The effect of COVID-19 pandemic on Croatian tourist sector

Bogdan, S., Sikic, L. and Suzana,XXX

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## 0.1 ABSTRACT

# 1 INTRODUCTION

The coronavirus pandemic flooded the globe in just a few months after the first case was registered, leaving huge consequences in the form of threatening the health and human lives, great economic losses, and psychological fear that has crept deep into society. The presence of the virus around the world has prevented potential tourists from feeling safe in the destination which has left deep consequences today and in the future for one of the most affected sectors, and that is tourism. According to the UNWTO (2021) international tourist arrivals (overnight visitors) dropped by 74% in 2020 compared to the 2019, due to massive drop in tourist demand and travel restrictions. This pandemic has caused loss of USD 1.3 trillion in export revenues which is eleven times greater loss compared to the global financial crisis from 2008. UNWTO forecasted that it could pass between 2,5 or even 4 years for international tourism to return on the old track from 2019. The effectiveness of vaccines and the level of vaccination of the population will certainly play an important role, which should contribute to a smaller number of new cases, as well as to the mitigation of travel restriction measures and the restoration of consumer confidence. The consequences are even worse since Croatia is a highly tourism dependent country.

According to the UNWTO, Croatia is among the 10 most vulnerable countries according to the criterion of the direct impact of tourism on the share of GDP. More precisely, in the first place is Macao (China) 48%, followed by: Fiji 13%, Jordan 12%, Spain 12% and Croatia with 11%. Many countries have introduced travel restrictions, and knowing that the share of foreign tourists in Croatia is 89% (UNWTO, 2021), negative results are expected from companies that are directly or indirectly involved in tourism. In Croatia tourism is taking part in a large share of total exports (35%) as well (UNWTO, 2021). Although Croatia achieved a record in 2019 in terms of the total number of arrivals and overnight stays of domestic and foreign tourists in 2020 due to the global corona pandemic, there was a steep decline compared to 2019, which amounts to -55,29% of overnight stays and -64,22% of total arrivals. Poor results in tourism spilled over into the capital market and caused turmoil, so the purpose of this research was to investigate how tourism stock prices respond to the event of the COVID-19 pandemic by using event study technique. This study contributes to the literature by analyzing the impact of global COVID-19 pandemic on tourism stock volatility in Croatia. Tu još nešto fali. The remainder of this study is structured as follows………

# 2 RESEARCH BACKGROUND

Tourist indicators of Croatian tourism before and during the Covid-19 pandemic

The Republic of Croatia systematically follows modern tourist trends and is well positioned on the European tourist market. It is recognized as a stable, safe tourist destination, beautiful and rich natural and cultural-historical heritage. The Croatian tourism sector has been successful since Croatia’s independence and accession to the European Union, and has consistently recorded enviable results, until the outbreak of the coronavirus pandemic in 2020. According to the data published on the official website of the World Health Organization–WHO, by April 20, 2021, a total of 141,754,944 confirmed cases of COVID-19 were recorded, of which 3,025,835 deaths. According to the data reported to the WHO, from 3 January 2020 to 20 April 2021, 310,306 confirmed COVID-19 cases with 6,643 deaths were recorded in Croatia on the total population of 4,058,165

The SARS-CoV-2 virus pandemic has shaken the whole world and caused historically unique problems in all aspects of social and economic life. It has greatly affected the global economic activities. Measures taken to prevent virus spreading (social distancing, traffic restrictions, restrictions on commercial activity, borders closures, etc.) have affected in particular the service sector, tourism and hospitality. The analysis of selected indicators of tourism development in Croatia before and at the time of Covid-19 pandemic in Croatia, shows how much the pandemic affected the results in tourism.

According to the historical review of data on tourist arrivals and overnight stays in Croatia (table 1), a constant growth in tourist arrivals and tourist overnight stays can be observed until 2020. If we compare the nights and arrivals in 2019 with those from 2010, it could be stated that the results have almost doubled. Despite the favorable results, a sharp decline followed in 2020 with decrease in tourist arrivals by 64.2% and decrease in overnight stays by 55.3% in commercial accommodation in 2020 compared to 2019 year. The decline in arrivals and overnight stays followed among domestic and foreign tourists, with the same being more pronounced among foreign tourists, which can also be seen from Charts 1 and 2.

