders increased insurance premiums due to increased mortality risk. Moreover, policies offered to persons age 75 and above were differentially removed from the market.

### 3. DESCRIPTION OF VARIABLES

To test how the coronavirus outbreak has affected the Croatian life insurance market, the authors have employed several dependent variables referring to the insurance market's development level and several explanatory and control variables, all calculated every quarter.

Specifically, dependent variables include quarterly year-on-year gross written premium growth expressed as a percentage, insurance depth, and insurance density. These variables have been chosen following the Wang et al. (2020) approach who investigated how COVID-19 affected China's insurance market in the 1<sup>st</sup> quarter of 2020. Furthermore, insurance density and insurance depth are regularly employed in the studies discussing the level of insurance market development (e.g., Kozak, 2011, p. 3; Öner Kaya, 2015, p. 511) or as a determinant of insurance demand (Beck & Webb, 2003, p. 53; Hwang & Gao, 2003, p. 84; Kjosevski, 2012, p. 239). Moreover, the gross written premium growth rate is also regularly employed in papers dealing with determinants of insurers' profitability (e.g., Chen & Wong, 2004, p. 471; Shiu, 2004, p. 1090; Ahmed et al., 2011, p. 127; Öner Kaya, 2015, p. 517).

Explanatory variables related to COVID-19 activity in this analysis encompass several confirmed cases and the number of death cases resulting from COVID-19 infection. These indicators, along with others, are considered vital indicators for reviewing the situation regarding the spread of COVID-19 (Washington State Department of Health, 2020; World Health Organization, 2020). Moreover, following Wang et al. (2020, p. 2353) approach, we have also employed coronavirus dummy variable taking a value of 1 if a country reports confirmed cases of COVID-19 disease every quarter and 0 otherwise. We ex-

pect all of these explanatory variables to negatively influence insurance activity, i.e., on the level of insurance development.

Furthermore, another control variable calculated as the natural logarithm of quarterly GDP (or year-on-year quarterly GDP growth rate) is employed in the analysis to see how economic activity expressed with GDP affects insurance companies' activities. Different GDP growth variations (GDP growth rates) have also been in numerous papers as a potential performance factor (e.g., Kozak, 2011; Akotey et al., 2013). Since this variable indicates general business conditions and therefore capacity to insure, a positive sign of this variable is expected.

All variables used in the research, their abbreviation and calculation methods are provided below in Table 2.

**Table 2.** Description of variables

Dependent variables	GWP_growth_rate	quarterly gross written premium year-on-year growth rate (%)
	INS_density	quarterly gross written premium over last year population
	INS_depth	quarterly gross written premium over quarterly GDP (%)
Explanatory variables	CONF_cases	cumulative number of confirmed COVID-19 cases reported at the end of the quarter
	DEATH_cases	cumulative number of reported deaths at the end of the quarter
	COVID_dummy	1 if country reports confirmed cases of COVID-19 disease every quarter, and 0 otherwise
Control variable	GDP_growth_rate	quarterly GDP year-on-year growth rate (%)

**Source:** authors'

Quarterly data on the gross written premium needed to calculate dependent variables were collected from monthly reports published by the Croatian Financial Services Supervisory Agency (HANFA). Data on population were collected from documents Population estimate of Republic of Croatia, various issues published by Croatian Bureau of Statistics. Croatian Bureau of Statistics is also used as a source for quarterly data on GDP. Furthermore, several confirmed COVID-19 positive cases every quarter, and the number of deaths was taken from webpages of the World Health Organization. Specifically, Coronavirus Disease (COVID-19) Dashboard compared it to the data from different issues of Situation reports publicly available by the World Health Organization.



## 4. EMPIRICAL RESEARCH

Descriptive statistics for all variables encompassed with the research are provided in Table 3. Descriptive statistics are computed based on 105 observations for all variables, including their mean, minimum and maximum value, and standard deviation.

**Table 3.** Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
INS_DENSITY	105	32.43	29.77	0.0496	109.54
INS_DEPTH	105	0.13	0.12	0.0002	0.42
GWP_GROWTH_RATE	105	0.04	30.26	-87.17	134.28
CONF_CASES	105	2096.54	4979.40	0	16380
DEATH_CASES	105	40.82	86.79	0	275
COVID_DUMMY	105	0.31	0.47	0	1
GDP_GROWTH_RATE	105	-0.59	6.47	-15.40	4.00

**Source:** authors' calculation

At the beginning of the research, multicollinearity between the independent variables was investigated, whereas the dummy variable was not included. The correlation matrix is given in Table 4. Having in mind that an absolute value of the Pearson coefficient higher than 0.7 suggests a strong correlation between independent variables, it can be observed that there is no multicollinearity problem between the GDP growth rate variable and other two variables (confirmed cases and death cases), but, as expected, there is a correlation between several COVID-19 diseases confirmed cases and death cases related to COVID-19. Regardless of the connection between these two variables, the research was continued without omitting any of them.

