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## THE COVID-19 AND THE STOCK MARKET BEHAVIOUR OF THE TOURISM SECTOR IN SPAIN.

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Carrillo-Hidalgo, Isabel; Pulido-Fernández, Juan Ignacio; Durán-Román, Jose Luis; and Casado-Montilla, Jairo, "THE COVID-19 AND THE STOCK MARKET BEHAVIOUR OF THE TOURISM SECTOR IN SPAIN." (2023). *ITSA 2022 Gran Canaria - 9th Biennial Conference: Corporate Entrepreneurship and Global Tourism Strategies After Covid 19*. 38.  
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# **THE COVID-19 AND THE STOCK MARKET BEHAVIOUR OF THE TOURISM SECTOR IN SPAIN.**

## **Abstract**

The global pandemic caused by COVID-19, has had a dramatic impact on tourism, especially in Spain, as it was one of the first countries affected by the pandemic, as well as being one of the world's biggest tourist destinations. Stock market values are responding to the evolution of the pandemic, especially in the case of tourist companies, so being able to quantify this relationship allows us to predict the effect of the pandemic on shares in the tourism sector, improving the response to the crisis. To this end, a model has been developed to predict the behaviour of shares in the Spanish tourism sector, according to the evolution of the COVID-19 pandemic in the medium term. It has been confirmed that both the number of deaths and the number of cases diagnosed are good predictors of abnormal stock prices in the tourism sector.

## **INTRODUCTION**

The COVID-19 has had a devastating impact on the tourism sector, as it has been shown that health-related crises “influence the perception of tourism risk, causing a sudden decline in demand, with significant socio-economic repercussions, especially in countries dependent on tourism” (Novelli, et al., 2018:85).

With regard to the stock market, no previous outbreak of an infectious disease has affected the stock market as strongly as the COVID-19 pandemic (Baker et al., 2020).

Considering that Spain is the world's second biggest tourist destination by number of international arrivals and assuming the impact of COVID-19 on tourism and the economy of the country, this research aims to develop a prediction model for the behaviour of shares in Spain's tourism sector according to the evolution of the COVID-19 pandemic. To this end, a database spanning a long period of time (14 months) will be used, allowing the evolution of the variables and their relationship to be analysed in the medium term, thus filling the current gap in the scientific literature, since all related studies were carried out in the early stages of the pandemic, with databases spanning two or three months at most (Al-Awadhi et al., 2020; Huo and Qiu, 2020).

Achieving this objective will allow us to validate the starting hypothesis of this research: in the medium term, there is a significant and quantifiable relationship between health data regarding the evolution of the COVID-19 pandemic in Spain and the stock market prices of the tourism sector.

## **LITERATURE REVIEW**

This pandemic is having a very serious impact on the economy, and its evolution is fraught with uncertainty (Ramelli and Wagner, 2020). Since the start of the pandemic, the stock markets around the world have reflected the impact of COVID-19, with very high volatilities, mainly during the months of February, March and April 2020 (Bagao et al., 2020).

As a result of this situation, the stock prices of companies in the tourism sector were greatly affected by the pandemic, with sharp falls and extreme volatility (Sharma and Nicolau, 2020 and Mazur, et al., 2020). In this way, some companies lost up to 80% of their value in a period of two weeks (Nhamo et al., 2020).

Regarding the research of the effect of COVID-19 on the stock market behavior of the tourism sector (Al-Awadhi, et al., 2020; Carter et al., 2021; Liev, 2020b; Carter et al., 2021), the work carried out to date has used databases from the start of the pandemic, during the first outbreak of the disease that took place during the first quarter of 2020. All of them agree on their final conclusions, which are summarized in that the first outbreak of COVID-19 negatively affected the stock prices and yields of shares in the tourism sector above other sectors, this being temporary (Liev, 2020b).

## **METHODS**

The time period of the database used extends from the month in which the first cases and news related to the pandemic appeared until the vaccination process began to be implemented at a rate of 90% and at least 5% of the population was fully immunised

In this study, for the dependent variable  $Y_t$  we have considered and tested different performance indicators of the tourism sector stock market, as with the explanatory variable  $X_t$  considering in this case different indicators of the evolution of the pandemic in Spain.

