How Pandemics Affect Tourism: International Evidence

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Coronavirus (COVID-19) outbreak, which began in Wuhan, China, has expanded to almost everywhere. World Health Organization declared this outbreak a global pandemic. The number of infections and deaths has increased rapidly. This has forced governments to implement several restrictions such as travel controls, school closures, limitations on internal movement to contain the spread in the country. The tourism industry will be the most affected, as there are travel bans (both external and internal) and border closures. UNWTO (2020) forecasts a decrease of 20% to 30% (300 to 450 US$ billion) in tourist arrivals (in international tourism receipts) in 2020. These numbers are likely to increase as the spread of coronavirus increases.

The World has experienced several diseases and the literature explores how they affect tourism. Zeng et al. (2005) consider SARS as a short-term crisis, which has significant effects on tourism in China. Blake et al. (2003) show that the foot and mouth disease decreases tourism expenditures in United Kingdom. Kuo et al. (2008) explore the effects of two diseases, namely Avian Flu and SARS (severe acute respiratory syndrome), on tourist arrivals in Asia. They show that tourist arrivals decreased significantly in SARS-affected countries but no effect was observed for Avian Flu-affected countries. Likewise, McAleer et al. (2010) analyze the impact of these two diseases and find that the effect of SARS is higher compared to Avian Flu in terms of tourist arrivals. Rosselló et al. (2017) focus on Malaria, Yellow Fever, Dengue, and Ebola, and examine their impact on tourist arrivals in affected countries. By using dummy variables, it is shown that those diseases cause a significant decline in tourist arrivals, more specifically, Malaria risk in a country leads to 47% fewer tourists to arrive.

In this study, we aim to examine how the pandemic measured by the newly developed index (Discussion about Pandemics Index) affects tourist arrivals. To our knowledge, we are the first to use this index which is continuous, comparable across countries, and can be used in panel data analysis. While the previous studies use dummy variables and the number of infected/death, we use a new version of the World Economic Uncertainty index (Ahir et al. 2020) modified to capture pandemic effect by calculating the percent of the words related to pandemic episodes in the Economist Intelligence Unit country reports. We find that pandemic decreases tourist arrivals. Moreover, this effect exists only for low-income economies.

International tourist arrivals and macro-economic variables are obtained from the World Bank. Our main variable of interest is the “Discussion about Pandemics Index (PI)” developed by Ahir et al. (2020). The index is developed by counting the number of times pandemic-related words are used in the Economist Intelligence Unit country reports, which are available until the first quarter of 2020. Based on the availability of existing macro-economic and tourist arrival data, the final sample is composed of 127 countries for the period of 2000-2018. This index
represents the percent of pandemic related words in those reports multiplied by 1,000. A higher
index value implies a higher discussion about pandemics and vice versa. The following
keywords are searched in the Economist Intelligence Unit reports: “Severe Acute Respiratory
Syndrome, SARS, Avian flu, H5N1, Swine flu, H1N1, Middle East respiratory syndrome, MERS
(Middle East respiratory syndrome), Bird flu, Ebola, Coronavirus, Covid-19, Influenza, H1V1,
World Health Organization, and WHO”. The index is comparable across countries and can be
used in a panel data format. We use the following demand model (Demir et al. 2019; Santana-
Gallego et al. 2020);

\[
\ln ITA_{i,t} = \beta_0 + \beta_1 P_{i,t} + \beta_2 GDP_{PC_{i,t}} + \beta_3 OPEN_{i,t} + \beta_4 EXCH_{i,t} + \lambda_t + u_{i,t}
\]  (1)

where \(\ln ITA_{i,t}\) is the natural logarithm of tourist arrivals; \(P_{i,t}\) is the Pandemic Index;
\(GDPPC_{i,t}\) is GDP (Gross Domestic Product) per capita; \(OPEN_{i,t}\) is the ratio of sum of exports &
imports to GDP; \(EXCH_{i,t}\) is domestic currency per $. Year fixed effects (\(\lambda_t\)) are included to control
for trends and common shocks to countries. We estimate Equation 1 by a panel fixed effects
 technique in order to absorb country time invariant characteristics (Santana-Gallego et al.
2020). Pandemic Index data is available quarterly, and we use the yearly average of quarterly
values, value at the fourth quartile, and weighted average of quarterly values in this study.
Moreover, we also examine the effect of pandemics on tourist arrivals for countries at different
income levels. Descriptive statistics along with variable definitions data sources are shown in
Table 1.