**Table 4.** Correlation matrix

	CONF_CASES	DEATH_CASES	GDP_GROWTH_RATE
CONF_CASES	1.0000		
DEATH_CASES	0.9752	1.0000	
GDP_GROWTH_RATE	-0.6343	-0.6838	1.0000

**Source:** authors' calculation

To conduct econometric data analysis, the authors have employed static balanced panel data analysis. Model (1) forms the basis of estimation.

$$Y_{it} = c + \sum_{k=1}^K \beta_k X_{it}^k + \varepsilon_{it} \quad (1)$$

Where  $Y_{it}$  is the dependent model variable of the company  $i$  at time  $t$ , with  $i = 1, \dots, N$ ;  $t = 1, \dots, T$ .

In research, three static panel models were employed. Each of the three models had a different dependent variable ( $Y_{it}$ ): gross written premium growth expressed as a percentage, insurance density, and insurance depth. These variables served as variables that describe the level of development of the insurance market.

$X_{it}$  are  $k$  independent variables as discussed in section 2.

F test, Lagrangian multiplier test for random effects, and Hausman test were used to show which panel model was the most appropriate one. To detect the problem of heteroscedasticity Breusch-Pagan test was used in each model. The null hypothesis in the Breusch-Pagan test assumes homoscedasticity is present. If the p-value is less than 0.10, the null hypothesis will be rejected, suggesting that the problem of heteroscedasticity is present while the standard errors are biased. This can lead to bias in test statistics and confidence intervals. After finding a suitable static panel model, robust standard errors were used in that same model. Table 5 shows the results of the analysis. Table 5 results from the F test, Lagrangian multiplier test for random effects, and Hausman are also shown. In all three models, results showed that the most appropriate model was with fixed effects. Breusch-Pagan test for heteroscedasticity showed that in models with dependent variable `INS_DENSITY` and `GWP_GROWTH_RATE`, the problem of heteroscedasticity was present. After finding a proper static panel model, robust standard errors were used in these two models.

**Table 5.** Parameter estimates of the static panel model

Variable	INS_DEPTH	INS_DENSITY	GWP_GROWTH_RATE
CONF_CASES	-0.00002	0.00320	-0.01140
	(0.00003)	(0.00378)	(0.01464)
DEATH_CASES	0.00039	-0.13278	0.78250
	(0.00192)	(0.25902)	(1.01786)
COVID DUMMY	-0.07072*	-22.76928**	8.95013
	(0.03679)	(8.60626)	(23.98348)
GDP_GROWTH_RATE	-0.00193	-1.24841	4.58005
	(0.00881)	1.21608)	(5.09597)
cons	-0.14232***	37.55746***	-8.09753
	(0.02683)	(4.41624)	(15.03414)
R2 within	0.167	0.1568	0.1429
R2 between	0.1174	0.0808	0.4165
R2 overall	0.0386	0.0459	0.0652
Model p-value	0.0025	0.0055	0.0010
Breusch-Pagan test for heteroscedasticity	chi = 2.54	chi = 4.47	chi = 12.87
	p value = 0.1112	p value = 0.0345	p value = 0.0003
F test	p value = 0.0000	p value = 0.0000	p value = 0.0000
Breusch and Pagan Lagrangian multiplier test for random effects	chi = 225.33	chi = 181.01	chi = 28.73
	p value = 0.0000	p value = 0.0000	p value = 0.0000
Hausman specification test	chi = 7.43	chi = 7.42	chi = 7.83
	p value = 0.0594	p value = 0.0596	p value = 0.0497

\*, \*\*, \*\*\* Statistically significant at the; 10%, 5%, 1% level, respectively. Standard errors are between parentheses.

Source: authors' work

Table 5 summarizes the final results of empirical analysis. In models where insurance depth (quarterly gross written premium over quarterly GDP) and insurance density (quarterly gross written premium over last year population) served as dependent variables, dummy variable (COVID DUMMY) has a statistically significant and negative impact. This variable's influence was expected since the COVID-19 dummy variable is employed in the analysis and takes value 1 if confirmed cases of COVID-19 infectious disease every quarter are reported and 0 otherwise. The results suggest that the level of insurance development decreases with the pandemic. Specifically, the insurance depth indicator is worse by 0.07, whereas insurance density by 22.77. Similar results regarding

COVID-19 dummy variables are obtained by Wang et al. (2020) when conducting a robustness test of their research. Other variables remained statistically insignificant.

## 5. CONCLUSION

The coronavirus outbreak has numerous adverse consequences on different aspects of human life such as health, social activities, financial activities, etc. Its negative impact on the economy is also evident worldwide.

This research focuses on the impact of the COVID-19 outbreak on the life insurance market level of development in Croatia using quarterly data in the first three quarters of 2020, 2019, and 2018. The results reveal the negative impact of COVID-19 pandemic on insurance depth and insurance density employing static panel analysis.

For an insurance market to be more resilient, we can say that the adoption of new analytical methods, understanding of new technologies, and acquisition of management skills will help insurers achieve added value in these turbulent times. Thus, the insurers need to respond to the trends and improve digital innovations and new technologies in insurance. Specifically, transformation in the direction of digital business models and new types of products might improve insurer-customer relationships and increase business processes efficiency in insurance companies.

The directions for future research might include an analysis of factors influencing the level of development of the non-life insurance segment in the pandemic as well. Furthermore, the study encompassing different countries with similar economic characteristics as Croatia might be useful to compare how resilient their insurance markets are.

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