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The impact of policy responses to COVID-19 on U.S. travel and leisure companies

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ABSTRACT
This paper analyzes the impact of government restrictions arising from the COVID-19 pandemic on stock returns of U.S. travel and leisure companies. We demonstrate that the stringency of government restrictions has a negative impact on stock returns even after controlling for the pandemic itself. Moreover, stock prices of travel and leisure firms with a smaller size, less tangibility, and higher cash reserves are more resilient to the COVID-19 related government restrictions. Restrictions have the highest impact on airlines, followed by travel and tourism and casinos and gambling sectors. Our empirical findings provide valuable policy implications for travel and leisure firm managers, financial investors, and policymakers.

1. Introduction

The novel coronavirus (COVID-19) outbreak began in Wuhan, China, in December 2019, and the first known death was reported on January 11, 2020. The novel coronavirus spread rapidly, especially to Western Europe and the United States. On March 11, 2020, the World Health Organization declared a global pandemic. Although there have been several epidemics and pandemics since the 1980s, none have had such major consequences for the global economy as COVID-19 (Gössling, Scott, & Hall, 2020)1. Asymptomatic transmission, human mobility, and lack of mass testing have increased the global spread of the virus. To contain the expansion of COVID-19 and flatten the death and infection curves, numerous governments have implemented a range of policy responses, such as the enforcement of social distancing, the obligatory wearing of masks in public, limitations on internal and international travel, border closures, stay-at-home requirements, and limitations on gathering size.

Those restrictions dramatically affect the tourism and hospitality industry, which was already suffering from low-profit margins, vulnerability to external shocks, higher leverage, and rising competition (Thams, Zech, Rempel, & Ayia-Koi, 2020). In fact, the pandemic may cause a complete market failure for the global tourism and hospitality industry (Thams et al., 2020). UNWTO (2020) has developed three scenarios, which point to a decline of 58%, 70%, and 78% in international tourist arrivals. These scenarios are constructed based on the duration of travel restrictions, border closures, and the speed of containment. The best-case scenario, projecting a 58% decrease in tourist arrivals, estimates that approximately 100 million jobs will be at risk.

International, regional, and domestic restrictions directly affect the hospitality and tourism value chain in terms of, for instance, international and domestic travel, airlines, daily visits, cruises, hotels, restaurants, conventions, festivals, and meetings. Companies reduced their services or stopped operating for an indefinite period depending on the easing of restrictions, which resulted in an abrupt cut-off of their revenue streams (Gössling,
In the way, restrictions require households to use fewer services requiring close human interaction, such as domestic tourism, restaurants and bars, and recreational activities, while shifting demand towards basic needs and pharmaceuticals (Maliszewska et al., 2020). Accommodation services have ground to a halt and restaurants are shuttering (Wen, Wang, Kozak, Liu, & Hou, 2020). The cancellation of events and closed accommodations have an impact on links in the supply chain, such as catering and laundry services. In most countries, restaurants have closed their dining rooms to maintain social distancing or have switched to take-away and/or delivery services (Gössling, Scott, & Hall, 2020). Casinos and the gambling sector mostly depend on air travel and large gatherings of people in closed areas. Therefore, they have had to close during the pandemic and move as much of their operations as possible online. Since travel restrictions are not been imposed worldwide in response to the COVID-19 pandemic (UNWTO, 2020), airlines have not able to operate as usual and are now facing severe liquidity problems.

In this paper, we explore the impact of government responses to COVID-19 on the stock returns of travel and leisure companies listed in the United States. While many studies have examined the impact of epidemics or pandemics on tourism demand (among others, see Zeng, Carter, & De Lacy, 2005; Kuo, Chen, Tseng, Ju, & Huang, 2008; Chen, 2011; Rosselló, Santana-Gallego, & Awan, 2017; Karabulut, Bilgin, Demir, & Doker, 2020), the effect on the stock returns of tourism and hospitality companies is not yet well explored. There are a few exceptions, such as Chen, Jang, and Kim (2007) and Chen (2011) on Severe Acute Respiratory Syndrome (SARS); Kim, Kim, Lee, and Tang (2020) on the effect of nine epidemics; and more recently, Song, Yeon, and Lee (2020) on COVID-19. In general, previous articles (Chen et al., 2007; Kim et al., 2020) adopted an event study approach by choosing the outbreak of an epidemic as the event. In contrast, our method examines how government responses to COVID-19 affect the stock returns of travel and leisure companies listed in the U.S. Articles employing the event study framework cannot accommodate the influence and timing of the policy interventions, as they rely on the outbreak of the pandemic as the event date and then use it to calculate the abnormal and cumulative abnormal returns.