Table 2 shows that estimations for the impact of different measures of the pandemic index on
tourist arrivals. We find that all measures of pandemics (namely yearly average of four-quarter
values, the value in the fourth quartile, and the weighted average of four quarters) negatively
affect the tourist arrivals in the whole sample. Columns 4-6 represent the estimations according
to different income levels. The negative effect of the pandemic on tourist arrivals disappears
for emerging and advance economies, and it exists only for the case of low-income economies.
The previous pandemics in recent history were mostly regional and lead to fewer infections
and deaths compared to coronavirus. Therefore, the health system of advance and emerging
economies was easily able to cope with them. Moreover, there were no widespread travel bans
or implementation of curfews. However, the world has become more global so viruses spread
rapidly to the entire world. For the case of COVID-19, the number of deaths and infections is

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1 The index is made online on April, 4, 2020 and presented in the IMF as chart of the week.

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rising exponentially and countries are implementing travel bans, quarantines, and curfews. The health system of almost all countries are about to collapse and the aim is to flatten the COVID-19 curve. UNWTO (2020) argues that the effect of COVID-19 is like no other and therefore, the previous experiences provide limited evidence to predict the possible effects on tourism.

In terms of the control variables, GDP per capita is positively associated with tourist arrivals in all estimations. An increase in GDP per capita leads to a rise in tourist arrivals. In the whole sample, the exchange rate has a positive effect however; this effect is significant only for the case of emerging economies. Those findings are mostly in line with the previous studies (Demir et al. 2019). Trade openness has a positive effect on tourist arrivals for advanced and emerging economies while no effect is found for low-income economies.

Table 3 examines the lagged effect of pandemic on tourism. We do not find any lagged effect for the whole sample. However, further analysis of different income levels indicates that the lag effect matters for low-income economies. It takes one more year to mitigate the negative effects of diseases on tourist arrivals to low-income economies. As tourism receipts have a major role in low-income economies, it will take time to for those countries to economically recover from pandemics.

We document the negative effect of pandemics on tourist arrivals by using data for 127 countries for the period of 2000-2018. This effect is valid only for the case of low-income economies. The findings will provide insights for the possible effects of COVID-19 on the tourism industry. Once we consider the change in “Discussion about Pandemics Index” from 2019 to the first quarter of 2020, the model estimations suggest a tourist arrival decrease of 20% in the whole sample and 29% in low-income economies. This in line with the forecasts of UNWTO (2020). However, it should also be noted that the effect of COVID-19 is hard to predict, as the world has not experienced such a global pandemic before. As long as the travel bans and border closures remain, the negative effect will get higher.
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Table 1. Descriptive Statistics and Variable Definition

