



October 2020

PUERTO RICO

Perspectives on the Potential to Expand Air Cargo Operations

Accessible Version

GAO Highlights

Highlights of [GAO-21-21](#), a report to congressional committees

Why GAO Did This Study

Puerto Rico's economy has been in decline for much of the last 15 years and was devastated by hurricanes in 2017. Puerto Rico has sought to increase air cargo and passenger traffic at its international airports as a means to bolster and diversify its economy. Specifically, Puerto Rico seeks to serve as a transshipment point for transferring cargo between air carriers flying from Europe to Latin America. Air cargo, whether carried in the holds of passenger aircraft or by cargo-only aircraft, is an important component of global trade.

The FAA Reauthorization Act of 2018 includes a provision for GAO to study the international air cargo transportation services among the United States and the African, Latin American, and European regions and the potential expansion of air cargo operations in Puerto Rico. This report addresses (1) what is known about air cargo operations between these world regions; (2) factors affecting the development of air cargo markets; and (3) Puerto Rican officials' and selected industry stakeholders' views on the economic effect and potential of expanding air cargo operations in Puerto Rico. GAO analyzed DOT and European air cargo data for flights between the U.S. and the selected regions for 2016 through 2018 (the latest available data). GAO also interviewed officials from DOT, and stakeholders from Puerto Rico and the air-cargo industry, selected based on prior GAO work and stakeholder mission.

View [GAO-21-21](#). For more information, contact Heather Krause at (202) 512-2834 or krauseh@gao.gov.

October 2020

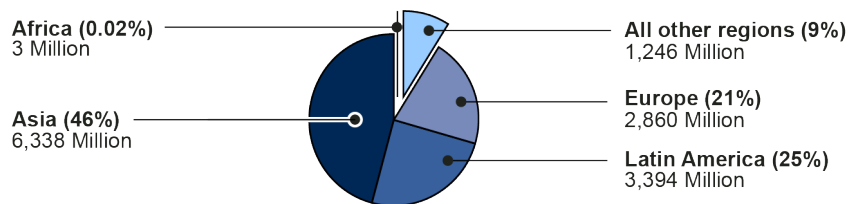
PUERTO RICO

Perspectives on the Potential to Expand Air Cargo Operations

What GAO Found

Cargo was flown by air between more than 97 countries within the selected regions of Africa, Europe, Latin America, and the U.S. that may affect air cargo expansion in Puerto Rico. However, according to Department of Transportation (DOT) and European Union data, most international air cargo transportation was concentrated at a handful of countries and at airports in these regions. For example, four countries in Europe accounted for 72 percent of the U.S.-European Union air cargo transported, by weight. Likewise for airports, Miami International Airport accounted for 70 percent of air cargo transported between the U.S. and Latin America. Worldwide, cargo-only carriers transported on average 13.8 billion pounds of air cargo to and from the U.S. from 2016 through 2018. Of that cargo, two of the selected regions—Latin America and Europe—when combined accounted for 46 percent.

Air Cargo Transported by Cargo-Only Airlines between the U.S. and Global Regions, Average Weight in Millions of Pounds, 2016 through 2018



Source: GAO analysis of Department of Transportation data. | GAO-21-21

Based on interviews with industry stakeholders and studies reviewed, GAO identified four factors that are generally associated with an airport's ability to attract air cargo traffic: (1) an airport's geographical location; (2) its proximity to transportation networks; (3) its supporting airport infrastructure and resources; and (4) the governmental and regulatory environments. For example, an airport located near businesses that generate large volumes of both inbound and outbound cargo that could be transported by air may be an important geographic factor for air carriers.

Puerto Rican government and industry stakeholders GAO spoke with said that increased air cargo would benefit its airports and lead to positive effects on the Puerto Rican economy. For example, officials noted that expansion of air cargo operations could increase the use of underutilized airports and create opportunities for existing industry—such as the pharmaceutical, medical device, and aerospace industries—and help develop new ones. Puerto Rican and industry stakeholders had varying perspectives on the potential for Puerto Rico's expanding its air cargo operations. For example, some stakeholders said Puerto Rico's geographic location may allow it to serve as a refueling and cargo distribution point, particularly for flights between Europe and Latin America, while others said the island may be too close to some Latin American destinations to serve that purpose. Whether and to what extent Puerto Rico can increase air cargo operations depends on how air carriers weigh the various factors discussed above.

Contents

Background	6
Within Selected Regions, International Air Cargo Shipments Tend to Be Concentrated at a Handful of Airports in a Few Countries	15
A Variety of Factors Influence an Airport's Ability to Attract Substantial Air Cargo Traffic	23
Stakeholders Identified Benefits of Increased Air Cargo to Puerto Rico but Held Varied Opinions on the Potential to Increase Operations	28
Agency Comments	33

Appendix I: GAO Contacts and Staff Acknowledgments	36
--	----

Figures

Figure 1: Comparison of Air Cargo Aircraft to Passenger Aircraft	9
Figure 2: The Location of Puerto Rico's Three International Airports	13
Figure 3: Air Cargo Transported by Cargo-Only Airlines between the U.S. and Global Regions, Average Weight in Millions of Pounds, 2016 through 2018	16
Figure 4: Latin American Countries with the Most Cargo Transported by Air to and from the U.S., Average Weight 2016 through 2018	17
Figure 5: U.S. Airports with the Most Cargo Transported by Air to and from Latin America, Average Weight 2016 through 2018	18
Figure 6: Latin American Airports with the Most Cargo Transported by Air to and from the U.S., Average Weight 2016 through 2018	19
Figure 7: European Countries with the Most Cargo Transported by Air to and from the U.S., Average Weight 2016 through 2018	20
Figure 8: African Countries with the Most Cargo Transported by Air to and from the U.S., Average Weight 2016 through 2018	21

Figure 9: European Countries with the Most Cargo Transported by Air to and from Latin America, Average Weight 2016 through 2018	22
Figure 10: Latin American Countries with the Most Cargo Transported by Air to and from Europe, Average Weight 2016 through 2018	23
Figure 11: Examples of Air Cargo Infrastructure at Miami International Airport	26
Figure 12: FedEx Express' Ramp and Warehouse at Luis Muñoz Marín Airport in San Juan	29

Abbreviations GAO-21-21

ACRP	Airport Cooperative Research Program
COVID-19	Coronavirus Disease 2019
DOT	U.S. Department of Transportation
EU	European Union

This is a work of the U.S. government and is not subject to copyright protection in the United States. The published product may be reproduced and distributed in its entirety without further permission from GAO. However, because this work may contain copyrighted images or other material, permission from the copyright holder may be necessary if you wish to reproduce this material separately.



October 29, 2020

The Honorable Roger Wicker
Chairman
The Honorable Maria Cantwell
Ranking Member
Committee on Commerce, Science, and Transportation
United States Senate

The Honorable Peter DeFazio
Chairman
The Honorable Sam Graves
Ranking Member
Committee on Transportation and Infrastructure
House of Representatives

Puerto Rico's economy has been in decline for much of the last 15 years. In 2018, we reported that Puerto Rico's economic output, as measured by real gross domestic product, fell by more than 9 percent (from \$82.8 billion to \$75.0 billion) between 2005 and 2016,¹ and its population declined by 411,000, or about 11 percent, during the same period. Puerto Rico faced additional challenges in the aftermath of Hurricanes Irma and Maria, which made landfall in September 2017, causing loss of life, displacement of its residents, and substantial infrastructure damage.

To help address these challenges, Puerto Rico has sought to bolster and diversify its economy. For example, Puerto Rico is pursuing efforts to help increase air cargo and passenger traffic at the island's three international airports.² These airports, including the island's main airport in San Juan, saw overall declines in both cargo volume and passengers from 2006 to 2017, and are substantially underutilized, according to Puerto Rican government officials.

¹GAO, *Puerto Rico: Factors Contributing to the Debt Crisis and Potential Federal Actions to Address Them*, [GAO-18-387](#) (Washington, D.C.: May 9, 2018). Dollar figures are in 2005 dollars.

²For the purposes of this report, air cargo is property transported by an aircraft other than baggage accompanied or checked by passengers (14 C.F.R. § 241.03 (section 03)). This report focuses on Puerto Rico's efforts with respect to air cargo rather than passenger traffic.

Some studies have shown that airports may serve as regional economic engines and stimulate the expansion of related service industries. For example, a 2014 Airport Cooperative Research Program (ACRP)³ study of the economic effect of air cargo operations at selected airports estimated John F. Kennedy International Airport's air cargo operations provided a \$23 billion economic impact to the New York City metropolitan area. Similarly, the same report estimated Kansas City International Airport's air cargo operation provided a \$134 million economic impact to the Kansas City metropolitan area.⁴ Since the beginning of the Coronavirus Disease 2019 (COVID-19) pandemic in 2020, air cargo transport has served as a critical means of supplying medical and protective materials to healthcare providers.

Section 537 of the FAA Reauthorization Act of 2018, enacted October 5, 2018, includes a provision for GAO to conduct a study of international air cargo transportation services among the U.S. and African, Caribbean Basin, Central American, European, and South American countries and the potential effect of the establishment of an air cargo hub in Puerto Rico.⁵ This report addresses:

³Airport-related research is conducted by the Airport Cooperative Research Program (ACRP), which is sponsored by the Federal Aviation Administration and managed by the Transportation Research Board, one of the major programs within the National Academies of Sciences, Engineering, and Medicine.

⁴ACRP, *Estimating the Economic Impact of Air Cargo Operations at Airports, Part 1: User's Guidebook and Part 2: Research Report*, (Washington, D.C.: 2014). We previously reviewed 13 economic studies that examined whether the availability and extent of air service was associated with economic growth in a local area. GAO, *Commercial Aviation: Effects of Changes to the Essential Air Service Program, and Stakeholders Views on Benefits, Challenges, and Potential Reforms*, [GAO-20-74](#) (Washington D.C.: Dec. 10, 2019). In reporting that most of those studies found a correlation between aviation activity and economic development, we noted that determining whether aviation activity leads to local economic growth is challenging because the causation between these factors may be bidirectional. While aviation activity may drive growth in jobs, incomes, and economic output in a region, it is also possible that such economic growth leads to more robust aviation activity.

⁵Pub. L. No. 115-254, § 537, 132 Stat. 3186, 3370 (2018). Federal law and Department of Transportation regulations define airports as hubs in terms of the number of passenger boarding but do not have a similar definition for cargo hubs. 49 U.S.C. § 40102, 14 C.F.R. § 398.2(a). The International Civil Aviation Organization defines a hub airport as generally meaning any airport having numerous inbound and outbound flights and a high percentage of coordinated connecting traffic to facilitate transshipment of passengers, freight, or mail.

