



# World Air Cargo Forecast

2014–2015





## Foreword

The Boeing Company issues the biennial *World Air Cargo Forecast* (WACF) to provide a comprehensive up-to-date overview of the air cargo industry. The forecast summarizes the world's major air trade markets, identifies major trends, and presents forecasts for the future performance and development of markets as well as for the world freighter airplane fleet.

After rebounding more than 19% in 2010 over the depressed levels of 2009, world air cargo traffic stagnated from mid-2011 to early 2013. This prolonged period of weak growth can be attributed to two factors: a weak world economy and slack trade growth. Since the onset of the global economic crisis in 2008, world air cargo traffic has averaged only 1.7% growth per year through 2013. On a positive note, world air cargo traffic began to grow again in second quarter 2013. By July 2014, traffic had grown 4.4% compared with the first seven months of 2013. Forecasts for even better economic and trade growth should lead to sustained air cargo traffic growth in 2015 and 2016.

Data represented as historical in this document were compiled from many sources, including Air Cargo Management Group (ACMG), Airports Council International (ACI), Airlines for America (A4A), Association of Asia-Pacific Airlines, Association of European Airlines, Boeing Foreign Trade Database, Eurostat, IHS Economics, United Nations Council on Trade and Development (UNCTAD), Clarkson Research Services Limited (CRSL), Drewry Maritime Research, International Air Transport Association (IATA), International Civil Aviation Organization (ICAO), Civil Aviation Administration of China (CAAC), China Statistical Bulletin, CAPA Centre for Aviation, Transport Canada, and US Department of Transportation (DOT). Historical information is updated each year as individual sources revise their respective publications.

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**The next update to the WACF will appear in fourth quarter 2016.** The authors welcome any questions or comments that readers may have. Direct any queries or suggestions to

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# Executive Summary



## Air cargo traffic rebounds in 2014 after three years of stagnation

After two years of either flat or slightly negative traffic growth, demand for air cargo transport began to grow slowly and steadily during the second quarter of 2013. The uptick in traffic continued into the second half of 2013 to end the year 0.9% above the 2012 traffic total. Growth has continued to gather strength in 2014, nearly recovering the long-term trend rate. World air cargo traffic is forecast to grow an average 4.7% per year over the next 20 years to reach a total of more than twice the number of revenue tonne-kilometers (RTK) logged in 2013. The number of airplanes in the freighter fleet will increase by more than half by the end of the forecast period.

The traffic growth rates of 12 major air cargo markets in 2013 reveals a few crucial developments for the industry. Domestic and intraregional markets were surprisingly resilient in the face of weak economic and trade growth, helping to spur demand for standard-body freighter airplanes. Traffic on international trade lanes connected to developing world markets generally rose compared with 2012 traffic levels. However, air trade contracted in both directions on nearly all the east-west trade lanes (those that connect Asia with Europe, Asia with North America, and Europe with North America).

Nearly 80% of long-haul air cargo traffic (routes longer than 4,500 kilometers) flows on these east-west trade lanes. Most of the cargo carried on these routes is transported on large widebody freighters. Air cargo traffic on these vital routes slackened during the global economic downturn, causing the yields of most large-freighter operators to fall. In response to flagging demand and declining yields, operators curtailed large-freighter flights, in some cases parking their widebody airplanes. There were as many as 70 parked 747-400 and MD-11 freighters during the slowest period. In the third quarter of 2014, however, operators began to return these two models to service as traffic volumes picked up.

## Weak economic activity and slack trade curbed air cargo traffic growth

Two principal causes are responsible for the weak air cargo growth between 2011 and 2013: an underperforming world economy and lackluster growth in trade, particularly trade in the commodities that are traditionally carried as air cargo.

