

## Has COVID-19 had an impact on prices? The case of the cruise industry

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## **Has COVID-19 had an impact on prices? The case of the cruise industry**

### **ABSTRACT**

One of the previously unknown and unexpected impact of COVID-19 is its effect on prices. The aim of this research is to estimate how prices in the cruise industry have changed since COVID-19 was declared a pandemic. To carry out this research the authors created an extensive database of prices from February 2019 to March 2021, which were collected from a leading Spanish online travel agency (OTA). Methodologically, this research uses descriptive and hedonic analyses. The main conclusion is that cruise prices have reduced, on average, by 4.3%, although there are relevant differences between cruise companies, zone of departure, size, antiquity and rating of the ships, and the number of days between the date of capture and the date of cruise departure. Finally, several managerial implications are suggested from the results of this study.

**KEYWORDS:** COVID-19, crisis, cruise, hedonic approach, OTA, prices

## **INTRODUCTION**

It is now well-known that the tourism industry has been widely affected by the impact of Covid-19 mainly due to travel constraints, so exogenous and uncontrolled factors (Pan et al., 2021). One of the tourist activities that has been most affected by this pandemic is the cruise industry. Cruise ships were the hardest hit tourist activities from the beginning of this pandemic and images of people stuck in some vessels rapidly spread a rapid negative perception about them (e.g. cases in Diamond Princess February 2020, etc.). In other words, no other tourism sub-sector has appeared in the global news as often as cruises (Gössling et al., 2020). This material from the media may change people's perceptions and behaviours. For example, after seeing cruise passengers evacuated by their respective national governments, people may want to avoid risks and keep away from crowded and exotic destinations (Ioannides & Gyimóthy, 2020). The cruise industry was among the first to be proactive and voluntarily suspend cruise operations, which occurred within 48 hours of the declaration of the worldwide pandemic (CLIA, 2020). Activity was stopped for a long time and only recently have companies begun to resume. In fact, every cruise companies ceased their activities in March 2020, approximately at the time when COVID-19 was declared a pandemic and started to spread around the world, and very few companies have resumed their activity at the time of writing, by mid-May 2021. For example, some cruise companies that are currently operating are Aida, Coral, Dream Cruises, Hapag Lloyd, MSC, Royal Caribbean and TUI. The majority of the other cruise companies expect to resume their activity between May and August 2021 (Medcruise, 2021). By looking back at these previous months, we can see that there has not been an agreed strategy between flag states and the states have been interested in protecting their territory, so that the cruise industry faces a major challenge due to the fact that itineraries go through different countries (Choquet & Sam-Lefebvre, 2021).

It is obvious that, due to all these circumstances, the cruise industry situation is far from being in the position it was in before COVID-19 and the efforts made and the strategies followed by different destinations and cruise companies are so diverse it makes it difficult to get an integrated view of what is happening to the cruise industry and what comes next. Thus, to contribute to a better description of what is happening in the cruise industry, the aim of this study is to estimate how prices changed in the cruise industry since COVID-19 was declared a pandemic. This empirical research is supported by an extensive database created by the authors from a leading Spanish Online Travel Agency (OTA) and can be considered a first step to addressing the variation of prices in the cruise industry since COVID-19 was declared a pandemic. In fact, up to now, the studies published about the impact of COVID-19 have focused on the future and referred to expected strategies but very few have empirical evidence from the supply side to support that. The nearest results are those obtained by Lai & Wong (2021) who carried out a survey in the Macau hotel market and concluded that a reduction in prices is one of the strategies applied after a crisis. Our study tries to address this gap from the point of view of prices in the seriously hit cruise sector.

## **LITERATURE REVIEW**

Although it is not the aim of this study to widely analyse the impacts of a crisis, some insights are given as a general overview of the situation. COVID-19 can be considered more of a disaster than a crisis ("a disaster can be defined as where an enterprise... is confronted with sudden unpredictable catastrophic changes over which it has little control" – Faulkner, 2001, p.136 -) although usually both are used and analysed interchangeably. Wut et al. (2021) summarize the main research into crisis management in the hospitality and tourism industry and suggest focusing on less explored industry sectors, such as the cruise industry. Specifically, when a crisis comes from a health disaster, as with COVID-19, there is a gradual deterioration in health status, which in turn influences labor productivity and finally leads to fewer outputs in the tourism industry from the supply side, and makes tourism demand decrease due to government restrictions and mobility limitations (Yang et al., 2020). Although the impact of crisis and disasters cannot be stopped, it can be minimized by considering crisis management research and with the co-operation of public and private actors. By analyzing the impact on

other sectors, we can reduce these negative impacts (Ritchie, 2004). Kontogeorgopoulos (1999) states that it is important to cope with these negative situations, as memories after crises are short and soon overcome.

The studies published on the impact of COVID-19 in the tourism industry are mainly conceptual and rely on the idea that tourism activity should be reimagined in a more sustainable and resilient way. However, both researchers and practitioners still need to address the consequences of the pandemic and the political-economic drivers and consequences (Mostafanezhad, 2020) and decide whether the tourism industry should be reshaped or not in the short, medium or long term. Although this pandemic has not been eradicated, some expected future trends have been described. Ioannides and Gyimóthy (2020) state that the COVID-19 crisis is leading to the decline of certain mainstream business formats and, simultaneously, the emergence of others. It is possible that tourists will change their booking patterns and will tend to book later than they did before COVID-19 due to mobility constraints and to the uncertainty of their future job and economic situation (Smeral, 2010). Specifically, they are planning shorter holidays than before and, for example, in terms of transportation patterns, a decline in intention of using public transport and an increase in the use of private cars has been observed, as people want to travel again but only once the pandemic is controlled (Li et al., 2020). Bulchand-Gidumal & Melián-González (2020) conclude that some changes in consumer behavior are taking place as a result of this pandemic, e.g. 28% of consumers plan to buy their tickets closer to their departure date and another 5% state that they will probably avoid flights altogether, which will affect to sales and profitability of the airlines.

Some studies conclude that the effect of COVID-19 has been, is and will be different depending on the characteristics of the company. Lin & Chen (2021) indicate that the impact of COVID-19 on hotel's performance is different depending on the hotel characteristics: international tourist hotels with high product varieties and five-star hotels suffered a greater loss in revenue than other types of hotels, while hotels located in scenic areas and international chain hotels were less affected. Guo et al. (2021) indicate that the recovery of hotels with shorter operating years, higher quality amenities and services, and better brand image, was faster during the pandemic. Moreover, the comparison between different types of cities suggests that hotels in tourism-oriented cities recovered faster than those in commerce-oriented ones. Another way of increasing and speeding up the recovery from the pandemic is to consider the role of OTA and the information that they provide from suppliers, which should be continuously updated (Guo et al., 2021).

