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COVID-19 and sectoral employment trends: assessing resilience in the US leisure and hospitality industry

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ABSTRACT

This study explores the vulnerability and resilience of the US Leisure and Hospitality industry sector-wise by taking employment levels in seven different business segments. An autoregressive distributed lag (ARDL) model approach was applied to daily time series data of employment and COVID-19 to assess each sector's fragility and resilience. The findings reveal that museums and historical places, performing arts, and sports are the worst influenced sectors and exhibit low resilience. The accommodation sector initially shows high vulnerability; however, it bounces back by showing high resilience compared to some of the other sectors. The rest of the sector presents the same story negatively influenced by pandemic but eventually reveals a sign of recovery. A detailed discussion with the theoretical and practical implications is provided.

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Leisure and hospitality industry; employment; COVID-19; resilience; US

1. Introduction

The leisure and hospitality industry creates an immense economic impact in the US (Tribe, 2015). It consists of accommodation, entertainment, amusement, food and drink, food services, performing arts, museums and historic places, and other recreational sectors (Travel Association, 2019b). The US travel and leisure industry generated $2.5 trillion in 2018, supporting 15.7 million US citizens jobs (Travel Association, 2019a). Besides, one in ten jobs in the US is directly or indirectly supported by the leisure and hospitality industry (Bureau of Labor Statistics, 2020; Tribe, 2015). It is considered the seventh-largest employer industry in the US (Bureau of Labor Statistics, 2020).

Historical records show that the leisure and hospitality industry is sensitive to extreme events (Gössling et al., 2020; Khan, Bibi, Lyu, et al., 2020). The US leisure and hospitality industry has faced several tragic events (Kosová & Enz, 2012), which have led to a reduction of the salaries and employment level (Dombey, 2004; Prideaux et al., 2020). One of these extreme events is represented by epidemics/pandemics (Min, 2005). For instance, the SARS epidemic resulted in a lower occupancy in the hotels, restaurants, fitness clubs, parks, and other recreational and amusement centres, henceforth lifted thousands of workers unemployed (Pine & McKercher, 2004). The impact of the COVID-19 pandemic is regarded as an even worse situation for the US leisure and hospitality industry (McCarthy, 2020), with a forecasted occupancy lower than the Great depression in all related

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sectors (McCarthy, 2020). They were eventually creating massive risks and uncertainty for the operators and employees (AHLA, 2020a; Bagnera & Steinberg, 2020). By mid of March, most US states declared an emergency and ordered to stay at home, which led to major employees layoff and revenue losses. Casinos, hotels, restaurants, bars, resorts, and theme parks announced closures. For instance, Marriott begun the process of furloughing thousand of its associates on 18th March 2020 (Karmin, 2020); and Hilton closed most the properties (Riegler, 2020), Disney announced the closure of all Walt Disney World resort hotels, Wynn and MGM Resourts closed all Las Vegas Properties (Stephanie, 2020). Museums and heritage place closed their door till next normal, performing arts and entertainment companies shifted their schedule to 2021 (Allmon, 2020).

Literature trends reveal that several studies have been conducted during the pandemic focusing on the impacts of the COVID-19 on the leisure industry in terms of psychological dimensions (Taylor, 2020), theoretical framework and post-pandemic agenda (Alonso et al., 2020), uncertainty (Melián-Alzola et al., 2020), the role of hotel managers (Filimonau et al., 2020), and China hotel and tourism industry (Hao et al., 2020). These studies either focus on a single sector of the leisure and hospitality industry or emphasize specific aspects and did not provide a holistic picture of the mentioned industry at the global, regional, or national level. Before 2019, research on the relationship between pandemic and leisure and tourism industry in econometric terms is focused on the aggregate level of industry and ignored sectoral level impacts (Chien & Law, 2003; Pine & McKercher, 2004).

This study fills the literature gap by examining the impacts of COVID-19 on employment level by sector in the US leisure and hospitality industry. These sectors include accommodation (AC), amusement, gambling, and recreation (AG), 'art, entertainment, and recreation (AER), food and drinking places (FDP), food services (FS), museums and historical places (MPH), and performing arts and sports (PAS). This study is also unique because it assessed each sector's resilience and provided a comparative resilience analysis with daily time-series data from 1 February 2020–31 July 2020. The findings of this study contribute to the current stream of literature on pandemic and resilience.

2. Theoretical background

Tourism and hospitality are considered susceptible industries to extreme events such as natural disasters, political violence, infectious diseases, terrorism, and pandemics (Hall, 2002; Khan, Bibi, Lyu, et al., 2020). Tourism and hospitality is a multi-faced industry that offers direct and indirect employment opportunities through various outlets such as hotels, restaurants, agriculture, airports, transportation, etc. (Khan, Bibi, Ardito, et al., 2020; Khan, Bibi, Lorenzo, et al., 2020). The absence of extreme events is the primary condition for tourism and hospitality development (Araña & León, 2008). The trends indicate that the US tourism and hotel industry faced two major shocks in the 2000s, 9/11, 2001 terrorist attacks, and the September 2008 recession (Kosová & Enz, 2012). These events lead to significant devastating effects on the US tourism, hotel, travel, and lodging industry (Kim & Gu, 2004). The drop in the real disposable income of global and US consumers and fear lead to a decline in aggregate demand for travel, hotel, and lodging products and services as individuals limit their leisure travel (Walsh, 2001).

2.1 Infectious diseases and the leisure and tourism industry

The association between travel, tourism, and hospitality industry and the pandemic is crucial to understand global change and health security issues (Gössling et al., 2020). For instance, air transportation has been regarded as an amplifier in the transfer of coronaviruses and infectious diseases (Browne et al., 2016). Accordingly, researches warned that pandemics pose huge threats to society and the tourism and hospitality industry (Bloom & Cadarette, 2019; Hall, 2006, 2019), as revealed in the case of Swine Flu (2009) and Ebola outbreak (2014) (Gössling et al., 2020; Petersen et al., 2016).

The Swine Flu pandemic resulted in 284,000 deaths across the globe (Viboud & Simonsen, 2012) and hardly hit the leisure and travel markets in Europe and Mexico (Rassy & Smith, 2013). The Ebola outbreak has created a negative image for African destinations (Novelli et al., 2018). It is also well documented that pandemic outbreaks dramatically influence the economic consequence of the leisure and travel industry (Gössling et al., 2020).

2.2 Impact of infectious diseases on the leisure and travel industry in times of the COVID-19

Moreover, infectious diseases show an intense impact on the tourism and hospitality industry around the globe (Henderson & Ng, 2004). The trends reveal that the SARS epidemic in 2003 disrupted tourist arrivals and hotel occupancy (Min, 2005). The hotel industry reduces staff, terminated temporary contracts, and probationers stopped all overtime remunerations during SARS (Chien & Law, 2003; Pine & McKercher, 2004). The global tourism industry trends suggest that recent crises and disasters such as 9/11, US Hurricane Katrina, UK outbreaks of mouth and foot diseases, SARS in Asian countries, and the Indian Ocean tsunami have a devastating influence on domestic and international tourism (Kuo et al., 2008). Wilder-Smith (2006) reported that following the outbreak of the Avian Flue epidemic, Asian and Pacific countries tourist' arrivals were dropped with billion $ losses in terms of GDP in the most affected countries (WTTC, 2003).

Pandemics' history reveals that outbreaks have had a momentous influence on the leisure and hospitality industry (Nhamo et al., 2020). The SARS pandemic resulted in 15 billion US$ losses to the global tourism and hospitality industry. For instance, 75% of employees in leisure and hospitality lost their jobs in Toronto during the SARS pandemic; besides, 38% financial losses are reported in the accommodation sector, 24% in recreation and entertainment, 14% in transportation, 9% in food and beverage, and 15% in other tourism-related sectors (Jayawardena et al., 2008). In Hong Kong, tourists' arrival declined by 80%, which caused unemployment in transport, restaurants, hotels, recreational and amusement parks, and catering, in addition, the hotel occupancy rate dropped by 12% (Pine & McKercher, 2004). In Taiwan, SARS led to instability of hotel stock in the tourism market, which caused losses in shareholders' revenue (Nhamo et al., 2020). The H5NI (bird flu virus) damaged the image of the Thailand hotel industry. The foot and mouth disease in the UK (2001) resulted in conference and trip cancellation, which led to unemployment in the leisure and hotel industry with aggregate losses of 4–5 billion US$ (Brown et al., 2017). The ongoing COVID-19 has caused a 71% decline in hotel occupancy in China during February 2020; besides, 150 Hilton hotels stopped their operations (Lai & Wong, 2020).

COVID-19 dominance has disrupted the leisure and travel supply chain and the allied services industry. All this results in employment terminations, joblessness, furloughs, and closures (Cheer, 2020). Eventually, there would be a recovery from the COVID-19 pandemic; however, no one is sure what will be the leisure and travel industry's future after COVID-19 (Lew, 2020). It is believed that COVID-19 is a backlash of over-tourism in New York, Amsterdam, Barcelona, and Venice (Cheer, 2020; Dodds & Butler, 2019). The COVID-19 situation is unprecedented, vividly explained by newspapers and blogs; some of these unrealistic optimistic perspectives have already proven wrong (Gössling et al., 2020). Thus, this situation calls for scholars worldwide to conduct scientifically reliable research within the premises defined. This article examines the impacts of COVID-19 on the employment trends in the leisure and hospitality industry and tries to evaluate each sector's resilience. We do so in the US context because she has a huge leisure and hospitality market and enjoying a previlage in terms of international travel and tourism world ranking; besides, the US is one of the most affected countries by COVID-19.