- what is known about air cargo operations between selected world markets,
- selected air-cargo industry stakeholders' views on key factors that help airports attract air cargo operations, and
- the potential economic effects identified by Puerto Rican and other stakeholders and stakeholders' views on the potential for expanding air cargo operations in Puerto Rico.

To identify what is known about air cargo operations between the U.S. and its territories and selected world regions—Africa, Europe, and Latin America—we obtained and analyzed data on international flights between the U.S. and the three regions and between Europe and Latin America. For flights involving the U.S., we used data from the U.S. Department of Transportation's (DOT) Air Carrier Statistics database for calendar years 2016 through 2018. We chose this 3-year time frame because it represented the most recent data and air cargo markets are dynamic so older data may not be reflective of current operations. We obtained these data from Diio, a private contractor that provides online access to U.S. airline financial, operational, and passenger data. We determined that the data were sufficiently reliable for our purposes by reviewing the relevant documentation of the dataset and quality control procedures used by Diio and steps taken to assess data reliability for previous GAO reports that used data from this contractor. The Air Carrier Statistics database includes international non-stop segment data reported by both U.S. and foreign air carriers. Specifically, it includes information on point-to-point flights between U.S. and foreign airports, including the carrier's name, service class,⁶ and amount of cargo transported in pounds.⁷ The data do not include information on cargo transported between foreign airports. For this analysis, we identified the amount, in pounds, of cargo transported between the U.S. and each country in Africa, Europe, and Latin America

⁶Service class refers to the type of air service, including scheduled passenger and cargo flights; scheduled cargo-only flights; non-scheduled passenger and cargo flights; and non-scheduled cargo-only flights.

⁷The Air Carrier Statistics database uses the term freight for the amount, in pounds, of property transported by air, other than mail and passenger baggage. In this report, we use the term cargo instead of freight.

appearing in the data⁸ by scheduled and non-scheduled cargo-only carriers. We excluded cargo carried by passenger carriers because 63 percent of cargo, by weight, involving the U.S. is transported by cargo-only carriers. In addition, according to several industry associations, passenger carrier operational decisions, such as routes and hub locations, are driven principally by passenger demand; cargo is a secondary consideration.

For the Europe-Latin America air cargo market, we obtained and analyzed data from Eurostat, the Statistical Office of the European Union (EU), for the same 3-year time period. These data include information on international flights between European and Latin American airports reported by EU member states,⁹ including the amount of cargo transported, in “tonnes,” which we converted to pounds, by both passenger and cargo-only flights; separate cargo-only carrier data were not available.¹⁰ To identify the types and approximate value of cargo transported by air between world regions, we obtained and analyzed data from the U.S. Department of Commerce’s Census Bureau and from Eurostat on goods exported and imported using air transportation for calendar years 2016 through 2018. We used data from the Census Bureau’s USA Trade[®] Online website, for cargo involving the U.S., and from Eurostat’s International Trade in Goods Statistics, for cargo transported between Europe and Latin America. We determined that the Eurostat and Census data were sufficiently reliable for our purposes by reviewing the relevant documentation of the dataset and quality control procedures used by Eurostat and Census. Factors considered for selecting the world regions of Africa, Europe, and Latin America were geographic proximity to Puerto Rico and existing air cargo operations that

⁸The DOT data categorize each country into one of nine geographic areas, including Africa, Caribbean, Central America, Europe, North America, and South America. For purposes of the analysis of DOT data, we defined our selected regions of Africa and Europe as all the countries categorized by DOT as Africa and Europe, respectively. We defined our selected region of Latin America as all the countries categorized by DOT as Caribbean, Central America, and South America, as well as Mexico, which is categorized as North America. Cargo-only carriers did not report transporting cargo to or from all of the countries in the selected regions.

⁹The EU data represent information reported by 27 EU member states; we excluded the United Kingdom because complete data were not available at the time we obtained it. For purposes of the analysis of EU data, we defined Latin America as those countries categorized by the EU as Central America and Caribbean and as South America.

¹⁰A “tonne,” also called a metric ton, is a unit of weight equal to 1,000 kilograms or 2,205 pounds.

fly over or close to Puerto Rico. These regions are also specified in the mandate. We also interviewed officials from DOT, the U.S. Department of Commerce, including the Census Bureau, International Trade Administration, and Bureau of Economic Analysis.

To identify key factors for attracting air cargo operations and stakeholders' views on them, we conducted semi-structured interviews with representatives from selected industry stakeholders relevant to air cargo operations, including seven domestic cargo airlines with international operations,¹¹ six aviation industry associations,¹² and two high-volume cargo airports in the U.S.¹³ We sought to select the largest U.S. cargo airlines in terms of pounds of cargo transported from 2016 through 2018, using the same Air Carrier Statistics data as above. The carriers interviewed represent 59 percent, by weight, of international cargo transported by all U.S. carriers. We selected the industry associations from among aviation-related associations that include cargo as part of their mission and based on prior GAO work; airports were selected based on their relevance to Puerto Rican efforts to increase air cargo operations. We also reviewed relevant studies produced by ACRP, studies commissioned by the Puerto Rican government, and other documents that we identified from DOT, Puerto Rican government, and international aviation bodies and association websites. We also conducted a site visit to Miami International Airport, which is one of the highest-volume U.S. cargo airports, and researched air cargo operations of other domestic and international airports using information obtained from their public websites, DOT, or studies we reviewed. Since our selection comprises a non-representative sample, the results are not generalizable to all stakeholders.

For potential economic effects identified by stakeholders, we reviewed documents from the Puerto Rican government and the DOT docket created for Puerto Rico's application for expanded cargo and passenger transfer flexibility, and studies identified in the previous paragraph on key

¹¹Selected cargo carriers include ABX Air, Amerijet, ATI Air, Atlas Air, FedEx Express, Polar Air Cargo Worldwide, and UPS.

¹²Selected associations include Airlines for America, Airports Council International, Express Association of America, International Air Transport Association, National Air Carrier Association, and The International Air Cargo Association.

¹³The selected high-volume U.S. air cargo airports are Ted Stevens Anchorage International and Miami International.

factors.¹⁴ We conducted a site visit to Puerto Rico and interviewed officials from Puerto Rican government agencies with aviation or economic development missions.¹⁵ We also interviewed representatives from relevant Puerto Rican private sector organizations, such as industry and business associations, as well as Aerostar, the company that operates Luis Muñoz Marín International Airport in San Juan.¹⁶ Collectively, we refer to these stakeholders as “Puerto Rican stakeholders.” We also toured the facilities of a major U.S. air cargo carrier at Luis Muñoz Marín International Airport and interviewed officials from the U.S. Customs and Border Protection. Finally, we obtained views on the potential for expanding air cargo operations from these industry and Puerto Rican stakeholders through interviews, as described above.

We conducted this performance audit from March 2019 to October 2020 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

In calendar year 2019, U.S. imports and exports of goods were valued at \$2.5 trillion and \$1.7 trillion, respectively and entailed trade with 232 countries, according to U.S. Census Bureau data. Worldwide trade in goods was valued at \$19.1 trillion in the same year. Air and marine transportation are the principal modes of intercontinental cargo transport,

¹⁴DOT, *In the matter of Expanded Cargo and Passenger Flexibility at Puerto Rican International Airports*, Docket DOT-OST-2019-0085, Application of the Commonwealth of Puerto Rico on Behalf of Its International Airports (June 7, 2019) and *In the matter of Expanded Cargo and Passenger Flexibility at Puerto Rican International Airports: Final Order* 2020-4-10, Docket DOT-OST-2019-0085 (Apr. 29, 2020).

¹⁵We met with Puerto Rican officials from the Puerto Rico Ports Authority, the Puerto Rico Department of Economic Development and Commerce, the Public Private Partnerships Authority, the Puerto Rico Federal Affairs Administration, and the Financial Oversight & Management Board for Puerto Rico.

¹⁶We met with representatives from the following four associations: the Puerto Rico Chamber of Commerce, the Pharmaceutical Industry Association of Puerto Rico, the Puerto Rico Manufacturer’s Association, and the Private Alliance for the Economic Development of Puerto Rico.

and both are critical to overseas trade. Most such cargo is transported by sea; however, air transport offers certain advantages over maritime transport, especially when speed of delivery is required. On the other hand, air transport is the most expensive mode of carriage and historically has carried the least amount of goods by weight on an annual basis.¹⁷ As a result, air transport is typically used for time-sensitive, high-value, or perishable goods, such as computers and electronics, pharmaceuticals, live animals, flowers, fruit, vegetables, and seafood. Air cargo is also a key component of the world's manufacturing supply chain. Air cargo operations can offer manufacturers "just-in-time" resupply of materials and goods rather than by maintaining inventory. Global revenue from air cargo generated by air carriers was \$100 billion in 2017, according to an industry analysis.¹⁸ The same analysis forecasts global air cargo traffic to grow by 4.2 percent annually over the next 20 years. That forecast, however, preceded the COVID-19 global pandemic, and thus it does not take this event into account.

Air Cargo Industry

The air cargo industry differs from the air passenger industry in that cargo is typically booked one-way (as opposed to roundtrip) and more air cargo may be carried between two points in one direction than the other. Transporting goods by air allows greater routing flexibilities than transporting passengers because cargo does not necessarily have to travel a direct route from origin to destination. For example, a shipper may choose from among a number of possible routes, to provide either the fastest delivery, lowest cost, or most reliable protection for perishable cargo, depending upon the needs of the client. Accordingly, an air-cargo logistics industry exists for the efficient flow of goods by air from point of origin to destination. This industry includes air carriers and aircraft, airports, logistics providers such as freight forwarders, and customs brokers for international cargo, among others.

¹⁷Goods transported by air accounted for less than 1 percent, by weight, of all goods transported but represented about 35 percent of their value, according to a 2018 industry analysis. Boeing Company, *World Air Cargo Forecast 2018-2037* (Seattle, WA: Oct. 16, 2018).

¹⁸Boeing Company, *World Air Cargo Forecast 2018-2037*.

