Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Tourism Management 84 (2021) 104281

Contents lists available at ScienceDirect

Tourism Management

journal homepage: http://www.elsevier.com/locate/tourman

How to survive a pandemic: The corporate resiliency of travel and leisure companies to the COVID-19 outbreak

Tomasz Kaczmarek [b], Katarzyna Perez [b], Ender Demir [c,d], Adam Zaremba [a,b,*]

[a] Montpellier Business School, 2300, Avenue des Moulins, 34185, Montpellier, France
[b] Department of Investment and Financial Markets, Institute of Finance, Poznan University of Economics and Business, Al. Niepodległości 10, 61-875, Poznań, Poland
[c] University of Social Sciences, Lodz, Poland
[d] Faculty of Tourism, Istanbul Medeniyet University, Istanbul, Turkey

ARTICLE INFO

JEL classification:
G12
G15
G19
I18
I19
Z30
Z31
Z32

Keywords:
COVID-19
Novel coronavirus
Tourism and leisure
Stock market
Corporate immunity
Policy responses
Containment
Closure

ABSTRACT

What protects travel and leisure companies from a global pandemic, such as COVID-19? To answer this question, we investigate data on over 1200 travel and leisure companies in 52 countries. We consider 80 characteristics, such as company financial ratios, macroeconomic variables, and government policy responses. Using regressions and machine learning tools, we demonstrate that firms with low valuations, limited leverage, and high investments have been more immune to the pandemic-induced crash. We also find a beneficial effect of stringent containment and closure policies. Finally, our results indicate that countries with less individualism may be better positioned to cope with the pandemic. Our findings have implications for regulatory bodies, managers, and investors concerning future pandemic outbreaks.

Credit author statement

Tomasz Kaczmarek: Conceptualization, Methodology, Software, Formal analysis, Investigation, Data curation, Writing – original draft, Writing – review & editing, Visualization. Katarzyna Perez: Conceptualization, Writing – original draft, Writing – review & editing. Ender Demir: Conceptualization, Writing – original draft, Writing – review & editing. Adam Zaremba: Conceptualization, Writing – original draft, Writing – review & editing; Project administration, Funding acquisition.

1. Introduction

The COVID-19 outbreak, which at the beginning of 2020 seemed to be a local health problem in Wuhan, China, evolved into a full-scale pandemic by the end of March (WHO, 2020). As a precaution, governments worldwide responded with stringent interventions that within days shut down tourism worldwide. The situation was unprecedented, and perhaps no other sector was hit as hard by COVID-19 as tourism and leisure (Gössling et al., 2020). By April 2020, international tourism arrivals dropped by 97%, translating into a loss of more than USD 200 billion in receipts (World Tourism Organization UNWTO, 2020b). This can be considered the worst decline in global tourism history after World War II (World Tourism Organization UNWTO, 2020a).

The disappearance of international tourism translated into a massive stock selloff in the related sector. During the first quarter of 2020, the travel and leisure sector dropped by more than 40% from its high to its

* Corresponding author. Montpellier Business School, 2300 Avenue des Moulins, 34185 Montpellier cedex 4, France.
E-mail addresses: tomasz.kaczmarek@phd.ue.poznan.pl (T. Kaczmarek), katarzyna.perez@ue.poznan.pl (K. Perez), ender.demir@medeniyet.edu.tr (E. Demir), adam.zaremba@ue.poznan.pl (A. Zaremba).

https://doi.org/10.1016/j.tourman.2020.104281
Received 11 August 2020; Received in revised form 3 December 2020; Accepted 21 December 2020
Available online 7 January 2021

low.[1] The travel and leisure industry experienced the fourth-highest drop among 38 industry categories as classified by Datastream. Even in this bleak landscape, there was still some heterogeneous behavior of stock returns in this sector. While some of them fell more than 80% (e.g., Carnival PLC, Eldorado Resorts, and Norwegian Cruise Line Holdings), others rose over the same period (e.g., Domino's Pizza, Haidilao International, and Xi'an Tourism). The performance also differed across countries. Tourism stocks from Brazil, Chile, and New Zealand fell by more than 60%, whereas their counterparts from Slovakia, Cyprus, and Bahrain lost less than 10% of their value.

In this paper, we examine what determines the performance of travel and leisure firms during a pandemic. Why do some companies perform better than others during the pandemic? What corporate or macroeconomic variables play a role? Do policy responses matter? The principal aim of this article is to attempt to answer these questions.

To this end, we use data on more than 1200 tourism firms across 52 countries. We investigate the relationship between tourism stock returns and 80 characteristics for the initial outbreak of the coronavirus pandemic: the first quarter of 2020. We use a machine learning tool Elastic net (Zou & Hastie, 2005) and Fama-MacBeth regressions (Fama & MacBeth, 1973). We consider three broad categories of potential predictors of stock returns: (1) firm characteristics, such as valuation, investment, profitability, leverage, and sector affiliation; (2) country characteristics, such as economic data, national culture-specific features, population data, and industry concentration, and (3) government policy responses to COVID-19 outbreaks, such as containment and closure policies, health interventions, and economic stimuli. The selection of variables is backed up by a theoretical basis stemming from the extant literature.

Our paper aims to contribute to the fast-growing body of research on corporate immunity against COVID-19. Ramelli and Wagner (2020) state that U.S. firms with low leverage and high-cash positions could protect themselves against the pandemic. This finding is extended by Fahlenbrach et al. (2020), who define low leverage as financial flexibility and reach similar conclusions supported by credit market observations in the United States. Dechow et al. (2020) highlight the role of equity duration; Albuquerque et al. (2020) investigate how environmental, social, and governance (ESG) policy affects returns and earnings of U.S. stocks; Haroon and Rizvi (2020) research the role of news coverage; Heyden and Heyden (2020) extend the considerations to fiscal and monetary measures; and Mazur et al. (2020, p. 101690) explore the role of data from financial statements and industry classification. Finally, although most papers are concerned with the United States, some studies cover global markets. Zaremba et al. (2020) analyze the cross-sectional variation in country index returns, and Ding et al. (2020), using simple regression, investigate how corporate characteristics affect international companies' returns. Several studies are examining the effect of epidemics and diseases on tourism inflows (Karabulut et al., 2020; Kuo et al., 2008; McAleer et al., 2010; Rosselló et al., 2017; Yang et al., 2020); however, to the best of our knowledge, there is no study focusing on their effect on travel and leisure companies. This article is the first to comprehensively fill this gap and explore the determinants of corporate immunity of travel and leisure companies to the COVID-19 pandemic.

The potential determinants of corporate immunity to the pandemic of travel and leisure companies may be essential to various decision-makers in a global context, including firm managers, policy-makers, investors, and regulatory bodies. They may help managers to shape better company policies, improving their resiliency to extreme risks such as pandemics. Furthermore, this information may be used by investors to adjust optimized exposure to pandemic risk factors. Finally, the knowledge of the tourist sector resiliency sources may help policy-makers undertake more informed decisions regarding relevant pandemic-related regulations and interventions.

Among the three categories of characteristics studied in this article, we find six drivers of travel and leisure companies' immunity to the COVID-19 pandemic. First, we demonstrate a company valuation's role represented by a relationship between a company's EBITDA and enterprise value (EV). The higher the EBITDA/EV ratio before the crisis, the stronger the firm position is. Second, investment policy matters: we find that firms with high asset growth recorded lower losses during the pandemic. We argue that the outbreak mainly affects imminent cash flows, so firms with value sources from long-run cash flows are less affected. Third, company leverage also plays a vital role. Tourism firms with limited levels of debt could handle the first months of the pandemic better. Low leverage may be beneficial, as it allows for greater financial flexibility and the ability to arrange additional financing when operating activity stops. Fourth, we find that the degree of individualism in national culture matters. Culturally loose and more individualistic countries may find it more challenging to cope with the pandemic swiftly, negatively affecting corporate immunity to COVID-19. Finally, we find that stringent policy responses positively affect the overall performance of the travel and leisure companies. Actions such as school closing (*SCHOOL*) and stay-at-home requirements (*STAYATHM*) may seem harmful at first sight but eventually proved advantageous for the tourism sector. As observed by Correira et al. (2020), strict policy interventions helped to curb the local outbreak more quickly, eventually benefitting the economy.

The rest of the article proceeds as follows. Section 2 outlines the theoretical basis for selecting the determinants of COVID-19 immunity of travel and leisure companies. Section 3 presents the data used in our study. Section 4 describes the methodology. In Section 5, we discuss the empirical results. Finally, Section 6 concludes the study.

2. Theoretical basis: variable selection

Our study considers 80 different firms' characteristics from different domains. This section provides the theoretical basis for the inclusion of different variables in our study. Overall, we examine data from three major domains: firm characteristics, country variables, and government policy responses.

