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COVID-19-related government interventions and travel and leisure stock

Ying Wang, Hongwei Zhang, Wang Gao, Cai Yang

COVID-19-related government interventions have significantly affected tourism, while the impact of government interventions on the tourism financial market remains essentially unexplored. This paper comprehensively evaluates how COVID-19-related government interventions affected the travel and leisure stock markets based on a panel quantile regression model. Three government interventions (stringency index, containment and health index and economic support index) and two important stock market features (return and volatility) are discussed. The results reveal that the three government interventions are beneficial to the travel and leisure stock market, especially when the market is under adverse conditions. Specifically, containment and health measures lead to an increase in stock returns. Stringency measures and economic support measures promote stock return and restrain stock market volatility. This study provides significant insights for protecting and recovering the travel and leisure stock market by considering when and which government interventions should be implemented.

1. Introduction

As of December 9, 2020, the COVID-19 pandemic has infected more than 68.5 million people and led to over 1.5 million deaths worldwide. Considering the enormous impact of the pandemic, governments across the world have implemented a range of emergency actions, such as lockdowns, travel bans, testing and quarantining, and income support. These interventions, especially social distancing restrictions, have greatly impacted economies and financial markets in tourism (Chen, Demir, García-Gómez, & Zaremba, 2020; Karabulut, Bilgin, Demir, & Doker, 2020; C.-C. Lee & Chen, 2020; Sharma & Nicolau, 2020; Uğur & Akbyak, 2020). According to estimations by the World Travel and Tourism Council in June 2020, tourism-related job losses are estimated to be 121.1 million for the baseline scenario, and tourism-related GDP losses are estimated to be $3.4 trillion for the baseline this year (WTTC, 2020).

COVID-19 and the related government interventions have significantly affected tourism, resulting in majority of studies on the economic impacts on tourism (Altuntas & Gok, 2021; Gössling, Scott, & Hall, 2020b; Yang, Zhang, & Chen, 2020; Zhang, Song, Wen, & Liu, 2021). Gössling et al. (2020b) find that social distancing restrictions, such as lockdowns and travel bans, have greatly damaged society, economy, and tourism. However, the impacts of government interventions on the tourism-related financial market remain essentially unexplored. Undoubtedly, government interventions may affect economic activities and mitigate the spread of COVID-19. According to the theory of supply of stock market returns and behavioral finance, these interventions will have an important impact on the stock market by affecting economic activities and investors’ sentiment (Diermeier, Ibbotson, & Siegel, 1984; He, Sun, Zhang, & Li, 2020). Recently, C.-C. Lee and Chen (2020) found that government interventions have overall positive impacts on travel and leisure-related stock returns, but they ignored the disparities in different interventions. In general, although some government interventions may powerfully hit tourism, the relationships between government interventions and the tourism stock market are ambiguous. First, different kinds of government interventions may have diverse impacts on the stock market. Second, although existing studies reveal the impacts on stock returns, stock volatility, which is another important stock market feature, is not discussed. Third, the impacts of government interventions on the stock market may be different under different market conditions.

This paper comprehensively evaluates how COVID-19-related government interventions affected the travel and leisure stock market. Three government interventions (stringency index, containment and

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* Corresponding author.

E-mail addresses: wangying19@csu.edu.cn (Y. Wang), hongwei@csu.edu.cn (H. Zhang), yangcaier@hnu.edu.cn, rucstats@foxmail.com (C. Yang).

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health index and economic support index) and two important stock market features (return and volatility) are discussed. Additionally, to reflect the response of the travel and leisure stock markets under different market conditions, we apply a panel quantile regression (QR) model. Overall, our results reveal that three government interventions are more or less beneficial to the stock market, especially under adverse market conditions. This research demonstrates the hitherto ignored financial impacts of interventions on tourism and contributes to helping policymakers make appropriate decisions to protect the travel and leisure stock market and promote market recovery.