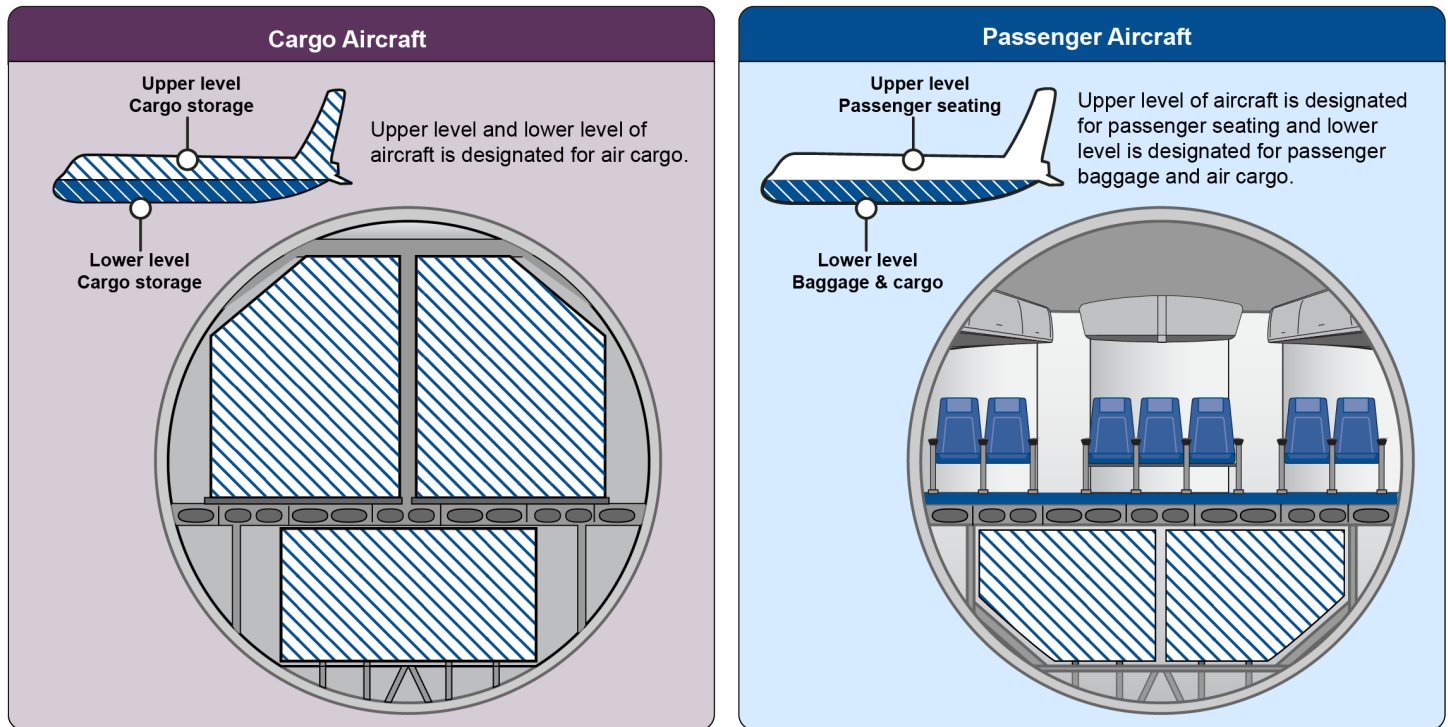
Air cargo carriers. There are two types of air cargo carriers, each of which carry about half the global air cargo traffic annually, according to an industry estimate:¹⁹

- **Passenger carriers.** These airlines primarily operate aircraft configured for carrying passengers and may carry cargo—called “belly-cargo”—in any excess space on the lower decks of their aircraft after passengers’ baggage is loaded (see fig. 1). These airlines fly to many locations, with major carriers typically using a hub-and spoke concept to provide scheduled passenger service to multiple destinations from a single location. Even though each passenger aircraft can carry substantially less cargo than a dedicated cargo aircraft, passenger carriers transport about half of all air cargo worldwide on an annual basis because of the high number and frequency of passenger flights. The amount of cargo transported by passenger carriers varies by market, however. For example, passenger carrier belly-cargo accounts for only about 25 percent of the air cargo volume between North America and Asia – a route with comparatively heavy demand for air cargo service.
- **Cargo-only carriers.** These airlines operate aircraft configured specifically for carrying cargo. Compared to passenger aircraft, dedicated cargo aircraft can carry a wider range of cargo types, such as large or unusually shaped cargo, hazardous material, and livestock and other animals. Some cargo-only carriers transport cargo from airport-to-airport while others provide door-to-door cargo transport service.²⁰ The latter type of cargo-only carriers, also known as integrated express carriers, are the door-to-door carriers that pick up goods at the point of origin (typically by truck), carry them to airports for shipment as air cargo, and deliver them from airports to their specific destinations by truck.

¹⁹Boeing Company, *World Air Cargo Forecast 2018-2037*. Boeing estimated that in 2016, cargo-only carriers transported slightly more than half of air cargo traffic, as measured in revenue tonne-kilometer. One revenue tonne-kilometer is one tonne of revenue freight carried one kilometer. In this report, unless otherwise indicated, we present cargo in pounds.

²⁰Atlas Air and ABX Air are examples of the former while FedEx Express and UPS are examples of the latter.

Figure 1: Comparison of Air Cargo Aircraft to Passenger Aircraft



Source: GAO. | GAO-21-21

Airports. Broadly speaking, airports facilitate the transfer and handling of air cargo by providing infrastructure, facilities, and support services. Airports, which in the U.S. are virtually all public entities, may earn revenue from air cargo operations in a variety of ways, including landing fees paid by air carriers; delivering services such as sales of fuel or other services; and fees for the use of cargo facilities such as for short term storage. According to an ACRP study, the roles airports play in air cargo services may be divided into several categories,²¹ including:

- **International gateways.** These airports function as transshipment points, where international air cargo is consolidated, processed, and distributed. Accordingly, they are not reliant on their surrounding areas to generate sufficient amounts of air cargo to support their

²¹These categories are not mutually exclusive—some airports may play roles in multiple categories.

cargo operations.²² A key characteristic of these types of airports is the availability of connections to a wide range of international locations, either through domestic or foreign carriers. For example, U.S. cargo destined for Europe may be transported from locations throughout the U.S. by air or truck to an international gateway, such as John F. Kennedy International Airport in New York, where it may be consolidated with other cargo, and transported by air to Europe. Other examples of international gateway airports in the U.S. are Miami International Airport in Florida and Ted Stevens Anchorage International Airport in Alaska, which serve as gateways for air cargo traffic to and from Latin America and Asia, respectively.

- **National and regional cargo hubs.** These airports function as focal points for integrated express carriers such as FedEx Express and UPS. For example, flights from around the world arrive at the carrier's national hub, where the package cargo is unloaded, sorted, and re-loaded onto appropriate outbound aircraft. Like international gateway airports, these airports are not reliant on their surrounding areas to generate sufficient amounts of air cargo to support cargo operations but owe the scale of their air cargo operations to individual integrated express carriers. Examples of national hubs include the FedEx Express "super hub" at Memphis International Airport and UPS's hub at Louisville Muhammad Ali International Airport; examples of regional cargo hubs include FedEx Express' hub at Indianapolis International Airport and UPS's hub at Dallas/Fort Worth International Airport.
- **Origin and destination airports.** These airports are generally located in areas with a concentration of population, industry, commerce, and transportation infrastructure, particularly highways. Because these airports typically represent the origin or destination points for the air cargo they are handling, they are reliant on cargo generated from the surrounding areas. An example of an origin and destination air-cargo airport is San Antonio International Airport.²³

Transporting cargo by air requires both supporting infrastructure at an airport and, in some cases, its surrounding area. Supporting airport physical infrastructure for cargo operations typically includes warehouses on the airport premises; taxiways to allow aircraft access to the

²²Transshipment refers to cargo that simply passes through an airport—that is, the cargo originates from and is destined for other airports. The cargo may remain on the same aircraft or be transferred between aircraft before continuing on to its destination.

²³ACRP, *Guidebook for Air Cargo Facility Planning and Development* (Washington, D.C.: 2015).

warehouses; and aircraft parking space. In addition to airport infrastructure, moving cargo to and from airports requires intermodal transportation networks such as highways, railroads, and maritime ports. Depending on how goods flow through the air-cargo supply chain, airport cargo facilities such as warehouses may serve as cargo handling and distribution facilities where cargo is sorted and transferred between airplanes or between airplanes and other modes such as trucks. These airside facilities may be carrier-specific, handling cargo from a single carrier, or general facilities, handling cargo for multiple carriers.²⁴

Both U.S. and foreign air-cargo carriers transport cargo to and from the U.S. Foreign carriers' operations in the U.S. are governed by DOT's Office of the Secretary, which licenses and authorizes airlines to operate to, from, and in limited cases within the U.S., and by aviation agreements between the U.S. and their home country.²⁵ These agreements, negotiated by the Departments of State, Commerce, and Transportation with representatives of foreign governments, establish air traffic rights that specify how and where airlines can operate in each country.²⁶ Foreign carriers are generally prohibited from engaging in "cabotage"—i.e., transporting domestic cargo or passengers solely between points within the U.S.²⁷ For example, although a foreign air carrier transporting cargo and passengers from a foreign country may land at a U.S. airport, it is

²⁴Air cargo sorting and storing facilities may also be located in the nearby airport vicinity.

²⁵The movement of air cargo to the U.S. is also subject to regulatory oversight by TSA, which requires that entities engaged in the movement of air cargo operate under an approved security program and be subject to TSA's inspection authority. See 49 U.S.C. §§ 44901 and 44903.

²⁶Until the early-1990s, aviation agreements tended to include restrictive elements that limited operations, such as the routes that airlines could serve between the countries, the number of airlines allowed to operate, or the frequency of flights. For example, a 1985 agreement between the U.S. and Argentina limited routes by Argentinian airlines to three U.S. cities and limited all-cargo operations to eight round-trips per week. However, since the early-1990s, the U.S. has pursued a policy of reducing or eliminating these kinds of restrictions on both U.S. and foreign carriers' operations, through the use of bi-lateral and multi-lateral "open skies" agreements. For example, a 2007 agreement between the U.S. and the European Union does not limit the number of airlines that may provide service to the U.S., the cities that could be served, or the frequency of flights. According to DOT, the U.S. has 130 such open skies agreements, but agreements with restrictive elements are still in place with some foreign countries.

²⁷"Cabotage" laws are designed to limit the domestic transport of goods and passengers to a country's national flagged vessels or aircraft. 49 U.S.C. § 41703, 19 C.F.R. § 122.165.

generally prohibited from taking on or exchanging cargo or passengers and continuing to another point in the U.S.