Within the first group—the firm characteristics—we begin with a set of common valuation ratios. Fundamental variables represent an important source of firm value (Liu et al., 2009; Loughran & Wellman, 2011) and, furthermore, Baltussen and van Vliet (2020) argue that some investment styles may be preferred or deferred during a pandemic. Next, we take into account firm investment policies. We consider these because they determine the timing of future cash flows. As Hasler and Marfe (2016) noted and Dechow et al. (2020), when a large part of a company's value comes from short-term cash flows, their stock prices may be more affected by a pandemic-type disaster. Also, in this group, we consider profitability ratios that represent firms' ability to generate cash flow. This attribute may prove highly useful in times of liquidity shortages (Kahle & Stulz, 2013), and we assess the role of indebtedness: prior work indicates that leverage can substantially affect a firm's operating performance during a crisis (Opler et al., 1994; Youn & Gu, 2010; Muradoglu & Sivaprasad, 2014) and evidence from the financial crisis shows that external finance affected corporate ability to recover (Duchin et al., 2010; Giroud & Mueller, 2015). Besides, we include a group of asset pricing variables describing different investment styles commonly used in cross-sectional analysis. These variables represent investors' preferences for certain classes of stocks during a crisis (Baltussen & van Vliet, 2020). When considering the firm-level characteristics, we also take into account their sector affiliation.

The second group encompasses country-level and macroeconomic variables. We conjecture that strong economies can better respond to the pandemic. Hence, firms listed in such countries should benefit from more intensive rescue and stimulation packages. We verify how national

[1] The World-DS Travel & Leisure Index fell by 44.7%, while the prices of all stocks represented by the World-DS Global Index fell "only" 32.6%.

GDP, unemployment, inflation, credit rating, and interest rates help protect local firms. We also consider the role of a country's economic openness. Firms are connected globally through networks of suppliers and customers that may have had different exposure levels to the COVID-19 pandemic (Acemoglu et al., 2017; Acemoglu & Robinson, 2012).

Furthermore, following Chui et al. (2010) and Docherty and Hurst (2018), we hypothesize that national culture is an essential determinant of stock prices' reaction to the crisis. For instance, we consider that nations characterized by collective thinking may undertake more effective actions against the virus outbreak, which eventually supports the state of the economy. On the other hand, high uncertainty avoidance may not only encourage social distancing but also influence investors' attitudes and provoke massive stock selloffs. Along with the degree of individualism and uncertainty avoidance, we assess the effects of three other national culture characteristics—power distance, masculinity, and long-term orientation—that we consider may also be important determinants of population behavior in a pandemic period.[2]

Also, in this group, we include governance indicators that describe a government's ability to manage a crisis and influence the reaction of its residents. Democratic regimes may be sometimes beneficial. Acemoglu et al. (2019) have shown that democratic countries offer better GDP growth opportunities. There is also a correlation between regime type and the health status of its citizens. Democratic countries generally provide better living conditions that support their citizens' health conditions (Bollyky et al., 2019). As well, some countries are not democratic or where democracy is poor or unstable. This may contribute to greater differences between countries in their populations' health status, as there is a strong connection between regime type and a country's ability to compete on the global market (Acemoglu & Robinson, 2012; Besley, 2007). On the other hand, countries like China and Vietnam show that undemocratic regimes may also provide some benefits related to signaling effects or the level of control over their citizens' behavior (Malesky & London, 2014; Weeks, 2008). We hypothesize that differences in regime type and national governance are the determinants of economic reaction to the pandemic and the vulnerability of travel and leisure companies to COVID-19. We test this with six indicators that measure the perception of government trustworthiness and stability.

Within the set of country-level determinants, we also explore how legal system origin affects stocks' reaction to COVID-19. It has been documented empirically that legal systems determine the level of investor protection: common law systems (with origins in English law) give more protection than civil law systems (those that originate from Roman law, best represented by French law) (La Porta et al., 1998). This relationship is strong enough to affect the size of the domestic capital market in relation to the whole economy, but the effect of legal tradition goes beyond finance. The legal origins theory states that it differentiates countries by their social control styles and the institutions supporting them (La Porta et al., 2008). Inspired by this theory, we test how stocks in countries with different legal origins reacted to the COVID-19 pandemic. In our empirical study, we use four variables describing a country's legal origin.

Another country feature that may determine local travel and leisure companies' vulnerability to a pandemic is demographics. Population density and migration patterns may determine the intensity of viral spread, and the average population age may determine disease severity. To test the relationship between stock price reactions to COVID-19 and these characteristics, we use two measures describing the countries' population data.

Moreover, we also consider healthcare variables' role, as adequate healthcare resources play a crucial role in determining economic outcomes (Ji et al., 2020; Rhodes et al., 2012). We assume that travel and leisure companies from countries with a higher quality healthcare system perform better during a pandemic than those with healthcare resource shortfalls. We use nine indicators of basic medical care that describe the coverage and cost of essential health services, the general health of the society, and the ability of the local healthcare system to deal with the lower respiratory infections that are a significant feature of the current pandemic (Fullman et al., 2018).

Finally, we study the role of sector concentration and its size in relation to the whole economy. We hypothesize that more concentrated industries—those with a higher market share relative to the total market capitalization—will have experienced more difficulties during the COVID-19 pandemic (Hou & Robinson, 2006).

Last but not least, the third group covers government policy responses to the COVID-19 pandemic. Some nonpharmaceutical interventions (NPIs) had a detrimental effect on international tourism. Following Hale et al. (2020), we scrutinize daily changes in government policies to examine the effect on travel and leisure companies of three groups of factors: 1) closure of public life (closing schools, workplaces, and public transport, cancellation of public events, restrictions on gatherings and local or international movement and travel, and stay-at-home requirements), 2) health system action (public information campaigns, testing policy, and contact tracing), and 3) economic stimuli (income support and debt relief for households and companies). We bear in mind that these interventions' short and long-term effects may be ambiguous (Correira et al., 2020; Heyden & Heyden, 2020; Huo & Qiu, 2020; Shanaev et al., 2020). However, we suppose that the more intensive the NPIs are implemented in a country, the less panic there would be about the pandemic, and the more stable travel and leisure companies' performance would be.

3. Data

We study the determinants that make tourism stocks relatively immune to the COVID-19 pandemic with four groups of data: 1) the number of COVID-19 cases reported per week in each country, 2) firm-level characteristics for 1201 international, stock market-listed tourism companies, 3) country-level characteristics for 52 countries, including economic data, national culture, world governance indicators, legal origin, population data, basic medical care data, and tourism sector composition data, and 4) government policy responses. The corporate immunity of travel and leisure firms is determined with weekly stock returns from the most critical period for stock markets starting from the week beginning on January 6, 2020, when the first confirmed death from COVID-19 was reported in Wuhan, until the week ending on March 23, 2020, right after the U.S. Federal Reserve declared comprehensive new measures to assist the economy.[3] The Federal Reserve action ended the sudden global market declines and started a global stock market rebound. Our study period focuses on the first and most severe wave of the pandemic that, at this point, was mainly an unknown and unprecedented shock to the global economy. The post-March period, on the other hand, was strongly influenced by government-orchestrated economic stimuli. During the recovery stage that commences, economic indicators and asset prices rebounded, and the state- and corporate-level immunity was no longer in the spotlight.

3.1. Sample of stocks

We retrieve a global selection of travel and leisure companies with Datastream, which provides 2881 equities classified to the travel and leisure industry. We include several filters to concentrate our study on the most representative stocks: 1) we eliminate all instruments other than shares, 2) we eliminate extreme weekly log excess returns of less

[2] A detailed description of each characteristic is presented in Table A2 in the Online Appendix A.

[3] The FED announcement is available at https://www.federalreserve.gov/newsevents/pressreleases/monetary20200323b.htm.

than −95% and more than 100%, 3) we remove penny stocks (i.e., prices less than USD 1.00), and 4) we discard companies with a market capitalization smaller than USD 100 million. Finally, we define 1201 worldwide tourism stocks classified in the travel and leisure industry. This provides a total of 13,193 weekly observations from our 11-week study period.

3.2. COVID-19

Our research period covers the 11 weeks between January 6 and March 23, 2020. Following Ding et al. (2020), for each country and each week, we compute the *ΔCOVID-19* variable as follows:

$$\Delta COVID-19 = ln\left(1 + confirmed\ cases_{c,t}\right) - ln\left(1 + confirmed\ cases_{c,t-1}\right) \quad (1)$$

where c and t represent the country and week, respectively, and $confirmed\ cases_{c,t}$ is the cumulative number of confirmed cases in country c as of the last day of week t. Thus, *ΔCOVID-19* represents the weekly growth rate of the cumulative number of confirmed cases in country c.

3.3. Firm-level characteristics and sector affiliation

We study 19 firm-level variables that may potentially drive tourism stock immunity to COVID-19. We follow the Fama and French (2015) five-factor model and define firm-level characteristics as follows: (1) market risk is measured with the stock market beta (*BETA*); (2) the size factor is measured with the log-market value (*MV*); (3) the value factor is represented by six indicators used in cross-country asset pricing studies (Zaremba, 2019); these are: book-to-market ratio (*BM*), dividend yield (*DY*), EBITDA-to-EV ratio (*EBEV*), forecasted earnings-to-price ratio (*FEP*), cash flow-to-price ratio (*CP*), and earnings-to-price ratio (*EP*); (4) the profitability factor is defined by the ratios of the return on assets (*ROA*), return on equity (*ROE*), and return on sales (*ROS*); and (5) the investment factor is tested by the CAPEX-to-assets ratio (*CA*) and 12-month asset growth ratio (*AG*).

