The Role of International Migration, Domestic Migration, and Short-term Travel in the Timing of COVID-19's Arrival: Evidence from County-level Data in the United States

Hiroaki Matsuura
Shoin University/World Committee on Tourism Ethics of the UNWTO

The recent global pandemic of COVID-19 has hit the United States particularly hard, reaching 1,095,223 infections and 58,943 deaths spread across over 90 percent of all U.S. counties in the first three months. On April 22nd, President Trump signed a new executive order temporarily suspending all immigration and tourism to the United States in addition to earlier entry ban against people from and recently visited to China, Iran, Europe, the United Kingdom. The question remains over the role that immigration and tourism has played on the introduction and spread of COVID-19 and the effectiveness of these early Presidential proclamations to prevent infections across the country.

This paper examines the association between international migration, foreign-born populations, tourism-related expenditure and the timing of COVID-19's arrival across 3,142 counties in 50 U.S. states and the District of Columbia. Although COVID-19 was still in the process of spreading across the United States, it was already present in 90.1 percent of all counties as of May 1st. This provides sufficient variation for examining the role that international migration has had on the timing of COVID-19's arrival in different parts of the country. I employ the Cox proportional hazards regressions model to examine the association between the proportion of international migration, the foreign-born population, and the timing of COVID-19's arrival in each county, controlling for domestic migration and (short-term) travel expenditure.

Figure 1 shows the Kaplan-Meier curves of the introduction of COVID-19 into counties by quartiles for international in-migration (upper-left), the foreign-born population (upper-right), for the domestic cross-county in-migration (lower-left), and tourism-related expenditure (lower-right). From the figure, it is evident that COVID-19 arrived much earlier in the counties with a more international in-migration, foreign populations, domestic in-migration, and tourism-related expenditure.

Table 2 shows the result of the Cox hazards regression, explaining the number of days before COVID-19's arrival in each county as a function of pre-determined covariates. Our main variables of interest are: international in-migration, the foreign-born population, for the domestic cross-county in-migration, and tourism-related expenditure, but we also include unemployment rate, the proportion of people under 18 years of age, the proportion of people aged 65 years and over, total population, and land area in categorical variables, and state fixed effects.

The first column shows that the earlier arrival of COVID-19 was associated with the highest quartile of in-migration at the five percent level. Moreover, all quartile coefficient estimates for tourism-related expenditure are positive and significant at one percent level. Column 2 splits the in-migration into international and domestic in-migration. The earlier arrival of COVID-19 was now associated with both international in-migration and tourism-related expenditure, while it was not significantly associated with domestic cross-county in-migration.

The third column added the foreign-born population (stock measure) instead of international in-migration (flow measure) to the specification. Again, the top quartile for the foreign-born population is significantly associated with the early arrival of COVID-19.

Column 4 splits the foreign-born population into people born to countries restricted and not restricted on entry by earlier Presidential proclamations. The earlier arrival of COVID-19 was significantly associated with the top quartile of both variables. I also tested the equality of the coefficients of the proportion of people born to countries restricted and not restricted in the top quartile. The result shows no evidence that COVID-19 arrived in counties with a higher proportion of people born to these countries later than in counties with a higher proportion of those born to countries unaffected by entry restrictions. This indicates that such travel restrictions against migrants were not effective for the purpose of delaying the introduction of COVID-19.

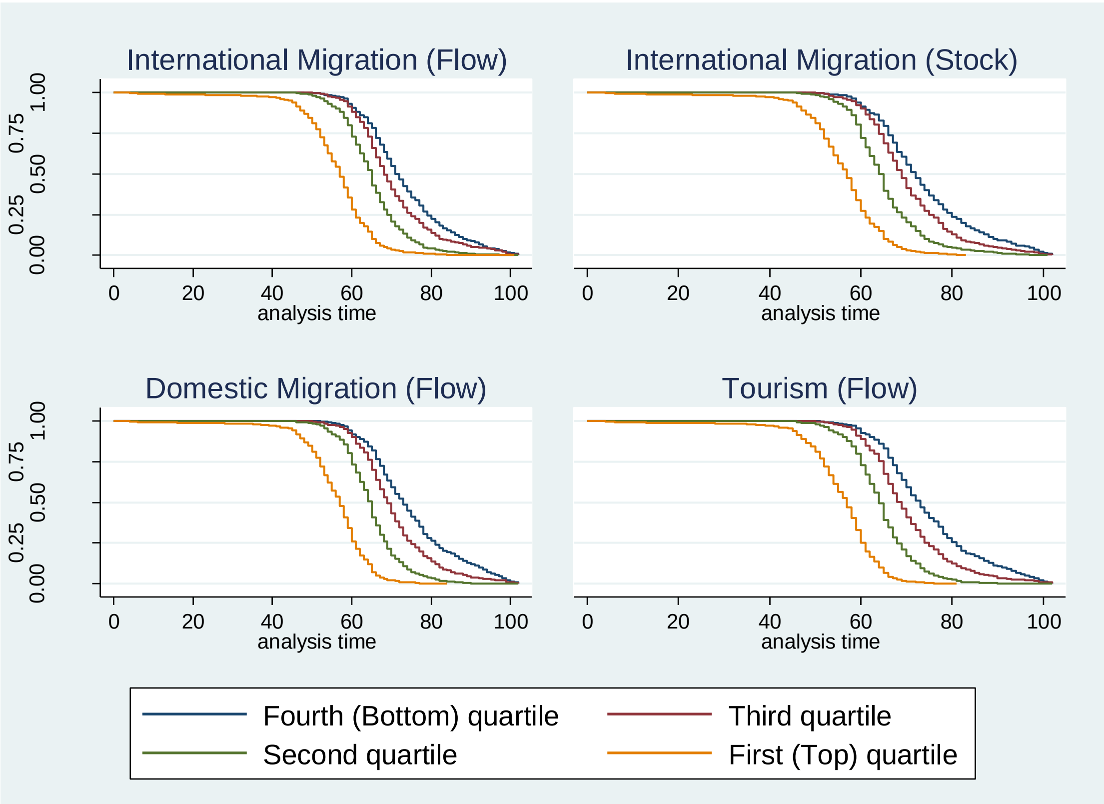
In addition to the analysis presented above, I further divided the restricted countries into individual countries. The result shows no evidence that COVID-19 arrived at counties with a more people born to countries where the U.S. entry ban was introduced earlier. The online appendix shows additional robustness checks and tests.