Specifically, very few articles have been published about the impact of disasters and crises in the cruise industry. Ryschka et al. (2016) indicates that the speed of response using social media, brand familiarity, and cultural values of the respondent affect perceptions of the corporate reputation of a cruise line after a crisis, and so corroborate Pan et al. (2021). This indicates that having a clear crisis communication plan might be beneficial to recovery. From the supply side, the products of the cruise industry are itineraries, which are based on mobility. Due to border and port closures to non-essential transit in most countries (Gössling et al., 2020), mobility has been extremely limited which was inevitably led to the cessation of cruise activity. From the point of view of demand, it is important to consider increasing worries about safety on cruise ships and the constraint it may represent, so it is important to improve tourists' feelings of safety and security and raise awareness of cruising standards and protocols (Hung et al., 2020). Up to now, cruise passengers were very confident in the safety and security measures adopted by cruise companies (Bowen et al., 2014). With the pandemic, the importance of hygiene and cleanliness has increased hugely, especially in the cruise industry, both in port and on board, as it is one of the key factors looked at when deciding to book a cruise (Whyte, 2018). Fisher et al. (2018) insist on the importance of handwashing and passenger's awareness of protection/safety measures. Healthy Gateways (2020), co-founded by the Health Programme of the European Union, published an extensive document to provide general guidance, measures and protocols in order for the cruise industry to give an appropriate response to the pandemic. Moreover, there is evidence of doubts about whether or not to go on a cruise in the future (around 52% according to Li, Zhang, Liu, Kozak, & Wen, 2020). To recover from this crisis and specifically speaking about the cruise industry, it is necessary to consider vaccines, the relaxation of travel restrictions, the implementation of additional health measures for passengers before to access the vessels, and the presence of a loyal clientele (Renaud, 2020). Espinet et al. (2021a) outline the changes and challenges

of the cruise industry after COVID-19, indicating that the impact will be different on each region or country, and describing the necessity of applying different measures and protocols accordingly. It may be the time to change the paradigm from “growth for development” to “edgrowth for liveability”, which in the cruise industry implies small ships and locally controlled fleets promoting the development of a niche cruise industry (Renaud, 2020).

Finally, when considering pricing strategies, research into the impact on prices after a crisis is scarce but a summary can be seen in Wut et al. (2021). Zhang et al. (2020) affirm that “tourists have a strong negative emotional reaction towards disadvantaged tourism-related prices in response to a high (vs low) infectious disease threat”. It appears that a discount strategy is commonly applied after a crisis, as consumers hope to profit from last-minute bargains and cheaper deals and, for example, it is possible that consumers become more price sensitive, which could lead to price wars in order to obtain liquidity, and to the delaying of investments and a deterioration in quality (Smeral, 2010), although there is no clear evidence that this also happens in the cruise industry. In fact, Lai & Wong (2021) conclude that the reduction in prices is one of the strategies applied to survive from a pandemic. However, Kim et al. (2019) maintain that discounts may alleviate cumulative occupancy loss precipitated by a crisis but do not reduce cumulative RevPAR and delay both occupancy and RevPAR recovery times as competitors also reduce their room rates in times of crisis. Hu et al. (2021) conclude that the importance of price has decreased during the pandemic and the importance of quality and service has increased. These results are coherent with those obtained by Lin & Chen (2021) who suggest that price elasticity of demand after COVID-19 in the hotel industry is smaller than one, so the demand hardly responds to the variation of prices. However, Pan et al. (2021) conclude that 52% of the respondents of the study would take a cruise if there were large discounts and 26% that would consider it, suggesting that discounts could allow cruise companies to recover faster.

## **MATERIALS AND METHODS**

This research has been developed using a database created at the rate of one per month by the authors from February 2019 to March 2021. Specifically, the authors collected the final prices paid by customers from a leading Spanish OTA. These prices were collected using web scraping techniques after which the authors extensively evaluated the quality of the data obtained and eliminated inconsistent and incomplete observations. The final database includes 1,644,098 prices. These prices correspond to itineraries of cruises around the world that depart within the period of one day after the date of capture to 730 days after (2 years) and whose length ranges from 2 to 14 nights, the most common lengths of cruise itineraries. The whole range of cruise prices is quite difficult to capture as there is not any official source including them so information collection requires extra effort.

As the pandemic was declared on the 11<sup>th</sup> March 2020 and the main aim of this research is to address the effect of COVID-19 on cruise package prices, the approach towards analysing the database was to compare prices 13 months before this date (863,919 observations) and 13 months after this declaration (780,179 observations), thereby obtaining reliable results month by month.

The database includes the following attributes: date of departure, cruise company, cruise ship, number of nights of the itinerary, type of cabin, CLIA zone of departure, the number of days between the date of capture and the date of departure, the antiquity of the ship, the tonnage of the ship, the ship rating and the final price paid by customers – including port taxes.

After data collection, data analysis is twofold. First, descriptive analyses comparing price availability and average prices are done, in order to get general view of the situation. Second, a hedonic regression model is implemented in order to isolate the impact of attributes on prices before and after COVID-19. This methodology has been widely used in the analysis of the tourism industry (see, for instance, Espinet et al. 2003; Haroutunian et al. 2005), including the cruise industry (see, for instance, Espinet et al., 2021b; Espinet, 2018; Niavis & Tsiotas, 2018). It is a useful methodology to assess the isolated impact of each characteristic on the whole price of the tourism package. The hedonic pricing model is assumed to be semi-logarithmic (i.e. ln price) and each of the attributes of the cruise package are assessed to better explain these changes in cruise packages before and after the declaration of the COVID-19 pandemic.

## RESULTS

The results of this research are divided into two parts. First, the comparison of price and itinerary availability pre and post the declaration of the COVID-19 pandemic is given. Second, the study of the evolution of cruise prices through descriptive and hedonic prices models is provided. Henceforth, pre-COVID-19 and post-COVID-19 refer to 13-month periods before and after COVID-19 was declared a pandemic in March 2020.

### Availability of itineraries

First it is interesting to address the evolution of the itineraries available over the 26 months of the analysis, 13 months before COVID-19 was declared a pandemic (February 2019 to February 2020) and 13 months after (March 2020 to March 2021). Table 1 displays the number of itineraries available per month of data capture and the number of days between the date of data capture and the date of departure.