Additionally, we consider market-related indicators that explain the cross-sectional differences in returns: momentum (*MOM*) (Jegadeesh & Titman, 1993), long-run reversal (*REV*) (Balvers et al., 2000), turnover ratio (*TURN*) (Lee, 2011), and idiosyncratic volatility (*IVOL*) (Bali & Cakici, 2010). Following Ding et al. (2020), we take into account the firm debt structure as a determinant of stock reaction to COVID-19 market shock, and we investigate the effects of leverage ratio (*LEV*) and interest coverage ratio (*INTCOV*) on tourism stocks.

Finally, we also include six dummy variables representing tourism subsectors: airlines (*AIRLINES*), casinos and gambling (*CAS&GAM*), hotels and motels (*HOT&MOT*), recreational services (*RECRSERV*), restaurants and bars (*RES&BAR*), and travel and tourism (*TR&TOUR*). The detailed description of these variables is presented in Table A1 in the Online Appendix A. We use data from Datastream.

3.4. Country-level variables

Our research's international scope requires extending the firm- and sector-level characteristics typical for cross-sectional analysis with country-level characteristics allowing cross-country analysis. For each stock, we consider 40 country-specific factors along with the firm domiciliation. We divide these factors into seven categories: (1) ten economic indicators describing country financial standing; (2) five national culture indicators representing typical social behavior of country citizens; (3) six indicators of governance quality; (4) four different indicators of legal origin; (5) four country population indicators; (6) nine fundamental medical care indicators; and (7) two country-level features of the tourism industry representing its concentration described with the Gini coefficient and the market share of the sector of the total local market value.[4]

The data is compiled from such sources as the World Bank, OECD national accounts, the International Monetary Fund, the World Tourism Organization, and the World Health Organization (WHO). The detailed list of all country-level variables is presented in Table A2 in the Online Appendix A.

3.5. Government policy responses

Finally, we consider 14 different government policy response indicators from Hale et al. (2020). We consider all the indicators available, classified into three broad categories: containment and closure policies, health system interventions, and economic stimuli. We also explore the composite Stringency Index aggregating different government actions. The details of the policy response variables are provided in Table A3 in the Online Appendix. All the data is sourced from Hale et al. (2020).

The primary statistical properties of all the variables examined in the study and described in Sections 3.1 to 3.5 are reported in Table A4 in the Online Appendix.

4. Methods

The study aims to find determinants of travel and leisure companies' immunity to the COVID-19 pandemic. Our model assumes that the key factor explaining cross-country differences is the *ΔCOVID-19* variable representing the growth rate of the cumulative number of confirmed cases reported per week in each country. Because the dynamics of cases during the research period varied across countries, we need to adjust each of the potential characteristics to the country-specific pandemic situation. We use the following regression specification to evaluate how different characteristics shape stock price movements (Ding et al., 2020):

$$r_{i,t} = \delta_0 + \delta_1 \Delta COVID-19_{c,t} + \gamma_1 CAR^{T}_{i,t-1} \times \Delta COVID-19_{c,t} + \gamma_2 CAR^{T}_{c,t-1} \times \Delta COVID-19_{c,t} + \gamma_3 CON^{T}_{i,t-1} + \varepsilon_{i,t} \quad (2)$$

where i, c, and t represent index firm, country, and week, respectively. The dependent variable $r_{i,t}$ is the weekly log-return. $\Delta COVID-19$ is the growth rate of the cumulative number of confirmed cases in country c and week t. $CAR^{T}_{i,t-1}$ and $CAR^{T}_{c,t-1}$ represent vectors of characteristics at the firm i and country c levels in week $t-1$, and γ_1 and γ_2 are vectors of δ regression coefficients at the firm i and country c levels, respectively. Equation (2) includes interactions between vectors of characteristics and $\Delta COVID19$. Finally, $CON^{'}_{i,t-1}$ is the vector of the six control variables (with the corresponding vector γ of appropriate δ) that we include in

[4] We adopt some data preparation techniques that are commonly applied in cross-sectional analysis. In order to deal with outliers for each variable, we estimate the interquartile range score. If a variable's single value is out of the interquartile range, we apply winsorization at the 0.5% level. Furthermore, we apply normalization for all data used in Elastic net regression. Another issue is missing values, which we replace with a cross-sectional median for each variable.

each regression: *BM*, *AG*, *ROE*, *MV*, *BETA*, and *MOM*.[5]

We examine the statistical importance of particular characteristics with Fama-MacBeth (FM) regressions (1973, FM hereafter). This two-step procedure is commonly used in cross-sectional research and eliminates problems of heteroskedasticity and autocorrelation.[6] Because multivariate linear regression is not suitable for a large number of correlated variables, we employ a two-stage procedure that preselects variables before implementing the final FM regression.

In the first step, we run single-interaction FM regressions to define every single feature's statistical importance. We concentrate on features with a 5% significance level.[7] Simultaneously, we verify each characteristic's importance from a different perspective and use a machine learning tool called "Elastic net" that eliminates the weights of the least critical features (Zou & Hastie, 2005). We create a specification that covers all interactions simultaneously, along with control variables. In the second step, we consider only these filtered features demonstrated relevant by both single-interaction FM regressions and Elastic net. The detailed model specifications for the FM regressions and Elastic net are presented in the Online Appendix B.

Subsequently, we continue with a detailed analysis of different categories of potential contributors to travel and leisure companies' resiliency. Specifically, we split our characteristics into groups based on the major domains identified previously: 1) firm-level characteristics and sector affiliations, 2) country characteristics, and 3) government policy responses. In each of these subsets, we run multiple-interaction FM regression specifications and investigate combinations of several variables, as well as all at once. This allows us to determine the validity of variables in a multidimensional setting and capture the immunity determinants reflecting similar phenomena. Therefore, toward the final stage, we pass only these variables that remain significant after controlling for each other within different groups. In all our tests, we employ the 5% significance threshold as a default. A detailed discussion concerning feature selection is presented in sections 5.2–5.4.

Finally, in the last step, we run the multivariate FM regressions that simultaneously consider all important variables. These specifications demonstrate the determinants of immunity of tourism stock returns to the COVID-19 pandemic and are discussed in Section 5.5.

5. Empirical findings

This section describes the results for the characteristics proven to be a valuable source of information on the immunity of the travel and leisure companies to the pandemic. For the sake of brevity, we report here only the results for the empirically relevant variables that pass our first-state examinations, i.e., are significant in single-interaction FM-regressions and the Elastic net. Also, the detailed list of all the coefficients determined with Elastic net and the coefficient *p*-values calculated with FM single-interaction regressions for each of the characteristics is presented in Table A4 in the Online Appendix A.

5.1. The COVID-19 pandemic and the stock market

Our first step is to verify whether the *ΔCOVID-19* variable, as defined in section 3.2, contains information useful for explaining variation in tourism stock returns during the pandemic. The coefficient on *ΔCOVID-19* in regression with no further interactions is significant and negative, amounting to −2.16 (see Tables 1–3, column 1). This indicates that the spread of the pandemic adversely impacts the performance of travel and leisure companies. This observation is in line with a common-sense intuition behind the effect of the pandemic on global tourism and the economy.

5.2. Firm-level characteristics

We begin our search for determinants that limit the negative shock from COVID-19 on tourism stock returns with the firm-level characteristics. Using both the single-interaction FM regression that contains six control variables and the Elastic net specification, we find that the interactions between *ΔCOVID-19* and (1) EBITDA-to-EV ratio (*EBEV*), (2) 12-month asset growth (*AG*), and (3) net debt-to-equity ratio (*LEV*) are statistically significant. None of the industry dummies turn out to be important. The results from the single- and multiple-interaction FM regressions are presented in Table 1.

As we can see in columns 2, 5, 6, and 8 of Table 1, the interaction between *ΔCOVID-19* and *EBEV* is positive and significant in both the univariate and multivariate tests. *EBEV* characterizes the firm valuation: the higher the ratio, the lower the company valuation. Thus, the regression result indicates that tourism stocks with lower valuation, as measured with *EBEV*, are more resilient to the selloff caused by the COVID-19 pandemic.

The role of *EBEV* stands out from other valuation ratios, which are less significant. Notably, Gray and Vogel (2012) also demonstrate that this valuation ratio proves to be the most effective of all valuation ratios for cross-sectional return predictions. One reason for this result is that only *EBEV* considers debt as an ingredient of firm size, thus linking *EBEV* with firm leverage. Also, because *EBEV* relies on EBITDA as a measure of earnings, it includes earnings before interest is paid—in contrast to other valuation ratios that capture earnings after interest is paid. All these factors relate to the company's level of debt, and the results align with Loughran and Wellman's (2011) arguments that EBITDA-to-EV is the most useful and reliable valuation ratio that can be compared more easily across firms with differing leverage.