To the best of our knowledge, we are the first to examine the impact of government responses to COVID-19 on stock returns of travel and leisure companies in the U.S. In a recent study, Song et al. (2020) explore the impact of COVID-19 on U.S. restaurant firms’ stock returns. Our study focuses on the role of government responses while controlling for the impact of COVID-19. We also perform a more comprehensive analysis as our data sets include not only restaurants but also firms operating in airlines, casinos and gambling, hotels and motels, recreational services, and the travel and tourism sectors. Moreover, it allows us to compare the magnitude of the effect on different sectors. The restrictions designed to flatten the infection curve reduced the cash flow of these firms. Travel restrictions have weakened demand, as people were not allowed to travel domestically or internationally, or generally, leave their homes. Therefore, additional containment and closure measures have harmed the stock prices of travel and leisure companies. Although all firms have suffered from COVID-19 restrictions, some suffer more than others. For this reason, we also investigate how pre-2020 corporate characteristics affect the reactions of stock prices to government responses to COVID-19 (Bates, Kahle, & Stulz, 2009; Ding, Levine, Lin, & Xie, 2020; Kahle & Stulz, 2013; Pinkowitz, Stulz, & Williamson, 2016).

Following Ding et al. (2020), Heyden & Heyden, 2020, and Song et al. (2020), we consider five pre-2020 characteristics of financial firms: size, profitability, tangibility, cash, and leverage. By examining these characteristics simultaneously, we can better identify the association between corporate characteristics and stock price reactions to government responses to COVID-19. Leverage is expected to intensify the negative stock price reaction to the pandemic, as highly leveraged firms may face major difficulties in obtaining external financing when the cash flow stops. Moreover, the restrictions directly lower or stop sales which can decrease the interest coverage ratio of the firms. For example, although the restrictions have stopped domestic and international flights, airlines still need to meet their financial obligations. Size and tangibility will exacerbate the negative reaction, as those companies will need to cover higher fixed costs and have less flexibility. The policy responses may limit cash flow and liquidity, but firms with higher money reserves will be less affected by the restrictions. In normal times, holding excess cash can be considered as negative because of the high opportunity cost; but it can provide shelter to firms in times of uncertainty.

Using Hale, Petherick, Phillips, and Webster’s (2020) COVID-19 Government Response Stringency Index (hereafter Stringency Index or SI), and after controlling for the COVID-19 pandemic with the growth rate of confirmed cases/deaths, we show that the Stringency Index has a negative impact on stock returns of travel and leisure companies in the U.S. This implies that the growth of confirmed cases does not affect the stock returns of travel and leisure companies; rather, the restrictions lead to a decrease in stock returns. In addition, the negative impact is stronger among airlines, tourism, and travel, and the casino and gambling sectors. We also show that stock prices of firms that are smaller, that have less tangibility, and that have more cash reserves can withstand the restrictions better. In other words, the drop in stock prices induced by the COVID-19 restrictions is larger for firms with greater tangibility, larger size, and fewer cash reserves.

The paper follows this structure: Section 2 presents the literature review. Data are discussed in Section 3 and methodology is described in Section 4. The findings are reported and discussed in Section 5. In Section 6 we present the major conclusions and implications.

2. Literature review

There is fast-growing literature on the impact of COVID-19 on stock markets. Al-Awadhi, Al-Saifi, Al-Awadhi, and Alhamadi (2020) examine how the COVID-19 pandemic, proxied by the daily growth in total confirmed cases and total deaths, has affected stock returns in China. While they show a significant negative effect of COVID-19 on stock returns, no impact is documented for hotels in China. By using the event study approach, Liu, Manzoor, Wang, Zhang, and Manzoor (2020) find that the COVID-19 outbreak leads to a decrease in stock returns in global stock markets, and especially for Asian countries. The number of confirmed cases also leads to a significant decrease in abnormal returns. In their comprehensive study, Ding et al. (2020) find that stock market returns of firms with strong financial positions, less international exposure, and strong corporate social responsibility strategies are less affected by COVID-19 proxied by the growth rate of the number of confirmed cases. Those studies document the strong negative effects of the pandemic on stock returns by using the growth rate of confirmed COVID-19 cases/deaths as the proxy.