2. Literature review and research hypotheses

A pandemic threat may lead to tourism crises by affecting tourism demand and the development of destinations, resulting in numerous studies in the tourism field (Haque & Haque, 2018; Page, Yeoman, Munro, Connell, & Walker, 2006). For example, Zeng, Carter, and De Lacy (2005) revealed that the 2003 SARS outbreak had a negative impact on tourism development in China. Rassy and Smith (2013) showed that Mexico lost approximately US$2.8 billion due to the influenza pandemic. Rossello, Santana-Gallego, and Awan (2017) focused on several pandemics, such as dengue and Ebola, by using dummy variables and verified their negative impacts on tourist arrivals. Although the world has experienced many major pandemics in the past, none has exerted the significant global impacts that COVID-19 has (Sigala, 2020; Skare, Soriano, & Porada-Rochot, 2021). As asymptomatic people may transmit the virus several days before they know to self-isolate, the number of infections and fatalities is increasing rapidly (Bai et al., 2020; Rothe et al., 2020). There were over sixty million confirmed cases and over one million deaths worldwide as of early December 2020.

As a result, some related government interventions have been implemented to mitigate the negative impacts of COVID-19. It should be recognized that the overall financial effects of government interventions on tourism are ambiguous. On the one hand, according to the supply of stock market returns hypothesis, market performance is a function of economic growth (Diermeier et al., 1984; Harjoto, Rossi, Lee, & Sergi, 2021; Harjoto, Rossi, & Paglia, 2021; Ibbotson & Chen, 2003). The negative economic impact of COVID-19 on tourism may lead to fluctuation of the tourism stock market. In addition, following government interventions may further affect the stock market by interrupting economic activity or improving the economic condition (Chen et al., 2020; Foo, Chin, Tan, & Phuah, 2020). On the other hand, based on behavioral finance, government interventions often affect investor behavior by affecting investor sentiment, which ultimately affects the stock market (Baker & Wurgler, 2006; He et al., 2020; W. Y. Lee, Jiang, & Indro, 2002). Government interventions may affect the investor sentiment from two aspects. First, many measures can effectively mitigate the spread of COVID-19 and help subdue panic, which has a positive impact on stock markets (Narayan, Pan, & Liu, 2020). Second, decisive government interventions may signal to the investors that the pandemic crisis is under control, thus reducing the investors’ uncertainty about future prospects and strengthen their confidence in stock markets (Kizys, Tzouvanas, & Donadelli, 2021; Sharif, Aloui, & Yarovaya, 2020).

Based on existing studies, this paper aims to explore the impacts of three major government interventions (social distancing measures, containment and health measures and economic support measures) on the travel and leisure stock market, and the following hypotheses are proposed.

2.1. Social distancing measures and travel and leisure stock market

Social distancing measures include the closure of schools, workplaces, parks, and public transport, which may have a mixed effect on the tourism industry. On the one hand, they 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 (Chen et al., 2020). Related companies reduced their services or stopped operating, leading to an abrupt cutoff of their revenue streams (Gossling et al., 2020b; Maliszewska, Matteo, & Van Der Mensbrugghe, 2020; Thams, Zech, Rempel, & Aya-Koi, 2020). According to the supply of stock market returns hypothesis, the stringency of government restrictions may damage economic activity, which may have a negative impact on the travel and leisure stock market (Diermeier et al., 1984). On the other hand, social distancing measures may also have a positive impact on the stock market by reducing the risk of infections and fatalities (Ashraf, 2020). Given that social distancing measures are most effective at mitigating the spread of COVID-19, humans may feel safe in their surroundings, helping to mitigate panic and enhance investor confidence. Additionally, these policies can improve the recovery process of the tourism industry. Therefore, these policies may be beneficial to the stock market by positively affecting investor sentiment from the behavioral finance perspective (Narayan, Pan, & Liu, 2020). We thus propose the following hypotheses:

H1a. Social distancing measures have a positive impact on the travel and leisure stock market.

H1b. Social distancing measures have a negative impact on the travel and leisure stock market.