2.3 The resilience of the leisure and hospitality industry

Norris et al. (2008) defined resilience as 'a process of linking a set of adaptive capacities to a positive trajectory of functioning and adaption after a disturbance.' The concept of hotel resilience can be defined as a hotel's capacity to successfully adapt strategies when facing disturbance or stress from any crisis or disaster (Alonso et al., 2020). The hotel and leisure industry's resilience is preparedness and capabilities to handle crises successfully and back to normal (Herbane, 2019). Organizational resilience is gaining popularity in the hospitality industry, comprised of stakeholders and organization dynamic capabilities and capacity to adapt, assess, and innovate to cope with potential disruption (Brown et al., 2017). As an outcome, resilience is an ability to recover, and as a process, an organization can effectively deal with a worse event before, during, and after such situations (Taylor, 2020).

As an outcome, resilience is to achieve the desired state and as process resilience is referred to as the organizational mechanisms that empower and assist in reaching the desired target. In terms of situational evaluation, resilience can be categories as 'bouncing back' and 'doing better than before' (Taylor, 2020). Whereas bouncing back is the return to the original situation or the capabilities to survive and flourish during the crisis. Resilience is a continuous adjustment to the crisis and challenges confronted by an organization. Hence, resilience is not only to bounce back to stability but to achieve a desirable level (doing better than before) through learning and innovation (Ruiz-Martin et al., 2018). Thus, leisure and hospitality organizations' resilience consists of flexibility, adaptative capabilities, capacity, and organizational culture that nurtures innovation and efficacy.

Literature trends reveal that leisure and hospitality show resilience to several disasters, epidemics, and terrorist events, for instance, the hotel industry of Taiwan bounce back in 2004 quickly after SARS (2003) by launching aggressive campaigns (Mao et al., 2010). The Korean hotel industry minimized the losses during SARS by implementing crisis management strategies. Thailand hotel industry in Phuket responded effectively by reopening 80% of hotels within a week after the 2004 Boxing Day Tsunami and see a 10% drop in occupancy rate only (Brown et al., 2017). The occupancy level in New York hotels took 34 months to recover from the 9/11 attacks, and the wider US market took 45 months (Tiffany, 2015). In contrast, Madrid (Spain) hotels took only twelve months to recover from the train bombings in 2003, besides, the hotel industry in London (UK) took nine months to progress from July 2005 attacks. The Boston Marathon bombing and Charlie Hebdo shootings revealed a limited impact on hotel occupancy rates (Tiffany, 2015).

3. METHODOLOGY and DATA

This part deals with data collection, methodological techniques, and approaches used to test the proposed hypotheses. We have used several econometrics approaches for data analysis.

3.1 Methodological approach and estimation strategy

This study examines the influence of COVID-19 on employment levels in the US's leisure and hospitality industry. We have developed several models (Equations (1)–(8)) based on our hypotheses; besides, the variables' details are given in Table 1.

$$LH_{(t)} = \text{f}\ [COVID19_{(t)},\ EXPO_{(t)}] \tag{1}$$

$$AC_{(t)} = \text{f}\ [COVID19_{(t)},\ EXPO_{(t)}] \tag{2}$$

$$AG_{(t)} = \text{f}\ [COVID19_{(t)},\ EXPO_{(t)}] \tag{3}$$

$$AER_{(t)} = \text{f}\ [COVID19_{(t)},\ EXPO_{(t)}] \tag{4}$$

$$FDP_{(t)} = \text{f}\ [COVID19_{(t)},\ EXPO_{(t)}] \tag{5}$$

$$FS_{(t)} = \text{f}\ [COVID19_{(t)},\ EXPO_{(t)}] \tag{6}$$

$$MHP_{(t)} = \text{f}\ [COVID19_{(t)},\ EXPO_{(t)}] \tag{7}$$

$$PAS_{(t)} = \text{f}\ [COVID19_{(t)},\ EXPO_{(t)}] \tag{8}$$

Table 1. Variables details.

Variables	Description	Measure	Units
LH	Leisure and hospitality	Employment level	In thousands
AC	Accommodation	Employment level	In thousands
AG	Amusement, gambling, and recreation	Employment level	In thousands
AER	Art, entertainment, and recreation	Employment level	In thousands
FDP	Food and drinking places	Employment level	In thousands
FS	Food services	Employment level	In thousands
MHP	Museums and historical places	Employment level	In thousands
PAS	Performing arts and sports	Employment level	In thousands
Expo	Exports	Total exports	In millions of US$
Covid	Coronavirus	Total positive cases of Covid-19	In number

Phillips and Perron (1988) and Dickey and Fuller (1979) unit root tests were applied to test all the time series' stationary features. We also applied the Zivot Andrew unit root test for assessing structural break in the unit root because traditional tests ignore breaks. Bai and Perron (1998) multiple breakpoint test was employed to identify unknown structural breaks. A structural break is an unexpected change in the regression model's parameters over time, leading to the instability and unreliability of the model and forecast (Hansen, 2001).

Pesaran et al. (2001)'s bounds test mechanism to cointegration was applied to examine the proposed models' long-run associations. The bound test approach reduces the problem of serial correlation (Khan, Bibi, Lorenzo, et al., 2020). Engle and Granger (1987) and Johansen and Juselius (1990) approaches are incapable of adjusting the different level stationary variables; however, the bounds test can be applied to the variables stationary at I(0) and I(1) (Khan, Bibi, Lyu, et al., 2020). Thus, if $F > F^U$, cointegration between variables would exist. A general dynamic unrestricted error correction model (ECM) by simple linear transformation can be derived for the above equations. An ECM integrates the long-run equilibrium with short-run relationships without losing any information (Khan, Bibi, Ardito, et al., 2020). The bound test is mainly an examination of the coefficient on the following unrestricted error correction model (ECM) by executing the Wald test:

$$\Delta Yt = a0 + \sum_{i=1}^{n} a1i\Delta Yt - i + \sum_{i=1}^{n} a2i\Delta X1,\ \ t - i + \sum_{i=1}^{n} a3i\Delta X2,\ \ t - i + \ a4Yt - 1 + a5X1,\ \ t - 1 + a6X2, t\ - 1 \tag{9}$$

In Equation (9), Y represents the dependent variable and X independent variables, whereas Δ is the first difference. If the null hypothesis H0: a4=a5=a6 = 0 is rejected by the Wald test, a cointegration exists between the variables. The short-run and long-run elasticities for Equations (1)–(8) can be estimated by applying the following autoregressive distributed lag (ARDL) (p1, q1, q2) model:

$$Yt = b0 + \sum_{i=1}^{p1} b1i\ Yt - 1 + \sum_{1=0}^{q1} b2i\ X1,\ \ t - 1 + \sum_{i=0}^{q2} b3i\ X2,\ \ t - 1 \tag{10}$$

We applied the ARDL model on Equations (1)–(8) for estimating the long-run relationships between the variables by using the formulas in Equations (11) and (12).

$$a0 = \frac{bo}{1 - \sum_{i=1}^{Pt} b1,\ \ i} \tag{11}$$

$$aj = \frac{bm}{1 - \sum_{i=1}^{Pt} b1,\ \ i} \tag{12}$$

Where j = 1, 2, 3 … and m = 2, 3 … .

The general short-run dynamics for Equations (1)–(8) are given in Equations (13).

$$\Delta Yt = d0 + \sum_{i=1}^{n} a1i\,\Delta Yt - 1 + \sum_{i=1}^{n} a2i\,\Delta X1,\ t - 1 + \sum_{i=1}^{n} a3i\,\Delta X2,\ t - 1 + \sum_{i=1}^{n} a3ECTt - 1 + et \quad (13)$$

Several standard diagnostics tests such as normality test, heteroscedasticity test, and serial correlations test were applied for examining the model errors. Vector error correction (VAR) Granger causality test was applied to decide the causality direction (Khan, Bibi, Lorenzo, et al., 2020). Besides, we also used the Cholesky impulse response function to trace the effects of one shock in COVID-19 and exports on the employment trends in the various sectors of the leisure and hospitality industry in the US. The impulse response describes the system's response to an independent variable in a time-bound manner to explain the dependent variable's dynamic behaviour to the corresponding shock (Lütkepohl & Reimers, 1992).

