

# Global Gateways: International Aviation in Metropolitan America

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## Findings

An analysis of international commercial air travel passenger levels within the United States' global aviation network reveals that:

- **International air travel in and out of the United States more than doubled between 1990 and 2011.** The growth in international passengers during the 21-year period was more than double the growth in domestic passengers and real GDP.
- **Since 2003, international air travel grew between the United States and every global region, with the strongest growth coming from emerging markets.** Four emerging economic regions—Middle East/North Africa, Developing Asia-Pacific, Sub-Saharan Africa, and Eastern Europe/Central Asia—experienced over 40 percent growth in both passengers and real GDP between 2003 and 2011. But the most passengers still moved between the United States and Western Europe or Latin America/Caribbean in 2003 and 2011.
- **Airports in the United States' 100 largest metropolitan areas are responsible for 96 percent of U.S. aviation passengers traveling internationally, with travel especially concentrated in a few critical gateways.** Just 17 metropolitan gateways captured 73 percent of all international passengers starting or ending their trip in the United States as well as 97 percent of all international transfer passengers. These 17 metropolitan gateways make international air travel possible for their own residents and businesses, plus for those in other United States metropolitan areas with limited international connections.
- **Critical groups of international metropolitan areas serve the same gateway function when connecting passengers to the United States—doubling as main launch point and transfer point for other metropolitan areas.** A group of just 200 international metropolitan areas are responsible for 93 percent of all air passenger travel to and from the United States. A subset of 20 metropolitan gateways redistributes 76 percent of all international passengers requiring an international transfer point.
- **The routes between United States and global gateways are the most structurally important parts of the United States' global aviation network, and corridors connecting to emerging economies are the fastest-growing.** The 500 most-traveled corridors tend to involve either a United States or international gateway, and those 500 corridors capture over half of all international travel. The majority of those 500 corridors travel to developed metropolitan economies, such as London or Toronto, but the fastest-growing corridors are to emerging metropolitan economies, such as Shanghai and Sao Paulo.

As metropolitan economies expand their global reach through trade and investment, international aviation plays a pivotal role: the movement of people across national borders. An important set of metropolitan gateways have become a major source of international passengers and the key facilitators of cross-border travel to other global markets, making these places especially vital within aviation's contribution to global trade. However, current federal and local investment policies do not reflect the travel concentrations in these places, nor do current regulations help maximize international passenger levels. To support global trade across all metropolitan markets, federal and local policies must refocus their support on the key metropolitan gateways.

“Analyzing international air travel will help policymakers better understand the potential to connect metropolitan markets and expand global trade.”

## I. Introduction

**A**cross the world, countries increasingly look to global trade to help fuel economic growth at home. Global merchandise trade reached \$18.3 trillion in 2011, and more than doubled in real terms over the prior decade.<sup>2</sup> Global services trade reached \$4.2 trillion in 2011, expanding by an even larger 179 percent between 2001 and 2011.<sup>3</sup>

The world's metropolitan economies power this growth in global trade. As aggregations of cities, suburbs, and surrounding rural land, metros house such assets as industrial clusters, innovative institutions, a well-educated workforce, and critical infrastructure assets.<sup>4</sup> Expanding global trade is no longer seen simply through the lens of national trade accounts and free trade agreements. Instead, the extent to which a metropolitan economy is globally engaged is equally vital to understanding future expansions.

A metro area's global status often stems from internal attributes, such as its number of residents, size of its regional economy, or number of multinational corporations.<sup>5</sup> Another essential feature is the flow of resources *between* metropolitan economies and the intercity linkages that facilitate such transactions.<sup>6</sup> Building relationships between places requires multiple resource types to flow between metropolitan trading partners. The exchange of money, goods, and people all play a vital role in creating dynamic metropolitan trade routes that traverse both natural and national boundaries.

International aviation is a key industry when it comes to the people side of global connectivity. Airlines transport over 1 billion passengers across international borders each year, enabling families to visit sites around the world and dispersed businesspeople to have face-to-face meetings.<sup>7</sup> Those same aviation routes also serve as an economic engine at home, generating tourism exports and supporting local industry.

This report addresses the relationships between U.S. metro areas and their international peers, using commercial aviation passenger data as the key indicator. Analyzing existing air traffic patterns among U.S. and international metropolitan areas, and the forces that facilitate and constrain their evolution, will help policymakers better understand the potential for international aviation to connect metropolitan markets and expand global trade.

The provided background clarifies how international aviation helps connect metropolitan areas to the 21<sup>st</sup> century global economy, and what factors influence aviation's local effects. After explaining the methodology, the report discusses trends at the national and regional scale. Next, it analyzes the specific metropolitan areas where travel occurs, both as single entities and through the corridors that connect them. The survey concludes with a discussion of the major implications and recommendations for growing metro economies through implementable reforms.

## II. Background

**W**e live in a global era—and the planet's metropolitan areas lead this interconnected growth. The world's 200 largest metropolitan economies account for just 14 percent of world population, but generated over 48 percent of global gross domestic product (GDP) in 2011.<sup>8</sup> These metro areas have emerged on every corner of the globe, from the largest economies within developed countries to the fast-growing metro areas in developing markets.<sup>9</sup> Taken in concert, the success of metropolitan economies throughout the developed and developing world suggest that the new global economy is much spikier and interconnected than originally thought.<sup>10</sup>

In this global era, U.S. metro areas must simultaneously collaborate with domestic and international peers. This is where aviation plays a critical role—it fosters the inter-metropolitan connections critical to future economic growth.

These connections cross both the physical and personal spheres. Metro areas such as New York and London are well connected through many domestic and global partners, which enhances their competitive advantage by offering their businesses greater access to global markets. Metro areas such as Miami or Seattle may have relatively fewer relationships, but nonetheless derive a competitive advantage as critical gateways to the South and West.<sup>11</sup> Lessons from Munich and its well-connected

airport hub further demonstrate the benefits from such connectivity.<sup>12</sup> International aviation puts people within reach of their overseas family, encourages tourism, and empowers businesses with the opportunity for face-to-face meetings.<sup>13</sup> The global aviation network also supports the rise of new immigrant gateways across the United States, forging even stronger economic and social connections to world regions.<sup>14</sup>

The key point is that while a metro area may have a wealth of human and economic capital, they cannot fully exploit those resources without strategic global linkages.

These aviation-related connections deliver real benefits to local economies.

Aviation's positive effect on local employment is a major economic benefit.<sup>15</sup> Metro areas that serve as destinations for large numbers of people are, implicitly, points of convergence for new ideas and capital. These places have the right mix of human capital and other resources to incubate new business ventures and to stimulate creativity. The net effect is an employment boost throughout local industries, from high-skill services that rely heavily on air travel to more stationary industries like manufacturing.<sup>16</sup> The economic effects of aviation are so wide-ranging that they hold potential for spillover effects that benefit other sectors and people.

That is not to say local economic effects are equal across all places. Airports specializing in through-traffic, like Atlanta, generate economic activity in sectors directly related to transportation, but these effects may not always spillover into the broader metro economy. In contrast, cities that serve primarily as destination points or freight hubs enjoy increased economic activity more broadly, experiencing job growth even in non-transportation sectors.<sup>17</sup> Metro areas with predominantly leisure-oriented flows see greater job growth in entertainment and recreation industries, while job growth in places with predominantly business-oriented flows comes from management and financial occupations.<sup>18</sup>

International aviation also directly boosts the U.S. economy by supporting travel and tourism since nearly all foreign visitors from outside North America enter the country via air. These visitors generated \$47 billion in real national output in 2011, an increase of 57.7 percent from 2003.<sup>19</sup> Overall, U.S. travel and tourism exports grew by 6.1 percent from 2009 to 2011, supported in large part by international visitors.<sup>20</sup>

Despite these benefits, certain market inefficiencies limit aviation's total economic impact.

One example is when a nonstop flight between two metro areas does not exist even though large numbers of passengers travel between them. Supply and demand mismatches introduce inefficiencies into the aviation system, forcing passengers to "fly where they don't want to go," such as the many international travelers that simply pass through Charlotte's Douglas International Airport.<sup>21</sup>

These systemic mismatches make certain metropolitan areas harder and costlier to reach, and could stifle their aviation-related economic growth. This may present relatively few challenges for U.S. businesses primarily operating in U.S. cities, where routes are some of the most time- and cost-efficient in the world.<sup>22</sup> But it is a bigger problem for U.S.-based businesses seeking to expand into South American or African markets, where cities may be more costly and time consuming to reach. Thus, the organization of international aviation service directly shapes U.S. businesses opportunities for global expansion and partnering.<sup>23</sup>

These less-connected metro areas may also suffer from the operational design flaw in international aviation network's hub-and-spoke structure. The daily operation of the global air network involves a high-stakes tradeoff between resilience and vulnerability. A hub-and-spoke route structure is highly resilient to the closure of any of the many spoke airports, which has little effect on the overall movement of passengers. However, the route structure is highly vulnerable to the closure of a hub, which can have catastrophic consequences on passenger movement that ripple throughout the system. Since the greater share of all aviation delays occur in hubs—which also have the most international connections—these become primary sites for potential operational difficulties.<sup>24</sup>

The reliance of aviation-related employment gains on external market forces is another market impediment. While aviation can serve as a direct and indirect engine for job growth, such growth appears to occur only during—or possibly just before—periods of national economic growth. During national economic contraction, however, metro areas with high volumes of airline traffic can actually experience job losses. Thus, while aviation is critical for cities economic health, it is not a panacea.<sup>25</sup>

Additionally, federal capital programs do not reflect the needs of modern navigational facilities that could increase efficiency. Without adequate capital inventories, U.S. metro areas cannot take

advantage of the extra distance and capacity offered by manufacturers' current and upcoming aircraft, nor the satellite technologies that allow travel in nearly all weather and expand capacity in current airspaces. As discussed later, the NextGen advanced navigational system has the potential to enable the aviation network to reach peak logistical or environmental efficiency.<sup>26</sup>

U.S. metropolitan economies also operate within an inconsistent legal system. The United States negotiates so-called "Open Skies" agreements with other countries, opening up each party's borders to the other's airlines in certain capacities. Research shows these agreements deliver benefits to consumers, typically through lower airfare.<sup>27</sup> However, each agreement is different and the United States does not have agreements with all countries, so consumers continue to miss out on optimal prices. The United States also restricts domestic routing for foreign-owned airlines, which further limits supply and may curtail consumer benefits. There are similar concerns surrounding the recent rise in formal airline alliances, which offer certain customer benefits like shared award programs but may limit routing competition.<sup>28</sup> Finally, inconsistencies across countries in the U.S. travel visa system create additional hurdles for tourists and businesspeople and possibly dissuade travel to America.