The number of itineraries available in the thirteen months prior to COVID-19 was 238,208 and in the thirteen months after COVID-19 was declared a pandemic, it was 217,060, a reduction of 21,148 itineraries. This difference is distributed as follows (in percentage terms): 33.2% correspond to itineraries that depart from the date of capture to 30 days later, 28.7% from 31 to 60 days, 15.1% from 61 to 90 days and 6.2% from 91 to 120 days. The sum of the first 120 days represents 83.2% of the reduction. In percentage terms, there is a reduction of 8.9%, which is distributed as follows: 83.6% up to 30 days; 58.9% from 31 to 60 days; 28.9% from 61 to 90 days and 10.9% from 91 to 120 days (Figure 1). It is clear that the main reduction in the availability of itineraries is when the cruise departs within 120 days from the date of data capture, so in the very short term. This can be explained by the fact that there is a lot of uncertainty surrounding whether the cruise will be able to depart, until the last minute. Although the cruise was not expected to depart, prices were still displayed to maintain the activity of the website and the flow of information. The strategy of publishing prices in spite of the assumption that the service cannot be provided has been observed in tourism sectors such as hotels and theme parks.

The analysis by CLIA zone of departure discloses relevant differences in the itineraries available (Figure 2). The areas where the offering is most reduced are Asia without China (-33.0%), Mexico / Central America (-26.1%) and Canada / New England (-25.5%). The three most important zones, i.e. the Caribbean, the Mediterranean and the North of Europe show completely different behaviour, with decreases in availability of -14.4%, -0.6% and -9.8%, respectively, that could be due to the proximity of the Spanish market in spite of the cease of the activity.

Table 1. Itineraries available per month of data capture and number of days between the date of capture and the date of departure

Month-Year capture	Total	0-30	31-60	61-90	91-120	121-150	151-180	181-210	211-240	241-270	271-300	301-330	331-360	361-390	391-420	421-450	451-480	481-510	511-540	541-570	571-600	601-630	631-660	661-690	691-730
February, 2019	18,647	555	720	880	1,029	942	953	1,016	929	763	791	835	744	641	752	804	834	875	903	823	735	624	489	432	578
March, 2019	19,225	638	842	951	997	957	945	931	812	763	807	794	672	721	869	932	904	908	946	803	648	597	585	496	707
April, 2019	19,388	711	897	909	993	981	862	782	886	791	754	714	823	863	962	1,045	942	939	898	714	608	629	604	555	526
May, 2019	19,032	746	863	924	1,022	889	816	793	871	745	700	830	875	958	1,044	1,025	954	922	805	637	657	601	603	475	277
June, 2019	18,391	659	884	905	922	818	786	816	804	687	763	938	1,031	991	991	1,039	908	764	741	748	635	668	551	240	102
July, 2019	17,520	666	894	871	852	816	815	743	749	777	865	1,036	1,023	940	967	957	787	704	770	664	630	547	293	78	76
August, 2019	16,965	681	810	803	833	835	726	719	791	850	986	1,064	965	955	953	827	711	760	715	661	551	317	123	136	193
September, 2019	17,150	713	746	819	870	766	659	829	932	988	1,008	1,056	983	942	862	799	755	675	732	572	337	240	271	250	346
October, 2019	17,525	626	762	810	827	691	783	944	1,049	987	1,006	1,063	970	856	874	901	749	775	677	399	306	358	354	322	436
November, 2019	18,360	712	706	763	736	818	919	1,063	1,067	985	1,026	1,024	852	847	921	815	746	635	561	526	561	584	565	472	456
December, 2019	18,652	461	708	678	869	920	997	1,076	1,048	998	986	902	840	839	812	795	659	659	719	701	686	721	653	451	474
January, 2020	18,853	599	681	801	955	994	996	1,058	1,043	950	863	879	879	789	825	741	665	730	829	769	737	725	520	367	458
February, 2020	18,500	634	791	960	1,099	1,028	1,012	1,079	992	833	852	970	830	654	672	766	807	860	915	795	725	528	257	199	242
<b>TOTAL Pre declared Pandemic</b>	<b>238,208</b>	<b>8,401</b>	<b>10,304</b>	<b>11,074</b>	<b>12,004</b>	<b>11,455</b>	<b>11,269</b>	<b>11,849</b>	<b>11,973</b>	<b>11,117</b>	<b>11,407</b>	<b>12,105</b>	<b>11,487</b>	<b>10,996</b>	<b>11,504</b>	<b>11,446</b>	<b>10,421</b>	<b>10,206</b>	<b>10,211</b>	<b>8,812</b>	<b>7,816</b>	<b>7,139</b>	<b>5,868</b>	<b>4,473</b>	<b>4,871</b>
<b>Month-Year capture</b>	<b>Total</b>	<b>0-30</b>	<b>31-60</b>	<b>61-90</b>	<b>91-120</b>	<b>121-150</b>	<b>151-180</b>	<b>181-210</b>	<b>211-240</b>	<b>241-270</b>	<b>271-300</b>	<b>301-330</b>	<b>331-360</b>	<b>361-390</b>	<b>391-420</b>	<b>421-450</b>	<b>451-480</b>	<b>481-510</b>	<b>511-540</b>	<b>541-570</b>	<b>571-600</b>	<b>601-630</b>	<b>631-660</b>	<b>661-690</b>	<b>691-730</b>
March, 2020	18,705	349	898	1,055	1,126	1,020	1,035	1,033	885	833	913	879	687	646	811	909	938	941	972	818	598	378	320	268	393
April, 2020	19,777	108	583	937	1,078	1,023	989	920	888	892	824	853	798	895	1,084	1,143	1,072	1,069	1,061	781	566	592	530	493	598
May, 2020	19,151	141	461	819	965	961	869	879	938	807	809	859	926	1,017	1,169	1,147	1,051	1,022	896	617	629	611	603	529	426
June, 2020	18,243	129	397	806	944	840	814	943	839	789	796	956	1,022	1,086	1,152	1,111	996	888	686	644	595	629	596	385	200
July, 2020	16,672	113	302	530	705	731	782	786	777	742	918	1,106	1,114	1,077	1,121	1,038	805	664	725	613	620	598	357	183	265
August, 2020	15,080	128	166	392	668	717	700	718	733	814	948	1,075	1,003	965	1,009	808	605	630	629	593	529	383	271	251	345
September, 2020	15,452	70	270	484	719	712	706	770	886	996	1,084	1,136	1,040	1,004	899	679	664	636	680	583	391	244	250	228	321
October, 2020	15,450	89	255	613	702	682	688	928	1,073	1,044	1,073	1,142	1,005	803	728	744	652	670	666	381	279	305	300	270	358
November, 2020	15,409	44	326	600	671	692	840	1,070	1,087	1,031	1,049	1,081	843	693	776	710	686	656	457	349	361	363	364	312	348
December, 2020	15,443	59	145	316	617	804	945	1,052	1,033	977	959	837	750	794	814	825	669	487	558	545	537	539	470	353	358
January, 2021	16,092	56	110	336	727	909	957	1,030	1,023	909	812	801	809	775	841	773	603	734	802	731	708	688	478	273	207
February, 2021	15,934	55	167	526	914	925	914	994	957	806	782	876	776	790	787	662	749	809	840	771	697	564	339	234	
March, 2021	15,652	37	154	464	858	821	815	902	830	753	828	840	810	742	762	912	909	908	967	835	667	463	375		
<b>TOTAL Post declared Pandemic</b>	<b>217,060</b>	<b>1,378</b>	<b>4,234</b>	<b>7,878</b>	<b>10,694</b>	<b>10,837</b>	<b>11,054</b>	<b>12,025</b>	<b>11,949</b>	<b>11,393</b>	<b>11,795</b>	<b>12,441</b>	<b>11,583</b>	<b>11,287</b>	<b>11,953</b>	<b>11,461</b>	<b>10,399</b>	<b>10,114</b>	<b>9,939</b>	<b>8,261</b>	<b>7,177</b>	<b>6,357</b>	<b>5,253</b>	<b>3,779</b>	<b>3,819</b>
Variation	-21,148	-7,023	-6,070	-3,196	-1,310	-618	-215	176	-24	276	388	336	96	291	449	15	-22	-92	-272	-551	-639	-782	-615	-694	-1,052