# 3 LITERATURE REVIEW

Tu fali uvodni dio.

Panyagometh ([2020](#ref-Pany)) used a sample of 46 stocks listed in the Stock Exchange of Thailand in order to analyze stock price reactions during pandemic. After applying event study methodology in order to empirically measure abnormal returns and volatility, research results suggest that the majority of stocks in the Stock Exchange of Thailand have been negatively affected by Covid-19 pandemic. On the other side authors have also found that some stocks had positive returns, these stocks are included in commerce sector- companies which are included in distribution of pharmaceutical products and services. Irfan, Kassim and Dhimmar (2021) analyzed the impact of COVID-19 on the performance of Indian stock exchange and Indonesian Stock Exchange. Author included three different event windows because they wanted to check results in different time periods. The analysis of both countries showed opposite results since Indian stock market showed downward sloping after WHO declaration, and Indonesian upward. Albulescu ([2020](#ref-Abul)) researched new COVID-19 official cases announcements and death ratio on the financial markets volatility index (VIX). Authors has concluded that new cases reported outside China has positive impact on VIX, death ratio has significant positive impact on VIX, and the spread of the COVID-19 increase financial volatility. Chia, Khim-Sen Liew and Rowland (2020) research the relation between Malaysian stock market and variables related to COVID-19 their results suggest that daily new cases had negative but insignificant impact on the indices returns. On the other hand authors also found that movement control order had significant and positive impact on all indices’ returns which is quite surprising.

# 4 METHODOLOGY

Pandemic

Index

Return\_sum

Return\_avg

Return\_sd

Return\_min

Return\_max

Ongoing

CrobexInd

-24.359

-0.609

4.116

-14.690

7.481

Ongoing

CrobexKonstr

-16.624

-0.416

4.652

-15.300

10.850

Ongoing

CrobexNutr

-26.150

-0.654

3.719

-12.460

6.432

Ongoing

CrobexTr

-25.882

-0.647

3.363

-11.313

5.460

Ongoing

CrobexTur

-25.204

-0.630

3.361

-10.975

6.572

Post

CrobexInd

40.059

0.159

1.282

-3.772

8.295

Post

CrobexKonstr

77.072

0.306

2.340

-6.538

8.203

Post

CrobexNutr

9.040

0.036

1.423

-11.098

6.014

Post

CrobexTr

17.694

0.070

0.631

-1.821

2.998

Post

CrobexTur

22.590

0.090

1.150

-3.223

5.170

Pre

CrobexInd

-1.412

-0.005

1.256

-4.032

6.658

Pre

CrobexKonstr

-31.339

-0.114

2.261

-8.131

6.921

Pre

CrobexNutr

42.658

0.156

1.763

-10.661

8.707

Pre

CrobexTr

19.076

0.070

0.418

-1.609

2.053

Pre

CrobexTur

-0.430

-0.002

0.623

-2.004

2.868

## 4.1 DATA

The analysis examines the Croatian stock market reaction to the announcement of first reported COVID-19 pandemic incidence in Italy. Since the pandemic was gaining momentum worldwide and it was highly anticipated by investors that it will spread into the Europe, we set the event day one week prior to the fist officially reported case in Italy.

This research paper will study the impact of variables related to the COVID 19 pandemic on the shares of the tourism sector listed on the Croatian capital market. The study used daily closing stock prices in order to calculate daily percentage returns. However, since the Croatian capital market has major liquidity problems out of a total of XX shares listed on the Croatian capital market, in this study was used XX shares according to the criterion of the number of trading days, which had to be greater than 100.