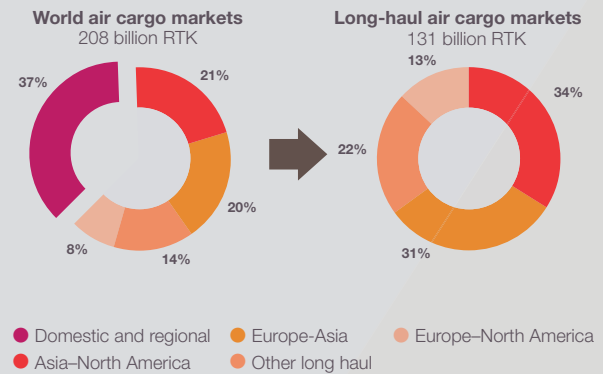
World economic activity, as measured by gross domestic product (GDP), grew only 2.1% per year between 2008 and 2013. Even since rebounding in 2010 from the global economic slowdown of 2008 and 2009, world economic growth has lagged behind its historical trend of 3.2% annual growth. Weakness in consumer demand and in business investment in Europe, North America, and Japan accounts for much of the slowdown. Growth in China, India, Brazil, and other developing economies has also slowed to varying degrees.

## 2013 air cargo growth by major market

Region	Percentage
World	0.9
Asia-North America	-2.2
Europe-Asia	1.4
Intra-Asia	-0.2
Europe-North America	-1.2
Intra-North America	1.1
Domestic China	6.5
Latin America-Europe	3.7
Latin America-North America	0.6
Africa-Europe	-3.9
South Asia-Europe	2.5
Middle East-Europe	13.6
Intra-Europe	1.5

## Asia-North America, Europe-Asia, and Europe-North America are the leading east-west air cargo markets

2013



## World economic growth strengthening from 2014 to 2016

Source: IHS Economics, September 2014

## GDP growth real year over year, by percentage



World economic activity began to pick up in late 2013, particularly in the United States and China, and continued to build momentum during 2014. World GDP growth is forecast to accelerate to the long-term average rate of 3.2% annual growth in 2015 and then to exceed the long-term average for several years before settling down to the historic trend for the remainder of the forecast period.

World merchandise trade, a component of world GDP, is an important measure of economic performance and a significant indicator of long-term air cargo traffic trends. This component tends to exaggerate changes in the broader GDP. World merchandise trade mirrors the prolonged postrecession stagnation of world air cargo traffic as well as its recent strengthening. When economic recovery became discernible in the second half of 2013, trade volumes began to accelerate, particularly in Asia. After faltering during the first quarter of 2014, trade growth picked up again during the second quarter. The forecast that world merchandise trade growth will hover around historic rates supports the long-term outlook for continued world air cargo traffic growth.

World air cargo traffic began to grow again during the second quarter of 2013. By July 2014, traffic had grown 4.4% compared with the first seven months of 2013, which is generally in line with the trends of world economic and trade activity. Persistence of this trend through the end of 2014 would mark the first full year since 2010 in which air cargo traffic has grown more than 1%.

### World air cargo traffic growth detail

[International air freight will drive overall world air cargo growth through 2033.](#)

Over the next 20 years, world air cargo traffic will grow 4.7% per year. Air freight, including express traffic, will average 4.8% annual growth, measured in RTKs. Airmail traffic will grow much more slowly, averaging 1.0% annual growth through 2033. Overall, world air cargo traffic will increase from 207.8 billion RTKs in 2013 to 521.8 billion in 2033.

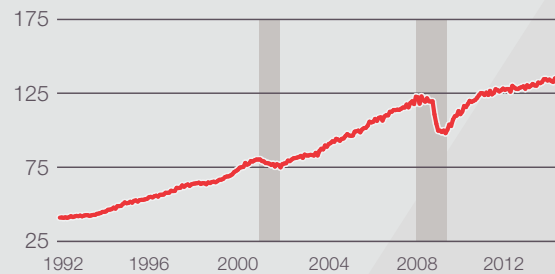
Asia will continue to lead the world in average annual air cargo growth, with domestic China and intra-Asia markets expanding 6.7% and 6.5% per year, respectively. The Asia-North America and Europe-Asia markets will grow slightly faster than the world average growth rate.

