Liquidity Effects of COVID-19 in the European Tourism Industry

Abstract

We examine the influence of COVID-19 on liquidity of the tourism industry in the UK, Europe and Spain. In the short run the pandemic causes significant negative stock market reaction in the tourism industry. In the long run the tourism industry recovers from the fall in returns due to the pandemic. Liquidity significantly decreases due to COVID-19, for the UK, European and Spanish tourism markets, even when we encapsulate the influence of stock prices, trading volume and volatility. Our findings suggest that European equity markets have declined in efficiency due to the pandemic in the tourism industry. Our empirical analysis has important implications for policy makers. Tourism recovery strategies from the pandemic are required with immediate effect in order to restore the valuation of the tourism companies, given that the negative stock price reaction and lack of liquidity significantly reduces market value of the tourism firms across Europe. In order for the tourism industry to fully recover from COVID-19, investors need to have the confidence to buy large volumes of tourism company stocks, which will increase the price and liquidity, leading to a substantial increase in market capitalization.

Keywords: Tourism, COVID-19, Europe, Spain, UK, Liquidity.

1. Introduction

Boot et al (2020) report that during the start of 2020, there has been a world-wide spread of a disease with large number of people, particularly in China, Korea, Italy and Iran, being infected. Aljazeera (2020) state that the World Health Organization (WHO) reported that pneumonia was discovered in Wuhan on January 05, 2020. Chinese officials suspected it to be the return of the severe acute respiratory syndrome (SARS) virus-an illness that originated in China and killed more than 770 people worldwide in 2002-2003. On January 07, 2020, the WHO identified the novel virus and gave it a name of 2019-nCOV and declared it as a member of the coronavirus family which includes SARS and the common cold. The first death occurred on January 11th, 2020 in China. Due to the current interlink of the world economy, the disease has spread throughout every country increasing the mortality rates in dramatic fashion. As reported by Salo (2020), the WHO declared COVID-19 as a pandemic during March 2020. The countries around the world start to impose lockdown measures which include closing borders as well as the domestic economy, by restricting the unnecessary public interaction all of which have drastically impacted the economic activity of the countries.

One of the most prominent and discussed issues in financial markets is the liquidity of stock exchanges. Noteworthy research has been conducted in order to capture the true definition and method of calculating liquidity. Among these, mentionable studies include Amihud and Mendelson (1986a), Amihud (2002), Liu (2006), Hasbrouck (2009) and Le and Gregoriou (2020). Considering all of these, it can be concluded that as liquidity involves its aspects into the quantity of trade, trading time, and price impact, it is difficult to attain a single persistent measure to calculate liquidity for all markets.

As the world-wide lockdown measures start to strengthen further and difficulty in continuing business activities begin to take part, the contagion finds its way to the financial markets. The companies find it difficult to carry on production and services. The same scenario has been reflected in the tourism industry. The closing borders and cancellation of trips have started to evolve financial risk for the hotels, restaurants and bars, entertainment and the airline sectors causing them to discontinue services and hence leading them to bankruptcy. The tourism industry has started to face liquidity risk in the financial markets. Undoubtedly, the effects on the tourism industry urge key policymakers to reconsider their strategies with new actions as part of the recovery and restarting period planning (Skare, Soriano, and Porada-Rochon (2021); Akron et al (2020)). Vulnerability is the key component of the industry in relation to financial crises, natural disaster, political instability and health related issues (Duro et al (2021), Gregoriou and Liasidou (2019)).

Immediately after the outbreak of the COVID-19 pandemic, tourism activity was declared as a vector that can easily spread the virus. Consequently, in 2020 the industry experienced one of the hardest times that abruptly interrupted tourism activity with UNWTO (2021) estimating a 74% decrease (1.5b USD in 2019 to 381m USD in 2020) of international travel. As stated by Kirby (2020), future estimates reveal that expected increase with recovery seems a long way ahead to reach post-pandemic figures. However, the tourism industry has proven resilient when dealing with previous crises (Zopiatis et al (2019), Gregoriou and Liasidou (2019)), given that it can recover as soon as tourism arrival numbers increase (Sharma, Thomas and Paul (2021), Brouder (2020)). According to Zhang et al (2021:12) 'business decisions are contingent on demand forecasts, which are useful for strategic and operational planning such as budgeting, sales, marketing, and resource allocation'. Recovery deals with rebuilding the tourism industry in the sense of providing a more holistic approach of development can be spread in more geographical areas as a gradual process (Sharma, Thomas and Paul (2021), Navarro-Drazich and Lorenzo (2021)).

The purpose of this paper is to investigate the impact of COVID-19 on the liquidity of the tourism industry of the major European countries, namely the UK, Euronext and Spain. This is accomplished by analysing forty-nine companies listed on the FTSE All Share (forty companies), EURONEXT 100 (seven companies) and IBEX 35 (two companies) of different aspects of the tourism industry, namely restaurants, casinos & gaming, internet & direct marketing retail, hotels, resorts & cruise lines, environmental facilities, airlines, airport services, trucking, movies & entertainment, leisure facilities, railroads, marines ports & services, and highways & rail tracks. The data for these forty-nine companies is collected for a period of 60 days pre- and post the pandemic announcement date, March 11, 2020.

