Effect of Covid 19 Outbreak on Hospitality Sector Stock Prices of top two Asian Tourist Destination Countries: A Beta Stationarity Methodology

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ABSTRACT

The COVID-19 pandemic has brought about an unthought of catastrophe to all aspects of life and has halted social, political, economic, religious, academic, and all other activities. The hospitality sector is one of the worst affected. This novel study investigates whether the COVID-19 outbreak has significantly changed the hospitality stock index sensitivity of the top two Asian tourist destinations. Outcome states that the COVID-19 outbreak has adversely affected the hospitality sector's stock volatility. However, while two countries displayed a significant increase in riskiness, the beta of China remained stationary while that of Turkey was stationary. Also, a regressor trend in beta was observed for four of five countries. Finally, the study further brings out that information absorption due to the pandemic was triggered at different points of time for different countries. This study attempts to enquire into the nature of stationarity of beta of hospitality industry securities and also assess the extent of additional impact on the hospitality industry stocks because of the COVID-19 outbreak, if any.

Keywords: Covid-19; Hospitality; Volatility; Beta; Stationarity

INTRODUCTION

Humanity is facing an unprecedented health crisis. The COVID-19 pandemic, also known as the coronavirus pandemic, has staggered life, the economy, employment, education, and society like never before.

As tumbling stock markets indicate growing fears about the potential economic impact of the coronavirus, the IGM Forum at Chicago Booth invited its panel of leading economists in the US and Europe, which concluded that of all the industries, the hospitality industry is and will continue to remain the hardest hit (UNWTO, 2020). Amongst the initial steps for preventing the spread of viruses, apart from basic hygiene measures of sanitation and social distancing, another crucial step most countries have taken is a ban or restrictions on travel, both international and domestic.

As for research work on the hospitality, tourism, travel, and leisure industries, much work has already been done on the current state of affairs of these industries and the impact that they are facing due to lockdowns and restrictions (Hoque *et al.*, 2020; Zhanga, Hu & Ji, 2020; Chinazzi *et al.*, 2020a; Kasare, 2020).

However, we could not find any work on the impact of COVID-19 on the stocks' of the hospitality, tourism, travel, and leisure industries. Although the common belief is that due to the sudden slowdown/lockdown of the activities of the hospitality, tourism, travel, and leisure industries, their stocks are also witnessing a sharp decline in prices, there is no research to support this view. There is an urgent necessity for research to examine the impact of this pandemic and its handling mechanism on the financial performance of hospitality, tourism, travel, and leisure industry stocks. The magnitude of the known adverse impact on hospitality-related industries needs to be assessed and quantified on

the basis of stock market reactions since investors in hospitality, tourism, travel, and leisure stocks are an extremely important stakeholder in the hospitality industry and investor sentiment is a significant driver of stock markets (Verma & Soydemir, 2006). Given the current situation, a crucial question is what the extent of this impact has been and whether this impact has altered the fundamental nature or the degree of riskiness of the hospitality stocks.

Hospitality stocks are presumed to be riskier than other categories of stocks (Park, 2013). Owing to this, the extent of the fall in the prices of hospitality stocks is expected to be more than the extent of the fall in the prices of the overall market index. This observation is expected to hold true for any emergency, be it COVID-19 or any other crisis. However, if due to the outbreak of COVID-19, the riskiness of the tourism stocks changes (increases or decreases), then the change in prices of hospitality stocks would be significantly different than expected (higher or lower). An assessment of the impact of the COVID-19 pandemic on the hospitality industry is necessary to not only understand the nature and extent of the impact but also to gain key insights regarding the path to recovery.

The term "riskiness" mostly refers to market-related risk. The most common measure of this is the beta coefficient (Sharpe, 2018; Babcock, 1972; Jagannathan & Wang, 2002). Conceptually speaking, beta is a measure of the percentage price change of a stock or portfolio given a one per cent change in the market index (Levy, 1971). Beta is widely used in financial analysis and investment decision-making. Various empirical tests on the assessment of financial models and their applications to investment decisions rely to a significant extent on the stationarity of volatility measurements. Hence, the usefulness of such models depends largely on the realization of the stationarity of beta. Because if beta is non-stationary, then beta should be adjusted for its "regression tendencies" and for expected market trends to correctly reflect its non-stationary properties (Gooding & O'Malley, 1977).