## Trade is improving as the economy strengthens

Source: CBP Netherlands Bureau for Economic Policy Analysis

### Volume index

s.a. 2005 = 100; indicator of world merchandise trade

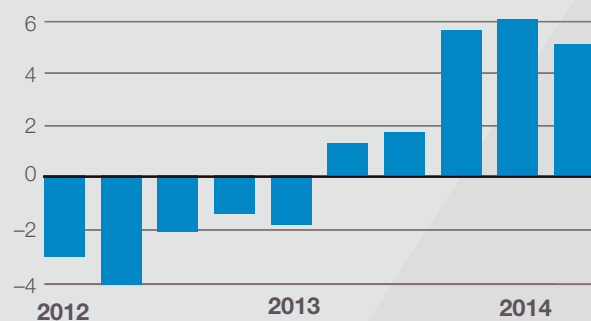


## Air cargo demand is improving with trade growth

Source: IATA, A4A

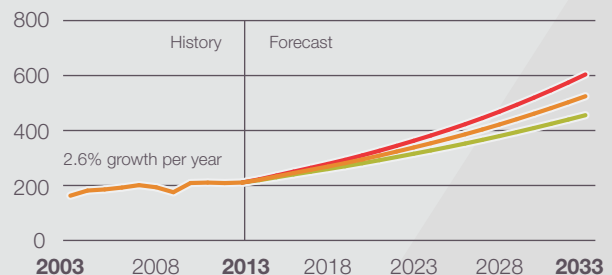
### Change in air cargo traffic over prior year

Quarterly, by percentage



## World air cargo traffic will more than double over the next 20 years

### RTKs in billions



Average annual growth, 2013-2033

● High, 5.5%      ● Base, 4.7%      ● Low, 4.0%

Latin America markets with North America and with Europe will grow at approximately the world average growth rate, as will Middle East markets with Europe. Established markets grow more slowly than developing markets, so North America and Europe air cargo growth rates are below the world average rate.

### Freighter fleet development

The number of airplanes in the worldwide freighter fleet will increase by more than half during the next 20 years as demand for air cargo services more than doubles.

The challenging market environment of the past three years have left traffic levels relatively flat, resulting in persistent overcapacity and weak yields. Cargo capacity on passenger flights has been expanding as airlines deploy new widebody jetliners, such as the 777-300ER and 787, that have large lower-hold cargo capacities, even with a full load of passenger luggage.

Dedicated freighter services nonetheless offer significant advantages, including more predictable and reliable volumes and schedules, greater control over timing and routing, and a variety of services for outsize cargo, hazardous materials, and other types of cargo that cannot be accommodated in passenger airplanes. In addition, range restrictions on fully loaded passenger flights and the limited number of passenger frequencies serving high-demand cargo markets make freighters essential where both long-range and frequent service are required. For example, the Asia-to-North America market requires about 70 daily freighter flights. It would take about 150 daily passenger flights to provide service equivalent to 10 daily of those freighter flights.

The demand for freighter capacity in long-haul markets is not confined to the Asia-North America market. Freighters are essential to all the east-west markets. Freighters carry about 72% of all air cargo carried between Europe and Asia, as well as 43% of all cargo carried between Europe and North America.

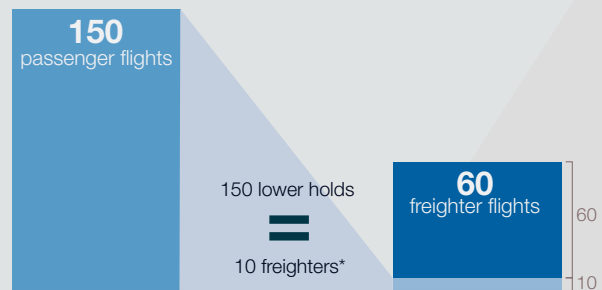
### Historical and forecast air cargo growth rates