The reason why firms with higher *EBEV* were more resilient to the COVID-19 pandemic also relates to the *q*-theory extended by Liu et al. (2009). This theory states that investment return is equal to unlevered investment return or discount rate, namely the weighted average cost of capital (WACC). *EBEV* is a proxy for WACC; therefore, just as a firm's WACC is positively associated with the leveraged investment return or cost of equity, a firm's *EBEV* should also be positively associated with the cost of equity (Loughran & Wellman, 2011). Firms with high *EBEV* are priced low and have a higher cost of capital and, thus, higher expected returns than low *EBEV* firms.

The second important determinant of tourism stock returns is *AG*, which also returned a positive coefficient (Table 1, columns 3, 5, 7, and 8). This means that companies with more aggressive investment policies were more resilient to the COVID-19 pandemic. Our finding may be initially counterintuitive, as firms with high investments are characterized by lower expected returns (Cooper et al., 2008). However, it is entirely consistent with the reasoning of Dechow et al. (2020): as operating activity stops, the pandemic affects mostly the imminent, short-term cash flows, whereas deferred cash flow, resulting from future investments, is less affected. Therefore, the larger the part of a firm value

[5] Our control variables stem from the return predictors underlying the six-factor model of Fama and French (2018) that nests other major asset pricing models such as the three-factor and four-factor models. Importantly, the Fama-French six-factor model variables, as well as the nested five-factor model (Fama & French, 2015), capture well the multidimensionality of stock returns. The models explain the broad array of different anomalies and return patterns in the stock market, synthesizing all the most important variables that have been demonstrated in the asset pricing literature to influence the cross-section of stock returns (Fama & French, 2016).

[6] The methodology is executed in two steps: a cross-sectional step and a time-series step. In the first step, regression coefficients are defined with a typical multivariate regression. In the second step, we define standard errors and p-values for regression coefficients with the Newey and West (1987) procedure that eliminates the heteroskedasticity and autocorrelation typical for stock returns.

[7] As we incorporate six control variables and *ΔCOVID-19* into every regression, our single-interaction regressions consist in practice of eight independent variables (a single interaction between the *ΔCOVID-19* and a characteristic, the *ΔCOVID-19* variable, and six controls).

Table 1
Firm-Level Characteristics and Tourism Stock Returns.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ΔCOVID-19	−2.16**	−2.740**	−2.724**	−1.889**	−3.426**	−2.469**	−2.469**	−3.125**
	(0.437)	(0.576)	(0.312)	(0.362)	(0.369)	(0.404)	(0.253)	(0.276)
*EBEV * ΔCOVID-19*		5.626**			6.741**	5.594**		6.185**
		(1.669)			*(1.232)*	*(1.028)*		*(1.05)*
*AG * ΔCOVID-19*			3.016*		3.085*		3.081**	3.115**
			(1.157)		*(1.154)*		*(0.991)*	*(0.993)*
*LEV * ΔCOVID-19*				−2.447**		−2.435**	−1.798*	−1.778*
				(0.744)		*(0.733)*	*0.657*	*(0.612)*
Control variables	Y	Y	Y	Y	Y	Y	Y	Y
Adjusted R^2	0.374	0.374	0.383	0.379	0.384	0.379	0.386	0.386
# of firms	1199	1199	1199	1199	1199	1199	1199	1199

This table shows the estimations of cross-sectional regressions of equation (2) for firm characteristics. The table shows the results for the three firm characteristics that were found to be significantly associated with tourism stock returns with single-interaction FM regressions and the machine learning tool, Elastic net: EBITDA-to-EV ratio (EBEV), 12-month asset growth (AG), and net debt-to-equity ratio (LEV). The importance of each characteristic is calculated through its interaction with the weekly growth rate of the cumulative number of confirmed cases (ΔCOVID-19). The dependent variable is weekly log-return. The panel regression includes the following control variables: book-to-market ratio (BM), 12-month asset growth (AG), return on equity (ROE), log-market value (MV), stock market beta (BETA), and momentum (MOM). The descriptions of the variables and how they are calculated are available in Table A1 in the Online Appendix A. In each row, regression coefficients are shown; the numbers in parentheses are the corresponding standard errors. The asterisks ** and * represent statistical significance at the 1% and 5% levels, respectively.

Table 2
Country Characteristics and Stock Returns in Reaction to the COVID-19 Pandemic.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
ΔCOVID-19	−2.164**	3.447**	−0.337	−6.332**	0.600	2.353	−0.657	5.37**	0.134	4.507	−4.815	−1.168
	(0.437)	(0.960)	(0.699)	(1.784)	(0.752)	(1.821)	(2.599)	(1.564)	(2.809)	(2.099)	(3.839)	(2.428)
*INDIV * ΔCOVID-19*		−0.152**				−0.07**	−0.096**	−0.162**	−0.06*	−0.077**	−0.09**	−0.064*
		(0.034)				*(0.016)*	*(0.022)*	*(0.039)*	*(0.023)*	*(0.016)*	*(0.023)*	*(0.024)*
*ACCOUN * ΔCOVID-19*			−2.422*			−1.79			−1.51	−1.782		−1.468
			(1.071)			*(0.900)*			*(0.870)*	*(0.887)*		*(0.839)*
*CON * ΔCOVID-19*				22.923*			12.146		10.204		29.277	17.327
				(9.441)			*(8.993)*		*(8.416)*		*(15.797)*	*(10.259)*
*TRAV * ΔCOVID-19*					−108.99**			−48.918		−78.478	64.054	29.442
					(32.268)			*(33.137)*		*(45.689)*	*(40.839)*	*(20.279)*
Control variables	Y	Y	Y	Y		Y	Y	Y	Y	Y	Y	Y
Adjusted R^2	0.380	0.382	0.381	0.381	0.386	0.388	0.386	0.394	0.393	0.393	0.394	0.380
# of firms	1199	1199	1199	1199	1199	1199	1199	1199	1199	1199	1199	1199

We show the estimations of cross-sectional regressions using equation (2) for country characteristics. The table shows the results for the four country characteristics that were found to be significantly associated with tourism stock returns with single-interaction FM regressions and the machine learning tool, Elastic net: individualism (*INDIV*); voice and accountability (*ACCOUN*); industry concentration in the local stock market (Gini coefficient) (*CON*); and the percentage of the local stock market capitalization comprised of travel and leisure industry stocks (*TRAV*). The importance of each characteristic is calculated through its interaction with the weekly growth rate of the cumulative number of confirmed cases (*ΔCOVID-19*). The dependent variable is weekly log-return. The panel regression includes the following control variables: book-to-market ratio (*BM*), 12-month asset growth (*AG*), return on equity (*ROE*), log-market value (*MV*), stock market beta (*BETA*), and momentum (*MOM*). The descriptions of the variables and how they are calculated are available in Table A2 in the Online Appendix A. In each row, regression coefficients are shown; the numbers in parentheses are the corresponding standard errors. The asterisks ** and * represent statistical significance at the 1% and 5% levels, respectively.

that comes from long-term deferred cash flow, the more immune a company should be.

Let us consider two companies: one low-growth and one high-growth. For the high-growth firm, a large part of its value comes from the profits generated on ongoing and future investments that are relatively deferred. On the other hand, in the low-growth company, a more significant part of its value comes from an ongoing operating activity that is less deferred. Now, assume the pandemic affects the cash flow expectation: short-term cash flows will be most reduced, whereas long-term cash flows may be relatively unaffected. With this shift of cash flow expectations, our low-growth firm will lose a large portion of its valuation, driving its stocks to fall deeply.

In contrast, the high-growth firm should be relatively unaffected, as its long-term cash flow expectations remain solid. This specific relationship has already been supported in the economic literature concerning COVID-19. Dechow et al. (2020) empirically demonstrate that value companies characterized by high short-term cash flow and low equity duration underperformed in the broader market during the first months of the pandemic. These results compare well with our finding that firms with higher asset growth are more resilient to the pandemic.

The last microlevel determinant of tourism stock return behavior during the COVID-19 pandemic is *LEV* (Table 1, columns 4, 6, 7, and 8). In this case, the observed relationship is negative, indicating that the stocks of tourism companies with less debt are more resilient to the pandemic. *LEV* describes the level of firm financial flexibility. The lower the leverage, the higher the flexibility, and the ease with which a firm can fund a revenue shortfall resulting from a shock such as COVID-19. A firm with substantial financial flexibility can easily finance a cash flow shortfall (Fahlenbrach et al., 2020). The results for *LEV* also support our earlier discussion concerning the significance of *EBEV*, where we note that the level of debt is a component that distinguishes *EBEV* from other valuation ratios. This result is also consistent with the conclusions of Ding et al. (2020).