Daily percentage changes of closing stock prices were calculated according to formula:

## 4.2 MODEL

This paper applies the event study methodology as described in Brown and Warner ([1985](#ref-BWarner)). This methodological approach is used to analyze stock markets reaction to the universe of possible events and in this study we are interested in the effect of COVID-19 pandemic outbreak on the tourist stocks listed on the Zagreb stock exchange. In order to estimate the economic impact of the event on the stock market performance, event study methodology measures the deviation of the stock`s retutrns from their historical average and tests weather the influence is translated into abnormal returns. Under the efficient market hypothesis, the stock market returns reflect all available information and price adjustment to the announcement of new information follows immediately (Fama ([1969](#ref-FamaETAL))).

The evidence of significant positive or negative abnormal returns is expected if the markets reaction to the event efficiently incorporates avaliable information.

Expected stock market returns are estimated in the pre-event time period, according to the formula:

where is the return of the stock *i* in the period *t*, is the avaliable information set and is the unexpected return component. There are multiple expected return models in the literature like market model, capital asset pricing model, Fama-French factor model and Carhart four factor model. In this analysis, the market model is applied with the following specification:

where represents the market portfolio return and in this particular empirical specification, Crobex index of ZSE is used to proxy general market. After the market model parameters are estimated, the expected returns during the event window are parametrised according to the specification:

.

The abnormal return is defined as a difference between the actual and expected return during the event window:

.

If AR systematically deviates from 0, this implies that the market misprices the event and implies a profitable arbitrage strategy. The cumulative abnormal return is a computed by aggregating abnormal returns:

The abnormal returns () for the stock *i* at day *t* is calculated as:

where the historical stock price average, i.e. normal return, is calculated over the period from from the first trading day of the 2019. until the event. The daily returns () are calculated according to the:

where represents the closing price of the stock *i* on the day *t*.

In the following step, cumulative abnormal returns during the event window are calculated acording to the following formula:

.

Conditional on the estimated according to the:

the null hypothesis that COVID-19 did not impact the Croatian tourist stocks can be rejected if the estimated value of CAR statistic lies outside the 95% confidence interval:

## 4.3 Insights from the data and topic identification

# 5 RESULTS AND DISCUSSION

## 5.1 Nonparametric tests

## date weekday percentage mean bw\_1980\_stat bw\_1980\_signif  
## 1 2020-02-24 ponedjeljak 100 -0.0253517374 -4.18776555 \*\*\*  
## 2 2020-02-25 utorak 100 -0.0168662994 -2.78608548 \*\*\*  
## 3 2020-02-26 srijeda 100 -0.0028612281 -0.47263635   
## 4 2020-02-27 četvrtak 100 -0.0012275795 -0.20277960   
## 5 2020-02-28 petak 100 -0.0040744550 -0.67304509   
## 6 2020-03-02 ponedjeljak 100 0.0106663761 1.76194167 \*  
## 7 2020-03-03 utorak 100 0.0014939110 0.24677397   
## 8 2020-03-04 srijeda 100 -0.0022980276 -0.37960321   
## 9 2020-03-05 četvrtak 100 -0.0033764014 -0.55773603   
## 10 2020-03-06 petak 100 -0.0084274128 -1.39209508   
## 11 2020-03-09 ponedjeljak 100 -0.0335319919 -5.53903341 \*\*\*  
## 12 2020-03-10 utorak 100 -0.0007096159 -0.11721899   
## 13 2020-03-11 srijeda 100 -0.0296381370 -4.89582103 \*\*\*  
## 14 2020-03-12 četvrtak 100 -0.0125579736 -2.07440808 \*\*  
## 15 2020-03-13 petak 100 0.0038293988 0.63256510   
## 16 2020-03-16 ponedjeljak 100 -0.0155702046 -2.57198808 \*\*  
## 17 2020-03-17 utorak 100 -0.0130909462 -2.16244798 \*\*  
## 18 2020-03-18 srijeda 100 -0.0080285123 -1.32620209   
## 19 2020-03-19 četvrtak 100 -0.0027287709 -0.45075619   
## 20 2020-03-20 petak 100 -0.0063838318 -1.05452302   
## 21 2020-03-23 ponedjeljak 100 -0.0055729549 -0.92057708   
## 22 2020-03-24 utorak 100 0.0061358307 1.01355658   
## 23 2020-03-25 srijeda 100 0.0135277150 2.23459631 \*\*  
## 24 2020-03-26 četvrtak 100 0.0040840745 0.67463410   
## 25 2020-03-27 petak 100 -0.0003058916 -0.05052918   
## 26 2020-03-30 ponedjeljak 100 0.0023558243 0.38915044   
## 27 2020-03-31 utorak 100 0.0079295220 1.30985022   
## 28 2020-04-01 srijeda 100 -0.0049073151 -0.81062236   
## 29 2020-04-02 četvrtak 100 -0.0011502233 -0.19000139   
## 30 2020-04-03 petak 100 0.0047497727 0.78459847   
## 31 2020-04-06 ponedjeljak 100 0.0099908642 1.65035619   
## 32 2020-04-07 utorak 100 -0.0013049513 -0.21556038   
## 33 2020-04-08 srijeda 100 -0.0072704178 -1.20097510   
## 34 2020-04-09 četvrtak 100 -0.0116394098 -1.92267373 \*  
## 35 2020-04-14 utorak 100 -0.0048957374 -0.80870988   
## bw\_1985\_stat bw\_1985\_signif t\_test\_stat t\_test\_signif pt\_stat pt\_signif  
## 1 -4.15476887 \*\*\* -2.06478699 \* -12.19939350 \*\*\*  
## 2 -2.76413306 \*\*\* -1.77332364 -4.30706518 \*\*\*  
## 3 -0.46891230 -0.52496852 -0.06175019   
## 4 -0.20118183 -0.28284774 0.50694751   
## 5 -0.66774196 -0.80178214 -1.56024269   
## 6 1.74805879 \* 1.32031771 3.81487894 \*\*\*  
## 7 