Our research contributes to the previous literature in the following ways. First, we are the only study to examine stock market liquidity during COVID-19 of the tourism industry. Mdaghri et al (2020) report that COVID-19 decreases stock market liquidity. Gofran et al (2022) empirically examine the liquidity impact of COVID-19 on the financial markets of the US, UK, Brazil, China, Germany and Spain. They discover that the pandemic causes short term decreases in liquidity, as a result of rising bid-ask spreads.

Second, we evaluate the impact of the pandemic on liquidity in the tourism industry in both the short and long run. This is achieved by conducting an event study approach over various windows to ensure that we capture both short and long run effects. In order to conduct this anaslysis, we follow the methodology implemented by Gofran et al (2022). It is important that we look at the long run effects as Gil-Alana and Poza (2020) report that the impact of the pandemic is permanent on the tourism industry, given that the data does not reverting back to stock prices before COVID-19. Finally, we analyse if the relationship between liquidity and the tourism industry during the pandemic remains intact once we account for the influence of stock prices, trading volume and volatility, by running a model in similar vein to Gofran et al

(2022). This is important to examine given that Lin and Falk (2021) discover that the pandemic increases the level of risk (which can be approximated by volatility) of tourism firms.

We discover that in the short run the pandemic causes significant negative stock market reaction in the tourism industry. In the long run the tourism industry recovers from the fall in returns due to the pandemic. Liquidity of the tourism industry significantly declines due to COVID-19, for the UK, European and Spanish capital markets. This result holds even when we encapsulate the influence of stock prices, trading volume and volatility. Our findings suggest that European equity markets have deteriorated in efficiency due to the pandemic in the tourism industry.

The remainder of the paper is organized in the following way. In the next section we provide a review of the previous literature and the theoretical relationship between liquidity and the tourism industry during COVID-19. Section 3 discusses the data resources and methodology used. Section 4 reports the empirical analysis of the impact of COVID-19 on the tourism industry. Our summary and conclusions are presented in section 5.

2.1 Literature Review

Various theoretical and empirical research has been conducted on the impact of COVID-19 on the tourism industry emphasising both the impact and predicting recovery remedies that can sustain industry's viability. Sharma and Nicolau (2020) investigate the returns of the airlines, hotels, cruise lines and rental car indices of the Dow Jones using the Karafiath's (1988) market-based model. The result of their study is indicative and suggests that there has been a substantial fall in valuation of the mentioned sectors especially in the cruise division. Carter et al (2021) in their research on stock prices of U.S. travel-related firms (airlines, restaurants, and hotels) conclude that larger firms were more affected, with cash reserves being more important for hotels.

Lee and Chen (2020) report that there are negative effects on the returns of the travel and leisure industry across 65 countries, when compared with the number of deaths rather than confirmed cases. Lin and Falk (2020) examine the performance and the volatility of the travel and leisure industry of three Nordic countries using the Markov switching model. They conclude that high idiosyncratic risk persists during the COVID-19 period. Yang et al (2020) compute a dynamic stochastic general equilibrium (DSGE) model which estimates the effect of COVID-19 and/or any other pandemics on the tourism industry. Using a multisectoral model, research by Mariolis et al (2020) investigates the effects of the tourism industry due to COVID-19 impose multiplier effects on GDP, employment and trade balance of the Greek economy.

Gil-Alana and Poza (2020) discover that COVID-19 has caused persistence in the data and the shocks have become permanent in the Spanish tourism sector. Bakar and Rosbi (2020) investigate the impact by analysing the demand-supply economics of the tourism industry worldwide. Their study illustrates that the pandemic has triggered panic which has caused a declining demand function leading to a decreasing equilibrium price of the tourism industry.

Foo et al (2020) report that in Malaysia, the pandemic and the 4 phases of Movement Control Order (MCO) by the government has created major losses in the tourism industry. Their study also highlights that the airline and hotel business have suffered from bankruptcy and losses in revenue, salary and position cut. Sio-Chong and So (2020) considers two cities Macao and Hong Kong and state that diseases such as the SARS cause negative effects on the tourism industry. Several studies (Qiu et al (2020), Lew et al (2020), and Jones and Comfort (2020)) have also been published on social economic and sustainability to estimate the impact of COVID-19 on the tourism industry.

2.2 Theoretical Considerations

We assume that investors are rational and therefore are aware of the intrinsic value of tourism stocks. We only focus on the sale side of tourism shares given that COVID-19 is seen as a negative shock, which will induce sell rather than buy pressure. Investors would be encouraged to sell stocks if the share price is greater than the value of the security. Their selling decision is based on the level of trading costs that they incur when they trade the asset.

We define:

V_t as the value of a stock at time t

P_t as the price of a stock at time t

TC_t as the trading cost of a stock at time t

We assume that trading costs follow a random walk implying that $TC_t \approx TC_{t+1}$

Investors can sell a security for $P_t - 0.5TC_t$

For the selling opportunity (price is higher than value after trading cost):

If $P_t - 0.5TC_t \geq V_t$ (1)

When the pandemic occurs, investors assume that the tourism stocks are overpriced and therefore sell large quantities. This prompts the market makers to increase the trading costs. This is because market makers are faced with inventory and adverse selection costs when they set the trading costs (see among others, Huang and Stoll (1997) and Zhang and Gregoriou (2020)). The negative shock of COVID-19 increases the inventory (cost to the market maker for holding an undiversified portfolio) and adverse selection (cost to the market maker for dealing with counterparties with superior information) cost components. The market makers then pass these increased costs over to the investor. This causes TC to rise until equation (2) holds.

$$P_t - 0.5TC_t = V_t \qquad (2)$$

This implies that the pandemic causes trading costs to increase in the tourism industry. Therefore, theoretically we would expect COVID-19 to result in a significant decline in liquidity of the tourism industry. We will empirically examine this theoretical relationship in the remainder of the paper.