Finally, the variables chosen were the ones that yielded the best results. For the dependent variable  $Y_t$ , the abnormal stock price (ASP) of all the companies in the tourist and the traveller transportation sectors, which are listed on the Madrid Stock Exchange was taken (Amrest Holdings, Edreams Odigeo, Meliá Hotels International, NH Hotel Group, Aena, and International Consolidat. Airlines Group). For the explanatory variables  $X_t$ , the cumulative number of deaths and the cumulative number of cases were selected.

To conduct this research, it has been used the dynamic regression model, which is a conjunction of the ARIMA method and the classic regression model one, widely used for fit and prediction in all sciences (Ichev and Marinč, 2018; Karafiath, 1988; Sharma and Nicolau, 2020), which could not be used because the observations of a series depend on their past values resulting residuals self-correlated.

$$Y_t = \alpha + \beta X_t + \eta_t,$$

$$\eta_t \sim ARIMA(p, d, q)$$

$$\eta_t \sim + \phi_1 \eta_{t-1} + \dots + \phi_p \eta_{t-p} +$$

$$+ \theta_1 \epsilon_{t-1} + \dots + \theta_q \epsilon_{t-q} +$$

$$+ \epsilon_t$$

$$\epsilon_t \sim N(0; \sigma)$$

To choose the appropriate model, a massive screening of all possible dynamic models with explanatory variable and with an error structure modelled by an ARIMA (p,d,q) process was performed, for which parameters p, d and q were computationally varied over a wide range of values. From the resulting models, the ones that satisfied the condition that residuals  $\epsilon_t$  were white noise were selected, verified by means of the Ljung-Box test. The stationarity of the series was confirmed by means of the Dickey-Fuller test. Then, the most parsimonious ones were selected, using the criterion of the minimum AIC, as a measure of the goodness of fit of the regressions obtained by the method of maximum likelihood.

## FINDINGS or ANTICIPATED FINDINGS

A first descriptive analysis allows us to state and compare the evolution of the Ibex35 ASP, reflecting the behaviour of the market, and the tourism sector ASP throughout the period under study. The analysis of these variables reflects the performance of the pandemic in Spain, with negative values in the periods of higher incidence of the COVID-19 disease, with variations in the tourism ASP being more pronounced than those of the market are.

The negative impact of the beginning of the pandemic on the ASP stands out, with a greater incidence in the case of tourism companies, reaching negative ASPs of -48%, when the market did not fall below -35.76 %.

After the statistical analysis, it is possible to demonstrate that there is a significant relationship of dependence between the series, quantify the strength of said relationship and establish a prediction model for ASP variables according to the evolution of the COVID-19 pandemic.

Two dynamic regression models have been developed with high predictive capacity and in which the Root-Mean-Square Error is practically the same, fulfilling the following requirements that validate the effectiveness and adequacy of the model:

- All the coefficients obtained were significant, in particular the  $\beta$  coefficients associated with the COVID-19 explanatory series (cumulative deaths  $\beta = -3.725$  and cumulative cases  $\beta = -16.448$ ), which were significant to 99% in both cases.
- The Dickey-Fuller test states that a series with no lag (lag=0) and differentiated d times is not stationary, and this is the case in both models.

- Applying the Ljung-Box test, we accept the hypothesis that the residual variables are white noise.

In addition, the goodness of fit of the models designed is confirmed, showing that the actual values of the ASP-tourism series fit fairly well to the values predicted by the models dependent on the COVID-19 variables.

Also there is verification of the behaviour of the epsilon residuals, which must act as white noise without correlation or dependence, as is the case here. Finally, the histogram can be approximated sufficiently well through normal distribution, and the evolution of residuals over time does not show growth in mean or amplitude.

## IMPLICATIONS

The results of this research will allow decision makers and governments to guide their decisions towards the achievement of their objectives. The pandemic has not yet come to an end and being able to know the impact and stock market evolution of the key companies in the tourism sector in situations of this type allows them to direct their aid and support, since their role is critical in the recovery and sustainability of the sector, as pointed out by Sharma and Nicolau (2020). In addition, it is very useful information for companies and investors when making decisions that allow them to maximize profits and minimize losses in global pandemic situations.

## CONCLUSIONS

The starting hypothesis is validated and it can be stated that, in the medium term, there is a significant and quantifiable relationship between health data regarding the evolution of the COVID-19 pandemic in Spain and the stock market prices of its tourism sector, thereby filling a gap in the scientific literature for studies of this kind over the medium term.

