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Abstract

This note aims to investigate the impact of the national lockdown adopted by the Italian government on hotel performance. For this purpose, a difference-in-differences (DID) methodology is employed to compare the performance of the hotel industry in Italy and Turkey during the post-treatment period. The empirical findings based on a daily unbalanced panel data set indicate that the national lockdown adopted by the Italian government to stem the COVID-19 spread mitigated the level of hotel performance by 68% on average. Our empirical findings survive robustness checks to account for alternative proxies of hotel performance and the inclusion of time fixed effects on the model.

Keywords: COVID-19; Hotel industry; Lockdown; Difference-in-Differences; Italy

JEL classification: Z31; Z38; C23

1. Introduction

Soon enough from the first reported case in Wuhan (December 2019), the COVID-19 has been transformed into a pandemic (March 2020). Amid the pandemic, numerous countries all over the world steered to adopt social distancing and several lockdown measures (i.e. travel and tourism restrictions, border shutdowns, etc) to curb its spread, with serious economic consequences.

The hotel industry constitutes one of the four main travel and tourism pillars (e.g. airlines, cruise lines, and car rentals) that has been entirely hit by the pandemic crisis (Sharma and Nicolau, 2020; Zenker and Kock, 2020). The relevant industry has already tossed from COVID-19 since hotel companies must deal with a dual crisis; declining demand and increased prices for their services jeopardizing the profitability level in the industry. Although the long-term consequences of this pandemic crisis are difficult to estimate, some studies are attempting to trace the short-term consequences of the pandemic.

In a recent study Sharma and Nicolau, (2020), adopt a market-based model to quantify the impact of COVID-19 on several global travel and tourism industries including the hotel sector. They find that each of the investigated industries has experienced a substantial fall in valuation because of the pandemic crisis. Qiu et al., (2020), estimate residents' willingness to pay (WTP) to reduce the risk associated with tourism activities in three Chinese cities amid the COVID-19 pandemic crisis. The empirical findings reveal that most respondents were willing to pay for risk reduction and action in responding to the COVID-19, although younger residents were willing to pay more for risk reduction. They also argue that residents' WTP is significantly driven by demographic and economic characteristics such as age, income, and tourism employment. While most of these studies have tried to focus on the economic consequences of COVID-19 on the tourism sector emphasizing the hotel industry, scarce attention has been paid to the effectiveness of the underlying restrictive measures on the performance of the hotel industry.

This study aims to focus on the impact of the national lockdown on hotel performance, in one of the most prevalent tourism destination (Italy). For this purpose, a difference-in-differences (DID) methodology is employed to compare the performance of the hotel industry in Italy and Turkey during the post-treatment period (e.g. after the national lockdown in Italy).

2. Research design and methodology

To assess the (short-term) effect of national lockdown on the hotel industry, this study identifies, two major tourist destinations within the South-East European territory. The first is Italy (treatment group), regarded as one of the most prominent tourist destinations with a possibility of a strong hotel performance effect after the implementation of the national lockdown measure taking its effect in 10.3.2020.[1] As a control group, Turkey was selected, since its hotel industry constitutes one of the most competitive sectors in the country, with a relatively increasing growth rate (Esen and Uyar, 2012). Therefore, Turkey can be considered as a properly comparable country to Italy, but unaffected by the (short-term) national lockdown since it has never adopted a total lockdown regime like Italy and other tourism countries (e.g. Spain, Portugal, Greece) but only transitory restrictive measures (e.g. local lockdowns, health checks, hygiene measures, social distancing, etc).

The sample is an unbalanced daily panel data set comprising of 5 cross-section units based on the hotel classes (luxury, midscale, upper midscale, upper-upscale,

[1] https://www.usnews.com/news/business/articles/2020-03-09/italians-unravel-new-world-of-strict-virus-control-measures

upscale), over the period 30.5.2019 to 18.5.2020. The closing date denotes the termination of the national lockdown measure. The sample was drawn from the well-established hotel database (Smith Travel Research).

Table 1 presents the summary statistics. As it is evident, the logged rooms availability (LSUPPL) exhibits the lowest standard deviation among the (non-binary) sample variables equal to 0.669, while, the logged occupancy rate (LOCC) the highest (4.190). Nearly all the sample variables are negatively skewed, except for the logged average daily room rate variable (LADR), though the absolute numbers are close to zero. Moreover, the logged occupancy rate has the highest (excess) kurtosis value equal to 6.172 (heavy-tailed) revealing a leptokurtic distribution.