0.24482956 0.26094998 0.10119379   
## 8 -0.37661220 -0.27610397 0.22781787   
## 9 -0.55334145 -0.66055418 -2.91889722 \*\*\*  
## 10 -1.38112634 -1.06602990 -5.59850396 \*\*\*  
## 11 -5.49538967 \*\*\* -2.00336824 \* -9.31405256 \*\*\*  
## 12 -0.11629538 -0.07852035 -2.83882659 \*\*\*  
## 13 -4.85724536 \*\*\* -2.32671208 \*\* -8.06117331 \*\*\*  
## 14 -2.05806319 \*\* -0.66090187 -5.54482180 \*\*\*  
## 15 0.62758092 0.35833908 2.10920680 \*\*  
## 16 -2.55172260 \*\* -0.91966035 -7.67777980 \*\*\*  
## 17 -2.14540939 \*\* -1.67845519 -1.94357793 \*  
## 18 -1.31575253 -0.75991382 -4.15354196 \*\*\*  
## 19 -0.44720455 -0.24907680 0.08029641   
## 20 -1.04621411 -1.02205820 -2.78961223 \*\*\*  
## 21 -0.91332357 -0.59208374 -3.83629196 \*\*\*  
## 22 1.00557046 0.60343754 2.18844928 \*\*  
## 23 2.21698924 \*\* 1.82839257 \* 6.72151962 \*\*\*  
## 24 0.66931845 0.96596721 1.41628145   
## 25 -0.05013105 -0.08090599 0.36008696   
## 26 0.38608421 1.31166110 0.87712261   
## 27 1.29952951 0.94183104 3.11618859 \*\*\*  
## 28 -0.80423522 -0.92272092 -2.09033351 \*\*  
## 29 -0.18850432 -0.33615017 0.43052245   
## 30 0.77841638 0.91580861 3.25555861 \*\*\*  
## 31 1.63735253 0.96155775 4.99413798 \*\*\*  
## 32 -0.21386192 -0.16417598 -0.76956480   
## 33 -1.19151225 -1.22828647 -3.45608764 \*\*\*  
## 34 -1.90752440 \* -1.39671291 -3.31336592 \*\*\*  
## 35 -0.80233781 -1.59589326 -1.66720757 \*  
## bh\_stat bh\_signif lmb\_stat lmb\_signif  
## 1 -2.24593003 \*\* -3.35089837 \*\*\*  
## 2 -1.63417288 -2.70167310 \*\*\*  
## 3 -0.03646777 -0.46155423   
## 4 0.22268190 -0.19846881   
## 5 -0.91361999 -0.64000240   
## 6 1.83792668 \* 1.74274640 \*  
## 7 0.06906562 0.24375695   
## 8 0.11698323 -0.37587259   
## 9 -1.35165310 -0.55056794   
## 10 -1.55001499 -1.31132157   
## 11 -2.24250979 \*\* -3.18998849 \*\*\*  
## 12 -1.07196506 -0.11525873   
## 13 -2.53852457 \*\* -4.04779174 \*\*\*  
## 14 -1.43040109 -1.11740835   
## 15 0.74875046 0.49061350   
## 16 -1.62034627 -1.75293186 \*  
## 17 -0.51379108 -2.06612399 \*\*  
## 18 -1.02718352 -1.18790369   
## 19 0.01933414 -0.44085173   
## 20 -1.04644892 -0.98883317   
## 21 -1.10086669 -0.83218098   
## 22 0.88912494 0.93408168   
## 23 2.04612207 \* 2.17434591 \*\*  
## 24 1.35483731 0.66229236   
## 25 0.40405871 -0.04919314   
## 26 1.52296713 0.38400604   
## 27 1.36915793 1.24645221   
## 28 -1.02580646 -0.79928156   
## 29 0.43086280 -0.18522120   
## 30 1.17381034 0.77139247   
## 31 1.44606086 1.34121074   
## 32 -0.47636099 -0.21161655   
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## 35 -1.20635791 -0.80048527