Puerto Rico's Existing Air Cargo Operations

Puerto Rico has existing air cargo operations at its three international airports.²⁸ Luis Muñoz Marín International Airport is the largest, ranked 24th in 2018 among all U.S. airports in terms of total pounds of air cargo. Puerto Rico currently serves as a regional hub for air cargo—including for cargo carriers such as Amerijet and FedEx Express—from mainland U.S. to Puerto Rico and the surrounding Caribbean islands and countries. For example, FedEx Express operates a daily flight to Luis Muñoz Marín International Airport, generally distributing this cargo locally on the island by truck or to other international locations in the Caribbean on board smaller aircraft. Most air-cargo activity in Puerto Rico currently takes place at Luis Muñoz Marín and at Rafael Hernández International Airport in Aguadilla (see fig. 2).

²⁸These are Luis Muñoz Marín International Airport in San Juan, Rafael Hernández International Airport in Aguadilla, and Mercedita International Airport in Ponce. While these airports are all owned by the Puerto Rico Ports Authority, Luis Muñoz Marín International Airport is operated by a private sector company under a 40-year lease agreement. The remaining airports are operated by the Puerto Rico Ports Authority.

Figure 2: The Location of Puerto Rico's Three International Airports



Source: Puerto Rico Government Application to DOT and MapInfo (Map). | GAO-21-21

As previously noted, Puerto Rico is seeking to increase the amount of air cargo and passengers passing through its airports. Specifically, Puerto Rico hopes to become a transshipment point for foreign-passenger and air-cargo carriers traveling between Europe and Latin America. For example, according to Puerto Rican officials, European carriers could stop in Puerto Rico and transfer cargo and passengers to other aircraft bound for other locations in the Caribbean, Central America, and South America, or to a U.S. carrier bound for domestic locations. To achieve this goal, Puerto Rico applied for in 2019, and was granted in 2020,²⁹ DOT authorization for foreign air carriers similar to those provided to Alaska

²⁹DOT, Application of Puerto Rico, Docket DOT-OST-2019-0085-0001 (Jun 7, 2019), and *Final Order* 2020-4-10, Docket DOT-OST-2019-0085-0036 (April 29, 2020). Puerto Rico also requested, and DOT granted, exemptions to allow foreign carriers to transfer passengers at its airports.

and others.³⁰ In addition to the DOT authorization, Puerto Rico's representative to Congress introduced legislation³¹ in the 116th Congress that, if enacted, would extend to Puerto Rico the same unique statutory authority provided only to Alaska's international airports in 2003. This authority allows foreign carriers to transport certain cargo between Alaska and other points in the U.S.³² According to DOT officials, no other U.S. airport has a similar statutory authority, which allows DOT-licensed foreign air carriers to conduct limited air-cargo transfer operations that would otherwise be considered cabotage, subject to qualifying statutory criteria.

³⁰In response to applications filed by specific U.S. states or territories, DOT has provided authorization to foreign air carriers to conduct certain cargo operations at specific locations the carriers may not otherwise be authorized to use. For example, under the authorization provided to Alaska, any foreign carrier approved by DOT to operate in the U.S. was allowed to operate at the Anchorage and Fairbanks airports in Alaska. DOT, *In the matter of Expanded Cargo Transfer Flexibility at Alaska International Airports: Final Order* 96-11-2, Docket DOT-OST-96-1600-28 (Nov. 1, 1996). Although these authorizations are applicable to the foreign carriers, which generally benefit from them, the states and territories filing the applications seek to benefit local airports and economies. According to DOT, it approves these authorizations to help address identified disadvantages associated with the locations' geographic isolation or comparatively lower level of air service; none of these authorizations it has approved, however, allows cabotage. In addition to Puerto Rico and Alaska, DOT has granted similar authorizations at different times to Hawaii and the U.S. territories of Guam and the Northern Marianas Islands. For example, see DOT, *In the matter of Expanded Air Services at Hawaii International Airports: Order* 99-12-10, Docket DOT-OST-99-5723 (Dec. 10, 1999) and *In the matter of Expanded Air Services at the Antonio B. Won Pat International Airport, Guam: Final Order* 2006-12-21, Docket DOT-OST-2006-23918 (Dec. 22, 2006).

³¹Puerto Rico Air Cargo Industry Empowerment Act, H.R. 2357, 116th Cong. (2019). No action has been taken on this bill as of October 21, 2020.

³²Vision 100—Century of Aviation Reauthorization Act, Pub. L. No. 108-176, § 808, 117 Stat. 2490, 2588 (2003) provided this air cargo authority in 2003 under what is commonly referred to as the "Stevens Amendment," named after Senator Ted Stevens of Alaska, who introduced the amendment. 49 U.S.C. § 41703 (e).

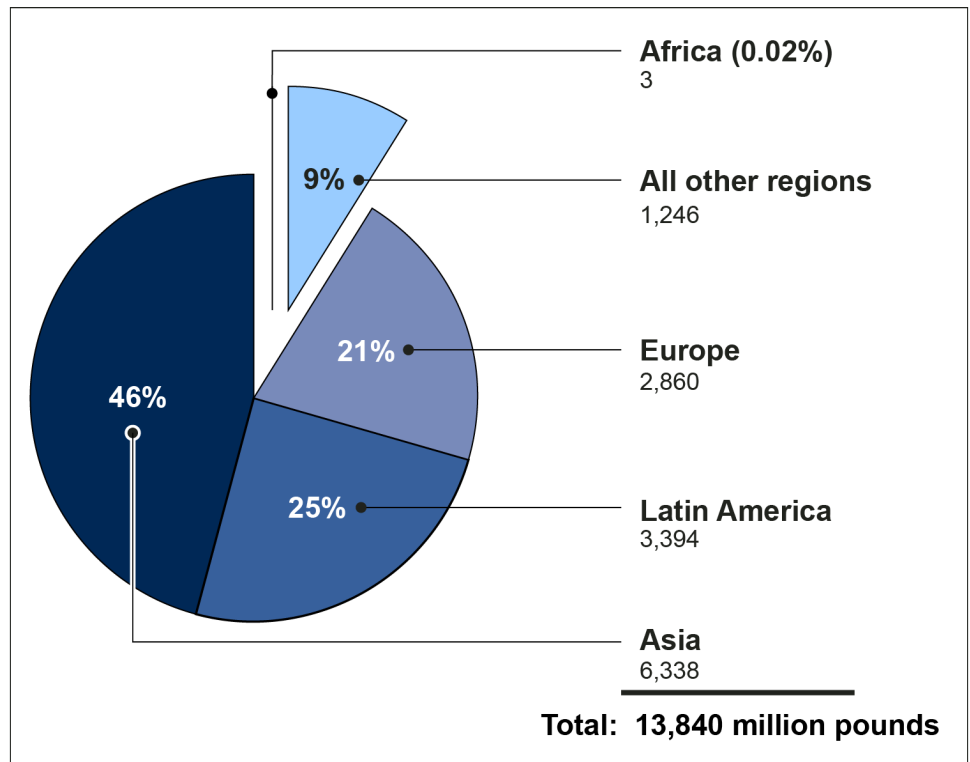
Within Selected Regions, International Air Cargo Shipments Tend to Be Concentrated at a Handful of Airports in a Few Countries

Nearly Half of U.S. International Air Cargo Was Transported between Selected Regions, Mostly between the U.S. and a Handful of Countries

From 2016 through 2018, cargo transported by cargo-only carriers between the U.S. and the selected regions—Latin America, Europe, and Africa—represented 46 percent of U.S. international air cargo transportation. Specifically, of the average annual 13.8 billion pounds of cargo these carriers transported between the U.S. and the rest of the world during this time frame, 6 billion pounds of cargo was transported to the selected regions (see fig. 3).³³ Among selected regions, virtually all cargo was transported between the U.S. and two regions—Latin America and Europe.

³³Cargo transported by air by all carriers—including both cargo-only and passenger carriers—was an average of 22 billion pounds from 2016 through 2018.

Figure 3: Air Cargo Transported by Cargo-Only Airlines between the U.S. and Global Regions, Average Weight in Millions of Pounds, 2016 through 2018



Source: GAO analysis of Department of Transportation data. | GAO-21-21

Notes: Amounts may not sum due to rounding. Although Asia as a region accounted for the largest amount of air cargo between the U.S., flight routes between Asia and the U.S. generally fly over the Pacific, and therefore make Puerto Rico an unlikely air-cargo transshipment location serving the Asian market. Therefore, we did not include the Asia region as part of this analysis but provided this information for context of global air cargo operations.

Although cargo-only carriers transported cargo between the U.S. and 97 countries within the selected regions over the 3-year period, our review of DOT data shows that air cargo activity was concentrated among a small number of countries and at a small number of airports.³⁴ However, cargo may originate from or ultimately be destined for other points. For example, cargo departing Miami may have originated in the Miami area, another state, or even another country. Likewise, cargo arriving in Bogotá, Colombia, may be destined for Bogotá, another location in Colombia, or another country. Additional details of the amount of air cargo

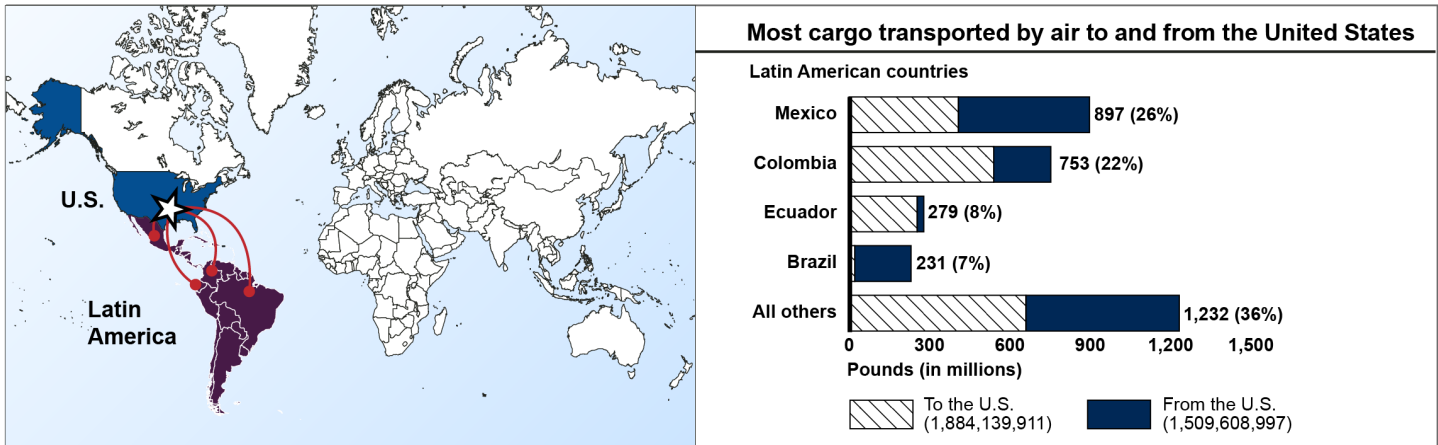
³⁴Air cargo was transported between the United States and 44 Latin American countries, 34 European countries, and, 19 African countries.