3. Data and Methodology

3.1. Data

Our sample consists of the forty-nine tourism and leisure companies being traded on the FTSE All Share index, EURONEXT 100 and IBEX 35.[1] Representing 98% of the UK's market capitalisation, the FTSE All share index gauges the performance of the eligible companies and thus is considered as the best measure of the London capital market. Incorporating more than 80% of the Euronext's total market capitalisation and the most liquid blue-chip stocks across five European exchanges in Amsterdam, Brussels, Lisbon, London and Paris, following Gofran et al (2022) the EURONEXT 100 is taken as the benchmark index for European equity markets. The IBEX 35 index represents the 35 most liquid stocks of the Madrid Stock Exchange. From these indices, we obtain data for the companies that are involved with the different sectors of the tourism industry. For the FTSE All Share Index, we have forty companies from the sectors of restaurants, casinos & gaming, internet & direct marketing retail, hotels, resorts & cruise lines, environmental facilities, airlines, airport services, trucking, movies & entertainment, leisure facilities, railroads, and marines' ports & services. For the

[1] A complete list of the companies in our sample are provided in the appendix.

EURONEXT 100, there are seven companies from the sectors of airlines, airport services, casinos and gaming, highways and rail tracks, hotels, resorts and cruise lines, movies and entertainment and restaurants. For the IBEX 35, the data consists of two companies from the sectors of airport services, hotels resorts & cruise lines.

In order to investigate the abnormal returns, following Gofran et al (2022) we collect data for the MSCI World Index as it comprises the performance of the global large and mid-cap companies of twenty-three world capital markets. For this reason, this is considered as an indicator for the world stock market. The index includes Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Hong Kong, Ireland, Israel, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, United Kingdom and the United States. The index represents approximately 85% of the free float-adjusted market capitalisation of each country.

For each of the forty-nine companies, we collect the closing price, bid and ask price, volume, number of shares traded and number of shares outstanding from Bloomberg with 60 days pre-and post- the pandemic announcement date, defined as March 11, 2020 by the WHO. For the MSCI World Index, we collect the closing price from Bloomberg with 60 days pre-and post- the pandemic announcement date. This event period is fairly common in financial research and follows prior studies (see among other, Gofran et al (2022)).

3.2. Methodology

3.2.1. Event Studies

We compute the daily average abnormal returns (AARs) for each of the forty-nine companies for event periods from [-5 to +5] in the short run and up to [-60,+60] in the long run around the pandemic announcement date.[2] There are several notable models such as the Capital Asset Pricing Model (CAPM) used among others by Brown and Warner (1980) and Ma et al (2009) to determine abnormal returns. As mentioned by Fama and French (1993), the CAPM model does not account for the compensation of value premium for risk. Thus, following Zhang and Gregoriou (2020) and more recently Gofran et al (2022), we use the econometric market-adjusted model in order to calculate the abnormal returns:

$$AR_{i,t} = R_{i,t} - R_{m,t} \quad (3)$$

Where, $AR_{i,t}$ denotes the abnormal return of stock i at time t. $R_{i,t}$ is the return on stock i at time t and $R_{m,t}$ represents the value-weighted market return (MSCI World Index) at time t.

3.2.2. Liquidity measures

Relative Bid-Ask Spread

Following Chordia et al (2001), the bid-ask spread is defined as the difference between the highest price a buyer wants to pay for the asset and the lowest price the seller wants to accept for it. Thus, a higher bid-ask spread will eventually mean that the frequency of a security being traded will be lower and as a result asset liquidity will decrease. Madhavan et al (1997) indicate that the trade of an asset is settled within the boundary of the bid-ask spread. Hence, the absolute bid-ask spread does not represent a significant measure to gauge the investor's trading costs. As the relative spread overcomes this disadvantage, following Zhang and Gregoriou (2020) and Gofran et al (2022), we compute the relative spread of the forty-nine

[2] There is no theoretical justification for the use of these event windows. We follow prior research (see among others Hedge and McDermott (1993), Gregoriou and Ioannidis (2006) and Gregoriou (2015)), in choosing an 11 and 121-day event window to capture short and long run effects.

companies around the 60 days pre- and post the pandemic announcement date, using the following equation:

$$RS_{i,t} = \frac{Ai,t - Bi,t}{(Ai,t + Bi,t)/2} \quad (4)$$

Where $RS_{i,t}$ represents the relative spread of stock i at time period t and $A_{i,t}$ is the ask price of stock i at time t. $B_{i,t}$ denotes the bid price of stock i at time t.

Price Impact Ratios

Although there is a wide acceptance of the bid-ask spread as a liquidity proxy, Le and Gregoriou (2020) state that it is only effective as a short run measure. A measure based on daily returns and volume is more appropriate for long run liquidity effects. Given this evidence like Gofran et al (2022), we also apply the Amihud (2002) illiquidity ratio, RtoV, to the forty-nine companies, using the following equation:

$$RtoV = \frac{1}{Di}\sum_{d=1}^{Di} \frac{|Ri,d|}{Vi,d} \quad (5)$$

Where, $|R_{i,d}|$ and $V_{i,d}$ represent the absolute return and monetary volume of stock i on day d respectively and D_i is the number of trading days for stock i.