The results of this paper show that counties with more international migration, not domestic cross-county migration, experience an earlier COVID-19 arrival at the county level. It also shows that counties with more tourism-related expenditure are likely to experience an earlier arrival. There is no evidence to support the suggestion that earlier Presidential proclamations successfully delayed the arrival of COVID-19 in counties with migrants born to these countries.

There are several limitations to this analysis. First, the country of origin variable is based on self-described places of birth in response to questions in the American Community Survey. It is not necessarily the same as the actual place of birth, nor is it indicative of immigrant or citizenship status. Second, the pandemic is still ongoing after our sample period. Although our results are derived from 90.1 percent of all counties, another 9.9 percent may change the result of the analysis. Third, the analysis focused on the arrival of the COVID-19 infection, not the spread of the infection after the first case. It is likely that in-migration and short-term travel plays a major role in the introduction but not the spread of COVID-19. I leave this to future research after the pandemic is over. Fourth, our data of the arrival of COVID-19 was based on official reporting. It did not reflect the actual date that COVID-19 arrived in each county. Therefore, the gap between the actual date of arrival and the confirmed date can introduce biases to the analysis if this gap is associated with some of the pre-determined covariates in the specification.

Despite these limitations, the results of this paper lead to the paradoxical conclusion that, while more international migrants can potentially cause COVID-19 to arrive earlier, restrictions on entry are less likely to delay it. However, further research is needed to reconcile this paradox.

Figure 1. Arrival of COVID-19 by quartiles of international migration, domestic migration, and tourism



Data on COVID-19 comes from the COVID-19 real-time dashboard by John Hopkins University. The data on total value of tourism-related expenditure comes from the Economic Census 2017. Other data comes from the American Community Survey 2014-2018.

Table 2. Results of the Analysis of the Timing of COVID-19's Arrival

VARIABLES	1	2	3	4
Number of in-migration (both domestic and international) (Baseline: Bottom Quartile)				
Third Quartile	0.91 (0.772 - 1.073)			
Second Quartile	1.027 (0.802 - 1.316)			
Top Quartile	1.588** (1.114 - 2.262)			
Number of domestic in-migration (Baseline: Bottom Quartile)				
Third Quartile		0.891 (0.749 - 1.059)	0.905 (0.759 - 1.080)	0.917 (0.782 - 1.076)
Second Quartile		0.997 (0.792 - 1.256)	1.007 (0.808 - 1.256)	1.062 (0.875 - 1.289)
Top Quartile		1.18 (0.852 - 1.634)	1.256 (0.922 - 1.710)	1.185 (0.877 - 1.601)
Number of international in-migration (Baseline: Bottom Quartile)				
Third Quartile		1.04 (0.920 - 1.174)		
Second Quartile		1.045 (0.915 - 1.195)		
Top Quartile		1.457*** (1.208 - 1.757)		
Number of people born to foreign countries (Baseline: Bottom Quartile)				
Third Quartile			0.963 (0.848 - 1.095)	
Second Quartile			1.105 (0.914 - 1.335)	
Top Quartile			1.713*** (1.277 - 2.299)	
Number of people born to countries affected by earlier Presidential proclamations				
Third Quartile				1.101 (0.967 - 1.254)
Second Quartile				0.926 (0.802 - 1.070)
Top Quartile				1.289** (1.035 - 1.606)
Number of people born to countries NOT affected by earlier Presidential proclamations				
Third Quartile				0.913 (0.815 - 1.022)
Second Quartile				1.025 (0.859 - 1.222)
Top Quartile				1.495*** (1.114 - 2.005)
Total value of tourism-related expenditure				
Third Quartile	1.184*** (1.047 - 1.339)	1.182*** (1.046 - 1.335)	1.184*** (1.042 - 1.346)	1.180*** (1.042 - 1.338)
Second Quartile	1.462*** (1.193 - 1.791)	1.423*** (1.161 - 1.744)	1.415*** (1.133 - 1.767)	1.416*** (1.140 - 1.759)
Top Quartile	2.362*** (1.832 - 3.046)	2.216*** (1.680 - 2.924)	2.120*** (1.600 - 2.809)	2.070*** (1.573 - 2.722)
Control Variables	YES	YES	YES	YES
Observations	2,804	2,804	2,804	2,804
No. Clusters	51	51	51	51
Log-likelihood	-18978	-18972	-18960	-18947
Equivalence of coefficients between countries affected and not affected by earlier Presidential proclamations				
Top Quartile				0.64

Note: All specifications include unemployment rate, the proportion of people under 18 years of age, the proportion of people aged 65 years and over, total population, and land area in categorical variables, and state fixed effects. Standard errors are clustered at state level. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$. 95% confidence intervals are reported in parentheses.