3.2 Data collection

We have taken daily positive COVID-19 cases data from 1st February 2020 to 31st July 2020 from 'Worldometers' (Worldometers, 2020) and 'Covid Tracking Project' in the US (Covidtracking, 2020). The employment data for leisure and hospitality and its different sectors were taken from the U.S. Burea of Labor Statistics in monthly time series (Bureau of Labor Statistics, 2020). We transform the monthly data into daily time series by linear frequency transformation with the help of Eviews 9 (McKenzie & Takaoka, 2012; Vogelvang, 2005). We have taken daily export in US millions of dollars from the US Census Bureau (Bureau, 2020). The exports were used as a control variable. We have taken a natural log of all the variables for transformation to minimize the issue of stationarity. The descriptive statistics are summarized in Table 2, which shows that all the variables have negative correlations with covid-19; besides, Figure 1 exhibits the variation in the variables, Figure 1 shows that sudden changes occur in the variables over the time. The trends in the supplementary material Appendix A Figure 1 suggest that an increase in the COVID-19 is followed by a decrease in the employment tendency in the different sectors of the leisure and hospitality industry.

4. Results

We applied Augmented Dickey-Fuller (ADF), Phillips-Perron (PP), and the Zivot Andrew unit root tests to examine the variables' stationarity. Table 3 confirms that all the variables are stationary at I(0) or I(1) or both. Thus, satisfying the bound test assumption of variables integration at the level or first difference. However, literature trends suggest that the bounds test approach is sensitive to lag length structure (Khan, Bibi, Lorenzo, et al., 2020). Thus, we calculated lag length for each model by using VAR lag order selection criteria. The results show that the lag length criteria for all the models are '2' confirmed by various lag length criteria as given in supplementary material Appendix A, Table 4. Figure 1 indicates several breakpoints in each time-series data, hence, we applied Bai and Perron (1998) multiple breakpoints test with the sequential testing procedure with a maximum 5; the results are given in supplementary material Appendix A, Table 5. Dummy variables for each significant break were generated for every model as per the information of Table 5 breaks; each dummy variable was multiplied by the LH, AC, AG, AER, FDP, FS, MPH, and PAS to create the required interaction/ structural dummy variables. Thus, the prosposed eight models would be tested for cointegration to accommodate the possibility of structural breaks in cointegration relationship.

Bounds test were performed for model 1–8 with selected structural breakpoints dummy variables as fixed regressors to confirm cointegration between the variables as per specified lag length criteria. The results given in Table 4 suggest that the variables in all the assumed models are cointegrated as the calculated F-statistic values are greater than the tabulated critical bounds values.

Table 2. Descriptive statistics.

Variables/ statistic	LNLH	LNAC	LNAG	LNAER	LNFDP	LNFS	LNMPH	LNPAS	LNCOVID	LNEXPO
Mean	16.31	14.14	13.94	14.28	16.02	14.95	11.82	12.64	11.48	12.01
Median	16.32	14.07	13.96	14.25	16.05	14.95	11.74	12.49	13.93	12.00
Maximum	16.64	14.55	14.39	14.72	16.32	14.96	12.07	13.14	15.33	12.25
Minimum	15.96	13.88	13.53	13.95	15.64	14.93	11.71	12.46	2.08	11.86
Std. Dev.	0.19	0.21	0.27	0.25	0.18	0.01	0.13	0.25	4.46	0.11
Jarque-Bera	4.79	28.15	7.70	15.03	4.60	16.28	41.22	40.36	38.40	11.59
Probability	0.19	0.00	0.02	0.00	0.10	0.00	0.00	0.00	0.00	0.00
Correlation										
LNLH	1									
LNAC	0.892	1.000								
LNAG	0.991	0.932	1.000							
LNAER	0.971	0.973	0.990	1.000						
LNFDP	0.990	0.819	0.966	0.928	1.000					
LNFS	0.121	−0.321	0.017	−0.112	0.255	1.000				
LNMPH	0.800	0.975	0.845	0.912	0.711	−0.471	1.000			
LNPAS	0.778	0.966	0.823	0.895	0.686	−0.491	0.999	1.000		
LNCOVID	−0.687	−0.922	−0.736	−0.823	−0.586	0.576	−0.980	−0.985	1.000	
LNEXPO	0.935	0.880	0.947	0.936	0.910	−0.025	0.790	0.767	−0.682	1.000

4.1 Long-run dynamics

The results in Table 4 allows us to estimate the long-run relationship for all the assumed models 1-8. The estimated long-run relationships of the proposed models are given in Table 5. The estimated models show that overall, COVID-19 has a significant negative impact on the US's leisure and hospitality industry's different sectors except for the FS sector. However, the structural break dummies show varying impacts from negative to positive, indicating different sectors' resilience levels. The results also provide evidence that exports have a significant positive relationship with various LH industry sectors. Table 5 indicates that a 1% increase in the COVID-19 positive cases decreases employment in the overall LH industry by 2% in the long-run. The structural break1 recommends that COVID-19 was positively associated with LH's employment level in March; however, breaks 2 and 3 indicate a negative influence of COVID-19 on LH in April and May. The AC sector's long-run estimates suggest that a 1% increase in COVID-19 positive cases decreases employment level by 6.3%. Structural beak 1 (March, April, and to May 09) show negative impacts on AC. Structural break 3 also indicates a negative impact, however, break 4 (Mid April, May, and June) shows a positive influence on the employment level.

Moreover, Table 5 results reveal that a 1% increase in the COVID-19 positive cases decreases employment in the AG sector by 1.1%, structural breaks 1 and 2 show significant negative impacts. Besides, a rise of 1% in COVID-19 positive cases shows a loss of jobs in the AER sector by 3%, where break1 shows a negative impact on AER in March, however, break4 indicates significant

Table 3. Unit root results (ADF, PP, and Zivot Andrew Unit Root tests).

Tests	Augmented Dickey-Fuller (ADF) Test		Phillips-Perron (PP) Test		Zivot-Andrew Unit Root Test			
Variable/Level	I(0)	I(1)	I(0)	I(1)	Intercept	Breakpoint	Trend	Breakpoint
LNLH	−3.026[b]	−1.897[c]	−1.656[c]	−2.007[b]	−5.208[c]	3/01/2020	−4.704[b]	3/23/2020
LNAC	−2.900[b]	1.639[c]	−2.163[b]	−1.694[c]	−5.541[a]	3/01/2020	−4.689[b]	3/24/2020
LNAG	−2.642[c]	−1.854[c]	−1.755[c]	−2.026[b]	−4.960[b]	3/01/2020	−4.595[b]	3/24/2020
LNAER	−2.581[c]	−1.863[c]	−2.241[a]	−1.944[b]	−5.264[b]	3/01/2020	−4.795[a]	3/24/2020
LNFDP	−2.642[c]	1.953[c]	−1.076	−2.079[b]	−5.061[b]	3/01/2020	−4.608[b]	3/22/2020
LNFS	−1.843	−1.896[c]	1.189	−1.801[c]	−4.695[c]	4/01/2020	−3.125	5/23/2020
LNMHP	−2.685[c]	−1.645[c]	−3.578[a]	−1.659[c]	−7.022[a]	3/01/2020	−5.150[a]	3/24/2020
LNPAS	−2.425	−1.684[c]	−2.715[c]	−1.754[c]	−5.548[a]	3/01/2020	−4.927[a]	3/25/2020
LNExpo	−4.068[a]	−1.058	−4.068[a]	−1.058	−4.585	3/01/2020	−5.413[a]	3/25/2020
LNCovid−19	−3.887[a]	−4.389[a]	−3.625[a]	−8.466[a]	−7.910[a]	3/03/2020	−6.269[a]	3/23/2020

Note [a,b,c] shows statistical significance level at 1%, 5%, and 10%.

Table 4. Bounds test for cointegration results.

ARDL model	F-static	lags	Critical bounds value 1%	5%	10%
FLNLH(LNLH|LNCOVID, LNEXPO) + Fixed breaks	22.75[a]	1, 0, 0	5.15-6.36	3.79-4.85	3.17-4.14
FLNAC(LNAC|LNCOVID, LNEXPO) + Fixed breaks	6.23[a]	2, 2, 2	5.15-6.36	3.79-4.85	3.17-4.14
FLNAG(LNAG|LNCOVID, LNEXPO) + Fixed breaks	22.03[a]	1, 0, 0	5.15-6.36	3.79-4.85	3.17-4.14
FLNAER(LNAER|LNCOVID, LNEXPO) + Fixed breaks	12.42[a]	1, 0, 0	5.15-6.36	3.79-4.85	3.17-4.14
FLNFDP(LNFDP|LNCOVID, LNEXPO) + Fixed breaks	21.70[a]	1, 0, 0	5.15-6.36	3.79-4.85	3.17-4.14
FLNFS(LNFS|LNCOVID, LNEXPO) + Fixed breaks	13.25[a]	1, 0, 0	5.15-6.36	3.79-4.85	3.17-4.14
FLNMPH(LNMPH|LNCOVID, LNEXPO) + Fixed breaks	311.22[a]	1, 2, 1	5.15-6.36	3.79-4.85	3.17-4.14
FLNPAS(LNPAS|LNCOVID, LNEXPO) + Fixed breaks	13.98[a]	1, 0, 0	3.88-5.3	2.72-3.83	2.17-3.19

Note: All the models use the assumption of unrestricted constant. Furthermore, asterisks * represent cointegration at a 1% significance level.

positive impacts in April and May. There is a loss of 1.6% job in the FDP sector as the COVID-19 positive cases rise by 1%, break 1 has a negative influence, and break2 shows positive impacts. The FS sector results indicate employment losses of 0.32% by a 1% rise in the COVID-19 positive cases, whereas break1 indicates negative impacts from March to April 09, and break2 shows positive influence from the rest of April and May.