Nevertheless, it is clear that aviation remains important for U.S. metropolitan economies in an age of globalization. However, little is known about the actual flows of people between U.S. metropolitan areas and their international peers, or how much international passenger growth directly fuels metropolitan economic growth.

### III. Methodology

Relying on data provided by Sabre Inc. and the U.S. Department of Transportation's Bureau of Transportation Statistics (BTS), we analyzed metropolitan-level passenger air travel between the United States and other countries. The report primarily reflects data from 2003 and 2011, but does extend the analysis at times to all data from 1990 onwards.

#### Databases

Two separate databases generated the international aviation statistics discussed in this report. The databases are distinct and should not be compared to one another.

The primary database is the global demand dataset (GDD) produced by Sabre.<sup>29</sup> The dataset includes a record for every international itinerary entering and leaving the United States. Each record includes the origin and destination airports, plus up to three connecting airports if necessary. The records also include the total number of passengers traveling under that particular itinerary. Sabre's GDD dataset includes various chronological aggregations—in this case, we selected 2003 and 2011 due to those years' macroeconomic similarities and shared upward trajectories in airline business. We do not include monthly data.

The power behind the GDD dataset is the ability to track entire itineraries. Since international travel tends to funnel between specific airports specializing in long-distance travel—such as Los Angeles International Airport or London Heathrow Airport—tracking entire itineraries enables an analysis beyond these major gateways. As such, the GDD goes beyond the segment and flight-number restrictions of the BTS monthly Air Carrier Statistics database, also known as the T-100.

The GDD also includes approximations for all international markets, irrespective of airline. While Sabre does direct business with over 400 global airlines, their bookings database does not reflect all international itineraries that travel to and from the United States. To compensate for those additional itineraries, the GDD uses formulas to estimate complete passenger levels and itineraries based on additional market data. This creates a complete dataset of travel into and out of the United States. As such, the GDD goes beyond the domestic carrier restrictions and sample size of the BTS DB1B dataset.

The BTS T-100 dataset is also employed to assess certain national-level statistics. In particular, it uses the T-100 Segment dataset, which includes all passenger counts on flights into and out of the United States for a given month. The data tracks back to 1990, enabling us to compare international aviation to domestic aviation and other economic indicators. At no times is the Segment dataset used at the metropolitan scale.

### **Spatial Data and Geographic Scope**

This report relies on a metropolitan analysis of aviation, foregoing the typical focus on specific airports. Generating metropolitan passenger levels required an aggregation of every airport's passenger levels up to its particular metropolitan location. The analysis does not exclude any airports, irrespective of service type or annual passenger loads.

Creating those aggregations required two different geographic processes. For the U.S. portion, the standard metropolitan definitions created by the U.S. Office of Management and Budget are used. Those metropolitan areas were then ranked according to their population counts from the 2010 decennial U.S. Census. We focus on the 100 largest metropolitan areas, of which all but five include a regular commercial service airport that contributed to international itineraries in either 2003 or 2011.<sup>30</sup>

Defining the international metropolitan areas required a multistep production process. First, the standard European and Canadian metropolitan geographies were used to create aggregations in those two regional locations.<sup>31</sup> Next, a 20-mile radius was drawn around 206 of the other largest international metropolitan areas, as measured by economic output, creating an approximation of metropolitan geography in those places.<sup>32</sup> These buffers were then manually scanned for inappropriate or missing airport aggregations, such as assigning Incheon International Airport to metropolitan Seoul. Finally, all remaining airports were assigned to their listed city according to a separate airport dataset. A geographic proximity test confirmed these airports were not within 40 miles of one another.

Passenger movements are analyzed based on national and world region borders, including aggregations of international metropolitan areas up to their corresponding country and region. The national borders correspond to the most current World Bank international geographic definitions at the time of publication, although the exact names are sometimes slightly different.<sup>33</sup> Any multinational metropolitan area is assigned to the country of the largest urban cluster, such as Austria for the Vienna-Bratislava metropolitan area. The world regions also correspond to World Bank standards, with some slight modifications.<sup>34</sup> First South Asia and East Asia and Pacific are combined into two new regions according to each country's development status based on World Bank income standards.<sup>35</sup> Due to this distinction, three places and their metro areas are assigned to the Developed Asia-Pacific region—Hong Kong, Macao SAR, and Taiwan. Second, the World Bank region of 'Europe and Central Asia' is redefined as Eastern Europe/Central Asia, assigning the other European countries to Western Europe.

Since this report focuses on international travel into and out of the United States, all U.S. territories as domestic locations are included. This is especially noteworthy for Puerto Rico and Guam, which move the largest passengers among U.S. territories. All travel between these territories and the 50 states or the District of Columbia is considered domestic travel. Along the same lines, a flight from a territory to an international location, like Puerto Rico to Antigua, is counted as international.

### **Terminology**

**International Travel:** All passengers traveling internationally by air, whether those itineraries start or end in the country being analyzed. For example, measuring all United States travel involves counting all passengers that start or end their trip in the United States. When assessing other countries, it means counting all passengers that start or end that trip in that country and do the opposite in the United States. In other words, this does not count all international travel for all countries—only the travel in and out of the United States.

**Gateway:** Any metropolitan area that moves at least 1 percent of all United States or internationally based through-travel. Through-travel means that the travel itinerary did not start or end in the particular metropolitan gateway, but the gateway served as the point of entrance or departure from either the United States or other world region. For example, a trip from Sarasota-Bradenton International Airport to Barcelona International Airport through Washington Dulles International Airport would count Washington as the U.S. gateway. The same origin-destination trip that replaced Washington Dulles with Toronto's Pearson International Airport would count Toronto as the international gateway.

**Corridor:** The total travel between any two metropolitan areas. Any corridor includes travel moving in both directions between a metropolitan pair. Any exceptions related to through-traffic are explicitly noted.

**IV. Findings**

**A. International air travel in and out of the United States more than doubled between 1990 and 2011**

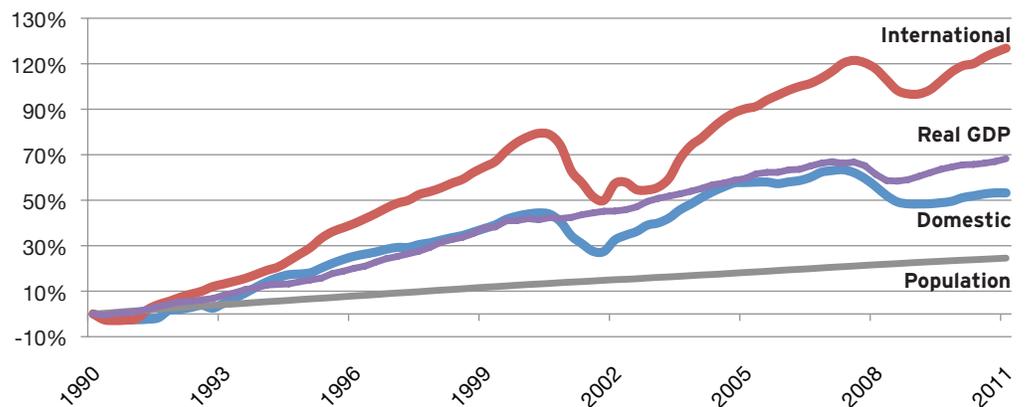
Between 1990 and 2011, the number of international passengers either entering or leaving the United States more than doubled—from 75.5 million passengers in 1990 to 163.7 million passengers in 2011. That rate was more than two-times the growth rate in domestic passengers, and far exceeded the country’s 24.5 percent population growth. The rapid growth in international passengers helped increase the international share of all commercial aviation passengers from 15.3 percent in 1990 to 20.4 percent in 2011.

The Great Recession affected commercial aviation along with most other industries, leading to a nearly 10 percent drop in passenger levels after 2008. This was the largest drop since the aviation-related declines after 9/11. But since the beginning of 2010, international aviation staged a major rebound—recapturing all of its passenger losses and setting record highs through the end of 2011. In contrast, the number of domestic passengers remains at late 2004 levels.

International passenger growth also outpaced real GDP growth by over two times since 1990. Figure 1 shows how domestic aviation holds much closer to the domestic GDP trend line, a trend similar to that of miles driven in the United States. International aviation’s ability to surpass GDP growth visualizes how aviation accounts not just for economic production at home, but also economic growth abroad. In this case, the emergence of new economic engines in Eastern Asia and Latin America helped attract greater connectivity with, and support for, economic activity in the United States.

Interestingly, the growth in international air travel coincides with passenger fare increases. Based on two separate government price indexes, international airfares grew by over 40 percent in inflation-adjusted terms between 1995 and 2011. This deviates considerably from domestic aviation, where the average fare actually *dropped* from an inflation-adjusted \$292 in 1995 to \$248 in 2011.<sup>36</sup> As world regions continue to deliberate aviation-related carbon fees, including international disputes of the European Union’s inclusion of commercial aviation in their Emissions Trading System (EU ETS), it is paramount to consider how price increases related to new carbon fees could impact international aviation demand.<sup>37</sup>

**Figure 1. Growth Since 1990, Domestic Passengers, International Passengers, Population, and Real GDP, 1990-2011**



Source: Brookings analysis of T-100 Market, Census, and Moody’s Analytics data

**B. Since 2003, international air travel grew between the United States and every global region, with the strongest growth coming from emerging markets.**

Between 2003 and 2011, international air travel to and from the United States increased to every single world region. Rapidly developing regions—Middle East/North Africa, Developing Asia-Pacific, Sub-Saharan Africa, and Eastern Europe/Central Asia—led this travel boom. The passenger growth to each exceeded 40 percent, which is similar to the over 40 percent real GDP growth those regions experienced during the same time period (Table 1).

However, the rate of growth is not the same as total travel counts. Latin America/Caribbean and Western Europe hosted the majority of U.S. international travel in both 2003 and 2011. A third of U.S. international travel connected to the former, with most of that travel headed to Mexico and the Caribbean. These large regional totals reflect the outsized number of Americans that fly to these locations (11.6 million in 2011), typically for leisure and/or family purposes, versus the visitors from those countries that fly to the United States (3.0 million).<sup>38</sup> Western European countries hosted another 26.7 percent of U.S. travel, easily the largest share of any ocean-crossing region.

Taken in concert, these global travel patterns offer some immediately positive implications. First, the continued travel growth between the United States and every world region offers U.S. businesses and households continued opportunities to travel abroad for business or pleasure. Second, the greater connectivity with the emerging regional economies could energize global economic growth and collaboration. In this case, U.S. firms stand poised to benefit from access to enormous new markets, while international firms can expand their access to U.S. specialties in value-added services and high-end manufacturing.