However, previous research shows that the Amihud illiquidity ratio involves size bias, since monetary volume shares a direct relationship with market capitalisation. To overcome this, Florackis et al (2011) introduce a new liquidity measure (RtoTR), defined below:

$$RtoTR = \frac{1}{Di}\sum_{d=1}^{Di} \frac{|Ri,d|}{TRi,d} \quad (6)$$

Where, $TR_{i,d}$ represents the turnover ratio of stock i at day d, D_i and $R_{i,d}$ are the same as the Amihud ratio. RtoTR does not involve any size bias as there is no significant correlation between market capitalisation and the turnover ratio. The RtoTR ratio also incorporates the influence of trading frequency in determining price impact. For completeness and following Gofran et al (2022) we compute both the RtoV and RtoTR ratios in our empirical analysis.

3.2.3 Multivariate Regression Analysis

Following Gregoriou (2015) and Gofran et al (2022), in order to incorporate the impact of other factors which influence liquidity during the pandemic announcement, we investigate the relationship between the liquidity measures and the external factors by computing the following multivariate time-pooled regression model:

$$Liquidity_{it} = \alpha_i + \beta_1 D_t + \beta_2 Volume_{it} + \beta_3 (Volume_{it} * D_t) + \beta_4 Close_{it} + \beta_5 StdDev_{it} + \varepsilon_{it} \quad (7)$$

for i = 1 to 49 and t = -60, +5

Where, the dependent variable, $Liquidity_{it}$, represents Relative Spread, RtoV and RtoTR respectively for stock i at time t. α_i, captures the time-invariant unobserved stock-specific fixed effects. The fixed effect α_i accounts for differences in the initial level of liquidity of each security in our sample. D_t represents the dummy variable which is equal to 1 in the post pandemic announcement period and zero otherwise. Volume, Close and StdDev (Standard Deviation) represent the traded volume in shares, closing price and return volatility for the stock of the individual forty-nine companies i at time period t for each trading day in the event window [-60, +5].

4. Empirical Results

4.1. Descriptive Statistics

Table 1 displays the mean of the descriptive statistics of the forty-nine companies representing the tourism industry of the FTSE All Share, EURONEXT 100 and IBEX 35 index for the period of [-60,+60] surrounding the COVID-19 pandemic announcement date. We observe that over the 121-event day period, the market capitalisation of the tourism industry of the United Kingdom (UK) (£56,040.95 billion) is more than that of the EURONEXT 100 countries and the Spanish capital market (£11.12 billion and £9.62 billion respectively). However, when comparing with the closing index, the UK (9.85) has the lowest price among the other capital markets (EURONEXT 100: 47.92, Spain: 62.85). The tourism industry of the UK also experiences the highest relative spread (0.35 with the highest average daily standard deviation of 2.42%).

This supports the argument by Emmerson and Johnson (2020) that the tourism industry of the UK has been a risky investment during the first wave of the pandemic. When compared between the EURONEXT 100 countries and Spanish capital markets, the tourism industry of Europe has witnessed a relative spread of 0.19 with a standard deviation of 1.50% and Spain has observed a relative spread of 0.12 with a standard deviation of 1.75%. This shows that even though the fall in short term liquidity, as measured by the relative spread, is somewhat similar for both the EURONEXT 100 countries and Spain, it is beneficial for individuals to invest in the EURONEXT 100 than in the Spanish capital markets, when compared with risk. A possible reason for this could be as reported by the European Commission (2020), that the EURONEXT 100 comprises of the major countries, some of which had less travel restrictions during the pandemic. This is also justified by the average daily volume which is 1,544.92 billion for the EURONEXT 100 countries and 712.90 billion for Spain, indicating less trading for Spain. On the other hand, the daily average volume of the tourism industry of the UK is the highest (2,316 billion) over the 121-event day period. However, the closing price index, relative spread and the risk of the UK equity markets clearly indicate a major fall in the liquidity than that of the EURONEXT 100 countries and Spain. Countries such as the UK need to implement new approaches that can lead to recovery by considering its strategic tourism planning. As reported by Navarro-Drarich and Lorenzo (2021), the UK is one of the leading markets in both tourism supply and demand that affects international tourism. Additionally, countries that are highly dependent on tourism seem to suffer the most and act with immediate effect to provide health safety measures as part of their initial recovery plan to avoid additional negative impacts.

[INSERT TABLE 1 HERE]

4.2. Abnormal Returns

Table 2 describes the average abnormal returns of the forty-nine companies under each of the three indices, FTSE All Share, EURONEXT 100 and IBEX 35 around the 60 days pre- and post the pandemic announcement date. The table shows substantial negative returns for all indices over the short run which continues to prolong in the long run. The significance of the negative returns tends to improve in the long run as observed by the significance tests. However, for the UK, the magnitude of the negative returns is more pronounced compared with the other nations in our sample. On the event day, the UK capital market experiences a negative return of -0.32%, whereas the EURONEXT 100 countries and Spain exhibit positive returns of 1.10% and 1.12% respectively. This shows that the announcement of the pandemic has severely impacted the UK capital market. As mentioned previously, the UK is heavily dependent on the tourism industry, implying that a shock like the pandemic has created more substantial impact on investors. The influence of the pandemic on the returns of the UK can also be seen during the [-5,+5] event period. During this period, the return of the UK capital market is -4.85% with a 1% significance level.