2.2. Containment and health measures and travel and leisure stock market

Containment and health measures are mainly about government public awareness campaigns and testing and quarantining policy. The response of the travel and leisure stock market to the containment and health measures may be positive because containment and health measures can help reduce new infections and mortality rates (Hsiang et al., 2020). For example, aggressive government information campaigns provide awareness about the benefits of staying home, sanitizing common areas and washing hands regularly. Testing and contact tracing help to identify infected individuals and suspected cases (Ashraf, 2020). Therefore, these interventions can be interpreted as a positive signal regarding fighting COVID-19, thereby subduing panic and improving investors’ confidence and economic activity (Aharon & Siev, 2021). Based on the behavioral finance theory, these interventions may improve a more positive investor sentiment, which is beneficial to the stock market (W. Y. Lee et al., 2002). We thus propose the following hypothesis:

H2. Containment and health measures have a positive impact on the travel and leisure stock market.

2.3. Economic support measures and travel and leisure stock market

Economic support measures include the government financial assistance to households in the form of direct cash transfers or relief in debt or other payments for utilities. The economic support measures may also have a positive impact on the travel and leisure stock market. First, these policies can help counter the adverse impact of the social distancing measures on incomes and employment, which reduces the infection rate due to higher compliance with social distancing measures (Ashraf, 2020; Wright, Sonin, Driscoll, & Wilson, 2020). Second, economic support measures can improve the economic condition of most households to some extent. These interventions are supposed to boost the economy and further improve a better stock market performance according to the supply of stock market returns hypothesis (Diermeier et al., 1984). Overall, generous income support programs may strengthen investor confidence by accompanying social distancing measures and boost the economic condition, which may have a positive impact on the stock market (Phan & Narayan, 2020). We thus propose the following hypothesis:
Economic support measures have a positive impact on the travel and leisure stock market.

3. Data and methodology

Due to data availability, this paper selected an unbalanced panel for nine major tourism destinations (United States, United Kingdom, France, Italy, Turkey, Denmark, Spain, Greece, Sweden) from January 2, 2020 to November 5, 2020. To avoid drifts or noise, we employed weekly data by averaging daily data in a week. The travel and leisure stock data were extracted from the DataStream database. We calculated the stock return by \( R_t = \ln(P_t) - \ln(P_{t-1}) \), where \( P_t \) denotes the price on day \( t \), and \( R_t \) denotes returns. Stock volatility is calculated as the square of the returns, which is in line with previous studies (Geng, Xu, & Ji, 2020; Qin, Hong, Chen, & Zhang, 2020; Xia, Yao, & Geng, 2020).

To explore the impact of government interventions on the travel and leisure stock market, we used data from the Oxford COVID-19 Government Response Tracker to measure government interventions. The tracker provides three kinds of intervention indexes: stringency index, containment and health index and economic support index. The stringency index reflects social distancing measures, such as lockdowns and travel bans. The containment and health index mainly reflects medical treatment, such as testing policies and investment in healthcare. The economic support index reflects the measures of income support and debt relief. The CBOE Volatility Index (VIX) data and oil price data are from https://fred.stlouisfed.org/.

We employed a panel QR model to analyze the impact of government interventions on travel and leisure-related stock. The QR model is based on an ordinary least squares (OLS) estimator, which reveals the average response of the explained variable to the explanatory variable. The OLS regression model is as follows:

\[
R_t = \alpha_t + \beta_t \text{Government intervention}_t + \gamma_t \text{VIX}_t + \delta_t \text{Oil prices}_t + \epsilon_{it}
\]

(1)

\[
V_{it} = \theta_t + \gamma_t \text{Government intervention}_t + \gamma_t \text{VIX}_t + \gamma_t \text{Oil prices}_t + \epsilon_{it}
\]

(2)

where subscript \( i \) denotes the country, and \( t \) denotes the week. \( R_t \) denotes stock returns, and \( V_{it} \) denotes stock volatility. The explanatory variables are three government interventions: stringency index, containment and health index and economic support index. To avoid problems of multicollinearity related to these interventions, we consider only one intervention in each equation, meaning that there are three equations for \( R_t \) and \( V_{it} \). Additionally, considering that tourism is an oil-intensive sector, oil prices are generally related to travel and leisure stock. The VIX reflects global stock market uncertainty, which affects travel and leisure stock performance. Therefore, we selected the VIX and oil prices as the control variables in accordance with previous studies (Demiralay & Kilincarslan, 2019; C.-C.; Lee & Chen, 2020).