Furthermore, Heyden & Heyden, 2020 document that firms with higher tangible assets, bigger size, and greater liquidity appear less affected by the pandemic. Fahlenbrach, Rageth, and Stulz (2020) show that firms with greater financial flexibility are less affected by the pandemic because they can better compensate for the decline in revenue. Zechner, Pagano, and Wagner (2020) and Laeven (2020) find that an operation’s sensitivity to social distancing determines the impact of Covid-19 on firms. In their multi-country analysis, Zaremba, Kizys, Tzouvanas, Aharon, and Demir (2020) find that stock markets of countries with low unemployment rates and firms with conservative investment policies tend to be more resilient to COVID-19. A strand of this literature examines the impact of government responses on stock markets. Zaremba, Kizys, Aharon, and Demir (2020) examine the COVID-19 Government Response Stringency Index on stock return volatility in 67 countries. They show that stock market volatility increases when government measures are stricter. By using the stringency measure, Kizys, Tzouvanas, and Donadelli (2020) document that investor herding behavior is mitigated by the Oxford Government Response Stringency Index.

To our knowledge, there is scarce literature exploring the impact of diseases on the performance of hospitality companies. Chen et al. (2007),
using event study methodology, show that the Severe Acute Respiratory Syndrome (SARS) outbreak in 2004 led to a decrease in hotel stock returns in Taiwan. In a later study, Chen (2011) examine the impact of SARS on several performance measures, including stock returns, by using a dummy variable; again, the negative impact of SARS on stock returns was documented for Taiwanese hotels. Kim et al. (2020) consider the impact of nine epidemics on the financial performance of the restaurant industry in the U.S. The event study method showed a negative influence of epidemics on restaurants’ stock returns of restaurants. Song et al. (2020) explore the impact of COVID-19 on U.S. restaurant firms’ stock returns. It is shown that firms with a larger size, more leverage, more cash flow, lower Return on Assets (ROA), and more internationalization are more resilient to the effects of COVID-19. However, no mitigation effect of dividend, franchising, institutional ownership, and managerial ownership is documented.

3. Data

We collect daily stock returns of companies listed in the U.S. from Datastream. The study period runs from 2 January 2020 to 30 April 2020, or 83 trading days for each company. Following Alles and Murray (2017), firms with no trading data on more than 50% of trading days in the given period have been removed. Hence, the final sample consists of 134 companies. We focus on all available firms from the “Travel and Leisure” sector (according to the Datastream definition), composed of the “Airlines,” “Casinos and Gambling,” “Hotels,” “Recreational Services,” “Restaurants and Bars,” and “Travel and Tourism” subsectors.3 This subsector analysis allows us to compare the effect of COVID-19 restrictions on different categories of firms. Table 1 presents the number of companies in each subsector; the full list is in Table A1 in the Appendix.

To measure the stringency of government policy responses to the COVID-19 pandemic, Hale et al. (2020) develop the COVID-19 Government Response Stringency Index, based on different government interventions and rescaled to create a score between 0 and 100, from the least (0) to the most (100) stringent policy responses. As of May 2020, the index covers eight policy indicators on containment and closure policies (school closing, workplace closing, cancellation of public events, restrictions on gathering size, the closing of public transport, stay-at-home requirements, restrictions on internal movement, and restrictions on international travel) and one indicator on recorded health system policies called “public information campaign.” The SI values in the U.S. are presented in Fig. 1.4

We measure a firm’s pre-COVID financial conditions using Firm Size (natural logarithm of total assets at day t-1), Leverage (total liabilities to total assets), Cash (cash and short-term investments to total assets), ROA (four-quarter trailing net income to total assets), and Tangibility (net property, plant, and equipment to total assets) for each firm in the sample. Whenever accounting data is used, we rely on the most recent publicly available values to avoid any form of look-ahead bias. As the restrictions negatively affect the cash flows and liquidity, pre-COVID corporate financial conditions may mitigate the response of stock prices to the restrictions (Ding et al., 2020).

Table 2 presents the descriptive statistics for the considered variables. The impact of COVID-19 can be easily seen in the negative returns and higher standard deviations. Mean of excess return is −0.236, with a standard deviation of 8.89. We see extreme values in both figures. The companies are highly leveraged with a mean of 0.81, and the mean ROA value is 0.007 with a maximum of 0.29.

Table 3 presents the correlations between the variables. We observe no multicollinearity among independent variables. The correlation between the growth of the COVID-19 Government Response Stringency Index and the number of deaths is almost zero, implying that restrictions and the

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2 The choice of the data period at the time of writing the paper depends on data availability. Fama-French’s three-factor data is available until the end of April 2020.