(by weight) transported between the U.S. and each of our selected regions for the 2016 through 2018 time frame follows.³⁵

Air Cargo between the U.S. and Latin America

Four countries in Latin America—Mexico, Colombia, Ecuador, and Brazil—accounted for most of the cargo transported by air between the U.S. and Latin America. Specifically, on average, 64 percent of cargo transported by cargo-only carriers on direct flights between the U.S. and Latin America from 2016 through 2018 involved airports in these four Latin American countries (see fig. 4). None of the other 40 Latin American countries with U.S. air cargo activity during that time accounted for more than 6 percent of the total cargo transported by air.

Figure 4: Latin American Countries with the Most Cargo Transported by Air to and from the U.S., Average Weight 2016 through 2018



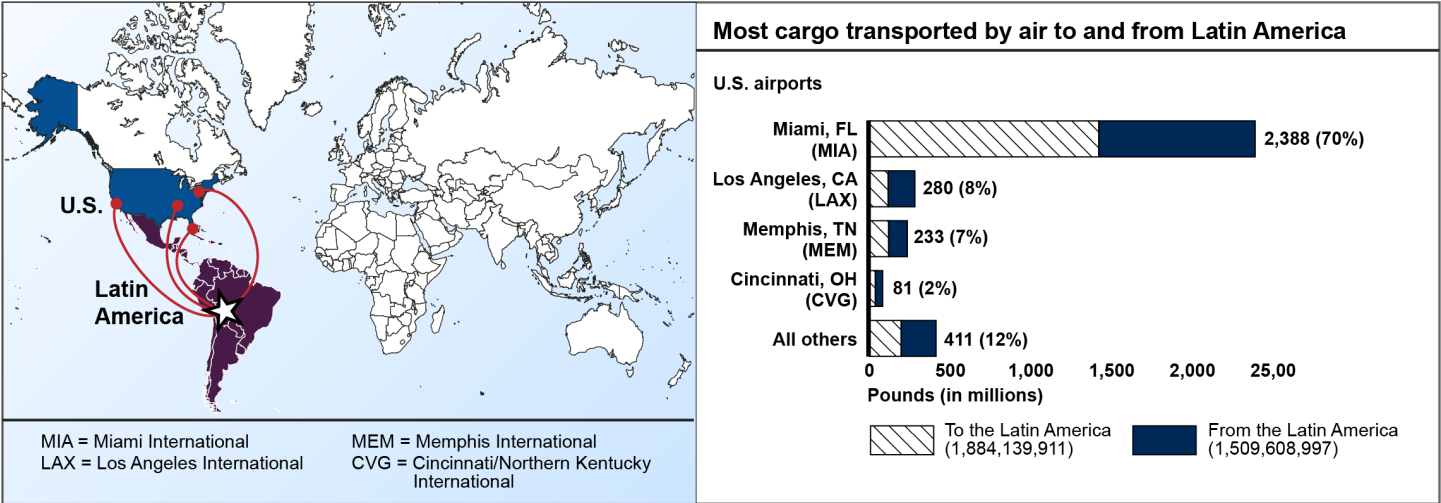
Source: GAO analysis of Department of Transportation data. | GAO-21-21

Likewise, most U.S.-Latin American air cargo traffic occurred at only a few airports. In the U.S., Miami International Airport was by far the largest cargo gateway airport to Latin America—70 percent of U.S.-Latin America air cargo departed from or arrived at this airport from 2016 through 2018. Los Angeles International Airport and Memphis International Airport followed with roughly 8 percent and 7 percent, respectively. No other U.S. airport accounted for more than 2 percent of air cargo transported (see fig. 5). Puerto Rican airports accounted for a small portion of U.S.-Latin America air cargo: 1.4 percent for Rafael

³⁵Unless expressly stated otherwise, all references to the percentage of air cargo transported refers to cargo by weight.

Hernández International Airport in Aguadilla and 0.5 percent for Luis Muñoz Marín International Airport in San Juan.

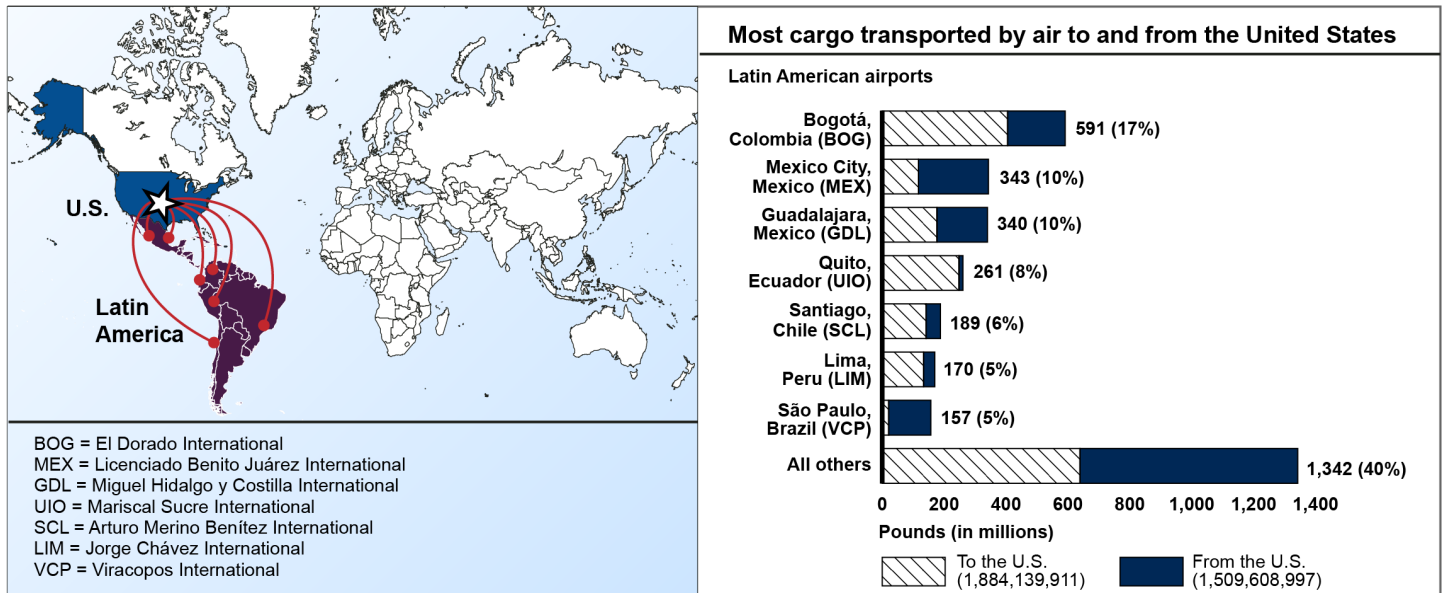
Figure 5: U.S. Airports with the Most Cargo Transported by Air to and from Latin America, Average Weight 2016 through 2018



Source: GAO analysis of Department of Transportation data. | GAO-21-21

In Latin America, seven airports handled 61 percent of air cargo to and from the U.S. (see fig. 6).

Figure 6: Latin American Airports with the Most Cargo Transported by Air to and from the U.S., Average Weight 2016 through 2018



Source: GAO analysis of Department of Transportation data. | GAO-21-21

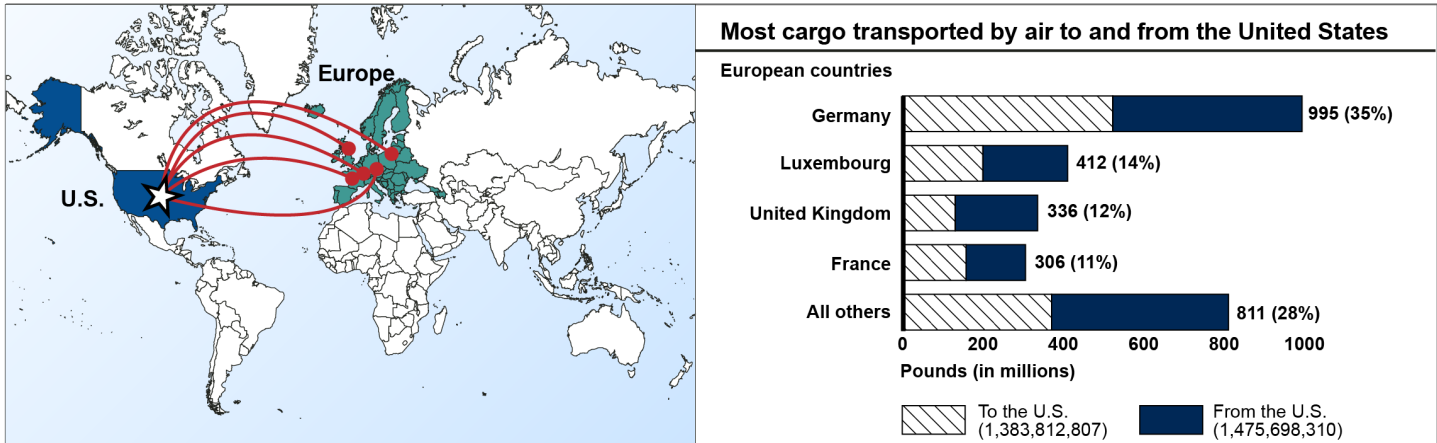
Note: Numbers may not add to 100 percent due to rounding.

Census data reveal some notable differences in the mix of goods transported between the U.S. and Latin America during our timeframe. For goods sent from Latin America to the U.S., precious metals, fish, and communication equipment were the largest categories of goods, by value, transported by air. The categories of goods with the highest weight were fish, fresh flowers, and fruits and vegetables. For goods sent from the U.S. to Latin America, the largest categories of goods by both weight and value include civilian aircraft and parts and communication equipment, including telephones.

Air Cargo between the U.S. and Europe

Four countries in Europe—Germany, Luxembourg, United Kingdom, and France—accounted for 72 percent of European air cargo traffic with the U.S. for our 3-year time frame (see fig. 7).