Figure 1. Difference of itinerary availability before and after COVID-19 according to the days between data capture date and itinerary date of departure.

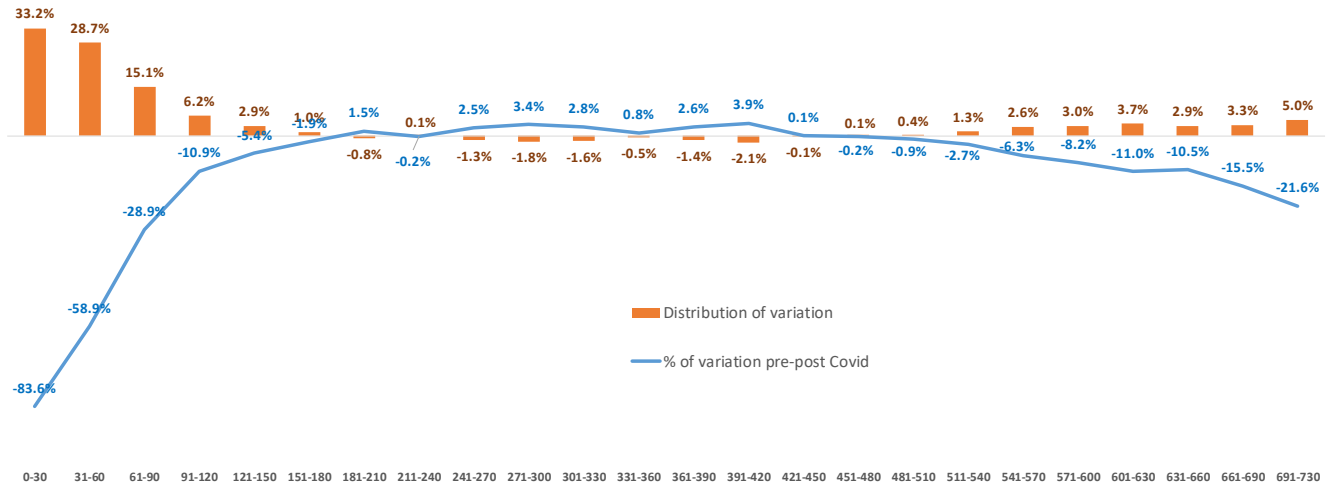
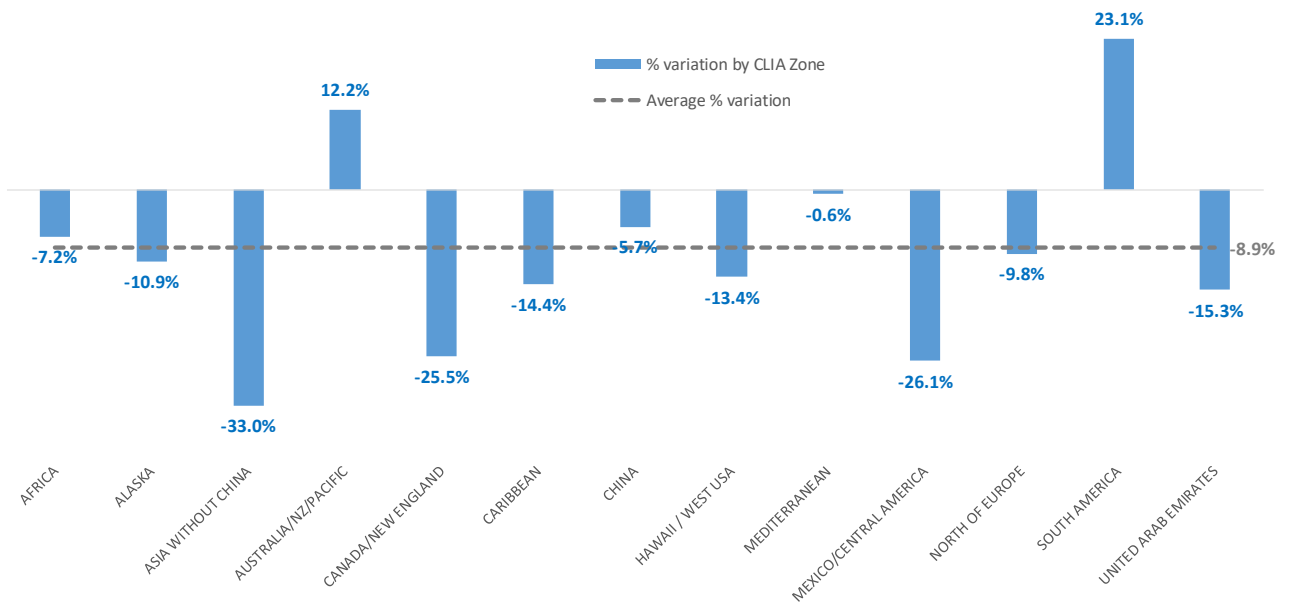


Figure 2. Percentage of difference of available itineraries depending on the CLIA zone of departure.