The MPH sector's long-run results reveal a loss of 7.8% jobs by a 1% rise in the COVID-19 positive cases, where break1 and 5 show a negative influence on MPH. The PAS indicates a loss of 4% by a 1% increase in COVID-19 positive cases, whereas break1 reveals a negative impact on PAS. However, a 1% decrease in exports is positively related to job loss in the LH industry by 72%, AG by 118%, AER by 81%, FDP by 76%, and PAS by 108% in the long-run.

We performed several diagnostics to examine whether the estimated models fulfil the linear regression assumptions. The diagnostics tests are reported in Tabel 7. The Jarque-Bera statistic indicates that all the models are not normally distributed. Heteroskedasticity Breush-Pagan-Godfrey test results show that our models possess heteroskedasticity problems, but they were expected because of outliers in our data set. The results of the Breusch–Godfrey Serial Correlation LM test approve that all the models are free of serial correlation issues. The literature trends reveal that normality and heteroscedasticity are desirable but not a requirement for time series analysis (Johnston, 1972; Pesaran et al., 2001). The stability diagnostic (CUSUM Square test) reveals that the models for LH, AC, AER, FDP, FS, and PAS are stable, however, the models for AG and MPH are found unstable. The F-statistics for all the models is significant at 5% with adjusted R^2 for LH 0.92, AC 0.99, AG 37.6, AER 0.85, FDP 0.91, FS 0.74, MPH 0.96 and PAS 0.73, hence, all models show a good fit. The error correction term (ECT) indicates the speed of adjustment and convergence from the short-run to the long-run (Pahlavani et al., 2005). The ECT results at the bottom of the short-run in Table 5 indicate that all ECTs are negative and significant. The ECTs suggest that a deviation in the long-run for LH, AC, AG, AER, FDP, FS, MPH, and PAS sector would be corrected in the future by 3.2%, 0.59%, 8.5%, 4.1%, 2.8%, 1.7%, and 4.3% respectively in one year.

4.2 Short-run dynamics

The short-run results are given in the middle of Table 5, indicating that a 1% increase in COVID-19 is positively associated with employment in the LH industry. Structural break1, which is consists of March, shows a significant negative influence on LH, whereas break2 and break3 indicate a positive impact on LH. Further, in the short-run, we failed to find any significant influence of COVID-19 on the AC sector; however, structural break1 and break3 reveal negative impacts on AC, and break2 and break3 show a positive influence on AC. A 1% increase in COVID-19 cases reveals a 0.1% decrease in the AG sector, whereas structural break1 and break2 show negative impacts on AG.

Moreover, a 1% increase in COVID-19 cases is positively related to the AER sector by 1.3%, FDP by 0.1%, FS by 0.03% with mix effects of different structural breaks. The results further indicate that a

Table 5. ARDL long-run and short-run dynamics and diagnostics.

Dependents	LNLH		LNAC		LNAG		LNAER		LNFDP		LNFS		LNMPH		LNPAS	
Independents	Coe	t-st	Coe	t-st	Coe	t-st	Coe	t-stat	Coe	t-st	Coe	t-st	Coe	t-st	Coe	t-st
Long-run estimates																
LNCOVID	−0.02[a]	−6.97	−0.063[a]	−5.95	−0.011[b]	−2.35	−0.03[a]	−9.23	−0.016[a]	−4.792	0.0032[a]	3.376	−0.078[a]	−4.74	−0.04[a]	−20.11
LNEXPO	0.72[a]	4.27	0.26	1.22	1.189[a]	6.71	0.816[a]	4.138	0.763[a]	3.893	–	–	−0.61[b]	−2.14	1.08[a]	587.4
Break1	0.04[a]	6.27	−0.033[a]	−3.44	−0.011[a]	−4.37	0.045[a]	5.339	0.050[a]	5.996	−0.001[a]	−3.396	−0.015[b]	−2.33	−0.02[a]	−4.37
Break2	−0.01[a]	−2.82	0.031[a]	3.08	−0.017[a]	−4.98	–	–	−0.012[a]	−2.605	0.003[a]	2.221	–	–	–	–
Break3	−0.01[b]	−2.17	−0.028[a]	−2.83	–	–	–	–	0.013[a]	2.828	–	–	–	–	–	–
Break4	–	–	0.028[a]	2.85	–	–	−0.010[b]	−2.06	–	–	–	–	–	–	–	–
Break5	–	–					–	–	–	–			−0.014[a]	−2.73		
Constant	7.95[a]	3.86	11.71[a]	4.63	–	–	4.859[a]	2.013	7.092[a]	2.954	15.51[a]	16.92	20.02[a]	5.55	–	–
Short−run estimates																
Δ LNCOVID	0.001[a]	6.29	–	–	−0.001[c]	−1.913	0.013[a]	5.45	0.001[a]	4.892	0.0003[a]	3.038	−0.003[a]	−5.06	−0.0015[a]	−5.96
Δ LNEXPO	−0.023[a]	−3.42	2.679[a]	43.35	0.101[a]	4.345	−0.034[a]	−3.03	−0.022[a]	−3.186	–	–	1.58[a]	37.48	0.046[a]	6.48
Δ Break1	−0.001[a]	−10.62	−0.0002[a]	−7.47	−0.001[a]	−3.501	−0.002[a]	−10.4	−0.002[a]	−10.68	−0.0001[a]	−2.499	−0.0003[a]	−4.06	−0.001[a]	−10.28
Δ Break2	0.0004[a]	2.84	0.0002[a]	5.31	−0.001[a]	−6.475	–	–	0.001[a]	2.63	0.0003[a]	11.125	–	–	–	–
Δ Break3	0.0003[b]	2.15	−0.0002[a]	−5.78	–	–	–	–	0.001[a]	2.86	−0.0001[a]	−3.051	–	–	–	–
Δ Break4	–	–	0.0002[a]	5.62	–	–	0.001[b]	2.38	–	–	–	–	–	–	–	–
Δ Break5	–	–					–	–	–	–			−0.0002[a]	−5.01		
ECT	−0.032[a]	−7.51	−0.0059[a]	−3.84	−0.085[b]	−6.023	−0.041[a]	−5.56	−0.028	−7.208	−0.0085[b]	−2.133	−0.017[a]	−3.39	−0.043[a]	−6.51
Diagnostic tests																
A	1.81(0.12)		0.019 (0.99)		0.044 (0.96)		1.11(0.35)		1.95 (0.103)		0.83(0.43)		1.51(0.16)		0.24(0.91)	
B	1.33(0.23)		2.90 (0.002)		16.45 (0.00)		1.91(0/ 06)		1.62(0.12)		11.56 (0.00)		23.71 (0.00)		9.6(0.00)	
C	64630 (0.00)		19418 (0.0)		87.79 (0.00)		19185 (0.0)		59811 (0.0)		160.55 (0.0)		67.79 (0.00)		3196 (0.00)	
AdJ R^2	0.92		0.99		0.376		0.85		0.91		0.74		0.96		0.73	
F−state	249.3 (0.00)		3369 (0.00)		16.52 (0.00)		130.9 (0.00)		234.79 (0.0)		72.81 (0.00)		461.78 (0.0)		748.5 (0.00)	
CUSUMSQ	Stable		Stable		Unstable		Stable		Stable		Stable		Unstable		Stable	

Note: Coe denotes coefficient, t-st represents t-statistic, A: Breusch-Godfrey Serial Correlation LM test; B: Heteroskedasticity ARCH test; C Jarque-Bera Stat (Probability); F-state show overall model fit. CUSUMSQ – the cumulative sum of square, Adj R^2- adjusted R^2, ECT – error correction term, where each break (break1 … ..break5) represent breakpoint dummy multiple by the dependent variable. Besides, a, b, c represent a significance level at 1%, 5%, and 10%, the – in the cell represents insignificant results, whereas a blank cell represents the value is not available.

positive increase in COVID-19 has a significant negative influence on the MPH and PAS sector in the short-run; besides, structural break1 reveals significant negative impacts on both sectors; however, break5 shows a negative influence on MPH. It is observed that an increase of 1% in the exports enhance employment level in AC, AG, MPH, and PAS sector, whereas, a significant negative relationship of export is found with LH, AER, and FDP in short-run.

4.3 Granger causality and impulse response function

We have performed a VAR Granger causality test to determine the causation direction. The results of Granger causality are given in Table 6. Besides, we conducted the impulse response analysis to observe and describe any dynamic system's reaction in response to an external shock. In supplementary material Appendix A, the impulse response of LH, AC, AG, AER, FDP, MHP, and PAS to COVID-19, EXPO, and different structural breaks at Cholesky one S.D. innovations response are given. The results indicate that the reaction of LH to COVID-19 from period to 3 shows a positive association, however, from period 4 onwards, LH reaction becomes negative. The impulse response of LH to structural break1 is entirely negative. The LH responds positively to break2 and 3 for one standard deviation shock. The LH responds positively to one standard deviation shock in break 4 and 5 more than break2 and 3. Besides, one standard deviation shock in exports brings a positive change in LH.