Figure 7: European Countries with the Most Cargo Transported by Air to and from the U.S., Average Weight 2016 through 2018



Source: GAO analysis of Department of Transportation data. | GAO-21-21

While Miami International Airport was among the U.S. airports handling the most U.S.-European air cargo, it was not as dominant a player as it is in the U.S.-Latin America market. The top U.S. air cargo gateway airports to and from Europe were Chicago O’Hare International Airport, Memphis International Airport, Cincinnati/Northern Kentucky International Airport, John F. Kennedy International Airport, and Miami International Airport, accounting for 57 percent of U.S.-Europe air cargo from 2016 through 2018. Puerto Rican airports accounted for only a fraction of the U.S.-Europe cargo: 0.8 percent for the airport in Aguadilla and 0.1 percent for the airport in San Juan.

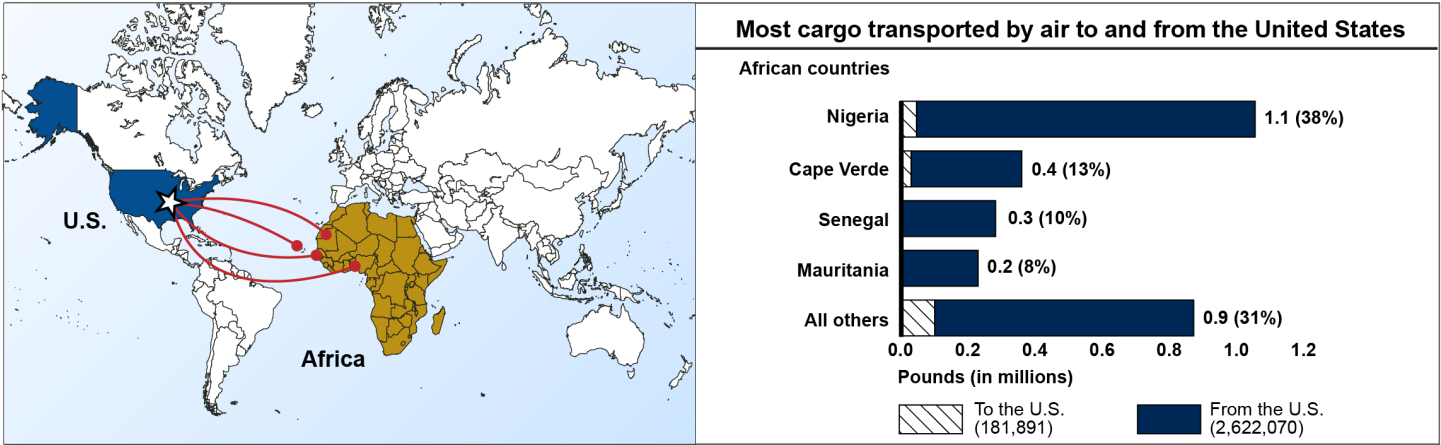
Similarly, a small number of European airports handled most air cargo to and from the U.S. Although no single airport was dominant, two of the top five airports were located in Germany. European airports with the most U.S. air cargo were Frankfurt Main Airport (15 percent); Luxembourg Airport (14 percent); Cologne Bonn Airport (11 percent); Paris-Charles de Gaulle Airport (10 percent); and Amsterdam Schiphol Airport (9 percent).

Pharmaceutical products, turbine engine parts, and artwork were the categories of goods of highest value imported by the U.S. from Europe while fish, machine parts, and vegetables were the categories with the highest weight. The highest valued goods exported to Europe were civilian aircraft and parts, gold, and pharmaceuticals. Exported goods weighing the most were civilian aircraft and parts, books, and diagnostic or laboratory reagents.

Air Cargo between the U.S. and Africa

Cargo transported between the U.S. and Africa was substantially less than other selected regions, representing 0.02 percent of U.S. international air cargo. Like the other selected markets, most of the cargo transported between the U.S. and Africa was concentrated in a few countries. Nigeria, Cape Verde, and Senegal accounted for 61 percent of cargo. Unlike the other markets, almost all of the cargo flowed in one direction, with 94 percent going from the U.S. to Africa (see fig. 8).

Figure 8: African Countries with the Most Cargo Transported by Air to and from the U.S., Average Weight 2016 through 2018



Source: GAO analysis of Department of Transportation data. | GAO-21-21

For goods imported by air from Africa by the U.S., diamonds and precious metals accounted for the highest value goods while vegetables, clothing, and flowers were the largest categories of goods by weight. For goods sent from the U.S. to Africa, the largest categories of goods by value included civilian aircraft and parts, communication equipment, and diamonds, while civilian aircraft and parts, machine parts, and diagnostic or laboratory reagents were the categories with the highest weight.

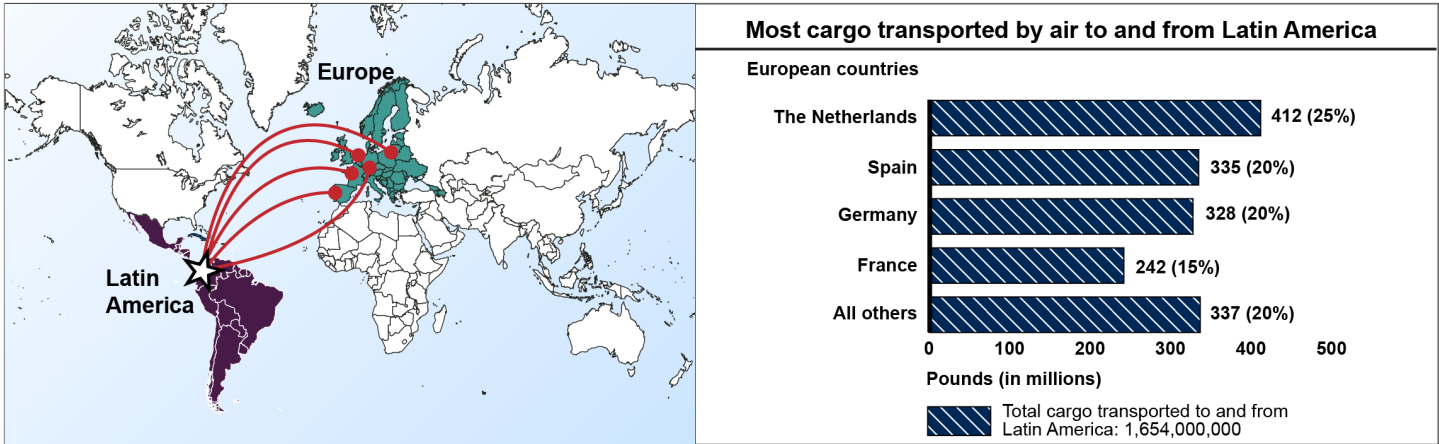
Most Air Cargo in the Europe–Latin America Market Also Moved through a Handful of Countries

The average amount of cargo transported between Europe and Latin America from 2016 through 2018 was about 1.7 billion pounds—roughly

half the amount transported between the U.S. and Latin America and also smaller than the U.S.-Europe air cargo market.³⁶

Most cargo transported by air between Europe and Latin America involved four countries in each region. Specifically, cargo transported between four Latin American countries—Brazil, Mexico, Colombia, and Ecuador—and four European countries—the Netherlands, Spain, Germany, and France—accounted for more than 72 percent on average of air cargo between those regions in the 3-year period (see figures 9 and 10). These four Latin American countries are the same as the top air-cargo transport countries in the U.S.-Latin America market.

Figure 9: European Countries with the Most Cargo Transported by Air to and from Latin America, Average Weight 2016 through 2018



Source: GAO analysis of Eurostat data. | GAO-21-21

³⁶The data on the Europe-Latin America market is from a different source than that for the U.S. data and is therefore not directly comparable. For example, the data on the Europe-Latin America market includes cargo and mail transported by both passenger and cargo-only carriers while the data on the U.S. markets does not include mail or cargo transported by passenger carriers.

Figure 10: Latin American Countries with the Most Cargo Transported by Air to and from Europe, Average Weight 2016 through 2018



Source: GAO analysis of Eurostat data. | GAO-21-21

For goods sent from Latin America to Europe, the categories with the greatest value were precious metal (gold), medical instruments, and communication equipment, while categories of goods with the greatest weight were fruits, vegetables, and fresh flowers. For goods sent from Europe to Latin America, pharmaceuticals and communication equipment were the categories of goods with the highest value and vehicle parts, pharmaceuticals, and fertilizers were the categories with the greatest weight.

A Variety of Factors Influence an Airport’s Ability to Attract Substantial Air Cargo Traffic

Based on interviews with industry stakeholders and studies we reviewed, we identified four key factors that are generally associated with a given airport’s success in attracting air cargo traffic: (1) geographical location; (2) proximity to transportation networks; (3) airport infrastructure and resources that support air cargo operations; and (4) the governmental and regulatory environment of an airport. Demand for air cargo services at an airport may be related to the economic activity in and around its location but also may be driven by drawing cargo traffic from more distant locations. If an airport, for example, is able to attract a broad range of cargo operators to consolidate cargo at that airport for further transport to

a variety of destinations, the airport may become an important node within the broad cargo transport network.³⁷

Industry stakeholders and the studies we reviewed both noted, however, that not all of these factors need weigh in favor of any given airport for it to successfully attract air cargo traffic. Conversely, the fact that one or more factors do weigh in favor of an airport does not guarantee that the airport will be able to establish itself as an air cargo hub. Each of the four factors is discussed in greater detail below.

Geographical location. The physical location of an airport may present advantages or disadvantages for attracting air cargo traffic, according to our sources. The location of an airport may influence whether the airport can serve as an intermediate stop for certain cargo movements. For example, the geographic location of Alaskan airports, approximately halfway along the great-circle flight paths between Asia and markets in the U.S., has historically enabled them to serve as waypoints for refueling aircraft on these routes. This factor, in particular, along with the enhanced transfer rights Alaskan airports received from DOT and through statute, have helped Ted Stevens Anchorage International Airport in Alaska to become one of the top cargo airports in the U.S. and the world.³⁸ According to industry reports, some airports in the United Arab Emirates and Qatar have similarly experienced considerable growth in part because they serve as operational waypoints for cargo flows between Europe and Asia.