On the other hand, the abnormal returns for the EURONEXT 100 countries and Spain are -1.91% and -2.69%, with only Spain being significant at the 10% level, over the event period [-5,+5]. This shows that the European markets recover from the pandemic five days post the announcement. The pandemic did have a minor impact on the Spanish capital markets during the same event period. When we analyse a shorter event window [-2,+2], the returns (t statistics) for the UK, EURONEXT 100 countries and Spain are -4.46% (-2.40), -2.37% (1.90) and -3.23% (-2.49) respectively. This shows that the pandemic had a significant negative stock market reaction in the UK and Spain. This is also true for the European equity markets, but not with the same magnitude as there is only significance at the 10% level.

When we analyse the long run event window [-60,+60] we observe that the stock market impact of the pandemic has disappeared in all three of our indices. This indicates that the UK, European and Spanish stock markets have been able to fully recover from the first wave of COVID-19. A possible reason could be that the long run event period includes the summer of 2020, where some restrictions were lifted paving the opportunity for leisure trips, which in turn increases stock returns of the tourism industry.

[INSERT TABLE 2 HERE]

4.3. Liquidity Impact

Table 3 represents the average of the liquidity measures of the tourism industry companies for each of the three indices, FTSE All Share, EURONEXT 100 and IBEX 35 around the 60 days pre-and post- the pandemic announcement date. Panel A displays the results using the relative spread as our liquidity measure. On the announcement date we report positive and significant relative spreads for the UK and European equity markets. Surprisingly, we find that the Spanish capital markets do not have a significant decrease in liquidity on the day of the COVID announcement. When we look at a three day event window around the news [-1,+1], we report that spreads are positive and significant for all three indices. This implies that the shock of the pandemic has significantly reduced liquidity in UK, European and Spanish equity markets in the short run. This trend continues to persist in the long run, as spreads are positive and significant for all three indices when we look at a 121 event day window [-60,+60], around the announcement of the pandemic. This observation suggests that there is a long-term reduction in liquidity of tourism equity markets as a result of COVID-19. This implies that even though abnormal returns recovered as observed in Table 2, the pandemic has caused a long-term reduction in stock market efficiency, due to the significant decline in liquidity of the tourism industry.

Panel B and Panel C show the empirical results when we use price impact ratios to approximate stock market liquidity. We find that the relative spread results reported above remain intact once we incorporate price impact, trading volume, firm size and trading frequency. We believe it is important to also look at price impact ratios to measure liquidity as they are a good approximation of financial stability as mentioned by Le and Gregoriou (2020).

[INSERT TABLE 3 HERE]

4.4. Multivariate Regression

In this section we conduct multivariate empirical analysis by estimating equation (7). We are interested in the significance of β_1, which indicates if the pandemic has caused changes in liquidity after controlling for the impact of stock prices, trading volume and volatility. The results can be seen in Table 4. Panel A displays the results when we approximate liquidity with the relative spread. We find that the pandemic does not influence the liquidity of UK, European and Spanish capital markets once we account for the influence of trading volume, stock prices and volatility. The results remain quantitively similar when we use the RtoV price impact ratio as our representation of liquidity (Panel B of Table 4). We observe different findings when we use the RtoTR price impact ratio as our liquidity measure (Panel C of Table 4). In this instance β_1 is positive and significant for all cases. This implies that liquidity has decreased due to the pandemic for the UK, European and Spanish equity markets. This is because RtoTR is an illiquidity ratio, implying that an increase represents a fall in liquidity. This result holds once we account for the influence of trading volume, stock prices and volatility. In addition, our findings reflect the importance of encapsulating the influence of firm size and trading frequency in our liquidity measures.[3] Our discoveries suggest that companies need to reinvest more wisely within the tourism sector (Zhang et al (2021)). Furthermore, governments must provide flexible policies that can ensure both economic recovery and survival during crises (Yang et al (2020)).

[INSERT TABLE 4 HERE]

Given that stock prices, trading volume and standard deviations are integrated of order 1, we need to re-estimate equation (7) using first differences for all explanatory variables with the exception of the dummy variable representing the post pandemic announcement period (β_1 in equation 7). This is to ensure that the findings displayed in Table 4, are not of a spurious nature (Granger and Theobald, 1974).[4] The results of the first differences can be seen in Table 5. We observe that the findings of Table 4 remain intact. This implies that the significant fall in liquidity (when we use RtoTR as our measure of liquidity) as a result of COVID-19 for the UK, European and Spanish equity markets is not spurious.

[INSERT TABLE 5 HERE]

5. Conclusion

This study investigates the impact of COVID-19 on the liquidity of the tourism industry in the UK, Europe and Spain. We look at both the short and long-term impact using three alternative liquidity measures. Initially we analyse the stock market reaction to the pandemic announcement date, which is defined as March 11th 2020 by the WHO. In the short run the pandemic has a significant negative stock market reaction in the UK and Spain. This is also true for the European equity markets, but only at the 10% significance level. When we examine

[3] We also decompose our dataset into the hotel, restaurants and airline sector. Our empirical results remain quantitatively similar. These findings are not reported in order to save space but are available from the authors upon request.

[4] We conducted unit root tests which provide evidence that closing prices, standard deviations and trading volume are I(1). These results are not reported in order to save space but are available from the authors upon request.

the stock market reaction for up to three months post the announcement date, the impact of the pandemic has disappeared for the UK, Europe and Spain with respect to abnormal returns.