## Price analyses

The analysis of the variation in prices was carried out in two steps. First, a comparison of the average prices was made and second, a hedonic model was carried out to identify the variation in prices for cruises with the same itinerary and the number of days between the date of data capture and the date of departure.

### Average price

On average, prices after the declaration of the COVID-19 pandemic increased by 0.9%. This percentage is different depending on the attributes analysed. When considering the type of cabin, the differences in price range from -1.9% for inside cabins to +2.6% for ocean cabins. This may be because of the increase in demand for cabins with windows and therefore fresh air. The analysis by cruise companies ranges from -17.8% for Crystal to +21.8% for Silversea, revealing large differences price strategies. In fact, 16 cruise companies are below the average and 9 over the average for price changes. The analysis by CLIA zone of departure ranges from -8.9% in China to +27.1% in South America, revealing different price strategies between zones of departure. In fact, 6 of the zones are below the average and 7 are over the average. The analysis by number of days between the date of capture to the date of departure ranges from -4.7% when the difference of days is 661-990 to +14.5% when the number of days is 0-30. In fact, the highest increase in average prices are for departures in the short-term. When comparing prices taking into account the size of the ship – tonnage – price differences range from -5.7% for ships from 100,001 to 150,000 tonnes to +19.4% for ships up to 50,000 tonnes, revealing huge differences depending on the size of the vessel. In parallel, when comparing prices according passenger capacity, price changes range from -6.5% for ships with a capacity of 3,001 to 4,000 passengers to +17.3% for ships which can carry up to 2,000 passengers. The results of the analysis by tonnage and passengers show similar results, as can be expected, as the more tonnage a ship has the more passengers it can carry. Consequently, no clear and direct correlation between the size or capacity of the ships and prices is observed.

Analysis by antiquity reveals that prices vary from -0.9% for the newest ships to + 19.7% for the ships whose antiquity is between 11 to 15 years. However, as happens with ship capacity and size, this correlation is not direct. Finally, the comparison by ship rating shows that the price change range is from -2.7% when ships have 4 stars to +2.9% when ships have 5 stars, indicating low correlation in this sense, too.

In summary, the fewest differences are found when comparing the type of cabin (the range is a 4.6%), which indicates that cruise companies use a homogeneous strategy towards pricing within the same cruise ship. The highest differences are observed when comparing cruise companies (the range is 39.6%) and CLIA zone of departure (the range is 36.0%) revealing that cruise companies apply different strategies and they do so according to the zone of departure.

### Adjusted price

Different specifications of the same regression model have been carried out and analysed to see the peculiarities according to the following 7 characteristics: type of cabin; cruise company; CLIA zone of departure; number of days between data capture date and date of departure; the antiquity of the ship; the ship tonnage; and the ship rating. The global model has an adjusted  $R^2$  of 0.833 and, from the 88 specifications carried out according to each characteristic, 79 have obtained values over 0.70, which can be considered robust and reliable results and models.

Although the average price can be a first indicator of the evolution of prices, in-depth analysis to obtain the differences pre-COVID-19 and post-COVID-19 consists of the comparison of the prices considering the same characteristics, in other words, the adjusted price, which has been estimated using the hedonic approach. The variation in prices when adjusting them by the same itinerary and the number of days between the date of capture and the date of departure is -4.3% (Table 2), which shows some differences from the price variation of the

average price (+0.9%). The reason is that the analysis of the average price has a different composition than the analysis of adjusted prices.

When considering the type of cabin, the differences in price range from -5.0% for balcony and suite cabins to -3.7% for ocean cabins. The range of differences, 1.3%, is small, which can be accounted for the fact that the price strategies are homogeneous in the same ship regardless of the type of cabin. The main reduction in the most expensive type of cabins –balcony and suites– could be the result of less willingness to pay more, in spite of the space and luxury they provide. The analysis by cruise companies ranges from -16.5% for Crystal to +12.4% for Costa Cruises –a difference of 29.0%– revealing high differences between cruise price strategies. In fact, 9 cruise companies have increased their prices. The five biggest cruise companies according to Medcruise (2021) that represent 54.5% of the industry, have all decreased their prices: Royal Caribbean (-4.3%), Carnival (-11.1%), MSC (-10.0%), Norwegian (-8.9%) and Princess (-8.9%). However, the following 4 cruise companies that represent 20.9% of the industry capacity have all increased their prices: Aida (+0.3%), Costa Cruises (+12.4%), Celebrity (+5.3%) and Holland America (4.5%). In spite of these results, from individual analysis it is not possible to conclude that the differences in prices depend on the capacity of the cruise ship, so no common factors can be defined.

The analysis by CLIA zone of departure ranges from -10.6% in Mexico / Central America to +2.1% in Canada / New England –a difference of 12.7%– revealing different price strategies according to the zone of departure, which could be due to the reopening strategy of ports and the quite diverse governmental measures and protocols applied. The analysis by number of days between the date of price capture to the date of itinerary departure ranges from -8.1% when the difference of days is 0-30 to -0.7% when the number of days is 691-730, a difference of 7.4%. As happened above, from the results no common conclusions can be defined.

When comparing prices according to the size of the ship –tonnage– prices range from -6.8% for ships from 100,001 to 150,000 to -1.8% for ships up to 50,000. In parallel, in the comparison depending on passenger capacity, prices range from -7.4% for ships from 3,001 to 4,000 passengers to -2.8% for ships up to 2,000 passengers. These results are similar because the more tonnage a ship has the more passengers it can carry. In sum, bigger ships have higher reductions as they need to fill their ships in order to obtain enough revenue and profits, which can come from on board services (29% of revenue according to Medcruise, 2021).

The analysis by ship antiquity reveals that prices vary from -5.3% of the ships from 6 to 10 years old and -4.7% up to five years old to +3.1% of the ships whose antiquity is between 11 to 15 years. It is observed that the newest ships have reduced prices and the oldest have increased prices. This could be due to the fact that the oldest ships have been amortized so that they have obtained enough benefits and this puts less pressure on prices. Moreover, the newest ships are the bigger ones, so the results are commercially coherent.

Finally, the comparison by ship rating shows that the range is from -5.8% when ships have 4 stars to -2.5% when ships have 5 stars. It could be predicted that the more luxurious the ship is, the less the price has an impact, as they achieve differentiation through other methods. However, there is no clear trend in the data that shows it has happened in the cruise industry during the pandemic.