The AC sector's impulse response to COVID-19 indicates that AC's relationship remains positive from period 1 to mid of period 4. After the mid of period 4 a one standard deviation shock in COVID-19 brings negative changes in the AC sector. The AC reaction to break1 is entirely negative; besides, it is observed that one standard deviation shock in break2 and break3 bring positive changes in AC. The AC response becomes negative to shocks in break4. The impulse response of the AG sector to COVID-19 is observed positive in the first two periods; however, from period 3 onwards, each one standard deviation shock in COVID-19 brings negative changes in AG. AG's response to break1 and 3 is positive in the first two periods and continuously negative to break2. The reaction of AG to one standard deviation shock in break4 is found positive.

Moreover, it is observed that AER responds positively to one standard deviation shock in COVID-19 to period 4, but onward the 5th period, AER's reaction becomes negative. The response of AER to a shock in break1 is observed negative. The reaction to break2 becomes positive and negative to break3. However, the response slightly becomes positive to break4, and 5. The response of FDP to a shock in COVID-19 is found negative. The impulse response of FDP to break1 is found negative; besides, the reaction of FDP to one standard deviation shock in break2 becomes slightly positive to period 8, the positive response of FDP to a shock in break4 and break5 are more visible.

Furthermore, the FS sector response to a shock in COVID-19 is found negative. It is also observed that FS reaction to break1 is negative; however, FS responded positively to shock in break2. Besides, FS reaction to break3 becomes negative again, but the response becomes positive in case of break4.

Table 6. Granger causality.

Dependent (row)/ Independent		LNLH	LNAC	LNAG	LNAER	LNFDP	LNFS	LNMHP	LNPAS	LNCOVID	LNEXPO
LNCOVID	→	6.55[b]	7.64[b]	10.81[a]	11.24[a]	5.21[b]	1.301	18.91[a]	18.51[a]		
LNEXPO	→	7.45[b]	9.17[b]	12.12[a]	12.28[a]	6.25[b]	52.94[a]	17.46[a]	13.93[a]		
LNLH	→									10.61[a]	2.87
LNAC	→									16.59[a]	6.95[b]
LNAG	→									11.48[a]	8.94[a]
LNAER	→									13.54[a]	8.24[b]
LNFDP	→									9.21[a]	9.21[a]
LNFS	→									29.33[a]	241.2[a]
LNMHP	→									27.94[a]	10.92[a]
LNPAS	→									14.68[a]	12.29[a]

Note: [a,b] indicates a significance level at 1% and 5%.

The MPH sector reaction to COVID-19 is found negative, where MPH response to a shock in break1 and 2 is positive. It becomes negative to break3 and 4. The impulse response function of PAS reveals that one standard deviation shock in COVID-19 brings positive changes to period 3. The response becomes negative from period 4–10. PAS responds negatively to a shock in break1 and break3; besides, PAS reaction to break2 and break4 is found positive. Further, LH, AC, AG, AER, FDP, FS, MPH, and PAS response to one standard deviation shock in export is found positive in all 10 periods. Based on Granger causality, short-run, and long-run outcomes, we established the following causations.

- A bi-directional causal relationship has been found between COVID-19 and the variables of interest. Thus, COVID-19 causes LH, AC, AG, AER, FDP, MHP, PAS, and vice versa. Besides, the FS uni-directionally granger causes COVID-19
- A bi-directional causality of EXPO and the variables of interest are established. Thus, it is found that EXPO causes AC, AG, AER, FDP, FS, MHP, and PAS and vice versa. Besides, EXPO uni-directionally causes LH.

5. Discussion

The COVID-19 outbreak presents an ultimate test for the business world. The contagion and crippling effects of COVID-19 caused several restrictions and resulted in far-reaching influence on restaurants, casinos, museums, food and beverages, bars, hotel, and other leisure and hospitality-related businesses. This study aimed to examine the impacts of the COVID-19 pandemic on the employment trends in the US leisure and hospitality industry by sector. Besides, it attempted to assess each sector's resilience. The findings indicate that COVID-19 has significant negative impacts on the employment level in the overall US leisure and hospitality industry both in the long and short-run. For instance, at the peak (February, March, and April) of the pandemic, nearly nine out of ten hotels had layoff or furlough employees, which led to 7.5 million job losses in the leisure and hospitality industry (AHLA, 2020b).

The structural breaks in the long as well as in the short-run reveal that LH starts bouncing back though COVID-19 cases continued to increase. In long-run, LH shows resilience at structural break1 and stands negative in the rest of the breaks. The short-run findings hold that LH starts recovery in May, June, and July, demonstrating LH resilience. The recovery rate in long-run is about 4% and in the short-run at the end of April-May, stands at 0.03% and May-June for 0.04%. The small gain in employment during May is largely driven by the reopening of restaurants and bars (AHLA, 2020b). The impulse response function also indicates that the recovery process is minor during the second and third break, however, at break4 (May) and break5 (June-July), LH exhibits high resilience. First, the reasons for resilience are on 24 April US president signed and released $484 billion relief funding for US businesses affected by COVID-19, which includes $310 billion for Paycheck Protection Program. Second, US states begin easing lockdown restrictions. Alaska, Oklahoma, and Georgia begin to reopen their economies and lifted restrictions on restaurants, hotels, food and drinking place, and some other businesses on May 18 (Stephanie, 2020). Third, restaurants, hotels, food and drinking places adapted social distancing, untouched services, use of more sanitizer, focus on staff and customer safety; these efforts make 37% of LH business to bring half of their employee to work (Johnson, 2020). Thus, the US LH industry continues to recover day by day; however, the rate of recovery is slow.

The accommodation sector seems much vulnerable in the long-run to COVID-19 with a negative long-run coefficient of −6.3% compared to amusement and gambling, art and recreation, food and drinking places, and food services sectors. The lodging industry's high vulnerability in terms of unemployment was expected because of the huge volume of the US hotel industry and its importance. For instance, US hotel guests spend $548.8 billion annually, out of which $170.6 billion (31%) is spent on the lodging sector, while the remaining amount is spent on transportation (23%), food and beverage (19%), recreation (11%), gaming (8%), and other sectors (9%) (Bryan, 2020). Further, the US accommodation sector directly employs 2.3 million employees and generates $394.8 billion in salaries, wages, and other compensations (Bryan, 2020). However, the accommodation sector also shows resilience against COVID-19 both in the long and short-run. The structural breaks reveal that accommodation started recovery by the end of April and bounce back significantly in May and June. The Smith Travel Research (Str) suggests a 3.1% recovery on average over the month (Ed, 2020). Our long-run break2 coefficient recommends a resilence of 3.1% during May and 2.8% during June and July in terms of employment. It is worth noting that the recovery is taking place faster in the economy class than the luxury class. For instance, economy class hotels sold over half of their room (52.1%), middle class (47.7%), upper-middle-class (45.8%), upper class (39.2%), upper up class (27.8%), and luxury class (31.8%) till June 20 (Dan, 2020).

In comparison to accommodation, food and drinking places, art and recreation, museums and historical places, and performinging arts, the amusement and gambling sector reveals less vulnerability to the COVID-19 pandemic with a coefficient of −1.1% in the long-run, which indicates that amusement and gambling sector is more resilient than the others. Although we failed to observe any significant recovery in the long-run, the impulse response function's findings suggest that in the structural break1 to the amusement and gambling sector reveals a minor drop in the employment level in break2, which consists of March and mid-April, a significant decrease is observed. Besides, at structural breaks 3 and 4 amusement and gambling sector bounce back. The low level of employment drop in the amusement and gambling sector and its resilience is due to several reasons. First, the gaming industry rigorously implements innovative protocols that allow the vast majority of gaming properties to stay open or reopen besides prioritizes health and safety for the employees and customers to support communities where they operate and provide entertainment (Association, 2020). Second, although most of the casinos closed their doors in March, however, in the second quarter of 2020 reported an uptick in average demand despite operating with limited capacity, game availability, and amenities. Third, online gambling in the US has become the biggest benefactor during lockdowns across the country and grow during COVID-19 (Thorson, 2020). Fourth, 85% of casinos are open now and implemented strict health and safety plans approved by regulators resulting in revenue jumped nearly four times than previous months (Association, 2020).

The art and recreation sector's coefficient in relationship with COVID-19 in the long-run reveals the art and recreational sector higher vulnerability compared to the amusement and gambling, food and drinking places, and food services sectors. The results suggest that during the first months, although the art and recreation sector shows some resilience; however, as the pandemic gets longer, we failed to find any sign of significant recovery. The impulse response function also reveals that the art and recreation sector's employment level remained low during break1 2, and 3, though we can observe some slight increase in employment in break4. Some sources have quoted that jobs in art and recreation further decline in May and begin to rebound in June, but demand for employment remained low (Worksystems, 2020). Though government and organizations are trying for the revival of the art and recreation sector and working for the survival of artists, for instance, United States Regional Arts Resilience Fund is created on June 12, 2020, to provide a lifeline to small size art and creative organizations and individuals (Washington, 2020). Besides, recreational amenities such as national parks are reopening with limited services and facilities, for instance, Great Canyon, Great Smoky Mountains, Yosemite National Park, and various others (Tate, 2020).