3 The subsector codes are collected from the Industry Classification Benchmark (ICB).

4 For more details, please see Hale et al. (2020).

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Table 1: Number of companies according to subsector.

| Subsector                          | Number of companies |
|-----------------------------------|---------------------|
| Airlines (5751)                   | 13                  |
| Casinos and Gambling (5752)       | 24                  |
| Hotels and Motels (5753)          | 14                  |
| Recreational Services (5755)      | 17                  |
| Restaurants and Bars (5757)       | 49                  |
| Travel and Tourism (5759)         | 17                  |
| Total                             | 134                 |

Note: The table reports the number of companies in different subsections of our research sample. The numbers in parenthesis represent the subsector codes of the Industry Classification Benchmark (ICB).

Table 2: Statistical properties of major variables.

| Variable | Mean | Standard deviation | Minimum | Maximum |
|----------|------|--------------------|---------|---------|
| R_m − R_f | −0.236 | 8.89 | −61.340 | 102.560 |
| SMB | −0.132 | 1.270 | −4.590 | 5.750 |
| HML | −0.324 | 1.485 | −4.720 | 3.140 |
| △SI | 0.018 | 0.069 | −0.045 | 0.468 |
| △Cases | 0.114 | 0.148 | 0.000 | 0.693 |
| ROA | 0.007 | 0.188 | −1.182 | 0.290 |
| Size | 15.748 | 0.362 | 14.182 | 16.220 |
| Cash | 0.118 | 0.149 | 0.000 | 1.000 |
| Tangibility | 0.492 | 0.281 | 0.000 | 0.902 |
| Leverage | 0.807 | 0.438 | 0.123 | 3.472 |

Note: The table provides basic statistical properties of the major variables employed in the study. Size = Natural logarithm of total assets; Leverage = Ratio of Total liabilities to total assets; Cash = Cash and short-term investments to total assets; ROA = Stock return of company i at time t; R_f = Risk-free rate; R_m − R_f = Excess returns. △SI = Excess return on the market; SMB (Small minus Big) = Average return on the three small portfolios minus the average return on the three big portfolios; HML (High minus Low) = Average return on the two value portfolios minus the average return on the two growth portfolios; △SI = Growth of COVID-19 Government Response Stringency Index; △Cases = Growth of confirmed COVID-19 cases. Firm-level data and stock prices are obtained from Datastream. The stringency of government policy responses to the COVID-19 pandemic and confirmed case data is from Hale et al.'s (2020) COVID-19 Government Response Stringency Index. Fama-French’s three-factor data is from Kenneth French’s website (https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html). All values except ratios and percentages are in USD.
number of deaths are not directly related and proxy a different aspect of the pandemic.

4. Methods

To examine the role of stringency measures, we resort to the three-factor model by Fama and French (1993) and introduce $\Delta SI$ into the model. The asset pricing factor returns are sourced from Kenneth French’s website. Our model builds on Li, Spigt, and Swinkels (2017) and Das, Dutta, Bhadra, and Uddin (2020):

$$R_{i,t} - R_f = a + \beta_1 \Delta SI_t + \beta_2 (R_{m,t} - R_f) + \beta_3 SMB_t + \beta_4 HML_t + \epsilon_{i,t} \quad (1)$$

where $R_i$ is the stock return of company $i$ at time $t$, $R_f$ is the risk-free rate, and $R_{m,t} - R_f$ stands for the stocks’ excess returns. $R_{m,t} - R_f$ is the excess return on the market, and value-weight return of all CRSP firms incorporated in the U.S. and listed on the NYSE, AMEX, or NASDAQ, minus the one-month Treasury bill rate. $SMB$ (Small minus Big) is the average return on the three small portfolios, minus the average return on the three big portfolios. $HML$ (High minus Low) is the average return on the two value portfolios minus the average return on the two growth portfolios; $\Delta SI$ = Growth of COVID-19 Government Response Stringency Index; $\Delta$Cases = Growth of confirmed COVID-19 cases.

One can easily question whether the reaction of stock prices to restrictions may be related to the COVID-19 deaths/cases, as most of the papers in the literature explore the impact of deaths/cases on stock returns. Accordingly, we control for the daily growth of COVID-19 cases ($\Delta$CASES), as obtained from Hale et al. (2020), to avoid any potential influence of the government interventions from the pandemic itself (Al-Awadhi et al., 2020, and Ramelli and Wagner, 2020), and introduce the interaction terms as follows:

$$R_{i,t} - R_f = a + \beta_1 \Delta SI_t + \beta_2 (R_{m,t} - R_f) + \beta_3 SMB_t + \beta_4 HML_t + \beta_5 \text{Size} \times \Delta SI_t + \beta_6 \text{Tangibility} \times \Delta SI_t + \beta_7 \text{Leverage} \times \Delta SI_t + \beta_8 \text{Cash} \times \Delta SI_t + \beta_9 \text{ROA} \times \Delta SI_t + \epsilon_{i,t} \quad (2)$$

First, we run models (1) and (3) for the whole sample by controlling for the subsector effect. We then perform estimations for the subsectors to explore whether companies operating in the Airlines, Casinos and Gambling, Hotels and Motels, Recreational Services, Restaurants and Bars, and Travel and Tourism subsectors are affected differently by the implementation of the restrictions.