In addition, an airport's regional market may determine the extent of demand for cargo services. For example, representatives from one air cargo carrier we spoke with said that they always consider regional market demand and close proximity to customers when planning routes. Also, an airport's location reasonably close to other markets from which cargo traffic is generated may aid that airport's ability to attract air cargo traffic. For example, Luxembourg Airport highlights its relative proximity to many large European Union consumer markets among the factors that it believes makes the airport attractive as an

³⁷There could also be other exogenous factors such as an individual carrier's decision to use a particular airport location as a central hub for its air cargo operations, such as FedEx Express's operations at Memphis International Airport and UPS's at Louisville Muhammad Ali International Airport.

³⁸According to Airports Council International, in 2018 Ted Stevens Anchorage International was ranked second in the U.S. and fifth in the world in terms of the total amount of cargo, by weight.

air-cargo aggregation point. Finally, general weather conditions and patterns may also be a factor influencing which airports are more attractive as air-cargo transshipment points. For example, some stakeholders said that operational uncertainties associated with seasonal weather conditions, such as hurricanes, may be important to some cargo operators when deciding which airports to use.

Proximity to transportation networks. Most industry stakeholders said another factor enabling an airport to attract substantial cargo traffic is having good connections to highways, ports and waterways, or railways. Access to such distribution networks facilitates the transport of goods to and from an airport, and thus expands its potential market. For example, representatives of an integrated cargo carrier we interviewed said proximity to regional highways and rail systems was a critical factor in deciding where to locate one of their largest airport hub operations. As another example, Miami International Airport touts its Ocean-to-Air Program, which enables perishable products to arrive by sea through seaports in the Miami area and then be transported by air to either domestic or international markets from the airport. Similarly, the cargo operations at Luxembourg Airport are facilitated by its strong connectivity to the European highway system, according to the airport's operator.

Supporting airport infrastructure and resources. To attract air cargo traffic, most industry stakeholders said an airport requires infrastructure, including on-site facilities in support of air cargo operations. These include specialized equipment for loading and unloading cargo from aircraft, sufficient aircraft-parking capacity, runway capacity to accommodate large aircraft, and buildings for processing air cargo, according to our sources. In addition, most industry stakeholders also cited other airport resources, such as the availability of fuel at a competitive cost, skilled labor, ground support, and nearby warehouse space as significant factors necessary for attracting air cargo business. As an example, air cargo facilities at Miami International Airport—ranked among the largest cargo airports in the U.S. and the world³⁹—include 18 airside warehouses totaling more than 3-million square feet, with nearly 445,000 square feet of refrigerated warehouse space for perishables such as food products and pharmaceuticals (see fig. 11). Similarly, El Dorado International Airport in Bogotá, Columbia operates the largest air cargo operation in Latin America, in terms of cargo shipped to and from the U.S. according to our analysis. The airport hosts three cargo terminals

³⁹According to Airports Council International, in 2018 Miami International was ranked 5th in the U.S. and 15th in the world in terms of the total amount of cargo, by weight.

totaling more than 700,000 square feet with more than 60 gates for airside operations and 25 aircraft-parking spaces enabling many kinds of aircraft to load and unload simultaneously.

Figure 11: Examples of Air Cargo Infrastructure at Miami International Airport



Source: GAO. | GAO-21-21

Governmental and regulatory environment. Finally, political and regulatory issues at an airport's particular location may affect an airport's ability to attract air cargo traffic, according to stakeholders we spoke to. For example, some industry stakeholders we interviewed cited the importance of having open skies agreements in place as a key factor in an airport's ability to attract international air cargo business. In addition, some of these stakeholders noted that air cargo operators look for airports with good security and governmental services in place. These considerations would include, for example, the relative ease or difficulty of passing customs operations. One stakeholder said the process for clearing customs in some countries is so difficult that it could outweigh any economic benefit that a carrier might realize by flying there. Some stakeholders noted that the political and regulatory environment were of particular concern when operating, or considering operating, in foreign countries. For example, the security environment might entail greater risk for a carrier in a politically or economically unstable country, particularly for employees' safety, and thus take on greater significance than it would in the U.S.

Industry stakeholders we interviewed noted several other factors that may influence cargo operators' decisions about which airports to use to support their air cargo operations. Some of these factors may be dynamic, in that changing economic and logistics conditions may influence an operator's assessment about an airport's attractiveness for cargo operations based on circumstances at a given point in time. Illustrative examples include the following.

- Certain airports already have well-established air-cargo hub operations. To the extent that shippers and air cargo operators have focused their own operations around those airports, it may be difficult for other airports to attract business away from them in order to expand cargo operations. However, some industry stakeholders and reports we reviewed noted that certain large-scale airports may be limited in their ability to accommodate future increases in air cargo demand as they face constraints such as congestion and noise restrictions.⁴⁰ Opportunities for growth at other airports may therefore become more viable as cargo airlines seek alternative routes to congested airports
- From the perspective of air cargo carriers, as a given carrier grows its business, its logistical decisions may change. For example, if a carrier experiences growth in demand for its services to a certain country, it may choose to use larger aircraft—which may have a greater range and carry more cargo—for those flights. The use of larger aircraft may, in turn, produce other operational changes, such as eliminating refueling stops.
- As noted above, an industry analysis published in 2018 forecasted air cargo traffic to grow by 4.2 percent annually over the next 20 years. However, the air cargo market is subject to fluctuations in demand from factors such as changes in the macro-economy, energy prices, trade agreements, or the outbreak of a communicable disease. These factors may cause demand for cargo traffic to change in the short term, and in some cases may also affect demand over the longer term. For example, during the COVID-19 pandemic in early 2020, air passenger traffic decreased by as much as 96 percent over the previous year, causing some passenger carriers to suspend many of their flights, thus eliminating the air-cargo belly capacity previously

⁴⁰Within the U.S., public-use airports are required by law to abide by certain statutory provisions before establishing noise restrictions. See 49 U.S.C. Chapter 475 and 14 C.F.R. Part 161.

provided. At the same time, according to DOT, air cargo demand increased to its highest reported level.⁴¹

Stakeholders Identified Benefits of Increased Air Cargo to Puerto Rico but Held Varied Opinions on the Potential to Increase Operations

Puerto Rican stakeholders we spoke with, representing government and industry, said that increasing air cargo passing through the island's airports would increase use of the airports and bring additional positive spill-over effects to the Puerto Rican economy.⁴² Specifically, Puerto Rico seeks to increase the number of foreign air-cargo carrier flights at its airports by attracting existing flights between Europe and Latin America that could use Puerto Rico's international airports as transfer points for air cargo instead of other Latin American airports. Some of these other airports have seen increased passenger and cargo traffic, according to the Puerto Rican government. For example, it stated that cargo traffic increased at Dominican Republic airports by 17 percent from 2014 to 2018. By comparison, DOT data show Puerto Rican airports have seen declines in cargo traffic by an average of 3 percent annually from 2008 to 2017.

According to Puerto Rican stakeholders, their international airports are under-utilized and can accommodate increased air cargo operations. Additionally, increases in the amount of air cargo traffic could benefit Puerto Rico's airports by increasing revenue from both cargo aircrafts'

⁴¹In May 2020, FAA provided regulatory relief to exempt certain passenger carriers from regulations that allowed them to operate cargo-only flights using aircraft configured for passengers, including transporting cargo in the passenger cabin. FAA, *In the matter of the petition of Airlines for America for an exemption from §§ 91.9(a) and (b), 121.153(a), and 121.337(b)(9)(iii) of title 14, Code of Federal Regulations: Partial Grant of Exemption* Exemption No. 18561, Regulatory Docket No. FAA-2020-0429 (May 20, 2020). Federal Aviation Administration regulations allow but place limits on how cargo can be carried within passenger compartments (14 C.F.R. §121.285) and the Transportation Security Administration imposes specific security measures on passenger operations (49 C.F.R. part 1544).

⁴²As previously noted, economic effect studies elsewhere have shown that airports may have positive economic effects both at and beyond the airport. See e.g., ACRP, *Estimating the Economic Impact of Air Cargo Operations at Airports, Part 1: User's Guidebook and Part 2: Research Report* (Washington, D.C.: 2014).

landing fees and support functions, such as refueling. Another potential source of revenue may include lease revenue if air cargo carriers choose to use existing, vacant airport buildings or construct new buildings on airport property to serve as their operational facilities, such as the new ramp that was built for and leased to FedEx Express at Luis Muñoz Marín International Airport in San Juan (see fig. 12).

Figure 12: FedEx Express' Ramp and Warehouse at Luis Muñoz Marín Airport in San Juan



Source: GAO. | GAO-21-21

In addition, Puerto Rican stakeholders said that increasing air cargo traffic may have a broader effect on the island's economy by creating opportunities for Puerto Rico's existing industries—such as the pharmaceutical, medical device, and aerospace industries—and by helping to develop new ones.⁴³ For example, one Puerto Rican stakeholder said that pharmaceutical manufacturers on the island ship

⁴³According to the Puerto Rican government, the pharmaceutical and medical industries currently account for 70 percent of the island's inbound and outbound air cargo.

most of their products to Miami for further distribution throughout the world. Another stakeholder said increased air cargo traffic in Puerto Rico could provide access to faster, more direct routes to customers. Expanding air cargo operations would likely enable Puerto Rican manufacturers to receive raw materials and equipment more quickly as well as ship their products directly to market instead of through other airports. In addition, other businesses that may potentially benefit include those that provide air cargo logistics services such as ground handling, freight forwarding, and warehousing, according to some Puerto Rican stakeholders. With increased air cargo operations, these businesses may potentially generate new jobs and tax revenue. Finally, some Puerto Rican stakeholders also suggested that expanding air cargo operations could produce geo-political benefits for the U.S. by strengthening the U.S. economic position in the region. For example, they said expanded cargo operations could better position the U.S. to compete with rapidly growing air cargo operations in neighboring countries, such as Colombia, Panama, and nearby Dominican Republic. The Puerto Rican government conducted studies that explore anticipated economic benefits of attracting additional air cargo operations to the island. Our review found that these studies, along with information provided during our interviews with Puerto Rican stakeholders, focused on the types of potential economic benefits that may be realized but generally did not attempt to quantify those benefits.

Stakeholders Held Varied Opinions on the Potential of Puerto Rico to Increase Air Cargo Operations and the Potential Effects on U.S. Carriers and Other Airports if It Did So

While Puerto Rican stakeholders identified economic benefits that could result from increasing air cargo operations, they and industry stakeholders we interviewed—cargo airlines, aviation industry associations, and airports—held varying perspectives on the potential of Puerto Rico to achieve such an increase. Although these industry stakeholders were willing to offer their perspectives, none indicated that anyone had undertaken an in-depth analysis of the Puerto Rican air cargo market or expansion opportunities.