5.3. Country characteristics

Next, we examine country characteristics that cause cross-sectional variation in tourism stock returns categorized as economic data,

Table 3
Government Policy Responses and Tourism Stock Returns.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
ΔCOVID-19	−2.164**	−3.144**	−3.909**	−3.522**	−4.68**	−3.173**	−3.235**	−4.335**	−2.763**	−4.592**	−3.17**	−3.204**	−4.139**
	(0.437)	(0.571)	(0.968)	(0.809)	(1.338)	(0.521)	(0.633)	(1.187)	(0.582)	(1.255)	(0.592)	(0.621)	(1.013)
STAYATHM * *ΔCOVID-19*		2.123*						0.996*	2.854*	1.357**	5.385	1.614*	1.108
		(0.740)						*(0.459)*	*(1.289)*	*(0.460)*	*(3.040)*	*(0.646)*	*(0.570)*
SCHOOL * *ΔCOVID-19*			0.937*					1.201*					0.709
			(0.393)					*(0.552)*					*(0.523)*
WORK * *ΔCOVID-19*				1.179*					−0.569				1.860
				(0.472)					*(0.467)*				*(1.234)*
PUBEVEN * *ΔCOVID-19*					1.997*					1.513			0.647
					(0.869)					*(0.758)*			*(0.623)*
GATHER * *ΔCOVID-19*						1.102**					−1.552		−0.800
						(0.313)					*(1.211)*		*(0.790)*
DOMTRAV * *ΔCOVID-19*							1.46**					0.489	−1.252
							(0.498)					*(0.244)*	*(0.843)*
Control variables	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Adjusted R^2	0.381	0.381	0.380	0.381	0.381	0.380	0.379	0.386	0.383	0.385	0.382	0.382	0.389
# of firms	1199	1199	1199	1199	1199	1199	1199	1199	1199	1199	1199	1199	1199

We show the estimations of cross-sectional regressions using equation (2) for government policy responses. The table shows the results for the six government policy responses that were found to be significantly associated with tourism stock returns with single-interaction FM regressions and the machine learning tool, Elastic net: stay-at-home requirements (*STAYATHM*), school closing (*SCHOOL*), workplace closing (*WORK*), cancellation of public events (*PUBEVEN*), restrictions on gatherings (*GATHER*), and domestic travel bans (*DOMTRAV*). The importance of each characteristic is calculated through its interaction with the weekly growth rate of the cumulative number of confirmed cases (*ΔCOVID-19*). The dependent variable is weekly log-return. The panel regression includes the following control variables: book-to-market ratio (*BM*), 12-month asset growth (*AG*), return on equity (*ROE*), log-market value (*MV*), stock market beta (*BETA*), and momentum (*MOM*). The descriptions of the variables and how they are calculated are available in Table A3 in the Online Appendix A. In each row, regression coefficients are shown; the numbers in parentheses are the corresponding standard errors. The asterisks ** and * represent statistical significance at the 1% and 5% levels, respectively.

national culture determinants, world governance indicators, legal system origin, population data, basic medical care data, as well as two industry characteristics. With the single-interaction FM regression and Elastic net specification, we find four variables that interact with *ΔCOVID-19* and are statistically meaningful: 1) individualism (*INDIV*), 2) voice and accountability (*ACCOUNT*), 3) industry concentration in the local stock market described with the Gini coefficient (*CON*), and 4) share of the tourism sector in the whole stock market capitalization (*TRAV*).

As we can see in Table 2, the only characteristic that is statistically important in combination with other interactions is individualism (*INDIV*), which returned a negative coefficient (columns 2, 6–12). *INDIV* is one of the variables representing national culture. It describes the degree to which individuals relate to the group, meaning that in "individualistic societies the ties between individuals are loose and everybody stands on her own and her immediate family" (Hofstede, 1991; after; Kim, 2001, p. 4). Together with its opposite, collectivism, where social relations are tight, individualism is one of the six dimensions of national culture described by Hofstede (1980). Our result confirms the suggestion of Eun et al. (2015) that culture is a crucial omitted variable in the literature that explores cross-country differences in equity returns.

The interaction between *ΔCOVID-19* and *INDIV* in our study is negative. Thus, the regression results indicate that tourism stocks in countries with a lower degree of individualism (equal to a higher degree of collectivism), as measured with *INDIV*, are more resilient to the selloff caused by the COVID-19 pandemic. This finding is supported by the evidence that individuals in collectivist societies like China are less crash-averse (Weigert, 2016) and take more risk than individualistic Westerners like in the United States (Wang & Fischbeck, 2008). The latter is described by Hsee and Weber (1999) in the "cushion hypothesis" about the relationship between national culture and individual risk-taking. According to this hypothesis, if individuals from collectivist countries fail, they are more likely to be "cushioned"—i.e., financially supported when they are in need—by their closest family and friends. Therefore they are more comfortable in taking a greater risk than those from individualistic countries. Schneider et al. (2017) confirm that social cushioning is associated with the greater propensity to take the risk, and Illiaschenko (2019) finds that the relationship between individualism and risk-taking is negative.

5.4. Policy responses

Finally, we turn to the examination of national policy responses. The results of the single-interaction FM regression and the Elastic net indicate six interventions as significant.[8] These are: stay-at-home requirements (*STAYATHM*), school closing (*SCHOOL*), workplace closing (*WORK*), cancellation of public events (*PUBEVEN*), restrictions on gatherings (*GATHER*), and domestic travel bans (*DOMTRAV*). They can be categorized as containment and closure policies. We include them in multiple-interaction FM regressions, as reported in Table 3. Two variables in this framework—*STAYATHM* and *SCHOOL*—prove significant after controlling for other variables, as well as after controlling for each other. In other words, these two stringency responses are essential determinants of tourism stocks' reaction to COVID-19 from both the individual and collateral perspectives. In contrast, other variables are important individually but fail to remain relevant in multi-interaction specifications (see columns 9–12). In other words, their role is captured by the effect of other policies.[9]

Notably, it is essential to highlight that the policy response category

[8] Table A5 in the Online Appendix A presents a detailed list of national policy responses with the FM regression coefficients and *p*-values and the values of the Elastic net coefficients.

[9] For the sake of brevity, we report only the relevant regression specifications. Any further results are available upon request.

variables are generally strongly correlated. In consequence, once we include all of them jointly in a regression (Table 3, column 13), all of the coefficients lack significance. Nevertheless, even in this framework, the coefficients for *STAYATHM* and *SCHOOL* remain positive, consistent with our assertion that tourist stocks in countries with specific closure policies are more resilient to the COVID-19 pandemic.

School closing (*SCHOOL*) and avoiding crowding related to stay-at-home requirements (*STAYATHM*) are among six factors necessary for social distancing during the global pandemic underlined in the policy review of Fong et al. (2020) [10]. It is well documented that closing schools are a useful tool in reducing influenza pandemics transmission (Glass et al., 2006; Kawaguchi et al., 2009; Rashid et al., 2015; Sypsa & Hatzakis, 2009). Avoiding crowds can help to reduce the virus death rate. Both types of policy interventions bring less panic concerning the pandemic and, therefore, more certainty about the financial stability and corporate liquidity and solvency underlined by the IMF (2020). Eventually, this turns into more stability of the performance of travel and leisure companies.

An important feature of school closing and stay-at-home recommendations is that they do not directly affect the tourism business. Though children do not attend school, this does not limit the leisure and travel industry's operations. Similarly, the stay-at-home policies—unless they take the most severe form of freezing entirely social interactions—may not necessarily affect the tourist sector. Soft recommendations targeted at local citizens suggesting they limit time spent outside their households may allow, e.g., the international tourist arrivals to remain unaffected. Consequently, while the adverse impact on the travel and leisure companies is limited, these policies still allow curbing the spread of the pandemic. Furthermore, they may also help strengthen a country's image as one that can cope with healthcare crises and extreme situations efficiently.

Intuitively, stay-at-home requirements (*STAYATHM*) and school closing (*SCHOOL*) are complementary to individualism (*INDIV*) in determining tourism stock return behavior. Huynh (2020) shows that cultural differences influence social distancing across countries during the COVID-19 pandemic. Collectivist countries with tight social bonds have more social distancing discipline, whereas individualistic countries with loose social bonds do not. Actually, in the latter countries at the beginning of the COVID-19 pandemic, social distancing was ignored even by their political leaders, which was spotted by both the media and academia (Cohen et al., 2020; Colarossi, 2020; Cottle, 2020). That leads to our finding that a lower degree of individualism and more social distancing are essential characteristics for the immunity of tourist stock returns to the COVID-19 outbreak.

5.5. Final multiple-interaction approach

The last step of our research is to consider jointly the characteristics selected in the single-interaction regressions to determine their overall predictive ability. We include the following characteristics, selected for the reasons described in sections 5.2 to 5.4: *EBEV*, *AG*, *LEV*, *INDIV*, as well as *SCHOOL* and *STAYATHM*. We analyze different combinations of these variables and find all of them significant in the multiple-interaction FM regressions. The results of this analysis are synthesized in Table 4.