The data set of the study constitutes a panel, as it has both time- and firm-level dimensions. Thus, both fixed effects and random effects techniques are suitable econometric methods for analyzing panel data. To decide which methodology is applicable, we calculate using the Hausman (1978) test. The rationale is that the fixed-effects and random-effects models are consistent when there is no correlation between the explanatory variables and the error term. Nevertheless, the fixed-effects model is preferable to the random-effects one when such a correlation exists. For whole-sample estimations, we use random effects to control for the sector effect.

5. Findings

Table 4 presents the estimations of models (1) and (2) for the whole sample. We first calculate model (1) with only the Stringency Index without any control variables. Column 1 shows a negative effect of the COVID-19 Government Response Stringency Index on excess returns of the travel and leisure sector. When the government imposes an additional restriction, the stock returns of the travel and leisure sector decrease. Our finding is in line with Shaan et al. (2020) who show that the sharp decline in stock returns can be explained by national lockdowns. According to Zaremba, Kizys, Tzouvanas, et al. (2020), stringent policy responses increase return.

### Table 3

| R\_Rn | R\_Rn-P | SMB | HML | SI |
|-------|---------|-----|-----|-----|
| 0.5493 | 0.3672 | 0.4360 | -0.2215 | -0.0109 | -0.0811 |
| 0.1588 | 0.5067 | -0.1445 | -0.0909 | -0.1456 | 0.2557 |

Note: $R_{m,t}$ = Stock return of company $i$ at time $t$; $R_f$ = Risk-free rate; $R_{m,t} - R_f$ = Excess returns. $R_{m,t} - R_f$ = Excess return on the market; $SMB$ = Small minus Big; $HML$ = Average return on the three small portfolios minus the average return on the three big portfolios; $SI$ = Average return on the two value portfolios minus the average return on the two growth portfolios; $\Delta SI$ = Growth of COVID-19 Government Response Stringency Index; $\Delta$Cases = Growth of confirmed COVID-19 cases.

### Table 4

| (1) | (2) | (3) | (4) |
|-----|-----|-----|-----|
| $\Delta SI$ | -24.2854*** | -10.6038*** | -4.8465*** |
| $\Delta SI$ | 0.9555*** | 1.0141*** | 1.0195*** |
| $\Delta SI$ | 1.4189*** | 1.4664*** | 1.4712*** |
| $\Delta SI$ | 0.5803*** | 0.6014*** | 0.6068*** |
| $\Delta SI$ | 0.0526 | 0.0551 | 0.0548 |
| $\Delta SI$ | -1.7146*** | -1.7297*** |
| $\Delta SI$ | 0.3180 | 0.3166 |
| $\Delta SI$ | 3.1006 | 3.1744 |
| $\Delta SI$ | 5.3234 | 5.3017 |
| $\Delta SI$ | -5.7316* | -5.8154* |
| $\Delta SI$ | 15.9232** | 15.7427** |
| $\Delta SI$ | 6.2056 | 6.1802 |
| $\Delta SI$ | 2.6221 | 2.5874 |
| $\Delta SI$ | 1.9189 | 1.9110 |
| Constant | -0.1998 | -0.0025 | 0.1723 | 0.1106 |
| Constant | 0.2688 | 0.2312 | 0.1999 | 0.1973 |