Indeed, cumulative numbers of cases and deaths are the best predictors of the evolution of stock prices in the tourist sector during the global COVID-19 pandemic.

## References

- Al-Awadhi, A. M., Alsaifi, K., Al-Awadhi, A., & Alhammadi, S. (2020). Death and contagious infectious diseases: Impact of the COVID-19 virus on stock market returns. *Journal of Behavioral and Experimental Finance*, 27, 100326.
- Ansele, M (2020, November, 16). La empresa Moderna anuncia que su vacuna contra la covid tiene casi un 95% de eficacia. *El País*. <https://elpais.com/ciencia/2020-11-16/la-empresa-moderna-anuncia-que-su-vacuna-contra-la-covid-tiene-casi-un-95-de-eficacia.html>
- Assaf, A., & Scuderi, R. (2020). COVID-19 and the recovery of the tourism industry. *Tourism Economics*, 26(5), 731-733.
- Bagao, A., Dias, R., Heliodoro, P. A., & Alexandre, P. M. (2020). The impact of COVID-19 on European financial markets: An empirical analysis. *LIMEN 2020*, 1.
- Baker, S. R., Bloom, N., Davis, S. J., Kost, K., Sammon, M., & Viratyosin, T. (2020). The unprecedented stock market reaction to COVID-19. *The Review of Asset Pricing Studies*, 10(4), 742-758.
- Bartik, A. W., Bertrand, M., Cullen, Z. B., Glaeser, E. L., Luca, M., & Stanton, C. T. (2020). How are small businesses adjusting to COVID-19? Early evidence from a survey National Bureau of Economic Research, Working Paper No. 26989.
- Bartlett, M. S. (1946). On the theoretical specification and sampling properties of autocorrelated time-series. *Supplement to the Journal of the Royal Statistical Society*, 8(1), 27-41.
- Bollerslev, T., & Wooldridge, J. M. (1992). Quasi-maximum likelihood estimation and inference in dynamic models with time-varying covariances. *Econometric Reviews*, 11(2), 143-172.
- Bolsa de Madrid (2021). Official webpage. <https://www.bolsademadrid.es>
- Brown, S.J., & Warner, J.B. (1985). Using daily stock returns: the case of event studies. *Journal of Financial Economics* 14, 3 – 31.
- Carter, D., Mazumder, S., Simkins, B., & Sisneros, E. (2021). The stock price reaction of the COVID-19 pandemic on the airline, hotel, and tourism industries. *Finance Research Letters*, 102047.
- Centro Nacional de Epidemiología (2021). Official webpage. <https://cnecovid.isciii.es/covid19/>