Certain regional groups showed uniform gains among nearly all countries. For example, in the Middle East/North Africa, the United Arab Emirates, Saudi Arabia, and Qatar all started with relatively small U.S.-related passenger bases which grew by more than 280 percent since 2003. Other countries in the region also experienced large passenger increases by global standards. This stretches from the largest regional partner, Israel (43.4 percent passenger growth), to smaller partners, like Morocco (87.9 percent) and Bahrain (84.9 percent).

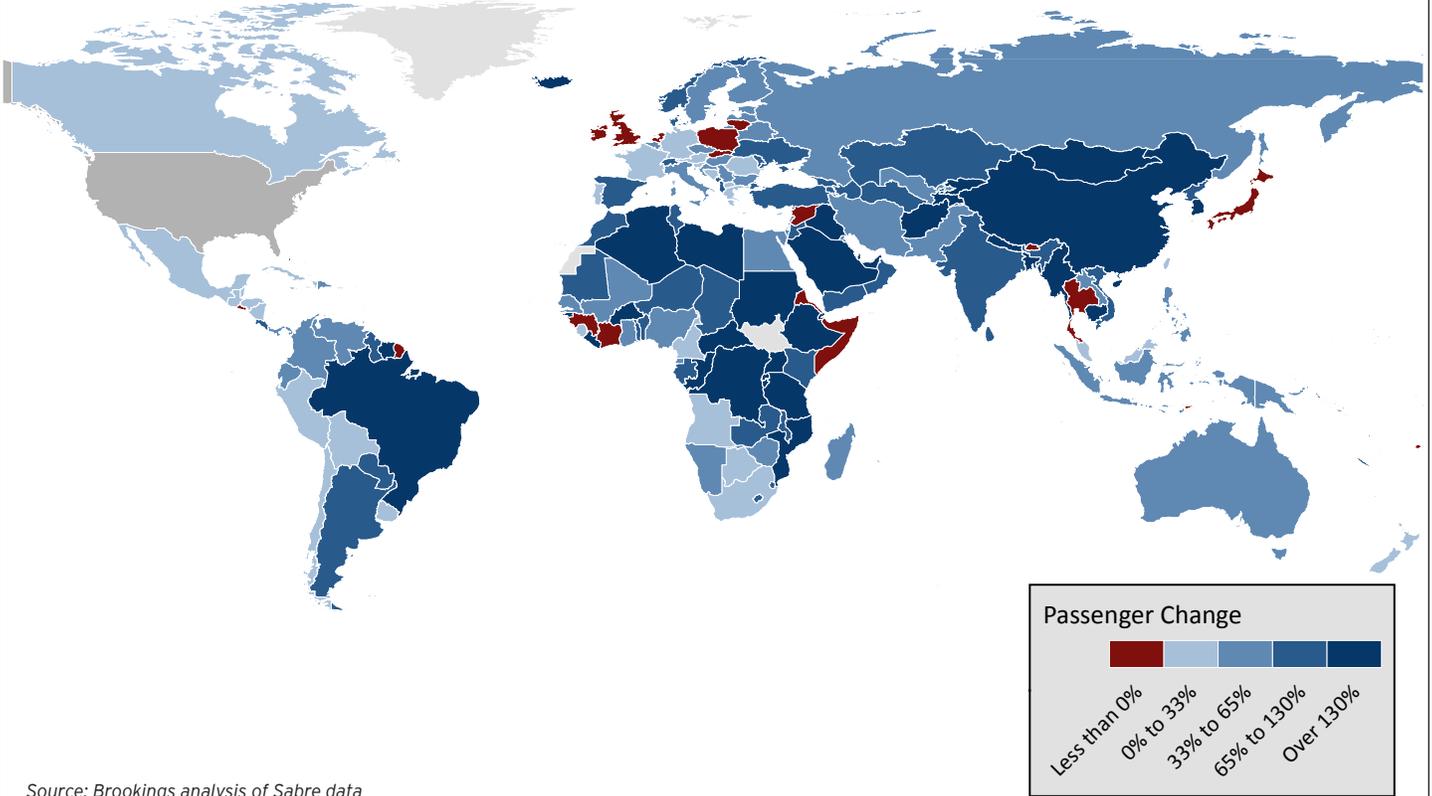
However, Map 1 shows that the more typical pattern was for mixed country growth, especially in slower-growth regions. South Korea's growth rate of 164.1 percent drove the Developed Asia-Pacific region and reinforces that country's emerging economic profile—both as a place of global business and a population with expanding purchasing power. U.S. Department of Commerce statistics reinforce the second portion of that equation, showing an 80 percent jump in South Korean tourists visiting the United States for personal reasons over the same period.<sup>39</sup> Argentina (107.0 percent) and Denmark (79.8 percent) also exhibited above-average increases within their respective regions.

**Table 1. International Air Travel between the United States by World Region, 2003 and 2011**

International Partner	Passenger Count			Share of All Passengers		Real GDP (\$ billions)		
	2003	2011	Change	2003	2011	2003	2011	Change
Developed Asia-Pacific	13,068,739	16,162,972	23.7%	11.1%	10.6%	6,549.9	7,593.6	15.9%
Developing Asia-Pacific	7,479,182	13,020,209	74.1%	6.3%	8.5%	3,451.0	6,911.7	100.3%
Eastern Europe/Central Asia	3,275,862	4,808,417	46.8%	2.8%	3.2%	2,016.7	2,843.1	41.0%
Latin America/Caribbean	39,862,809	50,648,522	27.1%	33.8%	33.2%	2,443.3	3,389.8	38.7%
Middle East/North Africa	2,816,550	5,202,848	84.7%	2.4%	3.4%	1,095.1	1,561.6	42.6%
North America	15,390,148	19,562,807	27.1%	13.1%	12.8%	1,067.2	1,229.3	15.2%
Sub-Saharan Africa	1,570,025	2,351,114	49.8%	1.3%	1.5%	570.0	860.7	51.0%
Western Europe	34,408,224	40,673,889	18.2%	29.2%	26.7%	13,142.2	14,452.9	10.0%
<b>All International Travel</b>	<b>117,871,539</b>	<b>152,430,778</b>	<b>29.3%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>

Source: Brookings analysis of Sabre and USDA economic data

Map 1. International Air Travel between the United States by Country, Passenger Growth, 2003 to 2011



Source: Brookings analysis of Sabre data

Very few countries saw downward changes in their overall trends. Of countries with over 500,000 travelers between the United States in 2003, only the Bahamas (-16.0 percent), Japan (-10.8), El Salvador (-8.1), Ireland (-4.2), the United Kingdom (-3.8), Thailand (-3.0), and the Netherlands (-1.5) experienced declines. In the case of Japan and Thailand, this was likely due to the devastating shocks due to the tsunamis and subsequent flooding to which airlines and airports are extremely susceptible. Economic shocks are not as clear. While many European countries continue to struggle through the sovereign-debt crisis, the only major countries with drops were the United Kingdom, Ireland, Slovakia, and the Netherlands. Spain (71.2 percent), Greece (23.1), and Portugal (19.8) all saw increases in traffic over the eight-year period. Others, like Syria (-7.1 percent), could blame political instability.

Finally, growth is not necessarily uniform across perceived economic groupings. For example, take the BRICS—an acronym to represent the emerging markets of Brazil, Russia, India, China, and South Africa. Collectively, their economies expanded by an astonishing 86 percent in inflation-adjusted terms between 2003 and 2011. They also represent even bigger markets in the future, evidenced by their 2.9 billion residents and ample room for per capita income growth.<sup>40</sup> Three of the countries showed major passenger increases; China (144.0 percent), Brazil (136.4 percent), and India (88.8 percent) all grew at rates exceeding their regional peers. But at the same time, Russia (42.1 percent) and South Africa (20.7 percent) failed to match even their regional growth rates.

Switching from growth rates to overall travel counts, proximity to the United States clearly matters. Canada and Mexico were easily the highest-trafficked countries, generating over one-fifth of total international air travel. Considering that these statistics do not include land crossings, these aggregate shares underscore the economic and social ties between the three NAFTA countries. Likewise,

many Caribbean countries defy their small populations and move a large number of passengers to and from the United States. These include small nations like the Dominican Republic—which handles more U.S.-related traffic than Italy—and Aruba. These statistics reinforce the presence of U.S. leisure travelers heading to the Caribbean for vacation and foreign-born populations now residing in the United States.

Despite the broad economic slowdown in Western Europe, that region's countries still dominate the ranks of American air travelers. Even with a drop in total passenger levels, the United Kingdom still easily moved the third most passengers of any country—exceeding Germany, the next highest Western European country, by over 5.6 million passengers. In total, Western Europe included five of the fifteen most-trafficked countries. Even smaller countries with smaller regional travel counts, like Luxembourg, still exceeded travel to larger countries in high-growth regions, like Uganda and Sri Lanka.

Aggregate shares also point to areas for future travel growth. Even with the volume increases in India and China, both countries are still only responsible for 5 percent of all U.S.-related international travel. The combination of enormous populations and macro economic growth offers a major travel growth market. Other countries with relatively small travel shares and similar growth prospects, like Argentina and Vietnam, fall into the same position.

Here again, economic growth itself is not necessarily a strong indicator of future aviation travel. Some countries with real GDP growth between 2003 and 2011 saw more passenger travel between the United States, such as Brazil and China. But others like Singapore and Peru experienced strong economic growth but did not experience above-average passenger increases. Likewise, some countries with slower economic growth experienced above-average passenger increases, such as Italy and Denmark. Overall, economic and passenger growth only share a relatively small correlation with one another.<sup>41</sup>

Multiple theoretical explanations for the smaller correlation suggest the need for additional research. For one, a country's economic growth is not necessarily related to the United States. While the United States may be the world's largest economy and a major factor in global business, economic growth an ocean away may have little bearing on passenger travel to and from the United States. It is also possible that it takes time for economic growth to create more travel between places. And infrastructure quality and stability certainly influences aviation connectivity.

There is a stronger but still mixed relationship when comparing international travel to *direct* flight connections. A strong correlation emerges when comparing aggregate passenger levels and direct connections in 2011.<sup>42</sup> But the correlation drops considerably when comparing the two measures' growth rates.<sup>43</sup> For example, the Dominican Republic lost six direct connections between 2003 and 2011—but still experienced a 1.2 million increase in aggregate travelers, outpacing the average international increase. Yet when New Zealand gained two direct connections, the pacific nation only registered an increase of 5,637 passengers. Similar to the correlation with real GDP growth, further research should assess the relationship between direct connectivity and passenger travel.