When we observe the influence of COVID on stock market liquidity, we obtain more interesting results. We find a significant decline in liquidity as a result of the pandemic regardless of the liquidity measure that we employ to undertake our empirical analysis. The decline in liquidity occurs in the short run and continues to persist in the long run.

Finally, we analyze if the deterioration in liquidity still exists for the tourism industry as a result of the pandemic once we account for the effect of stock prices, trading volume and volatility. We find that if we use the RtoTR liquidity measure that liquidity of the tourism industry significantly decreases due to COVID-19, for the UK, European and Spanish capital markets. This result shows the importance of encapsulating the impact of firm size and stock turnover when we attempt to measure liquidity in financial markets. We also provide evidence that our results are not spurious, by showing that our findings hold when we convert the model from levels to first differences.

This implies that liquidity has decreased due to the pandemic for the UK, European and Spanish equity markets. This is because RtoTR is an illiquidity ratio, implying that an increase represents a fall in liquidity. This result holds when we account for the influence of trading volume, stock prices and volatility. Our findings suggest that European equity markets have declined in efficiency due to the pandemic in the tourism industry. The effect of the pandemic has fundamental implications for all tourism stakeholders. Economic viability of the tourism sector should be set high in the agenda of governmental policies, given its multiple social and economic contribution. Recovery for the industry needs to be aligned with the release of strict governmental regulations, so tourism firms have flexibility in their financial decisions and actions that can ensure viability (Sharma and Nicolau (2020); Qiu et al (2020)).

Our empirical analysis provides an insight along with confirming tourism literature with plethora of practical implications to tourism practitioners. Undoubtedly, governments play an important role in managing world crises such the case of the pandemic (Lee and Chen (2020)). An evaluation of the impacts initiated because of COVID-19 calls for urgent inauguration of various public mechanisms that will limit and mitigate negative impacts caused by such a severe crisis on tourism demand (Bakar and Rosbi (2020), Sharma and Nicolau (2020) and Yang et al. (2020)). The key to recovery is sustainability policies that can act as the antidote to confront negative occurrences by providing resilience with local resources (Jones and Comfort (2020)). An interactive role among tourism stakeholders can lead to the drafting of realistic tourism policies with feasible and immediate solutions (Carter et al (2021)). Thus, the government should involve tourism representatives in the recovery process of the industry by considering their views and experiences (Skare et al. (2021)). This will provide a realistic perception of industry's realities caused by a major crisis and lead to solutions and actions that will be for the benefit of the economy and social life (Foo et al. (2020), Sio-Chong and So (2020)).

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Table 1. Descriptive Statistics

The following table reports the mean of the descriptive statistics of the forty-nine companies representing the tourism industry of the FTSE All Share, EURONEXT 100 and IBEX 35 for the period of [-60, +60] surrounding the COVID-19 pandemic announcement date.

	FTSE ALL Share	EURONEXT100	IBEX35
Market Capitalisation (£billion)	56,040.95	11.12	9.62
Closing Price	9.85	47.92	62.85
Relative Spread	0.35	0.19	0.12
Daily Standard Deviation of Return(%)	2.42%	1.50%	1.75%
Daily Volume(£billion)	2,316.62	1,544.92	712.90

Table 2. Abnormal Returns around the COVID-19 pandemic announcement date.

The following table represents the average abnormal returns (AAR) of the forty-nine tourism industry companies for each of the three indices, FTSE All Share, EURONEXT 100 and IBEX 35 around the 60 days pre-and post- the pandemic announcement date. The AAR has been calculated using the market model. The t test represents the t-statistic which has been computed following the standard event study methodology. The null hypothesis is that AAR is equal to 0 (***significance at 1%, **significance at 5% and * significance at 10%.).

	FTSE ALL Share	EURONEXT100	IBEX35
0	-0.32%	1.10%	1.12%
T test	*-0.22*	*0.83*	*1.43*
[-1,+1]	-3.71%	-2.66%	-4.02%
T test	*-2.01***	*-2.17***	*-3.22***
[-2,+2]	-4.46%	-2.37%	-3.23%
T test	*-2.40****	*-1.90**	*-2.49****
[-5,+5]	-4.85%	-1.91%	-2.69%
T test	*-2.62****	*-1.46*	*-1.83**
[-10,+10]	-1.73%	-0.37%	-0.75%
T test	*-0.90*	*-0.31*	*-0.54*
[-60,+60]	-0.14%	-0.08%	-0.15%
T test	*-0.08*	*-0.08*	*-0.11*

Table 3. Liquidity Impact around the COVID-19 pandemic announcement date.

Table 3 represents the average of the liquidity measures of the forty-nine tourism industry companies for each of the three indices, FTSE All Share, EURONEXT 100 and IBEX 35 around the 60 days pre-and post the pandemic announcement date. The liquidity measures are the Relative Spread, RtoV and RtoTR price impact ratios. Relative Spread is calculated as ask price minus bid price divided by the midpoint of the bid-ask spread. RtoV is calculated as the absolute daily stock return divided by the trading volume. RtoTR is computed as the absolute daily stock return divided by the turnover ratio. The ratios are tested using a standard t-test with a null hypothesis stating that the mean of the reported ratio is equal to zero. Two tailed tests of significance are reported as ***significance at 1%, **significance at 5% and * significance at the 10% level.