The food and drinking places sector seems less vulnerable than accommodation, art and recreation, museums and historical places, and performing arts sectors. Our findings reveal that the employment level in the food and drinking places sharply down from March to mid-April. However, from mid-April and May, the food and drinking places sector exhibited some level of resilience to COVID-19 by bouncing back to some extent. Further, the impulse response function indicates that although COVID-19 cases increased in June, the food and drinking places sector stays resilient. The sources reported that 68% of restaurants in the US are allowed to reopen dine-in services with limited seating capacity and sanitized tables, and fully disinfected restroom areas (Lucas, 2020). It is worth noting that fast food services and limited food and drinking places recover faster than full services restaurants (Lucas, 2020). The food services sector findings are unexpected because in the long-run it shows a positive long-run coefficient with COVID-19; however, the structural break2 suggests significant negative impacts of COVID-19 on the food services sector in March. As compared to other leisure and hospitality sectors, the food services sector shows high resilience to the COVID-19 pandemic. The sources reported that consumers spend a good sum of money on groceries, bread, meals from the takeaway, and other food items during the COVID-19 outbreak (Dworski, 2020).

Our findings recommend that the museums and historical places sector shows a higher vulnerability to COVID-19 as compared to the rest of the leisure and hospitality sectors. Besides, we failed to find any evidence of recovery in the long as well as in the short-run in the museums and historical places sector. At the end of April, state governments decree museums, galleries, and historical places can open the business with a 25% capacity; however, these institutions scramble to come up with plans to reopen that are safe for visitors, staff, volunteers amid the COVID-19 pandemic. For instance, the Dallas Museum of arts, Amon Carter Museum of American Art, and Kimbell Art Museum are some of the examples who announced in May that they would remain closed until the unknown date for preparing to safely reopen to staff, visitors, and volunteers (Allmon, 2020). Besides, few announced that fans could visit the museums' past May through a virtual tour (Allmon, 2020). The performing arts sector also reveals a low level of resilience as compared to amusement and recreation, food and drinking places, and amusement and gambling sectors to the pandemic. We do not find any evidence of resilience during the long-run, as well as in the short-run. The main reason for the low level of resilience is the requirement for social distancing, which curtails public performances and rehearsals. Second, most theatres, live musical companies, concerts, firms, orchestra, dancing, and opera performing companies announce closing until 2021 (Feldman, 2020). Third, the performing arts sector organizations are dependent on the ticket revenues, which has a devastating influence on employment level; for instance, Cirque du Soleil has laid off 95% of its employees (Cole, 2020). The performing arts sector is highly vulnerable due to its self-employment nature and dependence on ticket revenue. Further, the granger causalities between the maximum number of leisure and hospitality industry and COVID-19 reveals bi-directional causality. It confirms that COVID-19 influence these sectors and the reverse causality from the LH sectors to COVID-19 indicates that these sector one way or another also contributed to the increase in COVID-19 cases.

5.1 Implications, limitation, and future direction

5.1.1 Theoretical implications

This study demonstrates the impacts of the COVID-19 pandemic on employment trends in the different leisure and hospitality industry sectors and identified how each sector shows resilience to the outbreak. The findings contribute to disaster risk and resilience literature. The leisure and hospitality sectors' resilience is the related organizations' capability and capacity to assess the risk of doing business, adapt the new norms, and innovate to overcome the disaster (Brown et al., 2017). The risk management and disaster resilience for the leisure and hospitality industry is the reduction in risk through proactive and reactive strategies. Organizational resilience is the structural and physical capabilities to overcome the disaster and reinvent themselves (Brown et al., 2017). There are three basic components of organizational resilience comprised of adaption, survival, and innovation.

In terms of a holistic approach, our findings help to understand organizational psyche and resilience. For instance, accommodation, amusement and recreation, food and drinking places sectors exhibited high resilience, while museums and historical places, and performing arts sectors revealed a low resilience level. The US leisure and hospitality industry was found ill-prepared to combat the pandemic. The hotels, restaurants, bars, gaming and gambling, and food services adapt reactive strategies such as using disinfectants, untouched services, the distance between seating, hotel room disinfection, and the use of innovative technologies (apps, mini-programs) to show resilience to the outbreak. Drawing on resilience theory, the US leisure and hospitality industry requires to build adaptive capacities, enhance flexibility and self-efficacy, and focus on innovations to improve their resilience and business sustainability. Those who are unable to innovate due to a lack of resources can employ adaptive strategies to survive in the future. Besides, COVID-19 also offers opportunities to the leisure and hospitality organizations to innovate and provide a unique product to the market, which is more resilient to the outbreak.

5.1.2 Managerial implications

In light of our findings, the US leisure and hospitality industry is facing severe constraints and challenges, however, there is a need to revert these challenges to practical means to sustain business activities for survival by making adjustments to combat the pandemic through identifying practical strategies to renovative their businesses. It is recommended that managers in leisure and hospitality organizations should identify indicators that influence resilience. For instance, the food and beverage sector delivery system can be vital to making restaurants, cafes, and fast-food resilient. In the event of softening demand, the pressure will be on for revenue managers to maintain rates as pricing power shifts to the consumer.

The speedy recovery depends on leisure and hospitality organizations preparedness. We saw from the findings that museums and historical places, and peforming arts are ill-prepared for the outbreak and lack recovery plans. It is recommended to set up a government and industrial level recovery assistance fund for adequate recovery. Aggressive marketing campaigns are an essential step for initiating rapid recovery at the local, national, and regional levels. Discount prices with the message that you are safe with us may get back customers with no short-term gains. Discount prices may be a good strategy for a comeback, but the operators may find it difficult to continue for long. Hence, it is recommended rather than dropping the prices, and the operators should offer value addition, for instance, free meals, the package price, for example, buy two get one free.

Moreover, it is recommended that hotel managers should ensure good performance by taking safety and health measure for staff and customers, restraining necessary work hours for less important work such as laundry. The managers should reduce maintenance costs to survive during the outbreak. Restaurants and food services organizations should change their delivery system, for instance, developing web stores and free home delivery. The managers should introduce delivery apps for customers' convenience and manage their full-time and part-time staff's employment. Museums and historical places, and performing arts sectors are recommended to go online to engage the customer by virtual tours of museums and heritage places, to on-air previous such opera, orchestra, dances, and other performances to earn some money for survival. Restaurants managers should be innovative and creative to welcome customers by establishing social distancing through partitions between tables. Besides, they must focus on sanitation and cleaning practices and protocols and provide masks and gloves to employees for their health safety and customer satisfaction. Operators of the leisure and hospitality industry should take every innovative safety measure to provide a safe and enjoyable experience.

5.1.3 Limitations and future directions

Despite the relevant findings and implications proposed, some limitations must be acknowledged. Indeed, we have converted the leisure and hospitality monthly data to daily time series through linear frequency transformation due to the unavailability of real-time data, limiting the extent of our findings; however, our results reflect the industry estimate. Scholars can still use any other method such as Quadratic, Point, Denton, chow-lin, and Litterman frequency transformation method to convert the monthly data into a daily time series data. Furthermore, it may be possible that government agencies issue the real daily time series data in the future. We have used only a single variable as a control; scholars are suggested to use multiple control variables. Besides, it is recommended that a non-linear autoregressive distribution approach should be applied in future studies to know how the level of employment reacts to a positive and negative change in the COVID-19 variable.

6. Conclusion

In conclusion, the outbreak is a nightmare and has catastrophic impacts on the US leisure and hospitality industry as evident from our findings, which reveals that COVID-19 turned around every single stone of the mentioned industry. Although the circumstances and conditions are extremely terrible and hard to recover quickly from this health and economic tragedy. However, the evidence exhibits slow signs of recovery in the maximum number of leisure and hospitality sectors, which shows its resilience in front of the pandemic. Our findings reveal that at the beginning – February, March, and mid of April – the leisure and hospitality sector's employment level continuously shows a decrease. After the mid of April, with effective measures against COVID-19, the industry started reviving, and improvement can be seen day by day. Besides, some sectors such as museums and historical places and performing arts sectors are still passing through hard times but working on plans to safeguard staff and visitors for a reopening. We conclude the US leisure and hospitality industry would approximately take 3 and a half years for recovery or maybe to perform better than the previous; for instance, the accommodation sector recovery rate 3.1% in the long-run (3.1% in a month, $12 \times 3.1 = 37.2\%$ in a year, $3 \times 37.2 = 111.6\%$ in 3 years). The leisure and hospitality sectors are dependent and interlinked with each other; the performance of one influences another. Thus, we proposed that the US leisure and hospitality industry would take three and a half years for recovery in light of the recovering middle sectors.