Let us focus on the results of the all-in-one multivariate regression in Table 4, column 12. First, this approach confirms the significance of the three firm-level characteristics: *EBEV*, *LEV*, and *AG*. Furthermore, also observe the impact of individualism in a national culture (*INDIV*) on the stocks' performance—the relationship is negative and significant. In other words, the more individualistic (or less collectivistic) the economy, the more the returns in that economy were affected by the pandemic. This result is intuitive, especially when we combine it with the essential role of policy responses. The interactions between *ΔCOVID-19* and school closing (*SCHOOL*) or stay-at-home requirements (*STAYATHM*) are significant and positive, showing that fast and restrictive countries in implementing social distancing decreased the market panic and created a supportive environment for the performance of the travel and leisure sector. Our results show that tourism stocks from countries with tight bonds in society and restrictive social distancing policies were more immune to the early effects of the COVID-19 pandemic than those from countries with loose social bonds and that did not introduce any such restrictions or did not pay sufficient attention to it.

The positive role of social distancing may seem astonishing, counterintuitive, and unreasonable at first sight. Nonetheless, the policy's effect may be simply to help mitigate the role of the pandemic itself. For example, Correira et al. (2020) demonstrate that during the 1918 flu pandemic, the U.S. cities' economies that undertook more aggressive approaches did not perform worse and even managed to grow faster. Consistent with these results, Zaremba et al. (2020) find that strict government interventions positively affected domestic stock market returns.

To sum up, our final analysis confirmed the essential role of several variables in tourism company stocks' performance. Companies with low valuations, limited leverage, and high asset growth, as well as those located in countries with less individualism in national culture and undertaking strict policies to fight the pandemic, tended to overperform during the early months of the COVID-19 pandemic.

6. Conclusions

This article searches for the characteristics that may protect stock market-listed companies from the tourism sector against the COVID-19 pandemic. We address this question by assessing the relationships between the company and country characteristics and their stocks' reaction to COVID-19 using the machine learning tool Elastic net and Fama-MacBeth regressions (Fama & MacBeth, 1973).

Our findings identify several significant features that helped to protect tourism firms from the pandemic. First, we show that companies with a low enterprise valuation ratio, limited debt, and intensive investment policies are better prepared to cope with a potential epidemic crisis. Second, a low degree of individualism in the national culture may also prove protective. Last but not least, strong government policies and quick policy responses, such as school closure (*SCHOOL*) and stay-at-home requirements (*STAYATHM*), may help travel and leisure companies to cope with a pandemic.

Our findings are relevant to a variety of decision-makers in a global context, including investors, managers, governments, and other regulatory bodies. Investment policies, leverage, and enterprise valuation are key variables providing immunity against the pandemic. This may be considered as a road map for managers. The pandemic has a less negative tone for slightly leveraged firms, emphasizing the role of capital structure choice for managers in the travel and leisure companies. Entering the COVID-19 period with a lower leverage ratio brings higher flexibility and helps fund a revenue shortfall. The companies in the industry are, in general, highly leveraged compared to most of the other industries, which raises concerns for the impact of possible next waves of the pandemic.

Investors can follow microeconomic factors, which provide immunity to travel and leisure companies, and, in a pandemic period, can tilt their portfolios towards the companies with better profiles in these factors. Moreover, investors should be aware of the effect of government policy responses implemented to limit the transmission of the virus on stock returns. As the second wave of COVID-19 is highly expected, the investors need to follow the measures mentioned above closely. Such an investment strategy may protect investors in the pandemic period.

In addition to policies on preventing the transmission of the virus,

[10] The other four are: isolating ill people, tracing contacts, quarantine of exposed people, and workplace changes (see Fong et al. (2020)).

Table 4
Joint Tests of Multiple Variables.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
ΔCOVID-19	−2.74**	−2.724**	−1.889**	−3.909**	−3.144**	3.447**	−3.125**	−5.05**	−4.009**	2.865**	−5.35**	−1.919
	(0.576)	(0.312)	(0.362)	(0.968)	(0.571)	(0.96)	(0.276)	(0.842)	(0.345)	(0.834)	(0.990)	(1.749)
*EBEV * ΔCOVID-19*	5.626**						6.185**	6.946**	4.207**	6.223**	5.544**	3.534*
	(1.669)						*(1.05)*	*(1.618)*	*(1.043)*	*(1.891)*	*(1.205)*	*(1.353)*
*AG * ΔCOVID-19*		3.016*					3.115**	2.54*	3.102**	2.99**	2.685*	2.622*
		(1.157)					*(0.993)*	*(1.16)*	*(0.99)*	*(0.986)*	*(1.111)*	*(1.091)*
*LEV * ΔCOVID-19*			−2.447**				−1.778*	−1.619*	−1.756*	−1.175*	−1.484*	−1.361*
			(0.744)				*(0.612)*	*(0.649)*	*(0.637)*	*(0.614)*	*(0.649)*	*(0.577)*
*SCHOOL * ΔCOVID-19*				0.937*				1.025*			1.210*	1.224*
				(0.393)				*(0.398)*			*(0.536)*	*(0.492)*
*STAYATHM * ΔCOVID-19*					2.123*				2.142**		1.043*	1.03*
					(0.74)				*(0.703)*		*(0.439)*	*(0.444)*
*INDIV * ΔCOVID-19*						−0.152**				−0.177**		−0.08*
						(0.034)				*(0.038)*		*(0.032)*
Control variables	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Adjusted R^2	0.374	0.383	0.379	0.380	0.381	0.380	0.386	0.392	0.393	0.392	0.397	0.403
# of firms	1199	1199	1199	1199	1199	1199	1199	1199	1199	1199	1199	1199

We show the estimations of cross-sectional regressions using equation (2) for the joint test of multiple variables. The regression includes the variables found to be most significant in the Fama-MacBeth regressions and Elastic net analysis from each of the three domains of characteristics (i.e., firm, country, government policy responses): EBITDA-to-EV ratio (EBEV), 12-month asset growth (AG), net debt-to-equity ratio (LEV), school closing (SCHOOL), stay-at-home requirements (STAYATHM), and individualism (INDIV). The importance of each characteristic is calculated through its interaction with the weekly growth rate of the cumulative number of confirmed cases (ΔCOVID-19). The dependent variable is the stock weekly log-return. The panel regression includes the following control variables: book-to-market ratio (BM), 12-month asset growth (AG), return on equity (ROE), log-market value (MV), stock market beta (BETA), and momentum (MOM). The descriptions of the variables and how they are calculated are available in Tables A1-A3 in the Online Appendix A. In each row, regression coefficients are shown; the numbers in parentheses are the corresponding standard errors. The asterisks ** and * represent statistical significance at the 1% and 5% levels, respectively.

governments and regulatory bodies should also develop financial strategies for supporting travel and leisure companies during outbreak periods. We find that leverage can serve as a mitigating factor against the pandemic. The halting of international tourism is likely to create serious cash flow problems, and firms can face a liquidity crisis and have problems in debt repayment. Therefore, opening new credit channels, providing opportunities to extend debt maturities, and creating refinancing options might help travel and leisure firms be less affected by the pandemic. A proactive strategy might also be followed by providing liquidity options and financial flexibility in advance if a second wave is highly expected. The results may help prepare firms in this industry for disasters similar to COVID-19 that may occur in the future.

Finally, our findings highlight the role of country-specific cultures on the local resilience to the pandemic. This provides essential insights to policy-makers, who design and implement regulations aimed at curbing the pandemic. The containment and closure policies typically bear substantial social and economic costs, so governments must carefully balance the undertaken actions' costs and benefits. Our findings explicitly indicate that collectivistic cultures may boost corporate immunity to the pandemic, allowing for better design and selection of pandemic-related policies.

Our study is limited by the short examination period and the number of characteristics available for analysis. There may be other determinants of COVID-19 resilience not investigated in this study. Research with a longer time horizon, including a second wave and recovery after this crisis, can provide further insights into characteristics that protect travel and leisure companies against a pandemic.

Impact statement

This study contributes to the global travel and leisure industry by exploring which factors provide corporate immunity against COVID-19, and why some firms perform better than others during the pandemic. The results can help regulatory bodies, managers, and investors to adopt effective strategies in a period of overwhelming global panic and fear. We draw a road map for managers in order to mitigate the devastating impact of the pandemic. Investment policies, leverage, and enterprise valuation are key variables providing immunity against the pandemic. The collectivistic character of a national culture also matters. Governments implemented several policy responses in this novel period; however, school closures and stay-at-home requirements primarily helped travel and leisure companies cope with the pandemic. This implies that a timely and appropriate measure against the transmission of COVID-19 can be helpful for the industry. The findings can provide insight for a possible new wave of the pandemic.

Declaration of competing interest

None.

Acknowledgements

Adam Zaremba acknowledges the support of the National Science Center of Poland [Grant no. 2016/23/B/HS4/00731].

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.tourman.2020.104281.

References

Acemoglu, D., Naidu, S., Restrepo, P., & Robinson, J. A. (2019). Democracy does cause growth. *Journal of Political Economy, 127*(1), 47–100. https://doi.org/10.1086/700936

Acemoglu, D., Ozdaglar, A., & Tahbaz-Salehi, A. (2017). Microeconomic origins of macroeconomic tail risks. *The American Economic Review, 107*(1), 54–108. https://doi.org/10.1257/aer.20151086

Acemoglu, D., & Robinson, J. A. (2012). *Why nations fail: The origins of power, prosperity and poverty* (1st ed.). Crown.