$$RS_{i,t} = \frac{A_{i,t} - B_{i,t}}{(A_{i,t} + B_{i,t})/2} \qquad RtoV = \frac{1}{D_i}\sum_{d=1}^{D_i}\frac{|R_{i,d}|}{V_{i,d}} \qquad RtoTR = \frac{1}{D_i}\sum_{d=1}^{D_i}\frac{|R_{i,d}|}{TR_{i,d}}$$

Panel A: Relative Spread

	FTSE ALL Share	EURONEXT 100	IBEX35
0	0.29	0.23	0.08
T test	*2.45****	*13.79****	*-0.72*
[-1,+1]	0.31	0.23	0.0580
T test	*0.83*	*6.67****	*-4.65****
[-2,+2]	0.27	0.21	0.0583
T test	*0.67*	*4.25****	*-4.61****
[-5,+5]	0.35	0.20	0.131
T test	*4.58****	*2.84****	*6.39****
[-10,+10]	0.42	0.22	0.125
T test	*7.11****	*3.80****	*5.73****
[-60,+60]	0.35	0.19	0.12
T test	*2.63****	*2.25***	*5.90****

Panel B: RtoV

	FTSE ALL Share	EURONEXT 100	IBEX35
0	0.22	0.11	0.40
T test	*7.28****	*-0.02*	*6.54****
[-1,+1]	0.36	0.24	0.52
T test	*18.18****	*7.18****	*26.66****
[-2,+2]	0.35	0.26	0.42
T test	*17.48****	*7.35****	*21.03****
[-5,+5]	0.42	0.24	0.49
T test	*22.26****	*10.02****	*27.87****
[-10,+10]	0.41	0.27	0.57
T test	*21.12****	*12.45****	*30.44****
[-60,+60]	0.31	0.26	0.44
T test	*10.98****	*10.16****	*18.94****

Panel C: RtoTR

	FTSE ALL Share	**EURONEXT 100**	**IBEX35**
0	0.20	0.12	0.18
T test	*22.87******	*32.40******	*30.48******
[-1,+1]	0.43	0.47	0.44
T test	*58.87******	*132.23******	*121.59******
[-2,+2]	0.42	0.44	0.37
T test	*58.69******	*119.30******	*106.58******
[-5,+5]	0.55	0.31	0.40
T test	*113.82******	*84.45******	*110.29******
[-10,+10]	0.56	0.25	0.34
T test	*102.00******	*66.42******	*90.57******
[-60,+60]	0.29	0.09	0.17
T test	*35.64******	*19.89******	*34.58******

Table 4. Multivariate Regression around the COVID-19 pandemic announcement date in levels

The sample consists of the forty-nine tourism industry companies listed on the FTSE All Share Index, EURONEXT 100 and IBEX 35 for a period of [-60, +5] surrounding the COVID-19 pandemic announcement date.

$Liquidity_{it} = \alpha_i + \beta_1 D_t + \beta_2 Volume_{it} + \beta_3 (Volume_{it} * D_t) + \beta_4 Close_{it} + \beta_5 StdDev_{it} + \varepsilon_{it}$

for i= 1,49

and t = -60, +5

Where, the dependent variable, $Liquidity_{it}$, represents Relative Spread, RtoV and RtoTR respectively for stock i at time t. The constant, α_i, shows the variation in liquidity for each index in our sample. D_t represents the dummy variable which is equal to 1 in the post pandemic announcement period and zero otherwise. Volume, Close and StdDev (Standard Deviation) represent the traded volume in shares, closing price and return volatility for stock j at time period t for each trading day in the event window [-60, +5]. ***significance at 1%, **significance at 5% and * significance at the 10% level.

Panel A: Relative Spread

Var	FTSE ALL Share	EURONEXT 100	IBEX35
C	0.45	0.31	0.22
T test	*1.29*	*0.39*	*0.87*
β1	-0.40	0.23	-0.17
T test	*-0.54*	*1.38*	*-0.85*
β2	-0.11	0.07	-0.08
T test	*-0.48*	*0.10*	*-1.59*
β3	0.29	-0.25	0.11
T test	*1.20*	*-0.83*	*1.30*
β4	-0.05	-0.01	-0.03
T test	*-0.54*	*0.03*	*-0.43*
β5	0.29	-1.45	1.07
T test	*0.15*	*-0.63*	*0.93*

Panel B: RtoV

Var	FTSE ALL Share	EURONEXT 100	IBEX35
C	0.84	0.50	0.75
T test	*1.67*	*1.71*	*1.59*
β1	0.19	-0.09	-1.02
T test	*0.31*	*-0.49*	*-1.53*
β2	-0.11	-0.16	-0.23
T test	*-2.58***	*-1.89**	*-2.16***
β3	0.06	0.69	0.78
T test	*0.38*	*1.09*	*2.25****
β4	-0.17	-0.02	-0.05
T test	*-1.09*	*-1.31*	*-1.10*
β5	7.14	1.21	4.24
T test	*4.78****	*1.69**	*1.63**

Panel C : RtoTR

Var	FTSE ALL Share	EURONEXT 100	IBEX35
C	-0.23	0.40	0.25
T test	*-0.35*	*1.02*	*1.54*
β_1	-0.56	0.78	0.95
T test	*-3.41******	*3.75******	*4.86****
β_2	0.41	0.12	0.85
T test	*4.28******	*2.72******	*1.29*
β_3	1.04	0.54	0.12
T test	*5.61******	*5.47******	*6.56******
β_4	0.02	-0.02	-0.02
T test	*0.03******	*-1.20*	*-1.70*
β_5	7.59	-0.47	1.22
T test	*4.74******	*0.49*	*1.41*

Table 5. Multivariate Regression around the COVID-19 pandemic announcement date in levels

The sample consists of the forty-nine tourism industry companies listed on the FTSE All Share Index, EURONEXT 100 and IBEX 35 for a period of [-60, +5] surrounding the COVID-19 pandemic announcement date.