Note: The table reports the results of the estimations of our baseline regressions within the full sample. $\Delta SI$ is the change in the Stringency Index of Hale et al. (2020). The dependent variables are the stocks’ excess returns. $R_{m,t} - R_f$ = Excess returns. $SMB$ and $HML$ are market, small-minus-big, and high-minus-low factor returns, respectively. $\text{Size} = $Natural logarithm of total assets; $\text{Tangibility} = $Total liabilities to total assets; $\text{Leverage} = $Total liabilities to total assets; $\text{Cash} = $Cash and short-term investments to total assets; $\text{ROA} = $Return on asset; $\text{Tangibility} = $Net property, plant, and equipment to total assets. * * * represent significance levels at 10%, 5%, and 1%, respectively. Standard errors are reported in the parentheses.
volatility. Zechner et al. (2020) and Laeven (2020) document that the sensitivity of operations to social distancing determines the impact of COVID-19 on firms. Travel and leisure firms are more likely to suffer from social distancing restrictions. Our findings also imply that the easing of the restrictions will lead to an increase in stock returns of travel and leisure sector companies. In column 2, we introduce three factors, and the impact of the COVID-19 Government Response Stringency Index on stock returns is still negative and statistically significant. Market excess return, SMB (Small minus Big), and HML (High minus Low) have positive effects on excess returns, consistent with Das et al. (2020) who document similar results for the Bird/STR Hotel Stock Index (HSI).

In columns 3 and 4, we introduce the interaction of SI with financial characteristics. We find that stock prices of firms that are smaller, with less tangibility and higher cash reserves are more resilient to the restrictions. In other words, the COVID-19 restrictions-induced drop in stock prices is higher for firms with higher tangibility, bigger size, and fewer cash reserves. Size and tangibility also reinforce the negative reaction, as those companies need to cover higher amounts of fixed costs and have less flexibility.

Our findings differ from Ding et al. (2020) in terms of profitability, size, and leverage. Ding et al. (2020) document that profitability can mitigate the negative impact of COVID-19 while leverage worsens the situation. This difference can be explained by the nature of the industry we focus on. While Ding et al. (2020) provide findings across industries, our results are based on the travel and leisure industry. Our findings are also different from those of Song et al. (2020) whose results are derived from the impact of the growth of COVID-19 cases while we focus on the role of restrictions related to COVID-19. The restrictions affect cash flow and liquidity, though firms with higher cash flows are less affected by the restrictions. In normal times, holding excess cash can be considered negative due to its opportunity cost; however, during uncertain periods, it can provide shelter to firms. Consider two similar firms: one with a cash ratio at the 25th percentile (0.024) and the other at the 75th percentile (0.158). With other factors being constant, the estimations in column 4 show that a low-cash firm would experience 25.8% more stock return decline than a high-cash firm.6

In a similar vein, a firm with higher tangibility (at the 75th percentile with 0.73) will experience a 25% lower return compared to a firm with lower tangibility (at the 25th percentile with 0.22).

In Table 5, we estimate Model 1 for the six subsectors of the travel and leisure industry: airlines, casinos and gambling, hotels, recreational services, restaurants and bars, and travel and tourism. We show that all subsectors are negatively affected by government restrictions. The highest negative effect of the Stringency Index is observed in airlines, travel and tourism, and casinos and gambling sectors in line with Suneson (2020). The three-factor model variables are statistically significant and positively affect excess returns in all estimations.

In Table 6, we distinguish government interventions from the pandemic itself. We find that new confirmed cases do not affect the excess returns, while the negative impact of SI remains negative and statistically significant. This shows that once we control for the impact of COVID-19 itself, an increase in the Stringency Index leads to a decrease in excess returns of companies in the travel and leisure sector. The negative effect of SI is found to be higher for firms operating in the airline, travel and tourism, and casino and gambling sectors. We can argue that government measures comprise a diverse source of stock price decreases, independent from the impact of the pandemic itself.

The stock performance of travel and leisure companies suffers from the restrictions, not from the increasing number of confirmed COVID-19 cases. To flatten the curve, governments implemented several restrictions, especially on internal and international movement, gathering size, and stay-at-home requirements, which led to a sharp decrease in demand for the services of travel and leisure companies. The decrease in demand lowered the future expected revenues of those firms; therefore, their stock prices decreased following the restrictions. The stock market behaves rationally in this regard and discounts the value of decreasing future cash flows.

As a robustness check, we replace the growth rate of COVID-19 cases with the growth rate of deaths, and the results do not change. We also run Model 1 with data winsorized at 1% and 99%, and the results remain the same.7

6 The calculation is made as follows: (−10.664 + 15.7427×0.024)/ (−10.664 + 15.7427×0.158) − 1); please see Ding et al. (2020) for details.

7 The results are available upon request.

6. Conclusion and policy implications

In this paper, we examine the impact of government responses to COVID-19 on the stock returns of travel and leisure companies listed in the U.S. We use Hale et al.’s (2020) COVID-19 Government Response Stringency Index to measure the stringency of government policy responses to the COVID-19 pandemic. Using appropriate panel data techniques and after controlling for the COVID-19 pandemic with the growth rate of confirmed cases, our results confirm that the Stringency Index has a negative impact on stock returns of travel and leisure companies in the U.S. We also show that stock prices of firms with a smaller size, less tangibility, and higher cash reserves are more resilient to the restrictions. In other words, the COVID-19 restrictions-induced drop in stock prices is higher for firms with higher tangibility, bigger size, and smaller cash reserves.