In summary, the fewest differences take place when comparing the type of cabin (the range is 1.3%), which indicates that ships use a homogeneous strategy. The major differences in prices come from the individual strategy of the cruise companies, which depends on the zone of departure, which could be an indicator of the impact of COVID-19 at each location and the measures taken in these locations which affect the cruise industry. In fact, the impact of COVID-19 is expected to be different depending on the individual cruise company and apparently the luxury segment and the river cruises will see less impact (Espinet et al., 2021a). As a result, although cruise supply remains stable, sales and incomes can vary the market share. Another interesting observation is that, although the differences in prices using the average price and the adjusted price are relevant, they conceptually reveal the same types of strategy.

After considering price comparisons according to different attributes, it is also interesting to address the monthly evolution of the adjusted prices (Figure 3). Since the pandemic was declared and all ships had to cease their

activity, prices began to decrease, and the biggest reductions took place between July and September 2020. Moreover, the difference in prices comparing the same month pre and post COVID-19 has increased over the most recent months analysed: December 2019/2020 -7.8%, January 2020/2021 -6.3% and February 2020/2021 -6.9%. This could be due to the fact that cruise companies are thinking about resuming their activity and, in order to attract customers, one of the common strategies is to reduce prices as indicated in literature review (i.e. Lai et al., 2020).

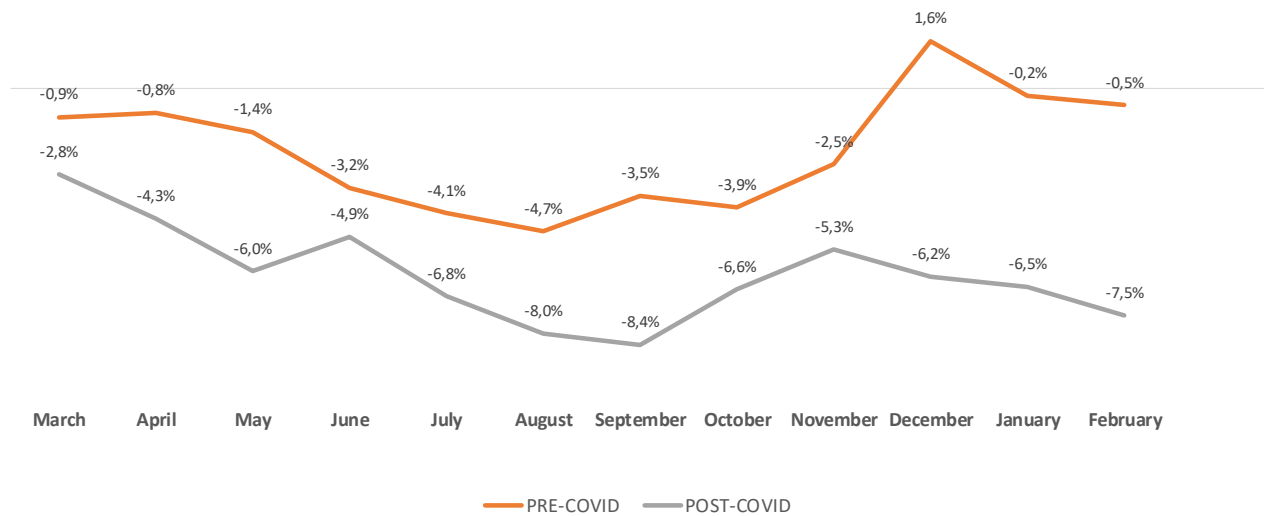
Table 2. Average price and adjusted price comparison pre and post the declaration of the COVID-19 pandemic.