***C. The United States' 100 largest metropolitan areas are responsible for 96 percent of U.S. aviation passengers traveling internationally, with travel especially concentrated in a few critical gateways.***

In 2011, over 96 percent of all international aviation passengers exited or entered the United States through one of the country's 100 largest metropolitan areas, echoing these metropolitan areas' dominance in the domestic aviation market.<sup>44</sup> This passenger share far outpaced these metropolitan areas' share of national population, and even exceeded their outsized share of economic output. Whether carrying foreign visitors or Americans traveling abroad, international aviation starts and stops almost exclusively in the country's largest metropolitan areas.

**Table 2. International Air Travel between the United States (2011), Population (2010) and Real GDP (2010)**

Geography	Passengers	Share of National	Population	Share of National	Real GDP (\$ Million)	Share of National
National	152,431,885	100.0%	308,745,538	100.0%	\$12,757,950	100.0%
Outside 100 Largest Metros	5,815,910	3.8%	107,020,691	34.7%	\$3,534,579	27.7%
100 Largest Metros	146,615,975	96.2%	201,724,847	65.3%	\$9,223,371	72.3%
50 Largest Metros	138,207,258	90.7%	166,033,092	53.8%	\$7,594,949	59.5%
25 Largest Metros	118,363,514	77.7%	127,027,407	41.1%	\$5,945,161	46.6%
10 Largest Metros	92,284,030	60.5%	80,439,034	26.1%	\$4,055,447	31.8%
5 Largest Metros	58,702,532	38.5%	53,524,167	17.3%	\$2,691,061	21.1%

Source: Brookings analysis of Sabre (Passengers), Census (Population), and Moody's Analytics (Real GDP) data

“These regional specialties provide a clue as to where these gateways may create stronger international connections beyond just exchanging airline passengers.”

Table 2 shows that the metropolitan shares grow more intense as the metro areas grow in size. The 50 largest metropolitan areas still move over 90 percent of all international passengers. Just the five largest—New York, Los Angeles, Chicago, Dallas, and Philadelphia—move over 38 percent.

However, while size does matter, the heaviest concentrations of global travel are in the metros that serve as international gateways.

Metropolitan gateways are the location of entry to, or exit from, the United States, and only count passengers that do not originate or terminate in that same place. These are known as the transfer points for international travel, such as Washington in the Sarasota-Washington-Barcelona example discussed earlier. This research defines a gateway as any metro area that moves at least 1 percent of all United States through-travel.

Only 17 metropolitan gateways move 96.6 percent of all international through-passengers. When a U.S. metro area does not maintain a direct connection to an international peer, or passengers simply demand more regularly scheduled service, they rely on these 17 metropolitan gateways to enter or exit the country. This list confirms the international findings from Brookings research in 2009.<sup>45</sup> That same research also found that delays concentrate in many of the same gateways, suggesting their travel concentration could cause delays to ripple throughout the domestic and international network.

This is especially the case when considering the regional specialties within most gateways. Metros such as Miami and Phoenix specialize in travel with Latin America, while Los Angeles and Honolulu shuttle passengers between the two Asia-Pacific regions (Table 3). These regional specialties provide a clue as to where these gateways may create stronger international connections beyond just exchanging airline passengers. In this sense, these gateways have a built-in advantage to expand business and leisure relationships with their most common regional peers.

But these metropolitan gateways do more than just transfer passengers across the country to and from their final destination—they also host and generate large shares of their own international passengers. In other words, these 17 metropolitan gateways also served as the final origin and destination for 72.8 percent of all international passengers in 2011.

Of those gateways, New York is in a class by itself. The nation's largest metropolitan area hosts 20.8 percent of all international passengers, equal to 31.7 million passengers in 2011. To put this number in perspective, more passengers start or end their trip in New York than all passengers in the 81 metropolitan areas at the bottom of the 95-metro list. That collection of 81 includes some of the country's biggest aviation centers, such as tourist-heavy Orlando and Las Vegas and fellow gateways in Philadelphia and Phoenix.

While New York stands alone, the other gateways still individually move significant shares of total passengers. Over 10 percent of all international travelers start or end their journey in Miami or Los Angeles. Those two metro areas benefit from more connections to their southern and western neighbors, respectively, than any other metro area as discussed below. Other large economic centers—San Francisco, Chicago, and Washington—also move at least 3.5 percent of all international passengers. Major airline hubs in Atlanta and Houston each produce shares over 2.0 percent.

**Table 3. United States Metropolitan Gateways, Through Passengers and Regional Distribution, 2011**

Metro Area	International Through-Traffic Passengers	Metropolitan Share to Each Region							
		Developed Asia-Pacific	Developing Asia-Pacific	Eastern Europe/Central Asia	Latin America/Caribbean	Middle East/North Africa	North America	Sub-Saharan Africa	Western Europe
Atlanta-Sandy Springs-Marietta, GA	6,178,718	2.4%	2.4%	2.0%	52.9%	3.7%	3.9%	5.1%	27.6%
New York-Northern New Jersey-Long Island, NY-NJ-PA	5,756,846	3.6%	11.7%	7.1%	9.7%	9.8%	8.6%	2.5%	47.1%
Miami-Fort Lauderdale-Pompano Beach, FL	5,031,125	0.0%	0.1%	0.1%	95.4%	0.2%	0.9%	0.0%	3.4%
Chicago-Joliet-Naperville, IL-IN-WI	4,535,905	10.0%	19.8%	4.9%	5.0%	4.5%	21.8%	1.4%	32.7%
Houston-Sugar Land-Baytown, TX	3,993,996	1.1%	2.7%	0.6%	79.8%	1.5%	6.8%	0.7%	6.8%
Dallas-Fort Worth-Arlington, TX	2,887,450	6.4%	3.1%	0.6%	64.6%	1.1%	10.6%	0.4%	13.1%
Los Angeles-Long Beach-Santa Ana, CA	2,781,728	52.5%	20.9%	1.2%	9.9%	1.3%	5.8%	0.3%	8.0%
Charlotte-Gastonia-Rock Hill, NC-SC	2,149,991	0.0%	0.2%	1.6%	65.5%	0.3%	8.5%	0.0%	23.9%
Washington-Arlington-Alexandria, DC-VA-MD-WV	2,061,436	3.6%	8.2%	7.9%	9.9%	11.7%	6.2%	11.7%	40.9%
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	2,019,117	0.0%	0.3%	1.7%	14.4%	5.4%	15.2%	0.3%	62.7%
Detroit-Warren-Livonia, MI	1,721,755	21.4%	20.1%	2.1%	7.0%	2.0%	17.2%	2.6%	27.5%
San Francisco-Oakland-Fremont, CA	1,616,583	44.8%	21.7%	1.3%	6.6%	0.9%	15.7%	0.3%	8.8%
Minneapolis-St. Paul-Bloomington, MN-WI	1,107,407	7.4%	5.7%	2.6%	6.7%	1.4%	50.8%	1.6%	23.7%
Phoenix-Mesa-Glendale, AZ	1,068,011	0.0%	0.0%	0.0%	84.3%	0.0%	15.3%	0.0%	0.4%
Seattle-Tacoma-Bellevue, WA	783,739	20.7%	17.3%	1.4%	1.5%	0.9%	49.1%	0.6%	8.6%
Denver-Aurora-Broomfield, CO	773,498	0.0%	0.5%	1.0%	22.6%	0.8%	67.4%	0.2%	7.5%
Honolulu, HI	465,749	35.3%	62.9%	0.0%	0.0%	0.0%	1.7%	0.0%	0.0%

Source: Brookings analysis of Sabre data

This means the fate of metro areas with growing international travel but with limited direct international connections—such as Omaha and Salt Lake City—currently ties inextricably to airport expansion in metros such as Atlanta or operational adjustments in Philadelphia or similar metros.

Gateway metros need to understand the value other metro areas add to their international traffic portfolio. For eight of the gateways, more than half of their total international passengers are through-traffic: Charlotte, Atlanta, Dallas, Detroit, Philadelphia, Houston, Minneapolis, and Phoenix. Any changes in airline operations or metropolitan preferences could lead to a serious drop in demand for their international flights, damaging their long-run international connectivity. Former gateways such as Cincinnati and Pittsburgh can provide important lessons with respect to the value of this through-traffic, and the consequences when that traffic leaves. As it stands, the gateways' business and residents receive spillover benefits from their gateway status—and it makes sense to monitor the long-term prospects for maintaining the status quo. This includes reviewing current airline lease agreements and whether other metros have begun to add more direct international service.

**Table 4. International Metropolitan Areas ranked by Total U.S. Air Passengers, 2011**

Metropolitan Area	Region	International Gateway	Total Passengers		
			2003	2011	Change
London, United Kingdom	Western Europe	Yes	9,649,308	9,245,540	-4.2%
Toronto, Canada	North America	Yes	5,419,802	6,905,458	27.4%
Cancun, Mexico	Latin America/Caribbean	No	4,100,397	4,873,338	18.9%
Tokyo, Japan	Developed Asia-Pacific	Yes	4,098,703	4,062,529	-0.9%
Mexico City, Mexico	Latin America/Caribbean	Yes	3,368,259	3,905,196	15.9%
Seoul-Incheon, South Korea	Developed Asia-Pacific	Yes	1,379,561	3,673,240	166.3%
Paris, France	Western Europe	Yes	2,893,623	3,658,219	26.4%
Vancouver, Canada	North America	Yes	3,185,031	3,139,724	-1.4%
Montreal, Canada	North America	No	2,215,225	2,601,549	17.4%
Frankfurt am Main, Germany	Western Europe	Yes	2,659,331	2,421,899	-8.9%

Source: Brookings analysis of Sabre data

***D. Critical groups of international metropolitan areas serve the same gateway function when connecting passengers to the United States—doubling as main launch point and transfer point for other metropolitan areas.***

Similar to the concentration in the United States, a small group of global metro areas move an outsized share of all passengers. Based on 2011 data, just 200 metro areas are responsible for 93.2 percent of all international passenger flows. Considering there are over 1,400 international locations that travel to and from the United States, this is a significant travel concentration.

The single most popular international metro area for U.S. air travel is London. The U.K. capital moves over 9.2 million passengers, equal to 6.1 percent of all international travelers, and an outsized 22.7 percent of all traffic between the United States and Western Europe. London also benefits from maintaining the most direct connections to U.S. metro areas (23) of any overseas metro area.<sup>46</sup> In many ways, London and New York share similar aviation profiles, which mirror their labels of archetypal global cities and as the two most globally connected cities in more recent research.<sup>47</sup>

Beyond London, eight of the 25 most trafficked international metro areas are in Canada and Mexico, with four metros apiece. This includes Toronto, the second busiest with 6.9 million passengers, and Cancun, the third busiest with 4.9 million passengers. More importantly, each set of four metro areas combines to move 75 percent of all Canadian and Mexican passengers, respectively.