- Chai, T., & Draxler, R. R. (2014). Root mean square error (RMSE) or mean absolute error (MAE). *Geoscientific Model Development Discussions*, 7(1), 1525-1534.
- Chen, A. H., & Siems, T. (2004). The effects of terrorism on global capital markets. *European Journal of Political Economy*, 20(2), 349-366.
- Chen, C. C. (2020). Psychological tolls of COVID-19 on industry employees. *Annals of Tourism Research*, 2020 Oct 20: 103080.
- Chen, C. D., Chen, C. C., Tang, W. W., & Huang, B. Y. (2009). The positive and negative impacts of the SARS outbreak: A case of the Taiwan industries. *The Journal of Developing Areas*, 43(1): 281-293.
- Chen, M. H. (2011). The response of hotel performance to international tourism development and crisis events. *International Journal of Hospitality Management*, 30(1), 200-212.
- Chen, M. H., Jang, S. S., & Kim, W. G. (2007). The impact of the SARS outbreak on Taiwanese hotel stock performance: an event-study approach. *International Journal of Hospitality Management*, 26(1), 200-212.
- Chen, M. P., Lee, C. C., Lin, Y. H., & Chen, W. Y. (2018). Did the SARS epidemic weaken the integration of Asian stock markets? Evidence from smooth time-varying cointegration analysis. *Economic Research-Ekonomska istraživanja*, 31(1), 908-926.
- Chien, G. C., & Law, R. (2003). The impact of the Severe Acute Respiratory Syndrome on hotels: a case study of Hong Kong. *International Journal of Hospitality Management*, 22(3), 327-332.
- Chong, T. L. T., Lu, S., & Wong, W. K. (2010). Portfolio Management During Epidemics: The Case of SARS in China. *Labuan Bulletin of International Business and Finance (LBIBF)*, 45-52.
- Dahles, H., & Susilowati, T. P. (2015). Business resilience in times of growth and crisis. *Annals of Tourism Research*, 51, 34-50.
- De la Quintana, L. (2020, September 21). IAG se desploma un 12,67%: si pierde los 0,92, no compensa acudir a la ampliación de capital. *El Economista*. <https://www.economista.es/mercados-cotizaciones/noticias/10780549/09/20/IAG-se-desploma-otro-13-si-pierde-los-092-no-compensa-acudir-a-la-ampliacion-de-capital.html>
- Demiralay, S., & Kilincarslan, E. (2019). The impact of geopolitical risks on travel and leisure stocks. *Tourism Management*, 75, 460-476.
- Drakos, K. (2004). Terrorism-induced structural shifts in financial risk: airline stocks in the aftermath of the September 11th terror attacks. *European Journal of Political Economy*, 20(2), 435-446.
- Dube, K., Nhamo, G., & Chikodzi, D. (2021). COVID-19 cripples global restaurant and hospitality industry. *Current Issues in Tourism*, 24(11), 1487-1490.
- Epdata (2021). Official webpage. <https://www.epdata.es>
- Haroon, O., & Rizvi, S. A. R. (2020). COVID-19: Media coverage and financial markets behaviour - A sectoral inquiry. *Journal of Behavioral and Experimental Finance*, 27, 100343.
- Hassan, T. A., Hollander, S., Van Lent, L., Schwedeler, M., & Tahoun, A. (2020). Firm-level exposure to epidemic diseases: Covid-19, SARS, and H1N1. *National Bureau of Economic Research, Discussion Paper* 26971.
- 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*, 8(4), 436-461.
- Ichev, R., & Marinč, M. (2018). Stock prices and geographic proximity of information: Evidence from the Ebola outbreak. *International Review of Financial Analysis*, 56, 153-166.
- Kaplanski, G., & Levy, H. (2010). Exploitable predictable irrationality: The FIFA World Cup effect on the US stock market. *Journal of Financial and Quantitative Analysis*, 535-553.
- Karafiath, I. (1988). Using dummy variables in the event methodology. *Financial Review*, 23(3), 351-357.
- Kim, H., & Gu, Z. (2004). Impact of the 9/11 terrorist attacks on the return and risk of airline stocks. *Tourism and Hospitality Research*, 5(2), 150-163.
- Kim, J., Kim, J., Lee, S. K., & Tang, L. R. (2020). Effects of epidemic disease outbreaks on financial performance of restaurants: Event study method approach. *Journal of Hospitality and Tourism Management*, 43, 32-41.
- Lanouar, C., & Goaid, M. (2019). Tourism, terrorism and political violence in Tunisia: Evidence from Markov-switching models. *Tourism Management*, 70, 404-418.
- Lee, J. S., & Jang, S. S. (2007). The systematic-risk determinants of the US airline industry. *Tourism Management*, 28(2), 434-442.