An analysis of the existing literature on beta stationarity does not reveal any work focused on industry specific beta analysis. All of the research focuses on the beta of diversified portfolios and/or the beta of individual securities. The findings of this research work are essentially skewed towards the existence of strong evidence of stationarity of portfolio beta across different market phases (bear, bull, and neutral). Regarding the stationarity of beta of individual securities, there is mixed evidence. Another prominent finding is that the beta of high-risk and low-risk portfolios has a tendency to regress to their average value (s) with time.

Research objectives

The purpose of this study was to explore the multi-faceted effects that the coronavirus pandemic had and is having on various sectors of the economy. We have especially looked into the hospitality sector by focusing on the top two tourist destinations in Asia and assessing the stock price reactions in the hospitality industry of these two countries. We specifically assess whether there has been any significant change in the sensitivity (i.e., riskiness) of the hospitality, tourism, travel, and leisure stocks of the two Asian countries that are among the world's top international tourist destinations as a result of the COVID-19 outbreak.

However, instead of assessing the beta stationarity of individual hospitality stocks, we have assessed the beta stationarity of the hospitality index (which can be considered as a portfolio of hospitality stocks). We have chosen two Asian tourist destinations (on the basis of international tourist arrivals) in the world (World Tourism Organization, 2016), namely China and Turkey. Also, since the national stock exchanges of these countries have travel and tourism indices, that would be an appropriate basis of comparison with an overall market index. In addition, these two countries are within the top 20 worst affected countries due to the COVID-19 outbreak as per the total number of affected cases (Worldometer, 2020).

Research questions

This study has clearly investigated the impact of Covid-19 outbreak on the different aspects of living

and economy. It has also studied the sensitivity of hospitality, tourism, travel and leisure stock indices of the top two tourist destinations of Asia that are also the most affected by Covid-19 pandemic. Based on the above-mentioned scope, our paper tried to answer the following research questions:

• How the different sections of existence were affected due to Covid 19?

• Was the stationarity of the beta of the hospitality index for selected top two Asian tourist destination countries impacted due to Covid 19 pandemic?

• Were the time points of impact on hospitality stocks same across both the countries selected?

• Do any of the key events signalling Covid-19 outbreak lead to any structural breaks in the relationship between hospitality index and market index returns.

This study is expected to be exemplary in nature, since this work, to the best of our understanding, is a novel attempt in performing an enquiry into the nature of stationarity of beta of hospitality industry securities.

Effect of Covid-19 outbreak on the hospitality sector

A quick analysis of the movement in hospitality indices for 2020 of two top Asian tourist destination (China and Turkey), two top European destinations (Italy and Spain) and the most travelled USA it was observed that Turkey showed a 50% annualised growth while China registered a modest 2% annualised loss. United States registered the second lowest drop in returns i.e. -22% while the two European countries, Italy and Spain, listed significant drop in returns: -58% and -70% respectively. (See Table 1 below)

The relative rankings of these five countries regarding returns generated by the hospitality indices in 2019 had been a bit different compared to 2019. Although Turkey had been the top performing country (much like 2020), Italy was the second-best performing country followed by China, Spain and United States. (See Table 2 below)

Table 1: Annualized Returns of Hospitality and corresponding Broad-Based Market Indices for2020

SL No	Country	Continent	CAGR (Hospitality Index)	CAGR (Market Index)
1	Spain	Europe	-70%	-39%
2	United States	North America	-22%	-13%
3	China	Asia	-2%	3%
4	Italy	Europe	-58%	-31%
5	Turkey	Asia	50%	-9%

Source: https://www.investing.com/

Table 2: Annualized Returns of Hospitality and corresponding Broad-Based Market Indices for2019