		Registers			Average Price			Sig. (2-tailed)	Hedonic values	
		Pre-Covid	Post-Covid	% dif.	Pre-Covid	Post-Covid	% dif.		Adjusted R <sup>2</sup>	% variation price
<b>TOTAL</b>		<b>863,919</b>	<b>780,179</b>	<b>-9.7%</b>	<b>202.9</b>	<b>204.7</b>	<b>0.9%</b>	<b>&lt; 0.001</b>	<b>0.833</b>	<b>-4.3%</b>
<b>Type of cabin</b>	<b>Inside</b>	216,412	190,183	-12.1%	128.8	126.4	-1.9%	< 0.001	0.773	-4.1%
	<b>Ocean</b>	220,441	197,373	-10.5%	165.4	169.8	2.6%	< 0.001	0.810	-3.7%
	<b>Balcony</b>	195,837	182,534	-6.8%	191.8	189.1	-1.4%	< 0.001	0.812	-5.0%
	<b>Suite</b>	231,229	210,089	-9.1%	317.8	322.4	1.4%	< 0.001	0.822	-5.0%
<b>Cruise Company</b>	<b>AIDA</b>	51,192	51,823	1.2%	181.8	184.9	1.7%	< 0.001	0.836	0.3%
	<b>Azamara</b>	6,520	5,520	-15.3%	385.4	373.3	-3.1%	< 0.001	0.724	-4.9%
	<b>Carnival</b>	151,167	132,753	-12.2%	139.5	128.0	-8.2%	0,000	0.794	-11.1%
	<b>Celebrity</b>	39,893	39,069	-2.1%	311.6	341.1	9.5%	< 0.001	0.851	5.3%
	<b>Celestyal Cruises</b>	17,210	16,487	-4.2%	208.4	194.1	-6.8%	< 0.001	0.822	-7.0%
	<b>Costa Cruises</b>	76,750	62,869	-18.1%	158.9	181.7	14.4%	0,000	0.705	12.4%
	<b>Cruise &amp; Maritime Voyages</b>	8,178	3,303	-59.6%	187.3	176.3	-5.9%	< 0.001	0.890	-3.5%
	<b>Crystal</b>	4,777	4,797	0.4%	781.9	642.5	-17.8%	< 0.001	0.763	-16.5%
	<b>Cunard</b>	14,436	11,625	-19.5%	287.8	309.2	7.4%	0.069	0.833	1.7%
	<b>Desire Cruise</b>	14	6	-57.1%	465.7	476.4	2.3%	0.696	0.998	
	<b>Disney</b>	16,855	12,438	-26.2%	443.7	450.9	1.6%	0.049	0.837	0.1%
	<b>Fred Olsen</b>	20			249.8				0.998	
	<b>Hapag Lloyd</b>	403	406	0.7%	728.3	600.6	-17.5%	< 0.001	0.649	-13.7%
	<b>Holland America</b>	37,117	25,040	-32.5%	201.3	215.3	6.9%	< 0.001	0.809	4.5%
	<b>MSC Cruises</b>	155,222	149,929	-3.4%	155.0	140.2	-9.6%	0,000	0.718	-10.0%
	<b>Nicko Cruises</b>		312			455.4			0.843	
	<b>Norwegian</b>	64,706	67,220	3.9%	225.8	209.0	-7.4%	< 0.001	0.752	-8.9%
	<b>Oceania Cruises</b>	11,836	10,936	-7.6%	350.7	317.6	-9.4%	< 0.001	0.817	-9.7%
	<b>Paul Gauguin Cruises</b>	2,075	2,109	1.6%	778.1	763.3	-1.9%	0.083	0.858	-1.9%
	<b>Ponant</b>		4,256			851.4			0.643	
	<b>Princess</b>	58,248	42,249	-27.5%	198.9	180.3	-9.3%	< 0.001	0.809	-8.9%
	<b>Pullmantur</b>	13,598	5,150	-62.1%	138.2	137.3	-0.6%	0.330	0.600	-0.3%
	<b>Regent</b>	2,457	2,319	-5.6%	632.0	622.4	-1.5%	0.124	0.603	0.0%
	<b>Royal Caribbean</b>	114,094	106,560	-6.6%	177.9	173.2	-2.6%	< 0.001	0.738	-4.3%
	<b>Seabourn</b>	2,791	3,340	19.7%	524.3	620.6	18.4%	< 0.001	0.800	11.8%
	<b>SeaDream Yacht Club</b>	4,012	3,112	-22.4%	726.1	708.2	-2.5%	0.003	0.761	2.5%
<b>Silversea</b>	3,803	4,334	14.0%	684.6	833.5	21.8%	< 0.001	0.695	1.4%	
<b>Temptation Cruise</b>	24			323.1				1.000		
<b>Virgin Voyages</b>		3,016			251.7			0.930		
<b>Windstar</b>	6,521	9,201	41.1%	412.7	411.9	-0.2%	0.697	0.480	-3.8%	
<b>CLIA zone of departure</b>	<b>Africa</b>	6,509	5,895	-9.4%	186.0	198.0	6.5%	< 0.001	0.968	-7.2%
	<b>Alaska</b>	52,816	47,242	-10.6%	251.2	245.4	-2.3%	< 0.001	0.797	-3.4%
	<b>Asia without China</b>	25,012	15,676	-37.3%	206.3	230.9	11.9%	< 0.001	0.851	-4.8%
	<b>Australia/NZ/Pacific</b>	25,355	27,146	7.1%	267.6	270.3	1.0%	0.183	0.886	-5.6%
	<b>Canada / New England</b>	8,723	6,634	-23.9%	236.4	244.7	3.5%	< 0.001	0.862	2.1%
	<b>Caribbean</b>	339,933	293,539	-13.6%	178.4	171.3	-3.9%	< 0.001	0.828	-6.4%
	<b>China</b>	6,361	6,033	-5.2%	215.5	196.3	-8.9%	< 0.001	0.530	-8.2%
	<b>Hawaii / West USA</b>	5,920	5,123	-13.5%	363.7	366.5	0.8%	0.315	0.807	-2.8%
	<b>Mediterranean</b>	249,276	242,874	-2.6%	200.9	197.3	-1.8%	< 0.001	0.796	-3.8%
	<b>Mexico / Central America</b>	30,183	24,305	-19.5%	160.7	150.0	-6.7%	< 0.001	0.879	-10.6%
	<b>North of Europe</b>	80,171	72,581	-9.5%	232.4	245.1	5.5%	< 0.001	0.814	-2.9%
	<b>South America</b>	17,752	19,571	10.2%	389.0	494.5	27.1%	< 0.001	0.945	-3.3%
	<b>United Arab Emirates</b>	15,896	13,528	-14.9%	138.8	147.8	6.5%	< 0.001	0.793	0.0%

Table 2. Continuation.