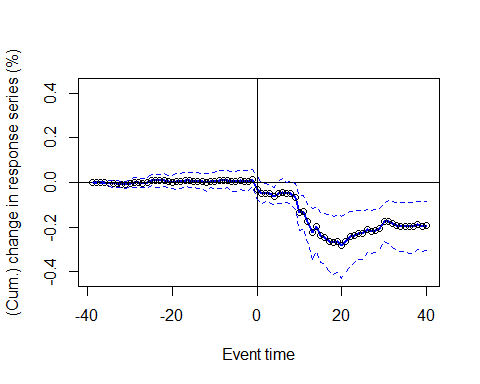
## 5.2 Parametric tests

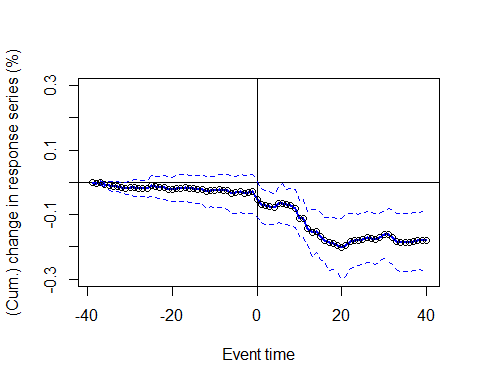
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## 2 2020-02-25 utorak 100 0.0000000 0.6948903  
## 3 2020-02-26 srijeda 100 -0.5773503 0.1060384  
## 4 2020-02-27 četvrtak 100 0.0000000 0.6948903  
## 5 2020-02-28 petak 100 0.5773503 1.2837421  
## 6 2020-03-02 ponedjeljak 100 0.5773503 1.2837421  
## 7 2020-03-03 utorak 100 -0.5773503 0.1060384  
## 8 2020-03-04 srijeda 100 -0.5773503 0.1060384  
## 9 2020-03-05 četvrtak 100 -0.5773503 0.1060384  
## 10 2020-03-06 petak 100 0.0000000 0.6948903  
## 11 2020-03-09 ponedjeljak 100 -0.5773503 0.1060384  
## 12 2020-03-10 utorak 100 -1.1547005 -0.4828134  
## 13 2020-03-11 srijeda 100 -2.3094011 \*\* -1.6605170  
## 14 2020-03-12 četvrtak 100 0.5773503 1.2837421  
## 15 2020-03-13 petak 100 -0.5773503 0.1060384  
## 16 2020-03-16 ponedjeljak 100 0.0000000 0.6948903  
## 17 2020-03-17 utorak 100 -2.3094011 \*\* -1.6605170  
## 18 2020-03-18 srijeda 100 1.1547005 1.8725939  
## 19 2020-03-19 četvrtak 100 0.5773503 1.2837421  
## 20 2020-03-20 petak 100 -1.7320508 \* -1.0716652  
## 21 2020-03-23 ponedjeljak 100 0.5773503 1.2837421  
## 22 2020-03-24 utorak 100 -1.1547005 -0.4828134  
## 23 2020-03-25 srijeda 100 -0.5773503 0.1060384  
## 24 2020-03-26 četvrtak 100 -0.5773503 0.1060384  
## 25 2020-03-27 petak 100 -1.7320508 \* -1.0716652  
## 26 2020-03-30 ponedjeljak 100 1.1547005 1.8725939  
## 27 2020-03-31 utorak 100 -1.1547005 -0.4828134  
## 28 2020-04-01 srijeda 100 0.5773503 1.2837421  
## 29 2020-04-02 četvrtak 100 -1.7320508 \* -1.0716652  
## 30 2020-04-03 petak 100 -1.1547005 -0.4828134  
## 31 2020-04-06 ponedjeljak 100 -0.5773503 0.1060384  
## 32 2020-04-07 utorak 100 -2.3094011 \*\* -1.6605170  
## 33 2020-04-08 srijeda 100 0.0000000 0.6948903  
## 34 2020-04-09 četvrtak 100 -0.5773503 0.1060384  
## 35 2020-04-14 utorak 100 -2.8867513 \*\*\* -2.2493688  
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## 4 0.5552777 0.8618291 0.8618291  
## 5 0.5552777 0.8597868 0.8597868  
## 6 1.1105554 1.6848554 \* 1.6848554  
## 7 -0.2776389 -0.1123237 -0.1123237  
## 8 0.8329166 0.3185908 0.3185908  
## 9 0.2776389 0.3185908 0.3185908  
## 10 0.2776389 0.3676048 0.3676048  
## 11 -0.2776389 -0.6678154 -0.6678154  
## 12 -0.5552777 -1.0538005 -1.0538005  
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## 14 0.2776389 0.3471823 0.3471823  
## 15 -0.2776389 -0.5289425 -0.5289425  
## 16 0.0000000 0.1552109 0.1552109  
## 17 \* -1.1105554 -2.0667560 \*\* -2.0667560  
## 18 \* 0.5552777 0.9761950 0.9761950  
## 19 0.8329166 1.3315463 1.3315463  
## 20 -0.8329166 -1.5480247 -1.5480247  
## 21 0.2776389 0.4064075 0.4064075  
## 22 -0.5552777 -1.0068287 -1.0068287  
## 23 -0.2776389 -0.2797881 -0.2797881  
## 24 -0.2776389 -0.4166188 -0.4166188  
## 25 -0.8329166 -1.4111940 -1.4111940  
## 26 \* 1.3881943 1.9871082 \*\* 1.9871082  
## 27 -0.5552777 -0.9251388 -0.9251388  
## 28 0.8329166 1.0803497 1.0803497  
## 29 -0.8329166 -1.3826026 -1.3826026  
## 30 -0.5552777 -0.6964069 -0.6964069  
## 31 -0.2776389 -0.4247878 -0.4247878  
## 32 \* -1.1105554 -1.8216861 \* -1.8216861  
## 33 0.5552777 0.7127449 0.7127449  
## 34 0.5552777 -0.2348586 -0.2348586  
## 35 \*\* -1.3881943 -1.3254196 -1.3254196  
## mrank\_signif wlcx\_stat wlcx\_signif  
## 1 19   
## 2 27   
## 3 35   
## 4 40   
## 5 39   
## 6 \* 55   
## 7 33   
## 8 35   
## 9 29   
## 10 30   
## 11 15 \*  
## 12 27   
## 13 \*\* 13 \*\*  
## 14 38   
## 15 36   
## 16 34   
## 17 \*\* 13 \*\*  
## 18 42   
## 19 46   
## 20 21   
## 21 34   
## 22 37   
## 23 50   
## 24 40   
## 25 24   
## 26 \*\* 57 \*  
## 27 35   
## 28 41   
## 29 23   
## 30 36   
## 31 48   
## 32 \* 14 \*\*  
## 33 34   
## 34 22   
## 35 3 \*\*\*