<Table 1>

The empirical specification is given by the following equation:

$$\log(TREV_{ijt}) = b_o + b_1 Time_t + b_2 Treated_j + b_3\, Time_t \times Treated_j + X_{ijt}d + \varepsilon_{ijt} \qquad (1)$$

where $\log(TREV_{ijt})$ denotes the logged total room revenues of hotel class i in country j at day t.[2] $Time_t$ is a dummy variable equal to one after the general lockdown (10.3.2020) and zero otherwise, $Treated_j$ is a dummy variable equal to one for the country affected by the lockdown (Italy) and zero otherwise (Turkey), $Time_t$x$Treated_i$ denotes their interaction effect (DID estimator), X_{ijt} is a matrix of control variables (average room daily rate and rooms availability) and ε_{ijt} is an i.i.d error term containing unobservable factors, with $E(\varepsilon_{ijt}|Time_t,Treated_i,X_{ijt})= 0$.

The coefficient b_1 indicates the time trend change in total revenue of hotel properties. The coefficient b_2 indicates the single difference between the treated and the control groups at the baseline (e.g. before the lockdown), while the estimate b_3 is the

[2] As in Yeon et al, (2020), we used the natural logarithmic of total revenues since the relevant variable is highly skewed.

basic parameter capturing the impact of the national lockdown (Villa 2016). Lastly, the estimated coefficients b_0+b_1, denote the mean outcome of the control group in the follow-up period (e.g. after the lockdown).

3. Results and discussion

We begin our analysis by conducting a statistical test on the assumption of parallel paths developed in Mora and Reggio, (2014), regarding the hotel performance indicator properly proxied by the total room revenues (see Yeon et al., 2020) to assess the inclusion of the two countries (Italy and Turkey) as treatment and control group respectively.[3] The test result cannot reject the null hypothesis (p-value = 0.7890) suggesting the existence of the assumption of parallel paths. This means that the treated and control group have common pre-treatment dynamics denoting that revenue trends between the two groups would be the same in the absence of treatment (see also Figure 1).

<Figure 1>

The identification of the impact of the lockdown measure is obtained within a DID framework. The relevant methodology interacts with all regressors and constant with the (policy) dummy variable ($Time_t$), to allow the coefficients to vary after the lockdown period.

Table 2 presents the empirical findings of a simple baseline-follow up comparison of the logged total hotel room revenues covered by the treatment group (Italy). The DID estimator is negative and statistically significantly correlated with the hotel performance indicator (LTREV). The average total hotel room revenues decrease by 66.4% after the adoption of the national lockdown (see column 1).

[3] The relevant test is conducted using the Stata command "*didq*" developed in Mora and Reggio, (2014). We have also performed this test to the other two hotel performance indicators (occupancy rate and revenues per available room) and the null hypothesis cannot be rejected.

This estimate is not much affected when controlling for year (column 2), month (column 3), and day fixed effects (column 4). It is also robust to the inclusion of the interaction between day and country fixed effects (column 4). Regarding the covariates, logged ADR, and rooms available (logSUPPL) exhibit a positive and statistically significant correlation with the dependent variable, aligned with previous studies (see Yeon et al, 2020).

<Table 2>

To test the robustness of our findings, we conduct sensitivity analysis by using two alternative hotel performance indicators namely occupancy and revenue per available room, as suggested by the existing literature (Yeon et al, 2020; Haywood et al., 2016; Viglia et al., 2016; Xie and Kwok, 2017). The results indicate that the national lockdown has a negative and statistically significant effect on hotel performance with its magnitude ranging from -0.664 to -0.670 (see Table 3). This result is consistent with our previous findings.

<Table 3>

4. Conclusion

The empirical findings reveal that the national lockdown adopted by the Italian government to stem the COVID-19 spread mitigated the level of hotel performance by 68% on average. This result is robust to alternative proxies of hotel performance and different methodologies (Fixed Effects). Since daily data are used, the empirical analysis reflects the instant policy effect (e.g. national lockdown) on hotel performance. However, this research is not free from limitations. The most prominent one is related to the selection of only two groups (Italy and Turkey), to examine the causal effect of national lockdown on hotel performance. As an avenue for future research, it would be useful to research with multiple spatial pairs (countries, regions, states, etc).