		Registers			Average Price			Sig. (2-tailed)	Hedonic values	
		Pre-Covid	Post-Covid	% dif.	Pre-Covid	Post-Covid	% dif.		Adjusted R <sup>2</sup>	% variation price
Number of days between the date of capture to the date of departure	<b>0-30</b>	30,421	5,077	-83.3%	194.5	222.6	14.5%	< 0.001	0.768	-8.1%
	<b>31-60</b>	37,583	15,684	-58.3%	192.7	203.3	5.5%	< 0.001	0.769	-1.8%
	<b>61-90</b>	40,362	29,063	-28.0%	196.7	205.9	4.7%	< 0.001	0.790	-1.0%
	<b>91-120</b>	43,723	39,037	-10.7%	200.5	208.8	4.1%	< 0.001	0.800	-3.3%
	<b>121-150</b>	41,801	39,331	-5.9%	202.2	215.1	6.4%	< 0.001	0.804	-5.3%
	<b>151-180</b>	41,030	39,861	-2.8%	203.0	206.1	1.5%	0.006	0.817	-7.1%
	<b>181-210</b>	43,209	43,413	0.5%	201.6	205.6	1.9%	< 0.001	0.823	-6.5%
	<b>211-240</b>	43,675	43,341	-0.8%	201.5	200.2	-0.7%	0.209	0.826	-7.3%
	<b>241-270</b>	40,501	41,202	1.7%	199.9	201.0	0.6%	0.310	0.830	-5.7%
	<b>271-300</b>	41,653	42,774	2.7%	200.2	204.4	2.1%	0.001	0.835	-4.2%
	<b>301-330</b>	44,218	44,956	1.7%	202.0	201.3	-0.3%	0.580	0.839	-5.8%
	<b>331-360</b>	41,997	41,937	-0.1%	199.9	202.5	1.3%	0.051	0.844	-4.0%
	<b>361-390</b>	40,043	40,613	1.4%	203.0	202.2	-0.4%	0.471	0.843	-3.8%
	<b>391-420</b>	41,942	42,995	2.5%	203.3	203.6	0.2%	0.775	0.842	-3.2%
	<b>421-450</b>	41,728	41,139	-1.4%	203.8	204.7	0.4%	0.464	0.847	-2.9%
	<b>451-480</b>	37,725	36,969	-2.0%	207.1	209.4	1.1%	0.051	0.851	-2.4%
	<b>481-510</b>	36,798	35,967	-2.3%	206.9	208.5	0.8%	0.153	0.861	-2.9%
	<b>511-540</b>	36,677	35,224	-4.0%	210.3	206.7	-1.7%	0.002	0.863	-4.3%
	<b>541-570</b>	31,641	29,211	-7.7%	207.2	201.4	-2.8%	< 0.001	0.873	-5.1%
	<b>571-600</b>	27,911	25,212	-9.7%	209.5	199.8	-4.6%	< 0.001	0.877	-6.1%
<b>601-630</b>	25,470	22,385	-12.1%	207.2	199.0	-3.9%	< 0.001	0.877	-4.8%	
<b>631-660</b>	20,843	18,475	-11.4%	208.3	199.1	-4.4%	< 0.001	0.884	-4.0%	
<b>661-690</b>	15,794	13,069	-17.3%	214.4	204.3	-4.7%	< 0.001	0.890	-3.3%	
<b>691-730</b>	17,174	13,244	-22.9%	214.0	210.3	-1.7%	0.090	0.897	-0.7%	
Tonnage	<b>Up to 50,000</b>	80,486	75,489	-6.2%	373.7	446.3	19.4%	< 0.001	0.899	-1.8%
	<b>From 50,001 to 100,000</b>	317,938	254,848	-19.8%	195.2	194.5	-0.4%	< 0.001	0.851	-3.5%
	<b>From 100,001 to 150,000</b>	298,428	263,287	-11.8%	176.2	166.2	-5.7%	< 0.001	0.822	-6.8%
	<b>More than 150,000</b>	167,067	186,555	11.7%	183.1	175.4	-4.2%	< 0.001	0.687	-4.7%
Passengers	<b>Up to 2,000</b>	133,284	113,091	-15.2%	329.3	386.4	17.3%	< 0.001	0.891	-2.8%
	<b>From 2,001 to 3,000</b>	317,632	262,547	-17.3%	182.4	184.0	0.9%	< 0.001	0.848	-3.1%
	<b>From 3,001 to 4,000</b>	207,466	187,498	-9.6%	186.3	174.2	-6.5%	< 0.001	0.797	-7.4%
	<b>More than 4,000</b>	205,537	217,043	5.6%	169.4	161.4	-4.7%	< 0.001	0.698	-6.3%
Antiquity	<b>Up to 5 years</b>	491,698	472,508	-3.9%	202.1	200.4	-0.9%	< 0.001	0.834	-4.7%
	<b>From 6 to 10 years</b>	282,214	244,116	-13.5%	211.5	210.5	-0.5%	< 0.001	0.847	-5.3%
	<b>From 11 to 15 years</b>	56,164	46,616	-17.0%	192.7	230.7	19.7%	< 0.001	0.838	3.1%
	<b>More than 15 years</b>	33,843	16,939	-49.9%	160.3	170.8	6.5%	< 0.001	0.906	1.3%
Ship rating	<b>3 stars</b>	43,108	32,643	-24.3%	167.0	163.3	-2.2%	< 0.001	0.727	-4.6%
	<b>4 stars</b>	501,483	432,572	-13.7%	176.8	171.9	-2.7%	< 0.001	0.818	-5.8%
	<b>5 stars</b>	294,765	292,930	-0.6%	232.9	239.8	2.9%	< 0.001	0.823	-2.5%
	<b>6 stars</b>	24,563	22,034	-10.3%	438.6	442.5	0.9%	< 0.001	0.857	-3.6%

Figure 3. Percentage of variation in adjusted prices compared to February 2019.



## CONCLUSIONS

The aim of this study is to estimate how prices have changed in the cruise industry since COVID-19 was declared a pandemic. This is an empirical study supported by an extensive database created by the authors from a leading Spanish OTA (1,644,098 prices) and can be considered a pioneering study into the variation of prices in the tourism sector, in this case specifically in the cruise industry, since COVID-19 was detected. The use of the information from an OTA has the advantage that prices of different cruise companies are homogeneous as they are provided from the same source and that OTA are a common source from which to obtain information, attract customers and book (De Pelsmacker et al., 2018) as they are able to improve the sales in this case of the cruise companies (Guo et al., 2021). From a methodological perspective this study uses the hedonic approach, very common in the tourism industry in this type of analysis.

The main results indicate that the itineraries available were reduced by 8.9% and prices were reduced, on average, by 4.3% although there are relevant differences between cruise companies, zone of departure, size, antiquity and rating of the ships, and the number of days between the date of data capture and the date of cruise departure. Due to the uncertainty of the situation, decision-making in the time of crisis is very complex.

From a managerial point of view, it is obvious that cruise companies will have higher costs derived from the new requirements of COVID-19 and, when they resume their activity and for some time, they will not be able to use their full capacity. This will affect the level of revenue and profit of the cruise companies. In this sense, several strategies are available. Regarding revenue, a very common strategy is to reduce price, as it is relatively easy to adjust them (Arbulú et al., 2021) as has been observed in this research and considering that consumer behaviour has changed with consumers booking closer to the departure date (Bulchand-Gidumal and Melián-González, 2020). These results support the findings that consumers are willing to go (52%) or would consider going (26%) on a cruise if there are large discounts (Pan et al., 2021). However, some previous experience in hotels indicates that the strategy of applying discounts during a recession does not work (Kim et al., 2019) and discounted prices for cruise trips are likely to make this sector's economic recovery much more difficult (Gössling et al., 2020). In fact, in spite of a tendency towards an oligopolistic market in the hotel industry, prices are set by adding a small profit margin to the costs of the package holiday, making it hard to use general price reductions as a way of boosting demand (Alegre & Sard, 2015). It is also important that cruise passengers do

not get used to lowered cabin rates as it would be difficult to sell the cabins again at higher prices when the demand is recovered, affecting profits in both the mid and long term (Kim et al., 2019). Another way to attract customers is to provide extra security measures and to offer a clear differentiated service (Espinete et al., 2021a; Guo et al., 2021), which include new specific services on the ship as onboard revenues represent 29% of the total (Medcruise, 2021). From the point of view of costs, cruise companies can adjust them by identifying those more relevant and to try to optimize them so that they can improve their profits. For example, they could negotiate their commissions with agents—this represents 15% of the costs (Medcruise, 2021) -, through changing their percentage or setting another structure of commissions, in order to benefit both. Another possible strategy could be to reduce their operating costs and payrolls, which represent 29.9% and 12.6%, respectively (Medcruise, 2021), although these measures should avoid to have a negative impact on image and reputation, which at the end affect the positioning of the cruise companies (Alonso-Almeida et al., 2015). In all cases, the image of cruise companies (Ryschka et al., 2016), the way they communicate after a crisis (Liu et al., 2016) and media will play a key role (Guo et al., 2021) in the recovery of the industry.

The main limitation is that it is still too early to analyse the real impact of COVID-19 on prices and the consequent managerial decisions. For this reason, further research is needed in order to know not only the specific impact on prices but also what are the best strategies to benefit cruise companies and passengers after a period of this kind of crisis and if these strategies will maintain in the future or will be temporary.

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