SL No	Country	Continent	CAGR (Hospitality Index)	CAGR (Market Index)
1	Spain	Europe	18%	12%
2	United States	North America	16%	26%
3	China	Asia	20%	17%
4	Italy	Europe	25%	28%
5	Turkey	Asia	77%	31%

Source: https://www.investing.com/

From the perspective of returns generated by the hospitality indices, Asian countries were the least affected and European countries the worst affected due to the COVID-19 outbreak. We have studied the beta stationarity of hospitality stocks in the Asian countries (in terms of returns generated) during this period, in the expectation of deriving valuable insights regarding whether the extent of the impact of the COVID-19 outbreak was similar or different for the overall market vis-à-vis the hospitality industry for the Asian countries. Also, since the hospitality sector is perceived to be more volatile (i.e., high-risk investment), it will be interesting to observe whether the regression tendency in betas, as was evident in the studies for diversified portfolios, also holds true for hospitality stocks/portfolios during the period of study.

METHODOLOGY

Sample period considered

This study has been conducted for the period 1 January 2019 to 5 Jun 2020. The first nine months and next three months of calendar year 2019 has been regarded as base period and pre Covid-19 period respectively. Two trigger points regarding outbreak of Covid-19 have been considered:

- Reporting of Covid-19 by China to WHO China office and
- Declaration of Cobid-19 as a pandemic by WHO.

Accordingly, for performing the analysis, the overall time period of study has been divided into four distinct stages (See Table 3 below).

Stage	Time Period	Details
Stage 0	1 st Jan 2019 – 30 th Sep 2019	9 months period prior to Stage 1
Stage1	1 st Oct 2019 – 31 st Dec 2019	3 months period immediately prior to reporting of COVID-19 by China to WHO, China
Stage2	1 st Jan 2020 – 11 th Mar 2020	2.5 months period between China reporting to WHO and WHO declaring COVID-19 as a pandemic
Stage3	12 th Mar 2020 – 5 th Jun 2020	3 months period post WHO declaring COVID-19 as a pandemic

 Table 3: Sample Period and different Stages considered in the Study

Data sources and sample details

The United Nations World Tourism Organization compiles the World Tourism rankings as part of their World Tourism Barometer publication. Information regarding the hospitality index was found for 5 countries. The data for this was obtained from investing.in. Since the analysis had to be done in the context of COVID-19 incidence, it was also necessary to check the degree of impact of COVID-19 on these shortlisted countries. Information regarding the country-wise impact of COVID-19 was sourced from Worldometer (n.d.). The daily closing prices of the hospitality index and the broad-based market index were collected from Tables 4 and 5 below.

Table 4: Ranking of the shortlisted countries regarding International tourist arrivals and the impact of Covid-19 pandemic

		Tourism S	Statistics	Coronavirus Statistics			
SI No	Country	Rank (2018)	Rank (2017)	Rank (Total Cases)	Rank (Total Cases/1M Pop)	Rank (Total Death)	Rank (Total Death/1M Pop)
1	China	4	4	18	178	18d	134
2	Turkey	6	7	11	52	16	41

Data as on 7th June 2020.

Sources: https://www.worldometers.info/coronavirus/

Table 5: Country wise listing of the indices considered for analysis under this study

SI No	Country	Hospitality Index	Broad-Based Market Index	
1	China	FTSE China A 600 - Travel & Leisure	Shanghai Composite	
2	Italy	FTSE Italia All Share Travel & Leisure	FTSE Italia All Share	

Data as on 7 June 2020. Source: https://www.investing.com

The daily closing prices were used for calculating the daily returns for both the hospitality index and the broad-based market index. The formulae used for the same was as follows:

$$R_t = LN\left(\frac{P_t}{P_{t-1}}\right)$$

Where R_t = Returns of the index on trading day t

 P_t = Closing Price of the index on trading day t

 P_{t-1} = Closing Price of the index on the trading day prior to day t

The daily closing returns of the hospitality index and the broad-based market index were first checked for stationarity based on the following criteria:

- Augmented Dickey Fuller test
- Lag order: 16
- Criterion: AIC
- Equation type: Test without constant
- Test statistic: Tau

Note: The daily closing returns of the hospitality index and the broad-based market index were found to be stationary for all the countries studied.