Region	History 2003–2013 by percentage	Forecast 2013–2033 by percentage
World	2.6	4.7
Asia–North America	2.3	5.4
Europe–Asia	4.8	5.3
Intra–Asia	3.0	6.5
Europe–North America	0.6	3.1
Intra–North America	-1.6	2.1
Domestic China	9.9	6.7
Latin America–Europe	5.0	4.8
Latin America–North America	2.5	5.2
Africa–Europe	1.0	4.3
South Asia–Europe	5.1	4.7
Middle East–Europe	4.1	4.0
Intra–Europe	1.6	2.0

### 150 transpacific passenger flights provide the equivalent of only 10 freighter flights

Source:  
Delo/Innovata,  
DOT T-100

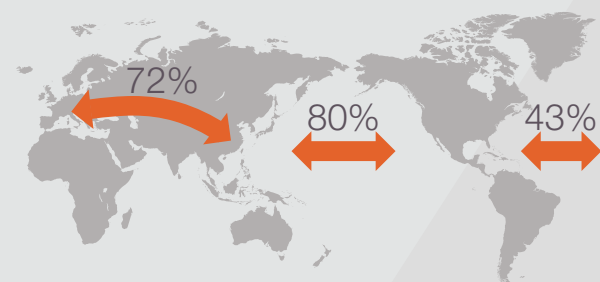
Analysis of average daily flights from Asia to North America, 2013



\*Conversion takes into account destination, range, and load factor.

### Freighters play a key role in major east-west markets

#### Total air cargo traffic carried by freighters by percentage



Freighters are therefore projected to carry more than half of the world's air cargo for the next 20 years, even as lower-hold cargo capacity expands faster than freighter capacity. It should be noted, however, that the faster growth and economical pricing of passenger lower-hold capacity makes the freighter share of the cargo market volatile when air cargo traffic growth is constrained.

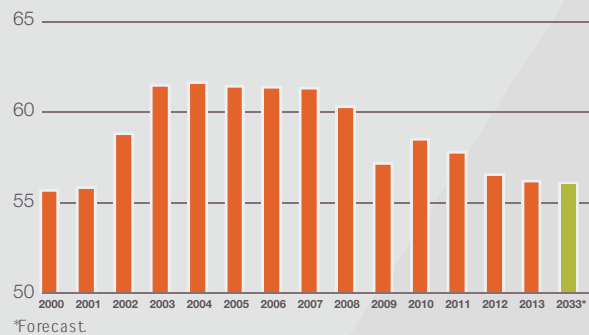
With air cargo traffic more than doubling by 2033, the world freighter fleet will grow by more than half, from the current 1,690 airplanes to 2,730 airplanes by the end of the forecast period. The imperative for efficiency favors large production freighters and will drive their share of the fleet to grow from 21% to 30% during the forecast period. Growing demand for regional express services in fast-developing economies will drive the standard-body share of the fleet to increase from 35% today to 40% in 20 years. All new deliveries of standard-body freighters will be converted passenger airplanes.

Of the 2,170 projected freighter deliveries, 1,130 will replace retiring airplanes, with the remainder expanding the fleet to meet projected traffic growth. More than 60% of deliveries will be freighter conversions, nearly 85% of which will be standard-body passenger airplanes. A projected 840 new production freighters, valued at \$240 billion, will be delivered, of which more than 70% will be in the large-freighter category.