Map 2 shows how the busiest metros for U.S. air travel span the globe—with size and growth trends differing by region. In general, the metro areas with the most passengers in 2011 are in the heaviest-trafficked regions: Western Europe and portions of Latin America and the Caribbean. Developed Asia-Pacific’s metro areas, while smaller in number, also tend to have some of the largest aggregate totals. However, those three regions and Canada tended to grow at slower rates.

Most of the high-growth metro areas are in the Middle East/North Africa, Developing Asia-Pacific, and South America. Some of these metro areas benefit from starting with small passenger bases, such as Abu Dhabi (297.3 percent) and Kathmandu (257.6 percent). But others, such as Shanghai (172.0 percent) and Sao Paulo (142.5 percent), started with large passenger totals in 2003 and still experienced large growth rates. While many of the fast-growing metro areas are in developing countries, it is important to keep in mind that passenger growth does not necessarily correspond with economic growth.<sup>48</sup>

As in the United States, many of the international metro areas with the largest passenger counts also function as the primary gateways to other international metro areas (Table 5). Similar to New York or Los Angeles, international gateways such as London and Tokyo do not just produce some of the largest passenger flows—they also redistribute large numbers of other international passengers.

**Table 5. International Metropolitan Gateways, 2011**

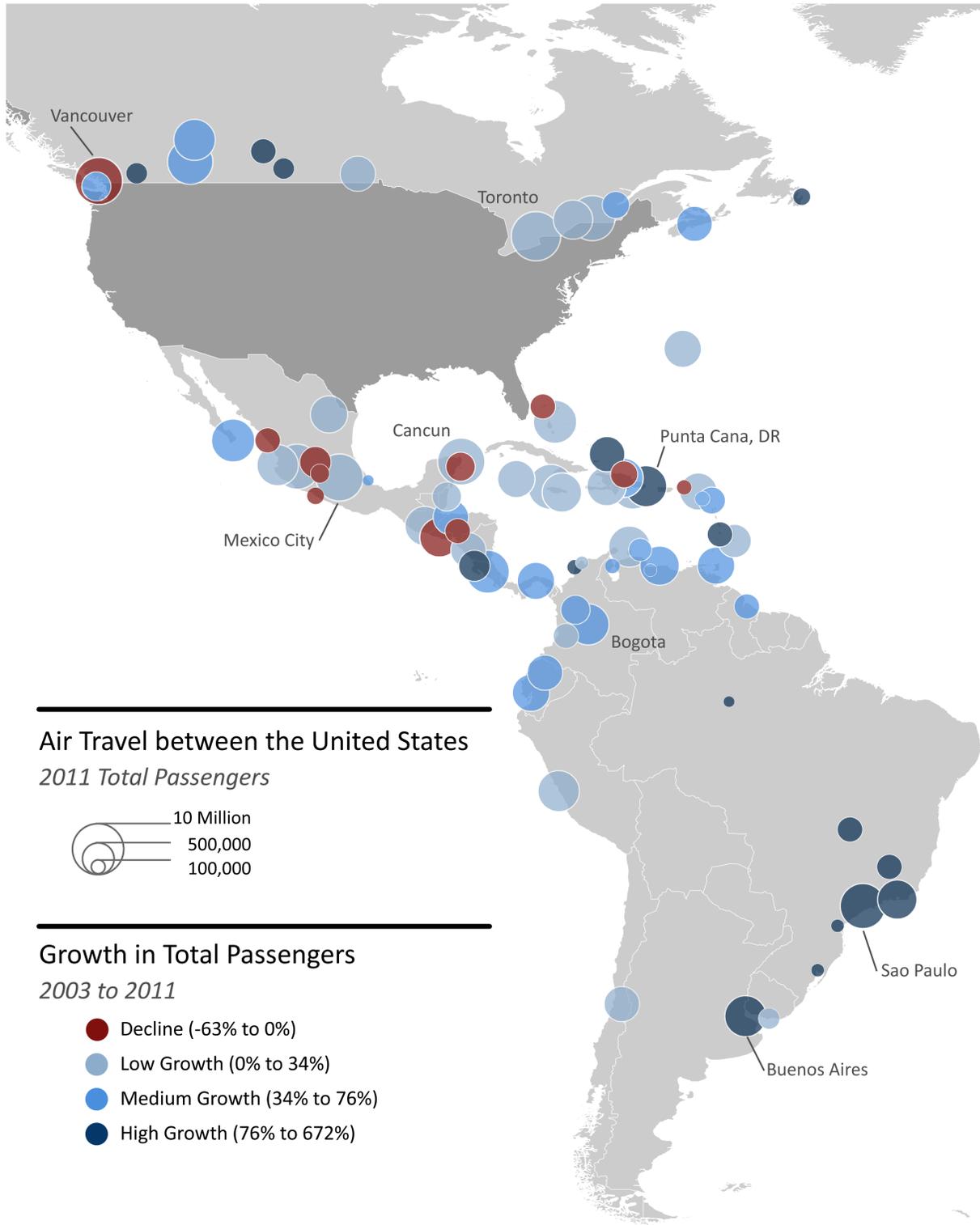
Metropolitan Area	Region	Origin-Destination Passengers		Through-Traffic Passengers	
		Total	Share of All Global Metros	Total	Share of All Global Metros
London, United Kingdom	Western Europe	9,245,540	6.1%	5,384,089	13.0%
Frankfurt am Main, Germany	Western Europe	2,421,899	1.6%	3,638,435	8.8%
Tokyo, Japan	Developed Asia-Pacific	4,062,529	2.7%	3,041,785	7.4%
Paris, France	Western Europe	3,658,219	2.4%	2,780,710	6.7%
Rotterdam-Amsterdam, Netherlands	Western Europe	1,698,037	1.1%	2,696,938	6.5%
Toronto, Canada	North America	6,905,458	4.5%	1,685,794	4.1%
Seoul-Incheon, South Korea	Developed Asia-Pacific	3,673,240	2.4%	1,653,463	4.0%
Dubai, United Arab Emirates	Middle East/North Africa	627,678	0.4%	1,186,254	2.9%
Munich, Germany	Western Europe	1,063,018	0.7%	1,131,050	2.7%
Hong Kong, China	Developed Asia-Pacific	1,590,537	1.0%	1,081,570	2.6%
Taipei, Taiwan	Developed Asia-Pacific	1,264,207	0.8%	931,665	2.3%
Madrid, Spain	Western Europe	1,406,838	0.9%	907,685	2.2%
Panama City, Panama	Latin America/Caribbean	699,647	0.5%	861,732	2.1%
Vancouver, Canada	North America	3,139,724	2.1%	717,333	1.7%
Zürich, Switzerland	Western Europe	1,156,284	0.8%	715,917	1.7%
Rome, Italy	Western Europe	1,711,744	1.1%	675,376	1.6%
Sao Paulo, Brazil	Latin America/Caribbean	1,966,026	1.3%	650,899	1.6%
Mexico City, Mexico	Latin America/Caribbean	3,905,196	2.6%	614,752	1.5%
Sydney, Australia	Developed Asia-Pacific	1,073,328	0.7%	498,967	1.2%
Doha, Qatar	Middle East/North Africa	141,977	0.1%	469,365	1.1%

Source: Brookings analysis of Sabre data

The 20 metro areas that move 1 percent of all international through-traffic are responsible for the transfer of 75.8 percent of all passengers flying in and out of the United States.

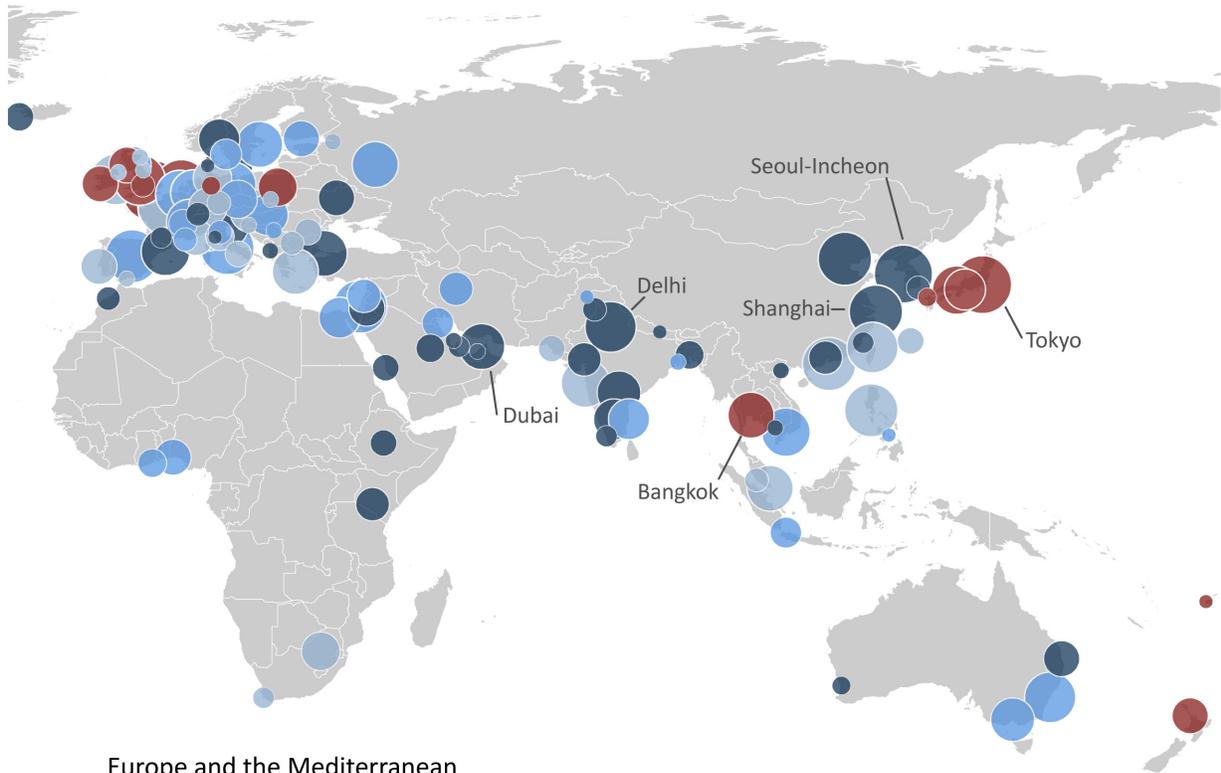
Unlike the 200 most-trafficked global metro areas, the gateways cluster in the world's developed regions. Western Europe contributes eight of the twenty, with another five in Developed Asia-Pacific and two more in Canada. There are no gateways in Developing Asia-Pacific or Eastern Europe/Central Asia. These regions are likely to develop gateways as more of their metro areas develop relationships with their U.S. counterparts and infrastructure continues to mature, enabling such current aviation centers as Beijing and Moscow to filter more passengers between their regional hinterlands and the United States.