Thereafter, closing returns for each day of the hospitality index were regressed on the broad-based market index with the OLS method (for the overall time period of study) to determine the linear relationship between these two variables. For this, the initial form of equation considered was as follows:

$$E(r)_{HI_t} = \alpha + \beta \times E(r)_{MI_t} + \varepsilon$$

Where $E(r)_{HI_t}$ = Expected daily returns of the hospitality index on trading day t

 α = Intercept i.e. Trend

 β = Beta of the hospitality index

 $E(r)_{MI_t}$ = Expected daily returns of the broad-based market index on trading day t

 $\epsilon = Error term$

The validity of the regression model, as derived above, was evaluated based on the following criteria:

- 1 No autocorrelation between the residuals
 - Breusch-Godfrey test for autocorrelation
 - Lag order: 5
 - Test statistic: LM
- 2 No heteroscedasticity of the residuals
 - Breusch-Pagan test for heteroscedasticity (robust variant)
 - Test statistic: LM

For validation of regression model, we did not consider the test for normality of residuals because of the following reasons:

- It has been empirically observed that data on stock returns seldom follow normal distribution
- The sample size was significantly large in size (more than 350 paired data points)
- The test for fixed variance of residuals was instead considered

If either of the above two criteria were not satisfied, then the regression model was modified by adding lagged regressors. The autocorrelation and partial autocorrelation plots of the daily closing returns of the hospitality index and the broad-based market index were considered for identifying the lags to be included in the model. The optimum regression model was determined on trial and error approach based on the statistical significance of the coefficients of the lagged regressors added to the model.

Once a valid regression model was determined, the model was rebuilt by removing all regressors (including intercept) whose coefficients were statistically not different than zero.

Then the beta stationarity of the hospitality index was evaluated based on the following criteria:

- Chow test for structural break
- Test statistic: F
- Structural break was studied at the beginning of each of stages 1, 2 and 3
 - a Stage1: 1st Oct 2019 or next available trading day
 - b Stage2: 2nd Jan 2020 or next available trading day
 - c Stage 3: 12th Mar 2020 or next available trading day

Absence of structural break in the overall data set meant stationarity of beta of the hospitality index thereby suggesting that spread of Covid-19 did not have any significant impact on the sensitivity of the hospitality index (and stocks) of that particular country.

On the contrary, presence of structural break indicated non stationarity of beta of the hospitality index which, as per the design of the study, could be attributed to the spread of Covid-19 in that particular country.

For countries, where beta was found to be non-stationary, we did a comparative analysis of the beta values for the pre and post Covid-19 incidence to assess the nature and extent of change in the sensitivity of the hospitality indices.

RESULTS

China

Summary Statistics:

Table 6: Summary statistics of the daily returns of the hospitality index and the broad-based market index for the overall time period of study (China)

	Mean	Median	Minimum	Maximum	SD	Correlation with Market
Market Index	0.050135	0.067411	-8.0391	5.4493	1.2429	1.0000
Hospitality Index	0.060422	0.058058	-10.498	5.2983	1.7308	0.8015

Interpretation:

• The hospitality index demonstrated higher volatility and higher returns compared to the broadbased market index.

• The average daily returns for the broad-based market index as well as the hospitality index were both positive.

• The daily returns of the hospitality index were strongly positively correlated with the daily returns of the broad-based market index.

FINDINGS

The finalized regression model was as follows:

$$E(r)_{FTL_t} = 1.11 \times E(r)_{SC_t} + \varepsilon$$

Where, $E(r)_{FTL_t}$ = Expected daily return of FTSE China A 600 - Travel & Leisure Index on trading day t

 $E(r)_{SC_t}$ = Expected daily return of Shanghai Composite Index on trading day t and

 $\varepsilon = \text{Error term}$

The Chow (1960) test revealed no structural break at beginning of any of the three stages. This was also validated when the finalized regression model was re-run using periodic dummy variables.