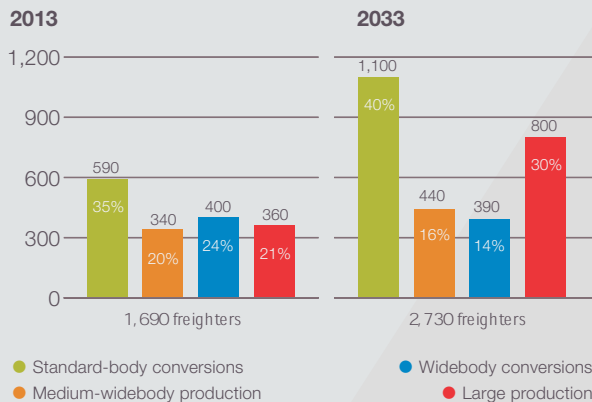
More than 40% of all freighter deliveries during the 20-year forecast period will be to carriers in the Asia Pacific region. Asia Pacific-based carriers will continue to receive a high proportion of large production freighters to serve their long-haul, intercontinental routes. North America will receive 30% of freighter deliveries over the next 20 years. Most of those deliveries will be to express carriers. Historically, up to three-quarters of medium widebodies, production and conversion, have supported express operations, in which relatively low airplane utilization makes converted freighters economically attractive. Standard-bodies will continue to support the needs of emerging regions, niche segments, and express operations.

Freighters carry more than half of air cargo traffic

World RTKs carried on freighters by percentage



Fleet grows by more than half, shifts to large production and standard-body converted freighters





# World Overview



## Air cargo traffic began growing again in 2013

From mid-2011 to early 2013, world air cargo traffic stagnated. This period of flat growth followed the decline in traffic associated with the global economic downturn of 2008 and 2009 and its strong recovery in 2010. Beginning in second quarter 2013, however, traffic began slowly and steadily to grow again, expanding 0.9% over 2012 levels for the full year. Growth continued to accelerate in 2014.

World air cargo traffic has averaged 5.2% growth per year since 1983. The growth rate actually exceeded 6% in several years throughout the 1980s, 1990s, and early 2000s. Growth slowed as fuel prices began to rise in 2005 and some shippers began to divert freight to less expensive modes of transport.

The global economic downturn, the worst economic contraction since the Great Depression, dragged down all modes of freight transport. World air cargo traffic dropped 13% over the two years ending in 2009. Traffic jumped 19.4% in 2010 and gained a further 0.8% in 2011 as global businesses replenished their inventories. The net result of these developments is a world air cargo traffic growth rate of only 2.6% for the span of years between 2003 and 2013. The growth rate since 2008 is only 1.7%. Containership traffic slowed to a similar pace during this timeframe.

The second quarter of 2013 brought a positive note as world air cargo traffic began growing again. Global air trade continued to gather momentum in 2014, and by July 2014, traffic had grown 4.4% compared with the first seven months of 2013. Even stronger growth is anticipated for the remainder of 2014 and all of 2015 as the world economy and trade recover to long-term growth trends.

## Air cargo growth varies by airline domicile and service type

The market share of airlines based in Asia and the Middle East has grown relative to that of airlines based in other regions. Scheduled air freight continues to claim the largest share of the air cargo market relative to charter and mail services.

Regional air cargo market shares have changed significantly during the past two decades. Airlines based in Asia, Europe, and North America have accounted for more than 80% of the world's air cargo traffic for that entire span of years. Airlines based in North America led all other world regions with a 35% share of the world's air cargo traffic in 1992. This changed during the 1990s and early 2000s as the share flown by airlines based in Asia, including those based in China, grew from 28% in 1992 to 39% in 2010, reflecting the rapid expansion of Asian export markets.

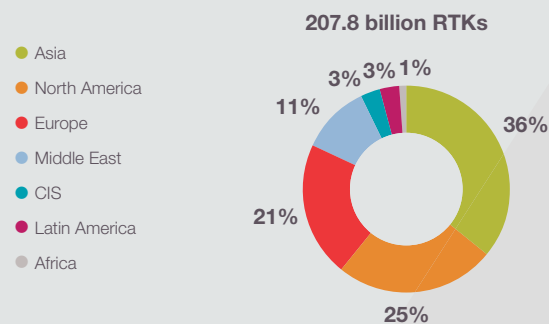
Since 2000, however, carriers based in the Middle East have leveraged their geographic position at the crossroads between Africa, Asia, and Europe. Middle East carriers have quickly expanded their widebody passenger and freighter fleets, allowing them to increase their share of world air cargo traffic from 4% in 2003 to 11% in 2013.