Geographical location. Some industry stakeholders viewed Puerto Rico's geographic location as advantageous for serving as a transfer point for cargo transported between Europe and Latin America—much like airports in Alaska serve as a transfer point for cargo transported

between North America and Asia. The Puerto Rican government noted that the island's location makes it a logical stopping and refueling point for flights between Europe and Central and South America. For example, it said San Juan is roughly 4,600 miles from Frankfurt, Germany and 3,600 miles from Santiago, Chile. Other industry stakeholders said Puerto Rico's central-Caribbean location allows it to serve as a regional distribution point to the Caribbean as well as to other parts of Latin America. For example, one cargo carrier we interviewed said it currently uses Puerto Rico as a distribution point for Puerto Rico and other Caribbean islands.

In contrast, Puerto Rico's location may be too close to some destinations in Latin America for it to be used as a stopover or refueling destination for flights originating in Europe. For example, Puerto Rico lies more than three-quarters of the way on routes between Frankfurt, Germany, and Panama City, Panama or Bogotá, Colombia. Similarly, several other industry stakeholders stated that Puerto Rico's interest in increasing air cargo operations puts it in direct competition with Miami International Airport, which has an extensive air cargo infrastructure and already serves as the principal gateway and transshipment point between Latin America and the U.S.⁴⁴ Finally, some of the industry stakeholders we interviewed said Puerto Rico's susceptibility to hurricanes might deter some carriers from operating or expanding there.

Proximity to distribution networks and customer base. Two industry stakeholders we interviewed said Puerto Rico's airports' lack of connection to other extensive transportation networks, such as access to the types of highway and rail systems that are present at many mainland U.S. airports, limits its ability to attract additional air cargo operations. On the other hand, proximity to distribution networks may not necessarily be a limiting factor for Puerto Rico because some airports that handle large amounts of cargo, such as Ted Stevens Anchorage International Airport in Alaska, do not rely on such access. More specifically, most of the cargo handled by the Anchorage airport passes through—that is, it originates from and is destined to locations outside of Alaska—so access to distribution networks or a customer base are not needed. In addition, as an island territory, Puerto Rico has access to maritime cargo networks at its ports in San Juan and in Ponce, on the southern coast of the island.

⁴⁴Miami International is about 1045 air miles from Luis Muñoz Marín International Airport in San Juan and about 985 air miles from Rafael Hernández International Airport in Aguadilla.

As for a customer base, some industry stakeholders noted that Puerto Rico's pharmaceutical manufacturing industry is heavily reliant on air cargo services. Further, products produced by Puerto Rico's other major manufacturing industries—including electronics and medical devices—are among those that are well-suited for transport by air cargo, according to an ACRP report.⁴⁵ Some industry stakeholders we interviewed noted, however, that products from these industries alone may not be sufficient to drive demand for expanded air cargo operations on the island.

Supporting airport infrastructure and resources. The Puerto Rican government stated that the island's three underutilized international airports have important competitive advantages that can help attract air carriers that are currently using other Latin American airports. For example, it noted that the 11,000-foot runway at Rafael Hernández International Airport in Aguadilla is the longest in the Caribbean and Luis Muñoz Marín International Airport in San Juan can handle twice the cargo and passenger traffic than it currently does. Some industry stakeholders we interviewed generally agreed that Puerto Rico has the basic airport infrastructure in place to support expanded air cargo operations. However, other stakeholders said that Puerto Rico may not have all the requisite supporting infrastructure, such as cargo-loading equipment. The Puerto Rican government acknowledged that additional infrastructure improvements are needed at its airports and that it has taken steps to improve its airport infrastructure. For example, the Puerto Rico Ports Authority approved \$180 million of capital improvements to its airports, which it expects to complete in 2023.

Governmental and regulatory environment. According to Puerto Rican economic development promotional information, Puerto Rico's status as a U.S. territory provides the same level of stability, protection, and operational security to businesses as mainland U.S. locations. For example, the U.S. dollar, as the official currency, provides monetary stability; and U.S. federal law and all its protections apply in Puerto Rico, including for intellectual property and patent protection. In addition, some industry stakeholders told us the fact that Puerto Rico is part of the U.S. was an advantage for U.S. carriers because it may allow them to fly between multiple foreign destinations without returning to the mainland. One stakeholder noted that Puerto

⁴⁵ACRP, *Guidebook for Air Cargo Facility Planning and Development* (Washington, D.C.: 2015). The report identified products that benefit from increased speed of distribution or better stock availability provided by air cargo shipping, including those that are of high value, that are relatively lightweight, and where shipping time is critical.

Rico also offers the benefit of the U.S. regulatory and security environment. For example, being located within the U.S. customs territory facilitates the flow of cargo both into and out of the island.

Puerto Rican stakeholders said that increased air cargo operations at Puerto Rico's airports should not occur at the expense of U.S. airports. Moreover, the Puerto Rico government stated that by increasing international traffic, U.S. carriers could benefit from increased connections to and from Puerto Rico, the continental U.S., and points in Central and South America and Europe. Industry stakeholders we interviewed did not generally comment on whether U.S. airports and carriers would be negatively affected by any changes to air traffic in Puerto Rico.

In addition, most comments submitted in opposition to Puerto Rico's application to DOT expressed concerns that in addition to the authorizations provided by DOT, Puerto Rico is also seeking to allow cabotage on the island.⁴⁶ According to some commenters, authorizing cabotage in Puerto Rico would be advantageous for foreign carriers and would hinder development of operations by U.S. carriers in Puerto Rico. Most Puerto Rican stakeholders we talked to affirmed that seeking the same statutory authority permitting cabotage as Alaska is a goal. As previously mentioned, Puerto Rico's representative in Congress has introduced legislation that provides the same statutory authority as Alaska that, according to DOT officials, allows DOT-licensed foreign air carriers to conduct limited air-cargo transfer operations that would otherwise be considered cabotage, subject to qualifying statutory criteria.⁴⁷

Agency Comments

We provided a draft of this report for review and comment to the Departments of Transportation, Commerce, and Homeland Security. All three departments provided technical comments, which we incorporated as appropriate.

⁴⁶As previously mentioned, foreign carriers are generally prohibited from engaging in cabotage—i.e., transporting domestic cargo or passengers between points within the United States.

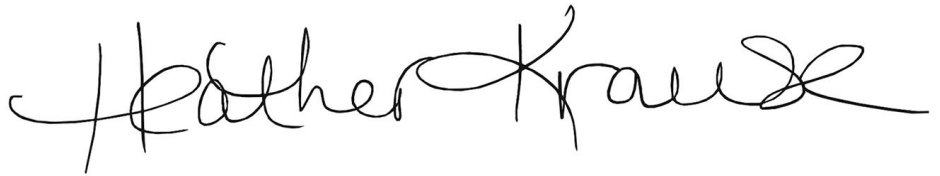
⁴⁷Puerto Rico Air Cargo Industry Empowerment Act, H.R. 2357, 116th Cong. (2019). As noted above, no action has been taken on this bill as of October 21, 2020.

**Appendix I: GAO Contacts and Staff
Acknowledgments**

We are sending copies of this report to the appropriate congressional committees, the Secretary of Transportation, the Secretary of Commerce, the Secretary of Homeland Security, and other interested parties. In addition, the report will be available at no charge on the GAO website at <http://www.gao.gov>.

**Appendix I: GAO Contacts and Staff
Acknowledgments**

If you or your staff have any questions about this report, please contact me at (202) 512-2834 or krauseh@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix I.

A handwritten signature in black ink that reads "Heather Krause". The signature is fluid and cursive, with the first name "Heather" and last name "Krause" clearly distinguishable.

Heather Krause
Director, Physical Infrastructure Issues

Appendix I: GAO Contacts and Staff Acknowledgments

GAO Contact

Heather Krause, (202) 512-2834 or krauseh@gao.gov

Staff Acknowledgments

In addition to the contact named above, Vashun Cole (Assistant Director); Travis Thomson (Analyst in Charge); Lindsay Bach; Namita Bhatia-Sabharwal; David Hooper; Delwen Jones; Malika Rice; and Elizabeth Wood made key contributions to this report.

GAO's Mission

The Government Accountability Office, the audit, evaluation, and investigative arm of Congress, exists to support Congress in meeting its constitutional responsibilities and to help improve the performance and accountability of the federal government for the American people. GAO examines the use of public funds; evaluates federal programs and policies; and provides analyses, recommendations, and other assistance to help Congress make informed oversight, policy, and funding decisions. GAO's commitment to good government is reflected in its core values of accountability, integrity, and reliability.

Obtaining Copies of GAO Reports and Testimony

The fastest and easiest way to obtain copies of GAO documents at no cost is through our website. Each weekday afternoon, GAO posts on its [website](#) newly released reports, testimony, and correspondence. You can also [subscribe](#) to GAO's email updates to receive notification of newly posted products.

Order by Phone

The price of each GAO publication reflects GAO's actual cost of production and distribution and depends on the number of pages in the publication and whether the publication is printed in color or black and white. Pricing and ordering information is posted on GAO's website, <https://www.gao.gov/ordering.htm>.

Place orders by calling (202) 512-6000, toll free (866) 801-7077, or TDD (202) 512-2537.

Orders may be paid for using American Express, Discover Card, MasterCard, Visa, check, or money order. Call for additional information.

Connect with GAO

Connect with GAO on [Facebook](#), [Flickr](#), [Twitter](#), and [YouTube](#).
Subscribe to our [RSS Feeds](#) or [Email Updates](#). Listen to our [Podcasts](#).
Visit GAO on the web at <https://www.gao.gov>.

To Report Fraud, Waste, and Abuse in Federal Programs

Contact FraudNet:

Website: <https://www.gao.gov/fraudnet/fraudnet.htm>

Automated answering system: (800) 424-5454 or (202) 512-7700

Congressional Relations

Orice Williams Brown, Managing Director, WilliamsO@gao.gov, (202) 512-4400,
U.S. Government Accountability Office, 441 G Street NW, Room 7125,
Washington, DC 20548

Public Affairs

Chuck Young, Managing Director, youngc1@gao.gov, (202) 512-4800
U.S. Government Accountability Office, 441 G Street NW, Room 7149
Washington, DC 20548

Strategic Planning and External Liaison

James-Christian Blockwood, Managing Director, spel@gao.gov, (202) 512-4707
U.S. Government Accountability Office, 441 G Street NW, Room 7814,
Washington, DC 20548



Please Print on Recycled Paper.