$Liquidity_{it} = \alpha_i + \beta_1 D_t + \beta_2 \Delta Volume_{it} + \beta_3 (\Delta Volume_{it} * D_t) + \beta_4 \Delta Close_{it} + \beta_5 \Delta StdDev_{it} + \varepsilon_{it}$

for i= 1,49 and t = -60, +5

Where, the dependent variable, $Liquidity_{it,}$ represents Relative Spread, RtoV and RtoTR respectively for stock i at time t. The constant, α_i, shows the variation in liquidity for each index in our sample. D_t represents the dummy variable which is equal to 1 in the post pandemic announcement period and zero otherwise Δ Volume (Change in Volume), Δ Close (Change in Closing Price) and Δ StdDev (Change in Standard Deviation) represent the first difference of traded volume in shares, first difference of closing price and first difference of return volatility for stock j at time period t for each trading day in the event window [-60, +5]. ***significance at 1%, **significance at 5% and * significance at the 10% level.

Panel A: Relative Spread

Var	FTSE ALL Share	EURONEXT 100	IBEX35
C	0.25	0.14	0.08
T test	*8.75******	*8.72******	*6.30******
β1	0.16	0.13	0.03
T test	*1.37*	*2.63****	*0.58*
β2	-0.01	0.32	-0.01
T test	*-0.34*	*-0.36*	*-0.73*
β3	0.31	-0.10	0.06
T test	*0.62*	*-0.64*	*0.81*
β4	0.09	0.06	-0.46
T test	*-0.13*	*0.52*	*-0.89*
β5	-0.11	0.34	-0.87
T test	*-0.27*	*0.38*	*-0.44*

Panel B: RtoV

Var	FTSE ALL Share	EURONEXT 100	IBEX35
C	0.18	0.12	0.24
T test	*6.43******	*7.75******	*7.25******
β1	0.19	0.11	0.08
T test	*1.97*	*2.34****	*3.00******
β2	-0.01	-0.02	-0.05
T test	*-0.57*	*-0.56*	*-1.20*
β3	-0.10	-0.02	0.10
T test	*-0.32*	*-0.69*	*-0.52*
β4	-2.19	-1.92	-4.12
T test	*-2.94******	*-3.41******	*-3.60******
β5	0.27	-0.01	-0.01
T test	*0.43*	*-0.34*	*-0.32*

Panel C : RtoTR

Var	FTSE ALL Share	EURONEXT 100	IBEX35
C	0.07	0.03	0.02
T test	*1.95*	*2.37***	*1.77*
β_1	0.27	0.29	0.30
T test	*3.16****	*6.26****	*9.87****
β_2	0.05	0.02	0.01
T test	*2.44***	*1.20*	*0.78*
β_3	0.44	0.48	-0.01
T test	*2.64***	*4.62****	*0.26*
β_4	-1.97	-2.49	-3.78
T test	*-3.86****	*-6.03****	*-10.34****
β_5	0.77	0.42	-0.60
T test	*0.33*	*0.10*	*-0.34*

Appendix

The following table shows the list of companies by industry in our sample from the FTSE ALL Share, EURONEXT 100 and IBEX35 indices.

FTSE ALL Share	
Industry	**Company**
Restaurants	Compass Group PLC
	Greggs PLC
	SSP Group PLC
	Domino's Pizza Group PLC
	J D Wetherspoon PLC
	Mitchells & Butlers PLC
	Marston's PLC
	Restaurant Group PLC/The
	Fuller Smith & Turner PLC
Casinos & Gaming	Flutter Entertainment PLC
	Entain PLC
	William Hill PLC
	Playtech Plc
	Gamesys Group PLC
	888 Holdings PLC
	Rank Group PLC
Internet & Direct Marketing Retail	On the Beach Group PLC
	Hostelworld Group PLC
Hotels, Resorts & Cruise Lines	InterContinental Hotels Group PLC
	Whitbread PLC
	TUI AG
	Carnival PLC
	PPHE Hotel Group Ltd
Environmental & Facilities Services	Biffa PLC
	Renewi PLC
	RPS Group PLC
Airlines	International Consolidated Airlines
	Wizz Air Holdings Plc
	easyJet PLC
	Esken Ltd
Airport Services	Signature Aviation PLC
	John Menzies PLC
Trucking	National Express Group PLC
	Firstgroup PLC
	Stagecoach Group PLC
Movies & Entertainment	Cineworld Group PLC
Leisure Facilities	Hollywood Bowl Group PLC

	TEN Entertainment Group PLC
Railroads	Go-Ahead Group PLC/The
Marine Ports & Services	James Fisher & Sons PLC

EURONEXT 100	
Industry	**Company**
Airlines	Ryanair Holdings PLC
Airport Services	Aeroports de Paris
Casinos & Gaming	Flutter Entertainment PLC
Highways & Railtracks	Getlink SE
Hotels, Resorts & Cruise Lines	Accor SA
Movies & Entertainment	Vivendi SE
Restaurants	Sodexo SA

IBEX 35	
Industry	**Company**
Airport Services	Aena SME SA
Hotels, Resorts & Cruise Lines	Melia Hotels International