We found the negative impact to be higher among companies operating in the airline, tourism and travel, and casino and gambling subsectors. Our results are consistent even when we separate the effects of government restrictions and the pandemic itself. The robustness checks such as replacing the growth rate of COVID-19 cases with the growth rate of deaths and winsorizing the data at 1% and 99% do not alter the main findings.

Some policy implications can be derived from the results. First, investors should closely follow government policy responses to COVID-19, as additional measures will lead to a decrease in stock returns. However, since in the medium- and long-term, governments start to loosen the restrictions, investors can diversify their investment portfolios by including travel and leisure stocks (Miller & Prondožinska, 2020).

Second, our results highlight the need for liquidity management in travel and leisure companies. Since they are highly dependent on demand and are one of the first to be affected in a pandemic (Gössling, Scott, & Hall, 2020), managers should maintain adequate liquidity in case of a revenue drop. When government restrictions are implemented, stock prices fall and access to external finance becomes difficult. Thus, it is important to carry out decisions that allow the companies to continue operations when restrictions are lifted. In that sense, hospitality companies should pay attention to new and asset-light and fee-oriented (ALFO) strategies (Demir, Díez-Esteban, & García-Gómez, 2019; Li & Singal, 2019). As our results suggest, companies that are less capital-intensive and with less tangibility are less affected by the restrictions. Therefore, if companies can adopt an ALFO strategy, they will be better able to mitigate the negative effects of the restrictions.

Third, government authorities should be aware of the particularities of each industry as we show that the magnitude of restrictions arising from COVID-19 tends to vary across industries. When a restriction measure is implemented to protect public health, it should be accompanied by measures that give travel and leisure companies access to favorable credit terms or that allow them to postpone, reduce, or even be forgiven certain taxes that affect their core accounts. Hence, policymakers should pay attention to the short-term economic consequences of the restriction. According to Shanaev et al. (2020), authorities should be cautious while implementing restrictions to avoid inflicting unnecessary economic harm; in some situations, targeted regional lockdowns could be a better strategy.

As for limitations and directions for future research, this paper provides evidence for travel and leisure firms listed only in the U.S. Thus, the findings are limited to the U.S. To better understand the impact of stringency measures, future studies can use multi-country datasets with additional control variables. Global evidence will help to provide a more complete
picture of the consequences of COVID-19 restrictions. As the restrictions are eased, further studies can examine the asymmetric effect on stock returns. Moreover, future studies can use alternative performance measures such as U.S. profit margin, Revenue per Available Room (REVPAR), and average daily rate (ADR).

**Statement of contribution**

- What is the contribution to knowledge, theory, policy, or practice offered by the paper?

To the best of our knowledge, we are the first to examine the impact of government responses to COVID-19 on stock returns of travel and leisure companies in the U.S. Second, we also investigate how pre-2020 corporate characteristics affect the stock price reactions to the government responses to COVID-19. It is important to understand which corporate characteristics affect the stock price reactions to the government responses to COVID-19. It is important to understand which corporate characteristics affect the stock price reactions to the government responses to COVID-19.

- How does the paper offer a social science perspective/approach?

Our paper has implications for several actors. First, investors should be aware of the negative impact of restrictions on stock returns. Second, our results highlight the need for appropriate liquidity management in travel and leisure companies and managers should maintain adequate liquidity levels in order to face a revenue drop. Hospitality companies should pay attention to new and more flexible strategies such as ALFO (asset-light and fee-oriented). Third, government authorities should be aware of the particularities of each industry and developed a range of measures to support travel and leisure companies in this period. Authorities should be cautious while implementing restrictions to avoid unnecessary economic harm; thus, targeted regional lockdowns could be a better strategy.

**Author contribution**

Ming-Hsiang Chen: Conceptualization; Writing - review & editing; Supervision. Ender Demir: Conceptualization; Formal analysis; Methodology; Writing - original draft; Visualization. Conrado Diego García-Gómez: Data curation; Methodology; Writing - original draft. Adam Zaremba: Conceptualization; Data curation; Methodology; Writing - review & editing.

**Declaration of Competing Interest**

None.