Albuquerque, R., Koskinen, Y., Yang, S., & Zhang, C. (2020). Resiliency of environmental and social stocks: An analysis of the exogenous COVID-19 market crash. *The Review of Corporate Finance Studies*. https://doi.org/10.1093/rcfs/cfaa011

Bali, T. G., & Cakici, N. (2010). World market risk, country-specific risk and expected returns in international stock markets. *Journal of Banking & Finance, 34*(6), 1152–1165. https://doi.org/10.1016/j.jbankfin.2009.11.012

Baltussen, G., & van Vliet, P. (2020). Equity styles and the Spanish flu. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3564688

Balvers, R., Wu, Y., & Gilliland, E. (2000). Mean reversion across national stock markets and parametric contrarian investment strategies. *The Journal of Finance, 55*(2), 745–772. https://doi.org/10.1111/0022-1082.00225

Besley, T. (2007). *Principled agents?: The political economy of good government*. Oxford University Press. https://ideas.repec.org/b/oxp/obooks/9780199283910.html.

Bollyky, T. J., Templin, T., Cohen, M., Schoder, D., Dieleman, J. L., & Wigley, S. (2019). The relationships between democratic experience, adult health, and cause-specific mortality in 170 countries between 1980 and 2016: An observational analysis. *The Lancet, 393*, 1628–1640. https://doi.org/10.1016/S0140-6736(19)30235-1, 10181.

Chui, A. C. W., Titman, S., & Wei, K. C. J. (2010). Individualism and momentum around the world. *The Journal of Finance, 65*(1), 361–392. https://doi.org/10.1111/j.1540-6261.2009.01532.x

Cohen, M., Subramaniam, T., & Hickey, C. (2020). *The lost month: Trump says he took 'strong action' in February to stop coronavirus. Here's the full picture*. CNN. https://edition.cnn.com/interactive/2020/04/politics/trump-covid-response-annotation/.

Colarossi, N. (2020). *"8 times world leaders underestimated the threat of the coronavirus*. Business Insider. https://www.businessinsider.com/times-world-leaders-downplayed-the-coronavirus-threat-2020-4?IR=T.

Cooper, M. J., Gulen, H., & Schill, M. J. (2008). Asset growth and the cross-section of stock returns. *The Journal of Finance, 63*(4), 1609–1651. https://doi.org/10.1111/j.1540-6261.2008.01370.x

Cottle, M. (2020). *Boris johnson should have taken his own medicine*. The New York Times. https://www.nytimes.com/2020/03/27/opinion/boris-johnson-coronavirus.html.

Dechow, P., Erhard, R., Sloan, R. G., & Soliman, M. T. (2020). Implied equity duration: A measure of pandemic shut-down risk. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3623588

Ding, W., Levine, R., Lin, C., & Xie, W. (2020). Corporate immunity to the COVID-19 pandemic. *Journal of Banking & Finance*. https://doi.org/10.3386/w27055 (in press).

Docherty, P., & Hurst, G. (2018). Investor myopia and the momentum premium across international equity markets. *Journal of Financial and Quantitative Analysis, 53*(6), 2465–2490. https://doi.org/10.1017/S0022109018000431

Duchin, R., Ozbas, O., & Sensoy, B. A. (2010). Costly external finance, corporate investment, and the subprime mortgage credit crisis. *Journal of Financial Economics, 97*(3), 418–435. https://doi.org/10.1016/j.jfineco.2009.12.008

Eun, C. S., Wang, L., & Xiao, S. C. (2015). Culture and R^2. *Journal of Financial Economics, 115*(2), 283–303. https://doi.org/10.1016/j.jfineco.2014.09.003

Fahlenbrach, R., Rageth, K., & Stulz, R. M. (2020). How valuable is financial flexibility when revenue stops? Evidence from the covid-19 crisis. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3586540

Fama, E. F., & French, K. R. (2015). A five-factor asset pricing model. *Journal of Financial Economics, 116*(1), 1–22. https://doi.org/10.1016/j.jfineco.2014.10.010

Fama, E. F., & French, K. R. (2016). Dissecting anomalies with a five-factor model. *Review of Financial Studies, 29*(1), 69–103. https://doi.org/10.1093/rfs/hhv043

Fama, E. F., & French, K. R. (2018). Choosing factors. *Journal of Financial Economics, 128*(2), 234–252. https://doi.org/10.1016/j.jfineco.2018.02.012

Fama, E. F., & MacBeth, J. D. (1973). Risk, return, and equilibrium: Empirical tests. *Journal of Political Economy, 81*, 607–636. https://doi.org/10.2307/1831028

Fong, M. W., Gao, H., Wong, J. Y., Xiao, J., Shiu, E. Y. C., Ryu, S., & Cowling, B. J. (2020). Nonpharmaceutical measures for pandemic influenza in nonhealthcare settings-social distancing measures. *Emerging Infectious Diseases, 26*(5), 976–984. https://doi.org/10.3201/eid2605.190995

Fullman, N., Yearwood, J., Abay, S. M., Abbafati, C., Abd-Allah, F., Abdela, J., Abdelalim, A., Abebe, Z., Abebo, T. A., Aboyans, V., Abraha, H. N., Abreu, D. M. X., Abu-Raddad, L. J., Adane, A. A., Adedoyin, R. A., Adetokunboh, O., Adhikari, T. B., Afarideh, M., Afshin, A., & Lozano, R. (2018). Measuring performance on the healthcare access and quality index for 195 countries and territories and selected subnational locations: A systematic analysis from the global burden of disease study 2016. *Lancet, 391*, 2236–2271. https://doi.org/10.1016/S0140-6736(18)30994-2, 10136.

Giroud, X., & Mueller, H. M. (2015). Firm leverage and unemployment during the great recession. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2588055

Glass, R. J., Glass, L. M., Beyeler, W. E., & Min, H. J. (2006). Targeted social distancing designs for pandemic influenza. *Emerging Infectious Diseases, 12*(11), 1671. https://doi.org/10.3201/eid1211.060255

Gössling, S., Scott, D., & Hall, C. M. (2020). Pandemics, tourism and global change: A rapid assessment of COVID-19. *Journal of Sustainable Tourism*, 1–20. https://doi.org/10.1080/09669582.2020.1758708

Gray, W. R., & Vogel, J. (2012). Analyzing valuation measures: A performance horse race over the past 40 years. *Journal of Portfolio Management, 39*(1), 112–121. https://doi.org/10.3905/jpm.2012.39.1.112

Hale, T., Angrist, N., Kira, B., Petherick, A., Phillips, T., & Webster, S. (2020). *Variation in government responses to COVID-19*. www.bsg.ox.ac.uk/covidtracker.

Haroon, O., & Rizvi, S. A. R. (2020). COVID-19: Media coverage and financial markets behavior—a sectoral inquiry. *Journal of Behavioral and Experimental Finance, 27*, 100343. https://doi.org/10.1016/j.jbef.2020.100343

Heyden, K. J., & Heyden, T. (2020). Market reactions to the arrival and containment of COVID-19: An event study. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3587497

Hofstede, G. (1980). *Culture's consequences: International differences in work-related values*. SAGE Publications.

Hofstede, G. (1991). *Cultures and organizations : Software of the mind*. McGraw-Hill.

Hou, K., & Robinson, D. T. (2006). Industry concentration and average stock returns. *The Journal of Finance, 61*(4), 1927–1956. https://doi.org/10.1111/j.1540-6261.2006.00893.x

Hsee, C. K., & Weber, E. U. (1999). Cross-national differences in risk preference and lay predictions.". *Journal of Behavioral Decision Making, 12*(2), 165–179. https://doi.org/10.1002/(SICI)1099-0771(199906)12:2<165::AID-BDM316>3.0.CO;2-N

Huo, X., & Qiu, Z. (2020). How does China's stock market react to the announcement of the COVID-19 pandemic lockdown? *Economic and Political Studies*, 1–26. https://doi.org/10.1080/20954816.2020.1780695

Huynh, T. L. D. (2020). Does culture matter social distancing under the COVID-19 pandemic? *Safety Science, 130*, 104872. https://doi.org/10.1016/j.ssci.2020.104872

Illiashenko, P. (2019). "Tough Guy" vs. "Cushion" hypothesis: How does individualism affect risk-taking? *Journal of Behavioral and Experimental Finance, 24*, 100212. https://doi.org/10.1016/j.jbef.2019.04.005

IMF. (2020). *Global financial stability report: Bridge to recovery*. https://www.imf.org/en/Publications/GFSR/Issues/2020/10/13/global-financial-stability-report-october-2020#ExecSum.