World air cargo traffic has slowed over the past decade

RTKs  
in billions



2013 air cargo market share by airline domicile



That same year, airlines based in Asia, Europe, North America, and the Middle East accounted for 91% of the air cargo traffic in the entire world.

World air cargo comprises three main service sectors: scheduled freight, charter freight, and mail. Scheduled freight is the largest component, accounting for 88% of all world air cargo traffic. Scheduled freight includes general and express (sometimes referred to as “integrator”) freight. The scheduled freight market share has remained more or less stable since 1992. Most shippers use regularly scheduled cargo services whenever possible because it is generally the least expensive way to ship by air. Scheduled freight grew 0.5% in 2013 compared with 2012.

Charter air freight (sometimes referred to as nonscheduled freight) accounts for 8% of world air cargo traffic. The charter sector captures traffic with urgent and/or special handling requirements. Nearly all urgent or special-handling cargo is carried on freighter airplanes, rather than in the lower hold of passenger airplanes. The charter freight market share generally rises during periods of strong world air cargo growth and, conversely, falls during times of slow or negative traffic growth. The charter segment grew 2.9% in 2013, particularly during the fourth quarter of that year as demand for several new-technology products exceeded manufacturer expectations.

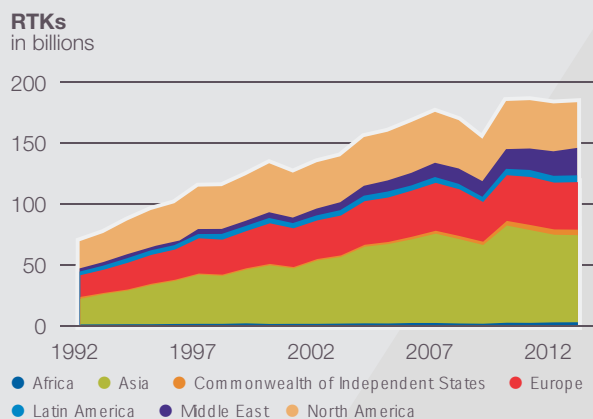
### Large widebody freighter ACMI services

Large widebody ACMI traffic volumes have fallen since the global economic downturn but still comprise 5% of world air cargo traffic.

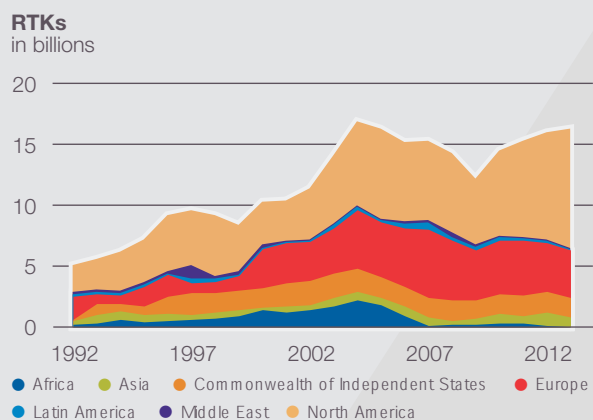
Aircraft, crew, maintenance, and insurance (ACMI) providers, sometimes called “wet lease providers,” offer cargo operators the flexibility to obtain lift on a trial basis, to augment existing markets and to provide service in markets that are highly seasonal—all with no capital equipment investment required. Large freighters in long-haul markets account for the most significant segment of the air cargo ACMI business. The ACMI business is sensitive to changes in the air cargo business, but it has become an established industry subsector since the early 1990s. ACMI providers have maintained approximately a 5% to 7% share of total world air cargo traffic for the past decade.