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None.
## Appendix A. Appendix

### Table A1

| Subsector          | Companies                                                                 |
|--------------------|---------------------------------------------------------------------------|
| **Airlines**       | Alaska Air Group, Allegiant Travel, American Airlines Group, Copa         |
|                    | Holdings S A, Delta Air Lines, Hawaiian Holdings, Jetblue Airways,        |
|                    | Malementr, Mesa Air Group, Skywest, Southwest Airlines, Spirit Airlines,   |
|                    | United Airlines Holdings                                                  |
| **Casinos and**    | Accel Entertainment A, Boyd Gaming, Caesars Entertainment,                |
| **Gaming**         | Canfield Medical Supplier, Canterbury Park Holding, Century                |
| **Hotels and**     | Bluegreen Vacations, Choice Hotels Intl., Extend Stay America              |
| **Motel**          | Hilton Grand Vacations, Hilton Worldwide Hgd., Hyatt                      |
| **Recreational**   | Bowl America, Cedar Fair, Dover Motorsports, Drive Shack,                 |
| **Services**       | Lindblad Expeditions Hgd, Madison Square Garden Sports A, Manchester      |
| **Restaurants**    | Azamak, Arcos Dorados Holdings, Ark Restaurants, Bab, Bbq                 |
| **Bars**           | Holding, Biglari Holdings B, B’s Restaurants, Bloomin’ Brands, Brinker     |
|                    | Inl., Carrolls Restaurant Group, Gecessity Factory, Chipotle               |
|                    | Mexx Grill, Chu’s Holdings, Cracker Barrel Old City, Store, Cuisine        |
|                    | Slm., Darden Restaurants, Dave & Buster’s Entm., Del Taco Restaurants,    |
|                    | Denny’s, Dine Brands Global, Domino’s Pizza, Dunkin’ Brands Group, El Pollo|
|                    | Loco Hgd., Fat Brands, Fiesta Restaurant Group, Flanigans Ent., J Alexander’s |
|                    | Ent., Kura Sushi USA, Laby’s, Mcdonalds, Meritage Hospitality Group,       |
|                    | Nathans Famous, Noble Romans, Noodles A, One Group                        |
|                    | Hospitality, Papa Johns Intl., Pothelly, Rave Restaurant Group, Red        |
|                    | Robin Gmt.Burgers, Raths Hospitality Group, Shake Shack A, Spy,            |
|                    | Starbucks, Texas Roadhouse, Wendy’s Class A, Wingstop, Yum China          |
| **Travel and**     | Alkaline Water, Booking Holdings, Carnival, Despegar Com, Expedia Group   |
| **Tourism**        | Hyrecar, Interlink Plus, Lgbg Loyalty Holdings, Liberty Trip Advis.Hgd.   |
|                    | Sr.A, Norwegian Cruise Line Hgd., Pro Travel Network, Royal Caribbean     |
|                    | Cruises, Sabre, Travelcenters Of Am., Travelzoo, Tripadvisor’ A, Yatra      |

**Note:** The table reports the list of companies included in the sample.

## References

Al-Awdahi, A. M., Al-Saffi, K., Al-Awdahi, A., & Alhamadi, S. (2020). Death and contagious infectious disease: Impact of the COVID-19 virus on stock market returns. *The Review of Corporate Finance Studies*, 6(5), 1985-2021.

Allen, L., & Murray, L. (2017). Asset pricing and downside risk in the Australian share market. *Applied Economics*, 49(43), 4336-4350.

Bates, T. W., Kahle, K. M., & Stulz, R. M. (2009). Why do US firms hold so much more cash than they use to? *Journal of Finance*, 64(5), 2009-2021.

Chen, M. H. (2011). The response of hotel performance to international tourism development and crisis events. *International Journal of Hospitality Management*, 30(1), 200-212.

Chen, M. H., Jung, S. S., & Kim, W. G. (2007). The impact of the SARS outbreak on Taiwanese hotel stock performance: an event-study approach. *International Journal of Hospitality Management*, 26(1), 200-212.

Das, D., Dutta, A., Bhadra, A., & Uddin, G. S. (2020). Role of presidential uncertainties on the hotel industry. *Annals of Tourism Research*, 81, 1-4.

Demir, E., Diez-Estebanez, M., & Garcia-Gomez, C. D. (2019). The impact of geopolitical risks on cash holdings of hospitality companies: Evidence from emerging countries. *Journal of Hospitality and Tourism Research*, 39, 166-174.

Ding, W., Levine, R., Lin, C., & Xie, W. (2020). Corporate immunity to the covid-19 pandemic (No. w20105). National Bureau of Economic Research.
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