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Figure 1: Total hotel room revenues before treatment (logarithmic scale)

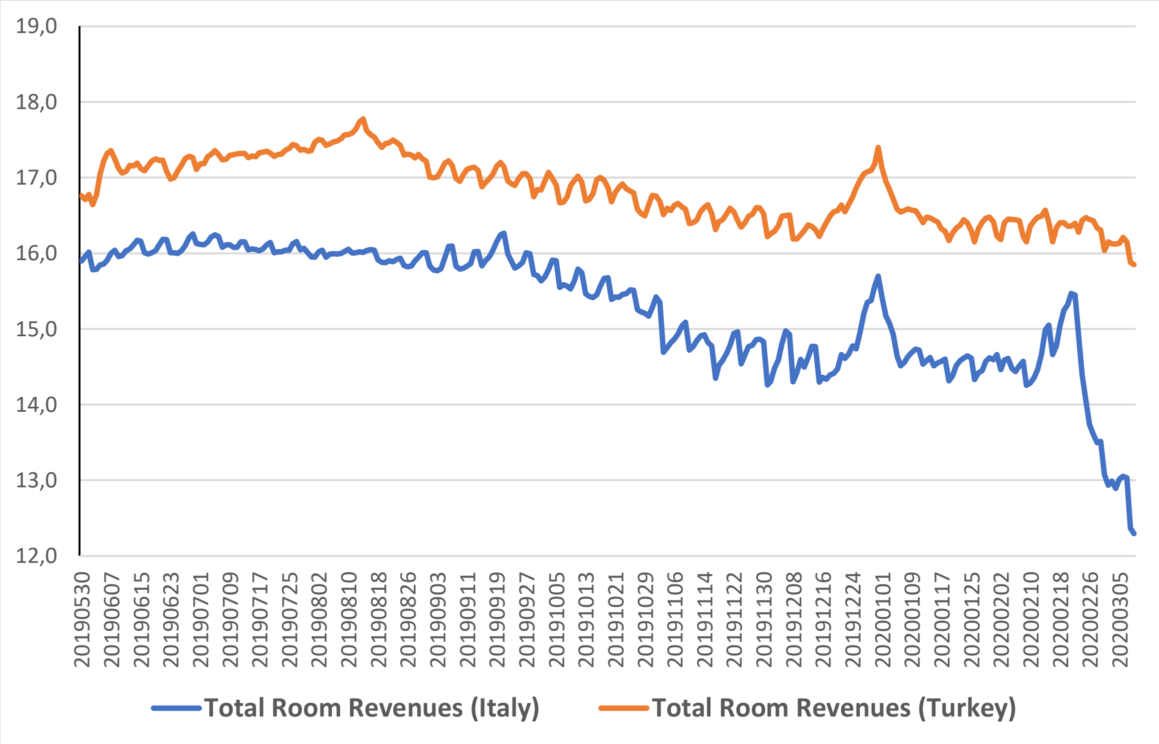

Table 1: Summary statistics

Variables	**Observations**	**Mean**	**Standard deviation**	**Median**	**Minimum**	**Maximum**	**Skewness**	**Kurtosis**
log(TREV)	3,473	15.44	1.397	15.46	9.811	17.78	-0.802	3.553
log(PAR)	3,473	4.697	1.351	4.871	0.647	7.764	-0.512	3.101
log(OCC)	3,473	3.826	4.190	-0.140	4.543	0.868	-1.944	6.172
log(ADR)	3,473	5.476	0.941	5.455	3.834	7.908	0.294	2.314
log(SUPPLY)	3,473	10.75	0.669	10.90	9.164	11.59	-0.437	1.833
Treated	3,550	0.5	0.5	0.5	0	1	0	1
Time	3,550	0.197	0.398	0	0	1	1.522	3.317