**Map 2. 200 Largest Metropolitan Areas based on International Aviation Passengers to and from the United States, 2011 Totals and Change from 2003 to 2011**

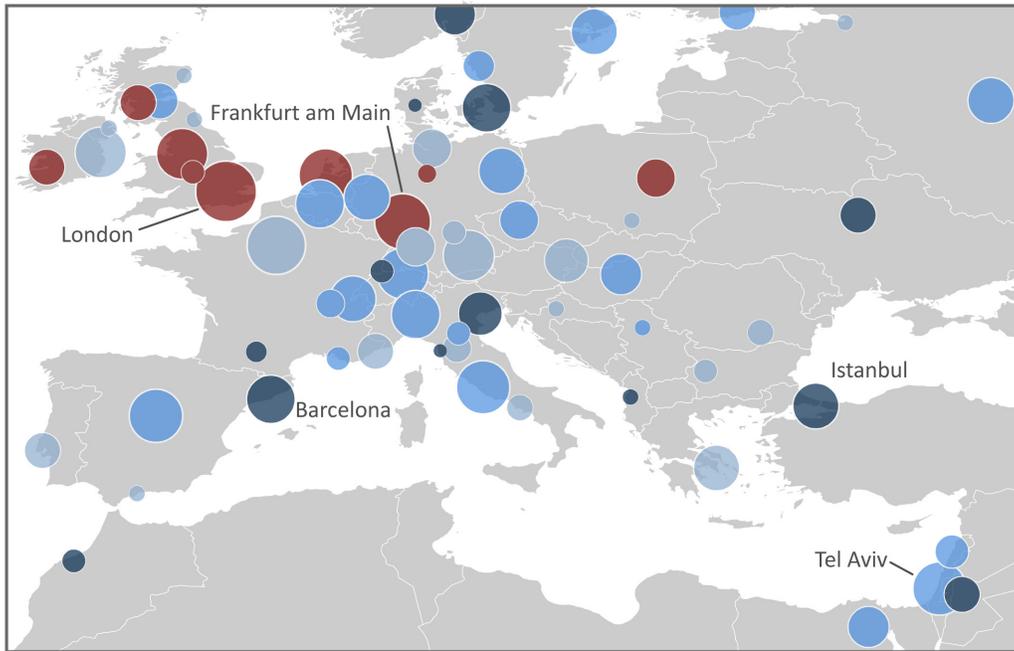


Source: Brookings analysis of Sabre data

Map 2. 200 Largest Metropolitan Areas based on International Aviation Passengers to and from the United States, 2011 Totals and Change from 2003 to 2011 (continued)



Europe and the Mediterranean



Source: Brookings analysis of Sabre data

**E. The routes between United States and global gateways are the most structurally important parts of the United States' global aviation network, and corridors connecting to emerging economies are the fastest-growing.**

Based on passenger data from 2011, most international air travel to and from the United States concentrates in a relatively small number of corridors. The 500 busiest origin-destination (OD) corridors carried 86.6 million passengers in 2011, an increase of over 20 million passengers from 2003 (Table 6). This represents over half of all passengers moving in and out of the United States that year. To put that concentration in perspective, there were over 160,000 unique OD corridors in 2011—meaning the first 500 corridors generated more traffic than the next 159,500 combined.

The busiest OD corridors tend to involve at least one gateway. Across just those 500 busiest corridors, 409 either start or end in a U.S. gateway and 180 corridors do the same with an international gateway. Combined, 140 of the 500 corridors exclusively start and end in gateways—moving 33.4 million passengers, or 22 percent of all international travelers, in the process. Since gateways simultaneously move their own passengers and enable access to metros with limited direct connectivity, these corridor shares reinforce their structural importance.

The corridors between New York and the Western European gateways offer the best examples of inter-gateway travel. By a wide margin, the single largest OD corridor is between New York and London, with 2.5 million passengers starting and ending their trip within the two metro areas (Table 7).<sup>49</sup> This does not include the additional 1.4 million passengers that used the two gateways as a connection point in their travels. Beyond London, another 3.4 million passengers started and ended their trip in New York and the seven other Western European gateways: Paris, Frankfurt am Main, Rome, Madrid, Rotterdam-Amsterdam, Zurich, and Munich. All eight of these New York-European gateway corridors ranked in the top 100 of all international corridors in 2011.

Beyond gateway-specific travel, many of the metro areas with the fastest-growing OD corridors are in developing regions, which is generally consistent with the overall passenger changes from Finding D. Limiting the analysis to the same 500 corridors between 2003 and 2011, the corridors involving Developing Asia-Pacific metros experienced an 94.4 percent growth rate. This included corridors such as Detroit-Shanghai, Chicago-Hyderabad, and Seattle-Shanghai. Many of the largest growth rates also connected with South American metros. The single fastest growing OD corridor among the 500 busiest is Miami-Brasilia (1,290 percent.) Other fast-growing corridors were Orlando-Bogota (558 percent), Las Vegas-Sao Paulo (457 percent), and Miami-Manaus (Brazil) (457 percent). In general, corridors running to the Brazilian metros typically doubled their passenger flows.

**Table 6. 500 Busiest International Aviation Corridors In and Out of the United States, 2011**

Region	Number of Corridors		Passengers		Change
	2003	2011	2003	2011	
Developed Asia-Pacific	52	45	8,421,701	10,998,283	30.6%
Developing Asia-Pacific	32	44	2,975,970	5,786,188	94.4%
Eastern Europe/Central Asia	8	10	748,895	1,169,595	56.2%
Latin America/Caribbean	187	175	23,442,455	29,832,336	27.3%
Middle East/North Africa	8	13	1,160,149	2,010,113	73.3%
North America	72	75	9,202,851	12,732,099	38.3%
Sub-Saharan Africa	4	4	338,866	301,668	-11.0%
Western Europe	137	134	19,666,134	23,818,635	21.1%
<b>All International Travel</b>	<b>500</b>	<b>500</b>	<b>65,957,021</b>	<b>86,648,917</b>	<b>31.4%</b>

Source: Brookings analysis of Sabre data

**Table 7. 50 Largest International Metropolitan Aviation Corridors, 2011**

2011 Rank	United States Metropolitan Area	International Metropolitan Area	International Passengers		
			2003	2011	Change
1	New York-Northern New Jersey-Long Island, NY-NJ-PA	London, United Kingdom	2,330,766	2,451,521	5.2%
2	Honolulu, HI	Tokyo, Japan	1,075,254	1,443,187	34.2%
3	New York-Northern New Jersey-Long Island, NY-NJ-PA	Toronto, Canada	841,225	1,317,892	56.7%
4	New York-Northern New Jersey-Long Island, NY-NJ-PA	Paris, France	679,931	1,081,194	59.0%
5	New York-Northern New Jersey-Long Island, NY-NJ-PA	Tel Aviv, Israel	695,732	912,969	31.2%
6	New York-Northern New Jersey-Long Island, NY-NJ-PA	Santo Domingo, Dominican Republic	679,229	771,591	13.6%
7	Los Angeles-Long Beach-Santa Ana, CA	Seoul-Incheon, South Korea	305,947	767,050	150.7%
8	Los Angeles-Long Beach-Santa Ana, CA	London, United Kingdom	732,288	712,978	-2.6%
9	Orlando-Kissimmee-Sanford, FL	London, United Kingdom	837,462	688,630	-17.8%
10	Miami-Fort Lauderdale-Pompano Beach, FL	Toronto, Canada	474,148	668,838	41.1%
11	Los Angeles-Long Beach-Santa Ana, CA	Guadalajara, Mexico	551,830	667,764	21.0%
12	New York-Northern New Jersey-Long Island, NY-NJ-PA	Santiago, Dominican Republic	453,642	664,659	46.5%
13	New York-Northern New Jersey-Long Island, NY-NJ-PA	Seoul-Incheon, South Korea	214,447	654,755	205.3%
14	Miami-Fort Lauderdale-Pompano Beach, FL	Caracas, Venezuela	367,512	617,296	68.0%
15	New York-Northern New Jersey-Long Island, NY-NJ-PA	Cancun, Mexico	356,016	613,931	72.4%
16	Los Angeles-Long Beach-Santa Ana, CA	Tokyo, Japan	607,754	596,086	-1.9%
17	Los Angeles-Long Beach-Santa Ana, CA	Vancouver, Canada	536,401	565,638	5.5%
18	San Francisco-Oakland-Fremont, CA	London, United Kingdom	559,044	542,441	-3.0%
19	Miami-Fort Lauderdale-Pompano Beach, FL	Nassau, Bahamas	516,541	538,089	4.2%
20	Miami-Fort Lauderdale-Pompano Beach, FL	Buenos Aires, Argentina	207,924	533,507	156.6%
21	Los Angeles-Long Beach-Santa Ana, CA	Mexico City, Mexico	428,714	518,220	20.9%
22	Boston-Cambridge-Quincy, MA-NH	London, United Kingdom	562,767	512,648	-8.9%
23	Miami-Fort Lauderdale-Pompano Beach, FL	Montreal, Canada	298,823	477,207	59.7%
24	Miami-Fort Lauderdale-Pompano Beach, FL	London, United Kingdom	491,670	476,010	-3.2%
25	New York-Northern New Jersey-Long Island, NY-NJ-PA	Mexico City, Mexico	404,543	473,082	16.9%
26	Las Vegas-Paradise, NV	Toronto, Canada	223,254	470,478	110.7%
27	Washington-Arlington-Alexandria, DC-VA-MD-WV	London, United Kingdom	453,382	470,132	3.7%
28	New York-Northern New Jersey-Long Island, NY-NJ-PA	Frankfurt am Main, Germany	322,242	469,247	45.6%
29	Miami-Fort Lauderdale-Pompano Beach, FL	Sao Paulo, Brazil	139,104	456,244	228.0%
30	New York-Northern New Jersey-Long Island, NY-NJ-PA	Rome, Italy	302,799	455,081	50.3%
31	Las Vegas-Paradise, NV	London, United Kingdom	271,322	452,610	66.8%
32	New York-Northern New Jersey-Long Island, NY-NJ-PA	Tokyo, Japan	480,733	446,866	-7.0%
33	Miami-Fort Lauderdale-Pompano Beach, FL	Port-au-prince, Haiti	425,904	445,348	4.6%
34	Miami-Fort Lauderdale-Pompano Beach, FL	Bogota, Colombia	283,114	442,221	56.2%
35	New York-Northern New Jersey-Long Island, NY-NJ-PA	Madrid, Spain	196,739	437,014	122.1%
36	Honolulu, HI	Osaka-Kobe, Japan	422,025	434,631	3.0%
37	New York-Northern New Jersey-Long Island, NY-NJ-PA	Sao Paulo, Brazil	156,791	425,801	171.6%
38	Miami-Fort Lauderdale-Pompano Beach, FL	Mexico City, Mexico	347,998	417,507	20.0%
39	Los Angeles-Long Beach-Santa Ana, CA	Toronto, Canada	301,553	403,730	33.9%
40	Honolulu, HI	Seoul-Incheon, South Korea	98,397	401,094	307.6%
41	Chicago-Joliet-Naperville, IL-IN-WI	Toronto, Canada	315,605	392,777	24.5%
42	Los Angeles-Long Beach-Santa Ana, CA	Taipei, Taiwan	302,037	389,446	28.9%
43	Los Angeles-Long Beach-Santa Ana, CA	Manila, Philippines	301,805	386,642	28.1%
44	Orlando-Kissimmee-Sanford, FL	Manchester, United Kingdom	288,920	381,525	32.1%
45	New York-Northern New Jersey-Long Island, NY-NJ-PA	Rotterdam-Amsterdam, Netherlands	318,726	377,797	18.5%
46	Chicago-Joliet-Naperville, IL-IN-WI	London, United Kingdom	350,664	377,523	7.7%
47	Los Angeles-Long Beach-Santa Ana, CA	Paris, France	268,450	372,543	38.8%
48	New York-Northern New Jersey-Long Island, NY-NJ-PA	Hong Kong, China	228,737	371,878	62.6%
49	New York-Northern New Jersey-Long Island, NY-NJ-PA	Oranjestad, Aruba	241,880	369,030	52.6%
50	New York-Northern New Jersey-Long Island, NY-NJ-PA	Milan, Italy	187,274	366,076	95.5%