| Variables | Definition | Data Source | Mean | Standard Deviation | Min. | Max. |
|-----------|------------|-------------|------|--------------------|------|------|
| LnITA     | Number of Tourist Arrivals | World Bank, WDI | 14.41 | 1.89 | 7.97 | 18.31 |
| PI_Avr    | Discussion about Pandemics Index – yearly average | Ahir et al. (2020) (<https://worlduncertaintyindex.com/data/> | 3.49 | 19.42 | 0 | 438.98 |
| PI_Q4     | Discussion about Pandemics Index – Q4 value | Ahir et al. (2020) (<https://worlduncertaintyindex.com/data/> | 3.37 | 24.60 | 0 | 671.66 |
| PI_WAvr   | Discussion about Pandemics Index – weighted average value calculated as (Q1*1+Q2*2+Q3*3+Q4*4)/10 | Ahir et al. (2020) (<https://worlduncertaintyindex.com/data/> | 3.62 | 21.04 | 0 | 438.18 |
| LnGDPPC   | GDP per capita (constant 2010 US$) | World Bank, WDI | 8.37 | 1.56 | 5.27 | 11.43 |
| LnEXCH    | Exchange rate (Domestic currency per US$) | World Bank, WDI | 3.51 | 2.77 | -3.11 | 22.63 |
| LnOPEN    | The sum of exports and imports of goods and services measured as a share of gross domestic product. | World Bank, WDI | 4.27 | 0.60 | -1.787 | 6.093 |
|               | PI_Avr     | PI_Q4      | PI_WAvr     | Advanced Economies | Emerging Economies | Low-Income Economies |
|---------------|------------|------------|-------------|--------------------|--------------------|----------------------|
| PI_Avr        | -0.0014*** | -0.0010    | -0.0005     | -0.0020***         |                    |                      |
|               | (0.0005)   |            |             | (0.0007)           | (0.0013)           | (0.0006)             |
| PI_Q4         |            | -0.0011*** | -0.0014***  |                    |                    |                      |
|               |            |            | (0.0004)    |                    |                    |                      |
| PI_WAvr       |            |            | -0.0014***  |                    |                    |                      |
|               |            |            | (0.0004)    |                    |                    |                      |
| LnGDPPC       | 0.7920***  | 0.8004***  | 0.7932***   | 0.7925***          | 0.8509***          | 0.7204***            |
|               | (0.0726)   | (0.0724)   | (0.0725)    | (0.1595)           | (0.0977)           | (0.1410)             |
| LnEXCH        | 0.0754***  | 0.0758***  | 0.0755***   | 0.1490             | 0.2896***          | 0.0006               |
|               | (0.0127)   | (0.0127)   | (0.0127)    | (0.1074)           | (0.0265)           | (0.0177)             |
| LnOPEN        | 0.0162     | 0.0156     | 0.0162      | 0.5040***          | 0.1466*            | 0.0449               |
|               | (0.0305)   | (0.0305)   | (0.0305)    | (0.1038)           | (0.0774)           | (0.0421)             |
| Constant      | 6.9541***  | 6.8878***  | 6.9433***   | 4.7707***          | 5.8017***          | 7.0295***            |
|               | (0.5878)   | (0.5867)   | (0.5873)    | (1.6600)           | (0.9607)           | (0.9018)             |
| Within R²     | 0.54       | 0.54       | 0.54        | 0.74               | 0.60               | 0.52                 |
| Observations  | 2,056      | 2,056      | 2,056       | 315                | 997                | 774                  |

Notes: S.E. are in parenthesis. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.
Table 3. Lagged effect of pandemic on tourist arrivals

|               | LagPI_Avr | Advanced economies | Emerging Economies | Low-Income Economies |
|---------------|-----------|--------------------|--------------------|----------------------|
| LagPI_Avr     | -0.0007   | -0.0001            | -0.0004            | -0.0012*             |
|               | (0.0005)  | (0.0007)           | (0.0013)           | (0.0006)             |
| LnGDPPC       | 0.7087*** | 0.8020***          | 0.8054***          | 0.6050***            |
|               | (0.0769)  | (0.1724)           | (0.1028)           | (0.1542)             |
| LnEXCH        | 0.0593*** | 0.1995*            | 0.3087***          | -0.0027              |
|               | (0.0136)  | (0.1171)           | (0.0323)           | (0.0184)             |
| LnOPEN        | 0.0503    | 0.3917***          | 0.2094**           | 0.0739*              |
|               | (0.0309)  | (0.1117)           | (0.0821)           | (0.0424)             |
| Constant      | 7.5550*** | 5.0299***          | 5.9099***          | 7.7208***            |
|               | (0.6225)  | (1.8204)           | (1.0167)           | (0.9874)             |
| Within R²     | 0.52      | 0.74               | 0.58               | 0.49                 |
| Observations  | 1,948     | 296                | 946                | 706                  |

Notes: S.E. are in parenthesis. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.