Table 2: DID estimation results before and after the treatment

	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Estimation method	OLS	FE	FE	FE	FE
Dependent variable	$log(TREV)_{ijt}$	$log(TREV)_{ijt}$	$log(TREV)_{ijt}$	$log(TREV)_{ijt}$	$log(TREV)_{ijt}$
$Treated_i$	-0.144*** (0.017)	-	-	-	-
$Time_i$	-1.652*** (0.0327)	-1.395* [0.144]	-0.651 [0.405]	-0.660 [0.431]	-0.660 [0.433]
$Treated_i \times Time_{it}$	**-0.664*** (0.051)**	**-0.664*** [0.00110]**	**-0.668** [0.0109]**	**-0.670** [0.0110]**	**-0.670** [0.0110]**
$log(ADR_{it})$	0.975*** (0.010)	0.946** [0.0321]	0.925** [0.0200]	0.924** [0.0192]	0.924** [0.0192]
$log(SUPPL_{it})$	1.158*** (0.011)	1.137** [0.0663]	1.121** [0.0542]	1.120** [0.0532]	1.120** [0.0535]
Constant	-1.918*** (0.146)	-1.518* [0.852]	-0.333 [0.193]	-0.347 [0.159]	-0.348 [0.180]
Observations	3,473	3,473	3,473	3,473	3,473
Adjusted R^2	0.920	0.911	0.925	0.927	0.927
Year FE	No	Yes	Yes	Yes	Yes
Month FE	No	No	Yes	Yes	Yes
Day FE	No	No	No	Yes	Yes
Day × Country FE	No	No	No	No	Yes

Notes: DID estimators in bold. Bootstrapped standard errors after 500 repetitions in parentheses. Robust standard errors adjusted for two clusters in $Treated_i$ variable in square brackets. Country FE are included but not reported. Significant at ***1%, **5% and *10% respectively.

Table 3: Robustness checks before and after the treatment

	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**
Estimation method	OLS	FE	FE	FE	FE	OLS	FE	FE	FE	FE
Dependent variable	log(OCC_{ijt})	log(OCC_{ijt})	log(OCC_{ijt})	log(OCC_{ijt})	log(OCC_{ijt})	log$(PAR)_{ijt}$	log$(PAR)_{ijt}$	log$(PAR)_{ijt}$	log$(PAR)_{ijt}$	log$(PAR)_{ijt}$
$Treated_i$	-1.652*** (0.0330)	-	-	-	-	-1.652*** (0.0319)	-	-	-	-
$Time_i$	-0.144*** (0.0192)	-1.395* [0.144]	-0.651 [0.405]	-0.660 [0.431]	-0.660 [0.433]	-0.144*** (0.0171)	-1.395* (0.144)	-0.651 (0.405)	-0.660 (0.431)	-0.660 (0.433)
$Treated_i$ × $Time_{it}$	**-0.664*** (0.0529)**	**-0.664*** [0.0011]**	**-0.668** [0.0109]**	**-0.670** [0.0110]**	**-0.670** [0.0110]**	**-0.664*** (0.0508)**	**-0.664*** (0.00110)**	**-0.668** (0.0109)**	**-0.670** (0.0110)**	**-0.670** (0.0110)**
log(ADR_{it})	-0.0251** (0.0112)	-0.0538 [0.0321]	-0.0753 [0.0200]	-0.0763 [0.0192]	-0.0762 [0.0192]	0.975*** (0.0104)	0.946** (0.0321)	0.925** (0.0200)	0.924** (0.0192)	0.924** (0.0192)
log($SUPPL_{it}$)	0.158*** (0.0103)	0.137 [0.0663]	0.121 [0.0542]	0.120 [0.0532]	0.120 [0.0535]	0.158*** (0.0105)	0.137 (0.0663)	0.121 (0.0542)	0.120 (0.0532)	0.120 (0.0535)
Constant	2.688*** (0.141)	-0.355 [0.165]	4.272** [0.193]	4.258** [0.159]	4.257** [0.180]	-1.918*** (0.141)	-1.518 (0.852)	-0.333 (0.193)	-0.347 (0.159)	-0.348 [0.180]
Observations	3,473	3,473	3,473	3,473	3,473	3,473	3,473	3,473	3,473	3,473
Adjusted R^2	0.794	0.817	0.846	0.850	0.851	0.915	0.897	0.913	0.915	0.915
Year FE	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Month FE	No	No	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Day FE	No	No	No	Yes	Yes	No	No	No	Yes	Yes
Day × Country FE	No	No	No	No	Yes	No	No	No	No	Yes

Notes: See Table 2.