Source: Brookings analysis of Sabre data

A handful of developed international markets also experienced growth on all of their corridors. Seoul registered 11 corridors on the 500-largest list—and each one at least doubled their passenger traffic in the nine-year period. These corridors covered every corner of the United States—from Boston to Los Angeles—and further confirm Seoul's growing relationship with U.S. metropolitan areas. Each of the four corridors connecting to Copenhagen also more than doubled their passenger levels. Others, like San Jose (Costa Rica) and Rome, experienced healthy growth on every single one of their corridors. In contrast, no U.S. metro area experienced passenger growth across all of its corridors within the 500-largest list. The consistent growth between certain international metro areas underscores the importance for U.S. metropolitan leaders to simultaneously monitor international economic performance alongside their own local dynamics.

Many of the most popular corridors also correspond with significant foreign-born population connections. This includes popular corridors such as New York-Tel Aviv, New York-Santo Domingo, Los Angeles-Seoul, Los Angeles-Guadalajara, and Miami-Caracas. Growth in the U.S. foreign-born population and rising international tourism suggest local airport officials should follow demographic changes in their metropolitan area.

## V. Implications

Even in the wake of the global recession, the United States' international aviation market is booming. In just 21 years, the number of air passengers entering and exiting the country more than doubled, outpacing the growth in real GDP and population. Metropolitan areas, both within and outside the United States, have powered this growth. The vast majority of U.S.-related international travel moved through a relatively small group of 100 U.S. metropolitan areas and 200 international ones. Gateway metro areas, split almost evenly between the United States and other countries, connected all 300 of these metropolitan economies.

Higher passenger levels do not just mean more people crossing national borders—it also means the potential for economic benefits at home and abroad. Many U.S. metro areas still primarily trade with domestic partners, not yet fully benefitting from global trade opportunities. Creating and strengthening connections with foreign markets will open new business opportunities and attract tourism exports in the long-run as these developing markets experience rising incomes.<sup>50</sup>

The United States must recognize the primacy of international aviation within our increasingly global economy. As international aviation continues to gain passengers and international connections, it is vital that the United States maintains a modern and efficient infrastructure system. A limited or stalled aviation system, as seen through the Icelandic volcano in 2010 or the Japanese tsunami in 2011, creates significant economic losses for both the tourism industry and the broader marketplace.<sup>51</sup>

Considering this growing but complex sector, the trends unveiled by this research highlight three critical implications.

### ***The United States' international aviation system relies on a handful of gateway metro areas.***

Since most metro areas maintain a small number of direct connections, this gateway network is a vital component of international travel. Metros such as Omaha, which experienced 50 percent international passenger growth between 2003 and 2011, maintain no direct international routes. As such, Omaha's businesses and residents are completely reliant on gateways such as Chicago and Houston to move its passengers in and out of the country.

But this is not a one-way relationship. Just as feeder metro areas need the gateways to connect internationally, those same gateways rely on business from the feeder metro areas. For example, over 70 percent of Atlanta's and Charlotte's international travelers are simply through-traffic. And when any technical problems occur along a gateway corridor—East Coast thunderstorms or air traffic control fire on June 22, 2012—entire domestic and international traffic flows can quickly grind to a halt or cause dramatic rerouting, creating significant costs for metro economies and travelers across the country.

“Even in the wake of the global recession, the United States' international aviation market is booming.”

Airline operations have actually increased the pressure on the country's gateways over time. The country lost two gateway metro areas over the past two decades—Cincinnati and Pittsburgh. This reduction may make sense from a business perspective for the airlines, especially if there was insufficient local demand to fill seats, but the loss places extra through-traffic pressures on the remaining gateways. And even within the remaining gateways the data shows a further concentration within 10 of the 17 metro areas. Fewer gateways render the U.S. aviation system more susceptible to operational problems in one place.

Internationally, the number of gateways is expanding. Between 2003 and 2011, four new metros began to serve as international gateways for U.S. travelers: Dubai, Panama City, Rome, and Doha. However, gateways still do not exist in China or Central Asia—sites of strong metropolitan economic growth in their regional hinterlands. This suggests even more international gateways will appear to better connect U.S. metro areas with these regional hinterlands.

Multiple policy areas, from security to capital programs, must reflect this new reality of concentrated gateway points within the United States and a diversifying market beyond U.S. borders.

***Current federal policies do not prioritize the most critical metro areas and restrict some bottom-up financing***

The United States' international aviation market concentrates in many of the world's largest metropolitan economies. Since these places are the primary engines of national GDP within their respective countries there is a natural economic order behind this geographic arrangement. The metropolitan concentration also makes business sense for the airlines, offering certain economies of scale in their route networking.

However, federal investment policies do not prioritize these metro areas and their dominance of the commercial aviation network. This includes their outsized passenger counts for both international and domestic travel.<sup>52</sup> Instead, the current capital programs focus more on geographic equity than consumer-benefiting efficiency.

The Airport Improvement Program (AIP) is the largest federally led program. The most recent federal aviation bill authorized \$3.35 billion annually for AIP, of which funding derives from a set of passenger ticket taxes, fuel fees, cargo taxes, and even an international arrival and departure tax. Due to market structure, the largest metro areas generate the largest share of those fees. However, the program's design includes a series of caps and controls that limit how much funding can return to those same metropolitan airports and their customers. For example, AIP's funding delivered via formula (the entitlement portion) redistributes funding based on airport passenger levels—but it significantly reduces the weight of passenger boardings above the 500,000 and 1 million thresholds.

The results of AIP weighting are clear: passengers flying through large metro areas are significant donors to the rest of the country. For example, Brookings research from 2010 found that just 37 percent of AIP funding from the American Recovery and Reinvestment Act (ARRA) went to the 100 largest metropolitan areas.<sup>53</sup> Extending that analysis to Fiscal Year 2011, the trend is the same: only 36 percent of AIP funding goes to these places. If the 100 largest metros received even two-thirds of all AIP funding—far short of their share of international and domestic passengers moved—then those metros would receive \$1 billion in additional federal funding each year.<sup>54</sup>

The AIP's structure means the major airports raise their funding locally, but other policies don't make this path any easier. The Passenger Facility Charge (PFC) program is the main source of locally generated, federally authorized funding. PFCs are a three-tier tax that each airport can levy on all commercial passengers landing at their facility, where an airport's PFC tier relates to the airport's FAA-defined size category.

But the program includes two significant design flaws. First, federal legislation caps top-tier PFC charges at \$4.50 per passenger, greatly inhibiting an airport's ability to raise funds from these user fees. Second, entering the PFC program limits an airport's ability to receive AIP formula entitlement funding.<sup>55</sup> So passengers traveling at PFC-participating airports pay taxes that fund the AIP but those same airports receive unequal access to those revenues. This creates a condition where seemingly complimentary programs become adversarial.

In addition to PFC and AIP funding, airports turn to the municipal bonds markets for their major capital investments. According to Airports Council International, bonds typically account for about one-half of all funding for new capital infrastructure.<sup>56</sup> In this case, though, the U.S. tax code also inhibits airports ability to maximize financial market opportunities. The U.S. tax code considers certain airport bond issuances as Private Activity Bonds (PABs), which means their bonds are not tax exempt like other municipal bonds. This costs the airport authorities dearly on the bond trading markets, leading to less bond issuances and higher interest rates on the bonds they do sell.

***The United States does not actively address the growth in international aviation through a coordinated suite of international aviation policies***

International aviation is one of the fastest growing portions of the national transportation network and an important way to tap into metropolitan-led global economic growth.

At the same time, federal policy does not yet take note of this explosive growth. The U.S. Department of Transportation wrote their most recent international aviation policy statement in 1995. Even in the 2012 FAA reauthorization bill, congressional authors rarely use the word “international” in a policy context.

The portion of the U.S. Code dealing with aviation, Title 49, does include a subsection devoted to international aviation—but focuses on industry negotiation and general directives around domestic and international integration and the elimination of operational and marketing restrictions. It even fails in one of the other directives to increase the number of nonstop U.S. gateway cities.

Negotiating on behalf of the domestic airline industry is a federal responsibility—but it is only one part. The government is also responsible for recognizing the long-term capacity constraints at many major metropolitan airports, and help to prioritize the travel that must occur via aviation (such as international routes) and those that could switch to competing transportation modes (such as sub-500 mile domestic routes).<sup>57</sup> The federal government also must recognize how a difficult visa process can dissuade tourism, affecting U.S. exports and airline business in the process.

Without a true national directive and supportive policies, the national government misses an opportunity to offer support for a national economic imperative.

## VI. Recommendations

These global aviation trends and their implications are at once promising and discouraging. The overall growth in international air passenger levels exposes how much the United States and its metropolitan economies interact with their international peers, reinforcing the vital business, social, and tourism relationships between these global engines of growth. Despite what is at stake, the United States’ federal aviation policies are in danger of lagging behind dynamic global growth patterns. U.S. policies reflect instead a decades-old environment with more domestic airline hubs and less global connections.