Jegadeesh, N., & Titman, S. (1993). Returns to buying winners and selling losers: Implications for stock market efficiency. *The Journal of Finance, 48*(1), 65. https://doi.org/10.2307/2328882

Ji, Y., Ma, Z., Peppelenbosch, M. P., & Pan, Q. (2020). Potential association between COVID-19 mortality and healthcare resource availability. *Lancet Global Health, 8* (Issue 4), Article e480. https://doi.org/10.1016/S2214-109X(20)30068-1

Kahle, K. M., & Stulz, R. M. (2013). Access to capital, investment, and the financial crisis. *Journal of Financial Economics, 110*(2), 280–299. https://doi.org/10.1016/j.jfineco.2013.02.014

Karabulut, G., Bilgin, M. H., Demir, E., & Doker, A. C. (2020). How pandemics affect tourism: International evidence. *Annals of Tourism Research, 84*, 102991. https://doi.org/10.1016/j.annals.2020.102991

Kawaguchi, R., Miyazono, M., Noda, T., Takayama, Y., Sasai, Y., & Iso, H. (2009). Influenza (H1N1) 2009 outbreak and school closure, Osaka Prefecture, Japan. *Emerging Infectious Diseases, 15*(10), 1685. https://doi.org/10.3201/eid1510.091029

Kim, U. (2001). *Individualism and collectivism: Psychological, cultural and ecological analysis* (Vol. 21). Nordic Institute of Asian Studies Reports.

Kuo, H. I., Chen, C. C., Tseng, W. C., Ju, L. F., & Huang, B. W. (2008). Assessing impacts of SARS and Avian Flu on international tourism demand to Asia. *Tourism Management, 29*(5), 917–928. https://doi.org/10.1016/j.tourman.2007.10.006

La Porta, R., Lopez-De-Silanes, F., & Shleifer, A. (2008). The economic consequences of legal origins. *Journal of Economic Literature, 46*(2), 285–332. https://doi.org/10.1257/jel.46.2.285

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. W. (1998). Law and finance. *Journal of Political Economy, 106*(6), 1113–1155. https://doi.org/10.1086/250042

Lee, K. H. (2011). The world price of liquidity risk. *Journal of Financial Economics, 99*(1), 136–161. https://doi.org/10.1016/j.jfineco.2010.08.003

Liu, L. X., Whited, T. M., & Zhang, L. (2009). Investment-based expected stock returns. *Journal of Political Economy, 117*(6), 1105–1139. https://doi.org/10.1086/649760

Loughran, T., & Wellman, J. W. (2011). New evidence on the relation between the enterprise multiple and average stock returns. *Journal of Financial and Quantitative Analysis, 46*(6), 1629–1650. https://doi.org/10.1017/S0022109011000445

Malesky, E., & London, J. (2014). The political economy of development in China and Vietnam. *Annual Review of Political Science, 17*(1), 395–419. https://doi.org/10.1146/annurev-polisci-041811-150032

Mazur, M., Dang, M., & Vega, M. (2020). *COVID-19 and the march 2020 stock market crash. Evidence from S&P500*. Finance Research Letters. https://doi.org/10.1016/j.frl.2020.101690

McAleer, M., Huang, B. W., Kuo, H. I., Chen, C. C., & Chang, C. L. (2010). An econometric analysis of SARS and Avian Flu on international tourist arrivals to Asia. *Environmental Modelling & Software, 25*(1), 100–106. https://doi.org/10.1016/j.envsoft.2009.07.015

Newey, W., & West, K. (1987). A simple, positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix. *Econometrica, 55*(3), 703–708. https://doi.org/10.2307/1913610

Opler, T. C., Titman, S., Opler, T. C., & Titman, S. (1994). "Financial distress and corporate performance.". *The Journal of Finance, 49*(3), 1015–1040. https://econpapers.repec.org/RePEc:bla:jfinan:v:49:y:1994:i:3:p:1015-40.

Ramelli, S., & Wagner, A. F. (2020). Feverish stock price reactions to the novel coronavirus. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3550274

Rashid, H., Ridda, I., King, C., Begun, M., Tekin, H., Wood, J. G., & Booy, R. (2015). Evidence compendium and advice on social distancing and other related measures for response to an influenza pandemic. *Pediatric Respiratory Reviews, 16*(2), 119–126. https://doi.org/10.1016/j.prrv.2014.01.003

Rhodes, A., Ferdinande, P., Flaatten, H., Guidet, B., Metnitz, P. G., & Moreno, R. P. (2012). The variability of critical care bed numbers in Europe. *Intensive Care Medicine, 38*(10), 1647–1653. https://doi.org/10.1007/s00134-012-2627-8

Rosselló, J., Santana-Gallego, M., & Awan, W. (2017). Infectious disease risk and international tourism demand. *Health Policy and Planning, 32*(4), 538–548. https://doi.org/10.1093/heapol/czw177

Schneider, C. R., Fehrenbacher, D. D., & Weber, E. U. (2017). Catch me if I fall: Cross-national differences in willingness to take financial risks as a function of social and state 'cushioning'. *International Business Review, 26*(6), 1023–1033. https://doi.org/10.1016/j.ibusrev.2017.03.008

Shanaev, S., Shuraeva, A., & Ghimire, B. (2020). The financial pandemic: COVID-19 and policy interventions on rational and irrational markets. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3589557

Sypsa, V., & Hatzakis, A. (2009). School closure is currently the main strategy to mitigate influenza A (H1N1): A modeling study. *Euro Surveillance, 14*(24), 19240.

Wang, M., & Fischbeck, P. S. (2008). Evaluating lotteries, risks, and risk-mitigation programs. *Journal of Risk Research, 11*(6), 775–795. https://doi.org/10.1080/13669870801967259

Weeks, J. L. (2008). Autocratic audience costs: Regime type and signaling resolve. *International Organization, 62*(1), 35–64. https://doi.org/10.1017/S0020818308080028

Weigert, F. (2016). Crash aversion and the cross-section of expected stock returns worldwide. *Review of Asset Pricing Studies, 6*(1), 135–178. https://doi.org/10.1093/rapstu/rav019

World Health Organization (WHO). (2020). *WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020*. https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19—11-march-2020.

World Tourism Organization UNWTO. (2020a). UNWTO world tourism barometer may 2020 special focus on the impact of COVID-19. In *UNWTO world tourism barometer may 2020 special focus on the impact of COVID-19 (summary)*. World Tourism Organization (UNWTO). https://doi.org/10.18111/9789284421817.

World Tourism Organization UNWTO. (2020b). *UNWTO global tourism dashboard*. https://www.unwto.org/international-tourism-and-covid-19.

Yang, Y., Zhang, H., & Chen, X. (2020). Coronavirus pandemic and tourism: Dynamic stochastic general equilibrium modeling of infectious disease outbreak. *Annals of Tourism Research, 83*. https://doi.org/10.1016/j.annals.2020.102913

Zaremba. (2019). The cross section of country equity returns: A review of empirical literature. *Journal of Risk and Financial Management, 12*(4), 165. https://doi.org/10.3390/jrfm12040165

Zaremba, A., Kizys, R., Tzouvanas, P., Aharon, D. Y., & Demir, E. (2020). The quest for multidimensional financial immunity to the COVID-19 pandemic: Evidence from international stock markets. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3632466

Zou, H., & Hastie, T. (2005). Regularization and variable selection via the elastic net. *Journal of the Royal Statistical Society - Series B: Statistical Methodology, 67*(2), 301–320. https://doi.org/10.1111/j.1467-9868.2005.00503.x

Tomasz Kaczmarek is a Ph.D. student at Poznan University of Economics and Business (Poland). Professionally strategist, portfolio manager, and capital markets analyst, with 17 years' experience in finance. He is a co-founder and Chief Investment Officer in Starfunds – fintech, an independent fund distributor offering robo-advisory solutions. Before joining Starfunds, he worked in a leading Polish brokerage house from a global capital group in various positions, including Chief Innovation and Product Officer, Chairman of Investment Committee, Portfolio Manager, and Equity Research Analyst. His most recent research focuses on empirical asset pricing via machine learning.

Katarzyna Perez is an Associate Professor and Head of Investment and Financial Markets Department at Poznan University of Economics and Business (Poland). Also serves as an independent member of a supervisory board in a mutual fund management company from a global capital group. Dr. Perez has been engaged in research on mutual funds, portfolio management and asset pricing, lately also in the context of robo-advisory. She is an author of few books on financial investments, bestsellers in a local market.

Ender Demir is an Associate Professor at the Istanbul Medeniyet University in Istanbul, Turkey. Dr. Demir has received his Ph.D. in Business from Ca Foscari University, Italy. Dr. Demir is the founder and conference coordinator of Eurasia Business and Economic Society (EBES). He has published his research in peer-reviewed international journals, including Annals of Tourism Research, Emerging Markets Review, Finance Research Letters, and Journal of International Financial Markets, Institutions & Money. His research interest are corporate finance, Cryptocurrencies, and tourism economics

Adam Zaremba serves as Associate Professor of Finance at Montpellier Business School (France) and Poznan University of Economics and Business (Poland). His research interests include asset pricing, investments, and financial markets. His works have been published in top finance journals, such Journal of Banking and Finance, Energy Economics, or Journal of Portfolio Management. He has worked as an economist, adviser, and portfolio manager for investment management companies. Dr. Zaremba has also written numerous research papers and several books on financial markets.