However, the OLS model is a mean model that estimates the average response of a dependent variable to explanatory variables. It only detects the central tendency of the data and does not allow any distinction between large and small stock price fluctuations, which cannot estimate the response of the stock market under different market conditions. In this regard, the QR model can analyze the nonlinear relationship between government interventions and travel and leisure stock. Thus, the various impacts of government interventions on stock returns and volatility in bearish, normal, and bullish markets can be investigated. Therefore, we used the QR model proposed by Koenker and Bassett (1978) to expand the research. The QR model is more robust and provides more efficient estimations because the model provides the analysis over the entire spectrum of the distribution. Consider the following panel QR model:

\[
Q_{R_{it}}(\tau|x_{it}) = \alpha_t + \beta(\tau)x_{it}^\tau
\]

(3)

\[
Q_{V_{it}}(\tau|x_{it}) = \theta_t + \gamma(\tau)x_{it}^\tau
\]

(4)

where \( 0 < \tau < 1 \) and \( x_{it}^\tau \) are the explanatory variable and control variable, respectively, \( \alpha \) and \( \theta \) are the individual-specific fixed effect coefficients that account for the unobserved country heterogeneity, \( \beta(\tau) \) and \( \gamma(\tau) \) are regression coefficients, and \( Q_{R_{it}}(\tau|x_{it}) \) and \( Q_{V_{it}}(\tau|x_{it}) \) are the \( \tau \)th conditional quantiles of \( R_{it} \) and \( V_{it} \). The OLS estimation results show that the three government interventions have significant positive impacts on returns, which is in line with the previous literature (Ashraf, 2020; C.-C.; Lee & Chen, 2020). Existing studies have found that lockdowns and travel bans greatly damage tourism. However, stringent interventions are verified to be the most effective measures at mitigating the spread of COVID-19, which enhances investor confidence and thus leads to an increase in stock returns (Narayan, Phan, & Liu, 2020). Additionally, containment and health interventions positively affect returns by reducing new infection and mortality rates (Ashraf, 2020). Economic support interventions can stimulate positive responses of the stock market because they may counter the adverse effects of social distancing measures and boost investor confidence and trust in government (Ashraf, 2020).

The QR results provide richer characterizations of the responses across different quantiles of the conditional distribution. The results reflect that government interventions lead to an increase in returns at most quantiles. Specifically, the coefficients of the three government interventions are larger at the lower quantiles. Government interventions may largely compensate for the decline in stock returns under a bearish market. However, regarding the higher-quantile results (0.8 and 0.9), government interventions cannot significantly affect stock returns. Under a bullish market, the stock market may self-regulate, and government interventions are ineffective. Regarding the control variables, the increase in both the VIX and oil prices may adversely affect stock returns, which is consistent with previous findings (Demiralay & Kilincarslan, 2019).

Table 3 presents the effects of government interventions on stock volatility. The OLS estimation results show that the three interventions have significant negative impacts on volatility, and the QR model presents richer findings. First, the QR results denote that the stringency index leads to a decline in stock volatility only at quantiles of 0.7 and 0.8. Lockdowns and travel bans can maintain stock stability when the travel and leisure-related stock market shows great fluctuations. Second, economic support measures play key roles in market stability. The economic support index has a significant negative effect on stock volatility at middle and high quantiles (0.3–0.8). When the stock market fluctuates at medium and high levels, income support and debt relief

### Table 1

| Variables                  | Test methods | Results  |
|----------------------------|--------------|----------|
| Stock return               | ADF          | IPS      |
|                            | Stationary   |          |
| Stock volatility           | -3.0182***   | -2.9328** Stationary |
| Stringency index           | -8.1816***   | -7.6972*** Stationary |
| Containment and health index| -9.6983***   | -9.3180*** Stationary |
| Economic support index     | -1.4647*     | -1.5282* Stationary |
| VIX                        | -3.4482***   | -3.3977*** Stationary |
| Oil prices                 | -2.0240**    | -2.0981* Stationary |

Notes: The asterisks *, **, and *** denote statistical significance at the 10% level, at the 5% level and at the 1% level, respectively.
from the government may strengthen investor confidence and boost the market. Finally, the QR results reflect that the containment and health index have no impacts on stock volatility at any quantile. Regarding travel and leisure-related stock stability, nonmedical measures are more effective than medical measures. The results of the control variables show that increases in the VIX and oil prices may lead to stock market fluctuations.