No single actor has more power to influence international aviation than the federal government, from small regional airport concerns to national airspace and navigation issues. However, given gridlock and constraint, major new federal initiatives are unlikely in the short-term. Therefore, the recommendations avoid wholesale program restructuring or new investments from Washington. Instead, the recommendations focus on straightforward adjustments that are implementable, even in the current climate.

The federal government should focus and lead where it must, while strengthening federalism and ensuring opportunities for closer partnerships with cities and metropolitan areas. Outdated programs must be realigned and reformed to reflect the new and changing global economic reality. Finally, there are a few critically important investments that, due to their scope and the national nature of the aviation network, demand a federal presence.

### **1. Strengthen partnerships with cities, metro areas, the private sector, and other nations to maximize the performance of the global aviation network**

A targeted federalist international aviation policy has the power to coordinate investment plans at airports across the country, engender investment and operational confidence among domestic and international carriers, and set a common approach to matters of national importance. The policy must address a host of issue areas, and must move beyond the limited language in the formal 1995 statement of a U.S. international air transportation policy or the current U.S. Code.<sup>58</sup>

For international partners, the federal government should reduce restrictive rules and expand Open Skies agreements with other countries, whether through single or multilateral agreements. These agreements, which govern exactly how each country's air carriers may operate within another country, lack structural balance. For example, U.S. carriers have certain capabilities in Europe that European carriers do not have within the United States—but the agreements generally permit each country's carriers to operate direct routes between countries. Leaders should also continue to improve the tourist visa process in an effort to better reflect emerging economies across the world. Even with recent program adjustments, waits are still too long in allied countries like Brazil and India. Expanding these agreements and improving the visa process can provide U.S. carriers with new opportunities for business expansion, open new markets for U.S. aviation manufactures and parts suppliers, and simplify passenger travel to and from the United States.

The federal government should also empower metro areas to better meet their airport investment needs by raising the cap on Passenger Facility Charges. Currently, the PFC graduated charge system does not do enough to cover the capital needs of international gateways, many of which also function as major gateways for domestic through-traffic. Congress should increase the current cap of \$4.50 per passenger in these FAA-defined large hubs, and work with metropolitan and airline representatives to determine a new cap in the best interests of the airport authorities and the system's users. At the same time, public and industry leaders should determine if any operational adjustments can be made to offset the collection burden currently falling on the airlines. Legislators should also address the adversarial relationship between PFC-participating airports and AIP entitlement formulas.

A focused international aviation policy should also provide opportunities for increased competition and greater private participation in the aviation market. This comes in two forms. On the airline side, federal authorities should explore what a completely open airline ownership system, known as cabotage, would do for net consumer benefit. Would certain communities gain more connections as foreign airlines expand operations within the United States and create new hubs? Would domestic airlines lose significant market shares, impacting long-run American output? A formal exploration of cabotage would begin to answer many of these vital questions. On the airport side, the federal government should create a formal stance on airport privatization and its effects on local consumer benefit.<sup>59</sup> The trend in transportation finance is to continue exploring private financing avenues, and airport privatization is one area with an international record for comparison purposes and many implementation options at the local level. Authorities should also consider returning to the slot-pricing experiments conducted during the 2000s.

For private investors, the federal government should also recalibrate how the tax code treats airport authorities' bond issuances. As it stands, airports and their managing authorities turn to the private municipal bond markets for over half of all their capital funding.<sup>60</sup> However, the federal tax code categorizes some airport bonds as private activity bonds. This qualification means the bond holder's interest earned is subject to Alternative Minimum Tax (AMT) calculations, which reduces the bonds' market value and makes debt more expensive. The American Recovery and Reinvestment Act created a temporary AMT exemption—leading to an increase of over \$4 billion in bond sales during the two qualifying years—and added the ability to refinance bonds created in 2004 to 2008.<sup>61</sup> The Joint Committee on Taxation estimates the exemption would only cost the federal government \$49 million annually. Making the AMT permanent is a small price to pay for expanded airport investment.<sup>62</sup>

## **2. Realign existing programs to support metropolitan gateways and the changing global economy**

This research shows that the entire system relies on the capital investments and airport operations in just 17 metropolitan areas. Yet, focusing investments on these particular metro areas is not an example of the rich getting richer—all U.S. metro areas benefit from investment within this small group of aviation gateways.

The most straightforward way to support these gateways is to recalibrate the Airport Improvement Program (AIP). Simply removing the undercutting of higher passenger counts within the entitlement formulas is one way to restore fairness to the system. Since AIP derives funds from the Airport and Airway Trust Fund, it makes sense to similarly calibrate AIP around the passenger and facility charges that contribute the most to Trust Fund resources.<sup>63</sup> This means removing the four graduated reductions related to passenger boardings, and reducing the mandatory spending floor for general aviation airports. It also means removing the clause that fiscally punishes larger airports that collect PFCs. The 2012 FAA reauthorization bill added a measure limiting discretionary funding for small- and non-hub airports, but more can still be done to better align AIP discretionary spending with national capital investment needs. There is no question that non-commercial aircraft generate most flight activity, but policies should cater to passenger levels instead of flight operations.<sup>64</sup>

Washington also needs to continue to refine the Essential Air Service (EAS) program. EAS is the result of a post-airline deregulation effort to continue small town air service when market demand could not ensure profitability. The program is relatively small (at least \$199 million per year through FY 2015) and there is a need to subsidize air service to isolated communities, such as in Alaska or the Mountain West. However, the problem for our metropolitan international gateways is that the growth in short-haul air travel (500 miles or less) presents logistical, economic, and environmental challenges with airport capacity concerns ever-present.

Congress should continue the service restrictions passed in the 2012 FAA Modernization and Reform Act and reduce non-Alaska EAS communities to only those at least 300 miles from a small-, medium-, or large-hub airport. Scaling back the program would provide at least some modicum of relief to major metro areas and would make EAS a more efficient use of taxpayer money. If the public wants to continue to subsidize intermetropolitan travel between the newly excluded EAS communities, then it should subsidize more affordable intermodal alternatives to regional hub airports.

## **3. Focus on critical investments that demand a present federal partner**

The growth in passenger aviation, especially within the international sector, promises to continue funneling more passengers and aircraft operations to the country's largest metropolitan areas. Despite the recent improvement in aviation delays, many delays continue to concentrate within the same major international gateways.<sup>65</sup> In 2011 alone, the 14 airports representing the worst arrival delay rates were all in an international metropolitan gateway.<sup>66</sup>

Investments in the Next Generation Air Transportation System, or NextGen, and in passenger facilities, are the most promising ways to address these gateway-concentrated delays.

NextGen is a set of physical investments that will dramatically redefine the way aircraft and airports interact with one another.<sup>67</sup> It will replace the United States' aging radar-based air traffic control system with a satellite-based one. The program will require investments in airplane capital stock, through the installation of on-board Global Positioning System (GPS) equipment, and in ground facilities, including airport and other facilities to read and process GPS data. Once complete, NextGen promises to simultaneously create more airspace capacity and enhance safety, all by allowing aircraft to fly closer together and by better tracking a plane's actual flight path. NextGen also promises to deliver significant environmental benefits to the current aviation profile through reduced fuel consumption.

The entire program comes with a conservative \$15 billion to \$20 billion price tag, one of the largest infrastructure programs in the country, with additional costs borne by the airlines to outfit their aircraft.<sup>68</sup> The program currently relies on various and incomplete funding sources, causing uncertainty for long-run project timelines. At the same time, the projects where FAA already started work have not had a perfect track record, leading to calls for more oversight and better short-term and long-range planning.<sup>69</sup> There is also the major legal question of which parties will pay what shares of onboard equipment procurement and installation.<sup>70</sup>

An additional element is the international perspective. To gain the full benefits from their NextGen investments, American commercial planes should be able to use their new GPS equipment in international airspace. Similarly, American airports will only gain partial benefits from ground-based NextGen investments if foreign aircraft do not install similar satellite technology. The main governmental actors leading NextGen implementation should not overlook this component of the program, especially considering the annual growth in international passengers.

Lastly, the federal government should strengthen its international statistical services. The current federal aviation statistical program is one of the strongest within the Bureau of Transportation Statistics. However, there is a missing link between complete single-segment data and sample-driven, private international itinerary data. A more robust international dataset would include all international itineraries, similar to the services provided by Sabre and other aviation data firms. Creating such a dataset would reduce the financial burden on airport authorities to purchase private data, and help local leaders—inside and beyond the airport—better understand their global relationships. The data can also help capacity-constrained airports prioritize their international routes over domestic routes with viable modal alternatives. Such knowledge can better target investments, from airport capital to trade missions, and reduce wasted spending.

## Conclusion

**A**s American metropolitan areas continue to expand their global trade networks, they stand to benefit from a well-connected international aviation network. Metropolitan economies have taken advantage of these networks, with international air passenger levels more than doubling over the past two decades. This included growth to some of the most rapidly expanding metropolitan economies in the world, from Shanghai and Istanbul in the Eastern Hemisphere to Sao Paulo and Buenos Aires in the Western.

That system relies on a condensed pool of 17 U.S. metropolitan gateways that generate and host large shares of international passengers while filtering passengers to other metropolitan areas with limited international connections. They cover major economic and population centers such as New York and Los Angeles to the smaller, airline specific hubs of Denver and Charlotte. These 17 gateways enable everything from foreign business trip to Des Moines or a vacation in Charleston.

However, the current policy environment does not reflect the vital role these major gateways play in globally connecting all domestic metropolitan areas. Federal investment policies tend to favor smaller airports at the expense of larger ones, while the regulations involving municipal airport bonds do local airport authorities no favors. The entire federalist web of airport-related public policies suggests a system with ambiguous priorities.

With the increasingly competitive global marketplace, now is the wrong time for ambiguity. Federal officials need to recognize the primacy of certain metropolitan areas and prioritize aviation investments in those places for the benefit of travelers across the country. Metropolitan leaders must also have the freedom and flexibility to increase investments in their aviation-related infrastructure portfolio, helping to build the physical investments of today to support the global trade of tomorrow. And leaders at all levels must work together to prioritize the shared operational elements that will power the aviation network for decades to come.

## Endnotes

1. Adie Tomer is a Senior Research Associate and Associate Fellow with the Brookings Institution's Metropolitan Policy Program. Rob Puentes is a Senior Fellow with the Brookings Institution's Metropolitan Policy Program where he also directs the Program's Metropolitan Infrastructure Initiative. Zachary Neal is an Assistant Professor of both Sociology and Global Urban Studies at Michigan State University.
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