ACMI large freighter traffic has grown an average 11.3% per year over the 24 years since 1990. Annual growth has been uneven, however, since 2000. ACMI traffic contracted 8.9% in 2008 and another 4.6% in 2009 as the effects of the global economic downturn took their toll. As demand for dedicated freighter airplane capacity rebounded in late 2009 and 2010, this segment benefited greatly from the limited availability of long-haul freighters in operator fleets. World air cargo traffic stagnated from mid-2011 to early 2013, driving ACMI traffic to decline 5% in 2012 and 9.7% in 2013. The drop in demand forced several ACMI providers to exit the business in 2012 and 2013, but airlines with newer large freighters were generally able to survive this period of slow traffic growth.

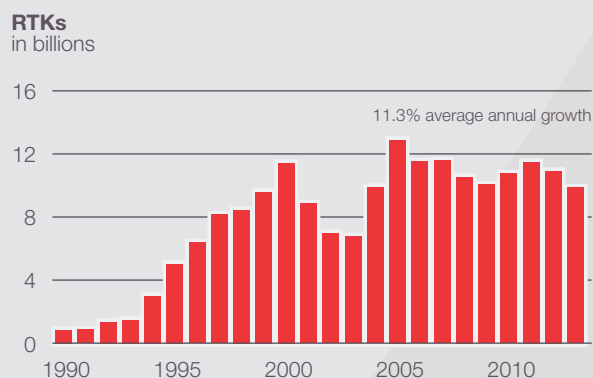
## World scheduled air freight grew 0.5% in 2013



## World charter air freight grew 2.9% in 2013



## About 5% of world air cargo traffic is transported by ACMI providers



## International express

International express traffic continued to grow faster than the average world air cargo growth rate, expanding 8.9% in 2012 and 5.8% in 2013.

The distinction between express and general air cargo continues to blur. Traditional providers are expanding their time-definite offerings, and express carriers, freight airlines, and postal authorities are consolidating. Ultimately, the air cargo customer benefits from increased service options and lower prices as market pressure brings competing products into the market.

International express traffic grew at nearly triple the rate of total worldwide air cargo traffic, averaging more than 22% annually from 1992 to 2000, as measured in revenue tonne-kilometers (RTK). However, growth slowed considerably, to about 6.8%, between 2000 and 2008. This pattern of rapid growth followed by more modest growth parallels the double-digit growth of the domestic US express industry during the 1970s and 1980s, which was followed by slower growth. However, international express traffic growth was interrupted in 2009, falling 12.6% as a result of the global economic downturn. The recovery was robust, with express traffic increasing 24.8% in 2010 and 11.6% in 2011. The upward trend continued in 2012 and 2013 with 8.9% and 5.8% growth, respectively.

Higher-than-average annual growth boosted the express share of international air cargo traffic from 4.1% in 1992 to 13.4% in 2008. The international express share remained at about 13% of total international traffic during the global economic downturn from 2008 through 2010. In 2011, the international express market share increased to 14.7% and then, continuing to outpace the growth of international freight and mail, increased its share to 16.2% in 2012 and 17.0% in 2013.

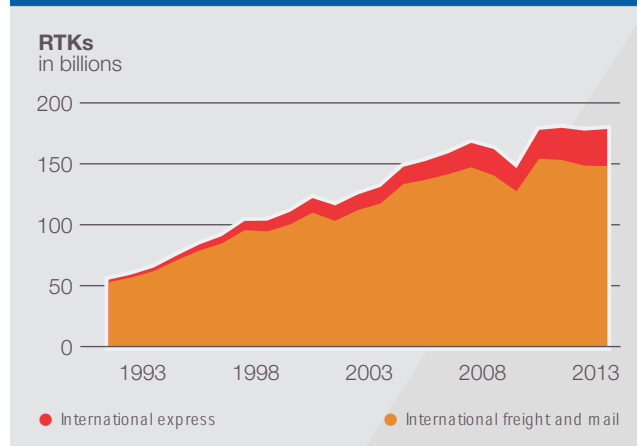
The average international express shipment size has also continued to grow. Average shipment weight is estimated to have increased from 2.7 kilograms in 1992 to 6.6 kilograms in 2013, which indicates continuing inroads of express services into the traditional province of general air cargo. As businesses continue to expand beyond domestic and nearby regional markets, the international express sector will continue to grow, albeit at more sustainable, long-term rates.