### 5. Conclusion

This study comprehensively evaluated how COVID-19-related government interventions affected the travel and leisure stock market. It expanded the COVID-19-related research field of tourism and highlighted that governments must be aware that, in addition to a vast detrimental economic impact in tourism, the COVID-19-related interventions may also affect tourism in the stock market. In addition, the results revealed that the three government interventions were beneficial to the travel and leisure-related stock markets. Specifically, containment and health measures led to an increase in stock returns. Stringency measures and economic support measures promoted returns and restrained stock market volatility. The impact of stringency measures may be more effective, and the impact of economic support measures is significant under most market conditions. Regarding the results at different quantiles, we find that government interventions are mainly effective under adverse market conditions. However, under advantageous market conditions, the travel and leisure stock market can self-regulate without government interventions.

This study provides significant insights for protecting and recovering the travel and leisure-related stock market. Three government interventions played a key role in promoting stock return and maintaining stock stability. Among these interventions, the positive impact of social distancing measures may initially seem astonishing, counterintuitive, and unreasonable. According to existing studies, social distancing measures adversely affect most markets, such as financial, energy and exchange rate markets (Feng, Yang, Gong, & Chang, 2021; Saif-Alyousfi & Saha, 2021; Zaremba, Kizys, Aharon, & Demir, 2020). However, in the travel and leisure stock market, although some social distancing measures may greatly damage the tourism industry in the short term, they can protect and recover the tourism financial market given their contributions to mitigating the spread of COVID-19, and thus subdue investor panic and strengthen investor confidence. This study innovatively introduced the behavioral finance theory to explain the significant result, and we expanded the application of the behavioral finance into the tourism stock market research during the COVID-19 pandemic. Governments must carefully balance the costs and benefits of social distancing measures (Kaczmarek, Perez, Demir, & Zaremba, 2021). Our results confirm that the positive impacts of social distancing measures may outweigh the negative impacts on the travel and leisure market.

Because COVID-19 is still unfolding worldwide, most researchers forecast that the negative impact on tourism may last long-term (Fotiadis, Polyzos, & Huan, 2021; Liu, Vici, Ramos, Giannoni, & Blake, 2021). This paper finds that three major types of government interventions are beneficial for the travel and leisure stock market, and the recovery process of the tourism industry may crucially depend on these external events (C.-C. Lee & Chen, 2020; Phan & Narayan, 2020). We call for the focus on the roles of government interventions in the tourism financial market. Governments and related authorities should be cautious about when and which interventions are appropriate for implementation. Note that government interventions are more effective under adverse market conditions; thus, it is necessary to monitor the tourism stock market environment in real time and establish a risk warning mechanism. In addition, governments will benefit from learning the intervention experiences of other governments that achieve better results. Interventions should tend to converge as governments gradually learn which are most effective. For related investors, they can focus on government interventions, optimizing their decisions on the
travel and leisure stock market. Such an investment strategy may protect
investors in the pandemic period (Kaczmarek et al., 2021).

This paper analyzes the relationships between government in-
terventions and the travel and leisure stock market. However, the
impacts of government interventions on tourism may vary across
subsectors, such as airlines, restaurants, gambling casinos, and
recreational services. In addition, considering that the pandemic is still
unfolding, it is interesting to compare the impacts of long/short-term
policies on the stock market. Finally, along with government re-
sponses, other important factors should also be considered when we
analyze the travel and leisure stock market. The research presented in
the present study will expand in future studies.

Declarations of competing interest

None.

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