Due to its niche nature, the leisure and hospitality industry is highly dependent on human resources and generally immune to outsourcing, and plays a key role in international trade. Given a critical role to the leisure and hospitality industry in job creation across the US, lawmakers at all levels should prioritize policies that pro-growth, pro-employment, and pro-connectivity. The leisure and hospitality industry managers must shift to maximum automation to minimize interactions and adopt strict health and safety measures to safeguard employees and consumers. Furthermore, new insurance policies, business models, and financial instruments should be developed to protect organizations and employees from such unknown future threats.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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References

AHLA. (2020a). *COVID-19 Devastating hotel industry, low to zero hotel revenue driving unprecedented job loss*. https://www.ahla.com/sites/default/files/FACT%20SHEET_COVID19%20Impact%20on%20Hotel%20Industry_4.22.20_updated.pdf

AHLA. (2020b). *State of the hotel industry analysis: Covid-19six months later*. A. H. L. Association. https://www.ahla.com/sites/default/files/State%20of%20the%20Industry.pdf

Allmon, S. (2020). *Dallas-Fort Worth museum fans will have to visit virtually past May 1*. Culturemap Dallas. Retrieved October 11, from https://dallas.culturemap.com/news/arts/04-28-20-dfw-museum-response-reopening-coronavirus/

Alonso, A. D., Kok, S. K., Bressan, A., O'Shea, M., Sakellarios, N., Koresis, A., Solis, M. A. B., & Santoni, L. J. (2020). COVID-19, aftermath, impacts, and hospitality firms: An international perspective. *International Journal of Hospitality Management*, *91*, 102654. https://doi.org/10.1016/j.ijhm.2020.102654

Araña, J. E., & León, C. J. (2008). The impact of terrorism on tourism demand. *Annals of Tourism Research*, *35*(2), 299–315. https://doi.org/10.1016/j.annals.2007.08.003

Association, A. G. (2020). *COVID-19 Causes 79% year-over-year drop in Q2 commercial casino gaming revenue: Record start to 2020 provides strong foundation for gaming's recovery*. CISION PR newswire. Retrieved October 1, from https://www.prnewswire.com/news-releases/covid-19-causes-79-year-over-year-drop-in-q2-commercial-casino-gaming-revenue-301111947.html

Bagnera, S. M., & Steinberg, M. (2020). Sanitized practices for human resources in a COVID-19 environment. *Boston Hospitality Review*. Retrieved October 1, 2020 from https://www.bu.edu/bhr/files/2020/04/Sanitized-Practices-for-Human-Resources-in-a-Covid-19-Environment-.pdf

Bai, J., & Perron, P. (1998). Estimating and testing linear models with multiple structural changes. *Econometrica*, 66 (1), 47–78. DOI: 10.2307/2998540

Bloom, D. E., & Cadarette, D. (2019). Infectious disease threats in the 21st century: Strengthening the global response. *Frontiers in Immunology*, *10*, 549. https://doi.org/10.3389/fimmu.2019.00549

Brown, N. A., Rovins, J. E., Feldmann-Jensen, S., Orchiston, C., & Johnston, D. (2017). Exploring disaster resilience within the hotel sector: A systematic review of literature. *International Journal of Disaster Risk Reduction*, *22*, 362–370. https://doi.org/10.1016/j.ijdrr.2017.02.005

Browne, A., St-Onge Ahmad, S., Beck, C. R., & Nguyen-Van-Tam, J. S. (2016). The roles of transportation and transportation hubs in the propagation of influenza and coronaviruses: A systematic review. *Journal of Travel Medicine*, *23* (1). https://doi.org/10.1093/jtm/tav002

Bryan, W. (2020). *The overall economic impact of the US hotel industry*. Hotel News Now. Retrieved October 5, from https://www.hotelnewsnow.com/Articles/298116/The-overall-economic-impact-of-the-US-hotel-industry

Bureau, U. C. (2020). *U.S. International trade data*. United States Census Bureau. Retrieved May 6, from https://www.census.gov/foreign-trade/data/index.html

Bureau of Labor Statistics, U. D. o. L. (2020). *Occupational Outlook Handbook, OOH Data Access and Republishing Information*. Bureau of Labor USA. Retrieved May 5, from https://www.bls.gov/ooh/about/ooh-developer-info.htm

Cheer, J. M. (2020). Human flourishing, tourism transformation and COVID-19: A conceptual touchstone. *Tourism Geographies*, *22*(3), 1–11. https://doi.org/10.1080/14616688.2020.1765016

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. https://doi.org/10.1016/S0278-4319(03)00041-0

Cole, B. (2020, March 20). Cirque du Soleil Lays off 95 Percent of Its Workforce after Coronavirus Forces Closure of All Its Shows Globally. *Newsweek*. https://www.newsweek.com/cirque-de-soleil-canada-coronavirus-staff-fired-1493386

Covidtracking. (2020). *Covid tracking project*. Retrieved 4 May, from https://covidtracking.com/about-project

Dan, K. (2020). *US occupancy increasing as COVID-19 cases reappear*. Hotel New Now. Retrieved October 5, from https://www.hotelnewsnow.com/articles/303282/US-occupancy-increasing-as-COVID-19-cases-reappear

Dickey, D. A., & Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association*, *74*(366a), 427–431. https://doi.org/10.1080/01621459.1979.10482531

Dodds, R., & Butler, R. (2019). *Overtourism: Issues, realities and solutions* (Vol. 1). De Gruyter Oldenbourg.

Dombey, O. (2004). The effects of SARS on the Chinese tourism industry. *Journal of Vacation Marketing*, *10*(1), 4–10. https://doi.org/10.1177/135676670301000101

Dworski, B. (2020). *U.S. Foodservice could lose $300 billion in* 2020. CPC Daily News. Retrieved October 9, from https://www.cspdailynews.com/foodservice/us-foodservice-could-lose-300-billion-2020

Ed, B. (2020). *STR: U.S. Hotel Demand up despite COVID-19 surge*. Asian Hospitality. Retrieved October 5, from https://www.asianhospitality.com/str-u-s-hotel-demand-up-despite-covid-19-surge/

Engle, R. F., & Granger, C. W. (1987). Co-integration and error correction: Representation, estimation, and testing. *Econometrica: Journal of the Econometric Society*, *55*(2), 251–276.

Feldman, A. (2020). *Broadway will officially stay dark until* 2021. Timeout. Retrieved October 12, from https://www.timeout.com/newyork/news/broadway-will-officially-stay-dark-until-2021

Filimonau, V., Derqui, B., & Matute, J. (2020). The COVID-19 pandemic and organisational commitment of senior hotel managers. *International Journal of Hospitality Management*, *91*, 102659. https://doi.org/10.1016/j.ijhm.2020.102659

Gössling, S., Scott, D., & Hall, C. M. (2020). Pandemics, tourism and global change: A rapid assessment of COVID-19. *Journal of Sustainable Tourism*, *29*(1), 1–20. https://doi.org/10.1080/09669582.2020.1758708

Hall, C. M. (2002). Travel safety, terrorism and the media: The significance of the issue-attention cycle. *Current Issues in Tourism*, *5*(5), 458–466. https://doi.org/10.1080/13683500208667935

Hall, C. M. (2006). Tourism, disease and global environmental change: The fourth transition? In Stefan Gössling & Michael C. Hall (Eds.), *Tourism and global environmental change* (pp. 173–193). Routledge.

Hall, C. M. (2019). Biological invasion, biosecurity, tourism, and globalisation. In Dallen J. Timothy (Eds.), *Handbook of globalisation and tourism* (pp. 114–125). Edward Elgar Publishing.

Hansen, B. E. (2001). The new econometrics of structural change: Dating breaks in US labour productivity. *Journal of Economic Perspectives*, *15*(4), 117–128. https://doi.org/10.1257/jep.15.4.117

Hao, F., Xiao, Q., & Chon, K. (2020). COVID-19 and China's hotel industry: Impacts, a disaster management framework, and post-pandemic agenda. *International Journal of Hospitality Management*, *90*, 102636. https://doi.org/10.1016/j.ijhm.2020.102636

Henderson, J. C., & Ng, A. (2004). Responding to crisis: Severe acute respiratory syndrome (SARS) and hotels in Singapore. *International Journal of Tourism Research*, *6*(6), 411–419. https://doi.org/10.1002/jtr.505

Herbane, B. (2019). Rethinking organizational resilience and strategic renewal in SMEs. *Entrepreneurship & Regional Development*, *31*(5-6), 476–495. https://doi.org/10.1080/08985626.2018.1541594

Jayawardena, C., Tew, P. J., Lu, Z., Tolomiczenko, G., & Gellatly, J. (2008). SARS: Lessons in strategic planning for hoteliers and destination marketers. *International Journal of Contemporary Hospitality Management*, *20*(3), 332–346. https://doi.org/10.1108/09596110810866145

Johansen, S., & Juselius, K. (1990). Maximum likelihood estimation and inference on cointegration—with applications to the demand for money. *Oxford Bulletin of Economics and Statistics*, *52*(2), 169–210. https://doi.org/10.1111/j.1468-0084.1990.mp52002003.x

Johnson, H. S. (2020, 29 July). Only 37% of hotels have brought back at least half of their employees. *eTurbo News (eTN)* https://www.eturbonews.com/577639/only-37-of-hotels-have-brought-back-at-least-half-of-their-employees/

Johnston, J. (1972). *Econometric Methods*. McGraw-Hill.