- Liew, V. K. S. (2020a). Abnormal Returns on Tourism Shares in The Chinese Stock Exchanges Amid The COVID-19 Pandemic. *International Journal of Economics and Management*, 14(2):247 – 262.
- Liew, V.K.-S. (2020b). The effect of novel coronavirus pandemic on tourism share prices. *Journal of Tourism Futures*, Vol. ahead-of-print No. ahead-of-print. <https://doi.org/10.1108/JTF-03-2020-0045>
- Ljung, G. M., & Box, G. E. (1978). On a measure of lack of fit in time series models. *Biometrika*, 65(2), 297-303.
- Loh, E. (2006). The impact of SARS on the performance and risk profile of airline stocks. *International Journal of Transport Economics/Rivista internazionale di economia dei trasporti*, 33(3): 401-422.
- Mazur, M., Dang, M., & Vega, M. (2021). COVID-19 and the March 2020 stock market crash. Evidence from S&P1500. *Finance Research Letters*, 38, 101690.
- McKercher, B., & Chon, K. (2004). The over-reaction to SARS and the collapse of Asian tourism. *Annals of Tourism Research*, 31(3), 716.
- Nhamo, G., Dube, K., & Chikodzi, D. (2020). COVID-19 and the Stock Market: Impacts on Tourism-Related Companies. *Counting the Cost of COVID-19 on the Global Tourism Industry* (pp. 297-318). Springer, Cham.
- Novelli, M., Burgess, L. G., Jones, A., & Ritchie, B. W. (2018). ‘No Ebola... still doomed’—The Ebola-induced tourism crisis. *Annals of Tourism Research*, 70, 76-87.
- Ramelli, S., & Wagner, A. F. (2020). Feverish stock price reactions to COVID-19. *The Review of Corporate Finance Studies*, 9(3), 622-655.
- Ramón, D. (2020, November, 9). Aerolíneas y hoteles vuelan en Bolsa tras el anuncio de una vacuna efectiva. *Hosteltur*. [https://www.hosteltur.com/140440\\_aerolineas-y-hoteles-vuelan-en-bolsa-tras-el-anuncio-de-una-vacuna-efectiva.html](https://www.hosteltur.com/140440_aerolineas-y-hoteles-vuelan-en-bolsa-tras-el-anuncio-de-una-vacuna-efectiva.html)
- Ru, H., Yang, E., & Zou, K. (2020). What do we learn from SARS-CoV-1 to SARS-CoV-2: Evidence from global stock markets. *SSRN Electronic Journal*, 3569330. <https://ssrn.com/abstract=3569330>.
- Said, S. E., & Dickey, D. A. (1984). Testing for unit roots in autoregressive-moving average models of unknown order. *Biometrika*, 71(3), 599-607.
- Schoenfeld, J. (2020). The invisible risk: Pandemics and the financial markets *SSRN Electronic Journal*, 3567249. <https://ssrn.com/abstract=3567249>.
- Sharma, A., & Nicolau, J. L. (2020). An open market valuation of the effects of COVID-19 on the travel and tourism industry. *Annals of Tourism Research*, 89:102990.
- Song, H. J., Yeon, J., & Lee, S. (2021). Impact of the COVID-19 pandemic: Evidence from the US restaurant industry. *International Journal of Hospitality Management*, 92, 102702.
- Stram, D. O., & Wei, W. W. (1986). Temporal aggregation in the ARIMA process. *Journal of Time Series Analysis*, 7(4), 279-292.
- Suau-Sanchez, P., Voltés-Dorta, A., & Cugueró-Escofet, N. (2020). An early assessment of the impact of COVID-19 on air transport: Just another crisis or the end of aviation as we know it?. *Journal of Transport Geography*, 86, 102749.
- Thams, A., Zech, N., Rempel, D., & Ayia-Koi, A. (2020). An initial assessment of economic impacts and operational challenges for the tourism & hospitality industry due to COVID-19. *IUBH Discussion Papers-Tourismus & Hospitality* (No. 2/2020).
- Torres, R., & Fernández, M. J. (2020). La política económica española y el COVID-19. *Funcas, Cuadernos de Información Económica*, 275.
- UNWTO (2020, April, 28). La Organización Mundial del Turismo transmite al Rey de España la importancia del turismo para la recuperación frente al covid-19. UNWTO, Madrid. <https://www.unwto.org/es/news/omt-transmite-al-rey-de-espana-la-importancia-del-turismo-para-la-recuperacion-frente-al-covid-19>
- UNWTO (2021a). UNWTO World Tourism Barometer, 19(3), May 2021. UNWTO.
- UNWTO (2021b). UNWTO Global Tourism Dashboard. UNWTO. <https://www.unwto.org/international-tourism-and-covid-19>.
- Vila, N. A. (2020). Repercusión económica mundial de la pandemia del COVID-19. *Análisis de sectores más afectados*. *Quipukamayoc*, 28(57), 85-94.
- Wagenmakers, E. J., & Farrell, S. (2004). AIC model selection using Akaike weights. *Psychonomic bulletin & review*, 11(1), 192-196.
- Wu, W., Lee, C. C., Xing, W., & Ho, S. J. (2021). The impact of the COVID-19 outbreak on Chinese-listed tourism stocks. *Financial Innovation*, 7(1), 1-18.