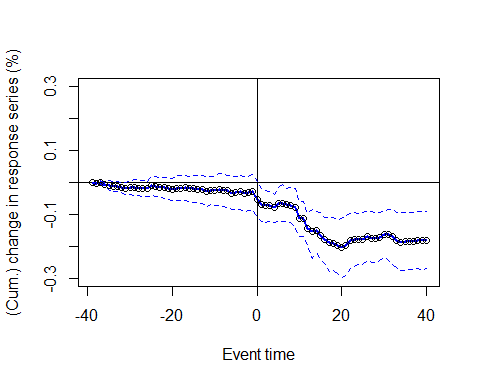
## 5.3 Visual presentation of results

It is observed that the cumulative abnormal return runs beyond the confidence interval after the time in the negative side, indicating that the market performed well before the Wuhan lockdown, however, the lockdown adversely affect the market, which is represented by the Caissa, and the market declined sharply and achieve significant negative abnormal return.

The blue line represent the companies’ return, and since is inside the abnormal area (doted lines) it shows the anormality of the series. However, the five days windw presents results equal zero, this mean that even if the event appears to cause disturbance in the series, it isn’t statistic significant.

In this first example, raw stock market returns was utilised in the event study. It is importantto emphasise that the event study is a statistically valid tool even under these circumstances. Averaging across multiple events isolates the event-related fluctuations. However, there is aloss of statistical efficiency that comes from fluctuations of stock prices that can have nothingto do with firm level news. In order to increase efficiency, we resort to adjustment of thereturns data. 





# 6 CONCLUSION

This analysis provides empirical evidence on the direct reactions of ZSE listed tourist firm to the outbreak of COVID-19 global pandemic by application of the event stud methodology. The results confirm that COVID-19 pandemic has affected tourist stocks by triggering the negative above average cumulative return during the event period. Hovever, the pandemic effect seems not to be the the strongst in the tourist sector which might be due to the low liquidity of tourist stocks on the ZSE, structure of croatian economy and exclusion of croatian stock market from global financial trends. It would be useful to further examine the reasons for the unequal sectoral distribution of pandemic effects in the local and global markets.

# 7 BIBLIOGRAPHY

Albulescu, Claudiu. 2020. “Coronavirus and financial volatility: 40 days of fasting and fear.” Papers 2003.04005. arXiv.org. <https://ideas.repec.org/p/arx/papers/2003.04005.html>.

Brown, Stephen, and Jerold B. Warner. 1985. “Using Daily Stock Returns: The Case of Event Studies.” *Journal of Financial Economics* 14 (1): 3–31. <https://EconPapers.repec.org/RePEc:eee:jfinec:v:14:y:1985:i:1:p:3-31>.

Fama, et al, Eugene F. 1969. “The Adjustment of Stock Prices to New Information.” *International Economic Review* 10 (1): 1–21. <https://EconPapers.repec.org/RePEc:ier:iecrev:v:10:y:1969:i:1:p:1-21>.

Panyagometh, Kamphol. 2020. “The Effects of Pandemic Event on the Stock Exchange of Thailand.” *Economies* 8 (4): 1–22. <https://ideas.repec.org/a/gam/jecomi/v8y2020i4p90-d433708.html>.