Karmin, C. (2020, 19 March). Marriott begins furloughing tens of thousands of employees. *Bangkok Post*. https://www.bangkokpost.com/business/1881850/marriott-begins-furloughing-tens-of-thousands-of-employees

Khan, A., Bibi, S., Ardito, L., Lyu, J., Hayat, H., & Arif, A. M. (2020). Revisiting the dynamics of tourism, economic growth, and Environmental Pollutants in the Emerging economies—sustainable tourism Policy implications. *Sustainability*, *12*(6), 2533. https://doi.org/10.3390/su12062533

Khan, A., Bibi, S., Lorenzo, A., Lyu, J., & Babar, Z. U. (2020). Tourism and development in developing economies: A Policy Implication Perspective. *Sustainability*, *12*(4), 1618. https://doi.org/10.3390/su12041618

Khan, A., Bibi, S., Lyu, J., Raza, A., Hayat, H., & Meo, M. S. (2020). Unraveling the Nexuses of tourism, terrorism, and well-Being: Evidence from Pakistan. *Journal of Hospitality & Tourism Research*, *XX*(X), 1–28. https://doi.org/10.1177/1096348020917742

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. https://doi.org/10.1057/palgrave.thr.6040013

Kosová, R., & Enz, C. A. (2012). The terrorist attacks of 9/11 and the financial crisis of 2008: The impact of external shocks on US hotel performance. *Cornell Hospitality Quarterly*, *53*(4), 308–325. https://doi.org/10.1177/1938965512457021

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

Lai, I. K. W., & Wong, J. W. C. (2020). Comparing crisis management practices in the hotel industry between initial and pandemic stages of COVID-19. *International Journal of Contemporary Hospitality Management*, *32*(10), 3135–3156. https://doi.org/10.1108/IJCHM-04-2020-0325

Lew, A. A. (2020). The global consciousness path to sustainable tourism: A perspective paper. *Tourism Review*.

Lucas, A. (2020). *3 charts that show the U.S. restaurant industry's coronavirus recovery*. CNBC. Retrieved July 10, from https://www.cnbc.com/2020/06/02/3-charts-that-show-the-us-restaurant-industrys-coronavirus-recovery.html

Lütkepohl, H., & Reimers, H.-E. (1992). Impulse response analysis of cointegrated systems. *Journal of Economic Dynamics and Control*, *16*(1), 53–78. https://doi.org/10.1016/0165-1889(92)90005-Y

Mao, C.-K., Ding, C. G., & Lee, H.-Y. (2010). Post-SARS tourist arrival recovery patterns: An analysis based on a catastrophe theory. *Tourism Management*, *31*(6), 855–861. https://doi.org/10.1016/j.tourman.2009.09.003

McCarthy, N. (2020). Report: COVID-19's Impact On The U.S. Travel Industry Expected To Be 9 Times Worse Than 9/11 [Infographic]. *Forbes*. https://www.forbes.com/sites/forbes-personal-shopper/2020/05/08/best-sales-right-now/#a0afc3b69c21

McKenzie, C., & Takaoka, S. (2012). EVIEWS 7.2. JSTOR.

Melián-Alzola, L., Fernández-Monroy, M., & Hidalgo-Peñate, M. (2020). Hotels in contexts of uncertainty: Measuring organisational resilience. *Tourism Management Perspectives*, *36*, 100747. https://doi.org/10.1016/j.tmp.2020.100747

Min, J. C. (2005). The effect of the SARS illness on tourism in Taiwan: An empirical study. *International Journal of Management*, *22*(3), 497.

Nhamo, G., Dube, K., & Chikodzi, D. (2020). Impacts and implications of COVID-19 on the global hotel industry and Airbnb. In *Counting the Cost of COVID-19 on the global tourism industry* (pp. 183–204). Springer. https://doi.org/10.1007/978-3-030-56231-1_8

Norris, F. H., Stevens, S. P., Pfefferbaum, B., Wyche, K. F., & Pfefferbaum, R. L. (2008). Community resilience as a metaphor, theory, set of capacities, and strategy for disaster readiness. *American Journal of Community Psychology*, *41*(1–2), 127–150. https://doi.org/10.1007/s10464-007-9156-6

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. https://doi.org/10.1016/j.annals.2018.03.006

Pahlavani, M., Wilson, E., & Worthington, A. C. (2005). Trade-GDP nexus in Iran: An application of the autoregressive distributed lag (ARDL) model.

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, *16*(3), 289–326. https://doi.org/10.1002/jae.616

Petersen, E., Wilson, M. E., Touch, S., McCloskey, B., Mwaba, P., Bates, M., Dar, O., Mattes, F., Kidd, M., & Ippolito, G. (2016). Rapid spread of Zika virus in the Americas-implications for public health preparedness for mass gatherings at the 2016 Brazil Olympic Games. *International Journal of Infectious Diseases*, *44*, 11–15. https://doi.org/10.1016/j.ijid.2016.02.001

Phillips, P. C., & Perron, P. (1988). Testing for a unit root in time series regression. *Biometrika*, *75*(2), 335–346. https://doi.org/10.1093/biomet/75.2.335

Pine, R., & McKercher, B. (2004). The impact of SARS on Hong Kong's tourism industry. *International Journal of Contemporary Hospitality Management*, *16*(2), 139–143. https://doi.org/10.1108/09596110410520034

Prideaux, B., Thompson, M., & Pabel, A. (2020). Lessons from COVID-19 can prepare global tourism for the economic transformation needed to combat climate change. *Tourism Geographies*, *22*(3), 1–12. https://doi.org/10.1080/14616688.2020.1762117

Rassy, D., & Smith, R. D. (2013). The economic impact of H1N1 on Mexico's tourist and pork sectors. *Health Economics*, *22*(7), 824–834. https://doi.org/10.1002/hec.2862

Riegler, P. (2020). Hilton to Close Most Hotels in Major Cities. *Frequent Business Traveler*. http://www.frequentbusinesstraveler.com/2020/03/hilton-to-close-most-hotels-in-major-cities/

Ruiz-Martin, C., López-Paredes, A., & Wainer, G. (2018). What we know and do not know about organizational resilience. *International Journal of Production Management and Engineering*, *6*(1), 11–28. https://doi.org/10.4995/ijpme.2018.7898

Stephanie, R. (2020). *Following COVID-19 developments, industry's response*. Hotel New Now. Retrieved October 16, 2020, from https://www.hotelnewsnow.com/Articles/300779/Following-COVID-19-developments-industrys-response

Tate, C. (2020, June). National parks are reopening from coronavirus closures. Here's what to know. *USA TODAY*. https://www.usatoday.com/story/travel/experience/america/national-parks/2020/06/02/national-parks-reopening-what-know-yellowstone-zion-more/5309391002/

Taylor Jr, S. (2020). The socially distant servicescape: An investigation of consumer preference's during the re-opening phase. *International Journal of Hospitality Management*, *91*, 102692. https://doi.org/10.1016/j.ijhm.2020.102692

Thorson, B. (2020). *How the US Online Gambling Industry Has Grown During the COVID-19 Crisis*. TMCnet. Retrieved October 12, from https://www.tmcnet.com/topics/articles/2020/08/12/446265-how-us-online-gambling-industry-has-grown-during.htm

Tiffany, M. (2015). *How tourism hotspots can bounce back after terrorist attacks*. World Economic Forum. Retrieved October 9 from https://www.weforum.org/agenda/2015/11/how-tourism-hotspots-can-bounce-back-after-terrorist-attacks/

Travel Association, U. S. (2019a). *Domestic Travel Market Report,* 2018 (https://www.ustravel.org/research/domestic-travel-market-report-2018

Travel Association, U. S. (2019b). *MADE IN AMERICA: Travel's Contribution to Workforce Development and Career Advancement*. https://www.ustravel.org/system/files/media_root/document/MadeInAmerica_Jobs_FINAL.pdf

Tribe, J. (2015). *The economics of recreation, leisure and tourism*. Routledge.

Viboud, C., & Simonsen, L. (2012). Global mortality of 2009 pandemic influenza A H1N1. *The Lancet Infectious Diseases*, *12*(9), 651–653. https://doi.org/10.1016/S1473-3099(12)70152-4

Vogelvang, B. (2005). *Econometrics: Theory and applications with Eviews*. Pearson Education.

Walsh, J. (2001). Despite predictions, industry's future remains uncertain. *Hotel & Motel Management*, *216*(18), 24–24.

Washington, L. (2020). *New Nationwide "United States Regional Arts Resilience Fund" to Give Arts Organizations a Critical Lifeline During Pandemic*. The Mellon Foundation. Retrieved September 5, from https://mellon.org/news-blog/articles/new-nationwide-united-states-regional-arts-resilience-fund-give-arts-organizations-critical-lifeline-during-pandemic/

Wilder-Smith, A. (2006). The severe acute respiratory syndrome: Impact on travel and tourism. *Travel Medicine and Infectious Disease*, *4*(2), 53–60. https://doi.org/10.1016/j.tmaid.2005.04.004

Worksystems. (2020). *Impact of COVID-19 on Arts, Entertainment, and Recreation Occupations* Worksystems. https://www.worksystems.org/research/impact-covid-19-arts-entertainment-and-recreation-occupations-updated-weekly

Worldometers. (2020). *Coronavirus cases*. Retrieved 4 May, from https://www.worldometers.info/coronavirus/country/us/

WTTC. (2003). SARS has a Massive Impact on Travel & Tourism in Affected Destinations (WTTC Reports).