(See Figure 1 below)



2nd Jan 2019 to 5th Jun 2020

Figure 1: Time Series Plot of returns of Hospitality Index (Tourism) and broad-based Market Index (Market) - both actual and predicted values (China)

Interpretation:

- Beta was stationary for the overall time period of study.
- There was no significant change in the sensitivity of the hospitality index (vis-à-vis hospitality stocks) to market movements due to incidence of Covid-19.

Turkey

Summary Statistics:

	Mean	Median	Minimum	Maximum	SD	Correlation with Market
Market Index	0.060158	0.15242	-8.4160	5.8104	1.5422	1.0000
Hospitality Index	0.21150	0.36487	-15.746	8.0420	2.5215	0.6883

Table 7: Summary statistics of the daily returns of the hospitality index and the broad-based market index for the overall time period of study (Turkey).

Interpretation:

• The hospitality index demonstrated higher volatility and higher returns compared to the broad-based market index.

• The average daily returns for the broad-based market index as well as the hospitality index were both positive.

• The daily returns of the hospitality index were positively correlated with the daily returns of the broadbased market index.

Findings:

The finalized regression model was as follows:

$$E(r)_{BT_t} = 1.10 \times E(r)_{B100_t} + 0.12 \times E(r)_{BT_{t-1}} + 0.11 \times E(r)_{BT_{t-3}} + \epsilon$$

Where, $E(r)_{BT_t}$ = Expected daily return of BIST Tourism Index at time period t

 $E(r)_{B100_t}$ = Expected daily return of BIST 100 Index on trading day t

 $E(r)_{BT_{t-1}}$ = Expected daily return of BIST Tourism Index on trading day t-1

 $E(r)_{BT_{t-3}}$ = Expected daily return of BIST Tourism Index on trading day t-3 and

 $\varepsilon = \text{Error term}$

The Chow (1960) test revealed structural breaks at beginning of all the three stages. Based on statistical significance of coefficients of periodic dummy variables, Stage3 was identified to have a significant impact on the overall relationship.

Hence, the regression model for pre Covid-19 incidence was as follows:

$$E(r)_{BT_t} = 0.94 \times E(r)_{B100_t} + 0.08 \times E(r)_{BT_{t-1}} + \varepsilon$$

Where, time period considered was 8 Jan 2019 to 11 Mar 2020

In addition, the regression model for post Covid-19 incidence was as follows:

$$E(r)_{BT_t} = 1.52 \times E(r)_{B100_t} + 0.22 \times E(r)_{BT_{t-1}} + \varepsilon$$

Where, time period considered was 12 Mar 2020 to 5 Jun 2020



Figure 2: Time Series Plot of returns of Hospitality Index (Tourism) and broad-based Market Index (Market) – both actual and predicted values (Turkey).

Interpretation:

• Beta was not stationary for the overall time period of study.

• There was a structural break in the relationship between daily returns of the hospitality index and the broad-based market index after WHO declared COVID-19 as a pandemic.

• Post incidence of Covid-19, there was a significant rise (62%) in the beta value for the hospitality index thereby indicating increase in sensitivity of hospitality stocks to market movements.

Regressory trend of observed beta values

Irrespective of the fact, whether beta of the countries studied were stationary or not, the following two trends were strongly evident for beta of the hospitality indices of each country studied:

- Beta for both countries displayed an upward trend across all the four stages studied
- Beta for Turkey showed a regressory trend across all the four stages studied

(See Table 8 below)

Table 8: Beta of hospitality indices for each country over the total period studied and each individual stage

Country	Total Period	Stage 0	Stage 1	Stage 2	Stage 3
China	1.11626	1.04716	1.07539	1.12358	1.3845
Turkey	1.11638	0.54552	0.954493	1.75223	1.52055

Overall Analysis

Beta remained stationary for China. This signified that the drop in prices of the hospitality index and stocks for China was in line with the drop in prices for the overall securities market as triggered by Covid-19 pandemic outbreak.

However, there was a significant change in beta of the hospitality index for Turkey. For Turkey beta values increased significantly (62%) respectively. Further, for Turkey the declaration of the disease as a pandemic by WHO triggered a shift from the existing beta.

DISCUSSION

A study evaluated the distribution and stationarity of beta coefficients for 500 common stocks across bear, bull, and neutral market periods. The evidence indicated that beta was remarkably stationary for large portfolios, less stationary for smaller portfolios, and unpredictable for individual securities (Levy, 1971).

Another study demonstrated that estimated beta coefficients tend to regress towards the grand mean of all betas over time (Blume, 1975). Blume also demonstrated that though measurement error existed, it did not significantly influence the stationarity/non-stationarity nature of betas.

Gooding and Malley (1977) examined the stationarity of beta coefficients in up-markets, down-markets, and markets of negligible change. Their findings revealed that the betas for individual securities were higher during the two bull markets than they were during the two bear markets.

In the same year, in another study, Fabozzi and Francis (1977) assessed the stationarity of alpha and beta for individual stocks across both bull and bear markets by using dummy variables. Their findings revealed that neither alpha nor beta is significantly different between bear and bull markets.

In 1978, Bey re-assessed beta stationarity by using statistical techniques that addressed the

shortcomings of the techniques used in the previous studies. He commented that the time trending tests showed that the betas of the extremely low (high) risk portfolios became larger (smaller) over time.

Hsu in his 1984 paper showed shifts in market return and instability of the single-index beta coefficient. He concluded that stock market risk is evolutionary and not stationary.

Simon, Pagini, and Decourt (2002) performed correlation studies between 52-week betas and the following 52-week betas of selected Brazilian publicly traded companies and found little to no evidence of strong correlation, either for individual stocks or industry portfolios. They concluded that their evidence pointed to a very low level of stationarity in the beta coefficients of companies.

Dash and Sundarka (2015) tested the stationarity of beta for Automotive and Auto-Ancillary sector stocks in the Indian stock market using a univariate ANCOVA/General Linear Model. The results of their study supported the hypothesis of beta stationarity.

COVID-19 has severely impacted the global economy and becomes the most critical challenge for any country worldwide. Investors in the hospitality industry who wish to better deploy their assets should make predictions based on variations of the COVID-19 outbreak for better accuracy (Lee, Lee & Wu, 2021). So, it is seen that Coronavirus disease (COVID-19) has affected the economy and has caused increasing uncertainty in stock markets of China and Turkey. Therefore, knowledge of present beta stationarity methodology can enable policymakers to evaluate and implement effective policies to stabilize the stock markets and help investors to make appropriate investment strategies.

Limitations

In spite of a holistic research design, there are certain open areas that could not be addresses as part of the current research scope:

- In this study, only a linear relationship between the daily returns of hospitality index and the broadbased market index was considered.
- In addition, this study did not consider presence of any other economic event(s) that simultaneously affected the stationarity of beta of the hospitality industry for the time period studied.

CONCLUSION

From the perspective of returns, an interesting observation has been that tourism stocks of Asian countries had limited to no fall in prices in 2020. However, the results strongly indicate that Covid-19 outbreak has adversely affected the hospitality sector stocks volatility. Across the countries studied, this has either led to shifts in volatility (beta values trending upwards without change in beta stationarity) signifying temporary departures from existing volatility levels or change in volatility (change in beta stationarity with upward rise) signifying permanent departures from existing volatility levels. A higher beta may aid in generating higher returns and achieving faster recovery, but the investors' perception towards these stocks are bound to alter given the dynamics of change, which will influence demand and supply of this stocks that in turn will influence the recovery trend of these stocks. Needless to mention that would be an interesting area of further research.

The study also revealed that absorption of information regarding Covid-19 outbreak in the hospitality share prices was triggered at different points of time in different countries. No country experienced price adjustment on a priori basis; it was either announcement of Covid-19 cases by China or declaration of Covid-19 as a pandemic that triggered the price adjustments, with the second one being more pertinent as per the findings of the study.

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