## World air cargo and maritime traffic

With improving global economic conditions, world trade and containership traffic are growing slowly after struggling through the global economic downturn.

Air cargo is only one part of the global goods distribution network. Shippers demand that shipments arrive at their destination on time, undamaged, and at a reasonable price, regardless of transportation mode. Different transport modes—road, rail, maritime, and air—can often move the same commodities. But shippers usually have only two choices for intercontinental freight: air and maritime. Maritime transport offers the primary benefit of low cost; air transport offers the benefits of speed and reliability.

International express market share reached 17% in 2013



## World trade commodities shipped by sea

The maritime transportation industry is much larger than the air cargo industry, measured in tonnes of goods transported. In 2013, the world maritime industry carried an estimated 9.5 billion tonnes, compared with 42 million tonnes for the air cargo industry. By weight, more than 80% of world trade is in raw materials and other bulk items, such as oil, metal ores, and grains. Because most of these commodities are low value and are not time sensitive, they are shipped by sea in specialized tankers or bulk carriers. Movement of these bulk commodities constitutes the major part of world trade and maritime traffic, which cannot be directly compared with transport of the high-value commodities generally shipped by air. Although air cargo constitutes only an estimated 1% of world trade calculated by tonnage, air cargo represents about 35% of world trade calculated by the value of goods shipped.

## Containership transportation

Containerized cargo, a segment of maritime dry cargo, is one of the fastest growing forms of freight transport. Although the major portion of maritime cargo consists of low-value bulk commodities, containerships also carry some commodities that are typically carried by air, providing a low-cost transportation alternative for goods that do not require the speed and reliability of air shipment.

Since the late 1980s, globalization and regional specialization of industry, particularly in Asia, have driven rapid growth in containership freight flows. Containership tonnage is estimated at 1.53 billion tonnes in 2013, representing about 40% of world maritime dry cargo. Containership tonnage has been growing faster than other maritime transportation segments. Containerized cargo tonnage grew an average 7.4% per year between 2000 and 2013, while tanker cargo averaged 2.3%; main bulk commodities, 6.0%; and noncontainerized dry cargo, 1.4%.

Many of the world's trade lanes are not balanced directionally. Finished products fill the available capacity in one direction, but there are fewer goods to take up the capacity in the opposite direction. Capacity on return trips is therefore available at a low price. Taking advantage of this directional capacity surplus, shippers are transporting many bulk and low-cost goods as containerized cargo, instead of as maritime bulk cargo. For example, in 2013, soybeans, motor vehicles, waste and scrap metals, and cotton were the top commodities by weight shipped on containerships from the United States to China. The growth in containership traffic has been primarily transport of these types of products, not of the high-value goods commonly shipped by air.





**Comparison of containership and air cargo transport traffic**

Containership cargo traffic in 2013 is estimated at 11.2 trillion RTKs, while world air cargo traffic is 208 billion RTKs. The largest containership markets, as measured in RTKs, mirror the largest air cargo markets. In 2013, Europe-Asia was the largest containership market, with 2.9 trillion RTKs, followed by Asia-North America with 2.0 trillion RTKs and Europe-North America with 0.3 trillion RTKs.

Until the global economic downturn, the containership industry had grown steadily every year since its inception. Between 1980 and 2011, containership tonnage averaged 8.9% growth per year. Both air and maritime cargo had major declines during the global economic downturn. World air cargo traffic fell by 9.4%, and containership freight dropped 7.2% in 2009. Deteriorating economic conditions and the consequent drop in demand for shipping services brought overcapacity, declining yields, and financial losses to the container shipping industry. Operators responded with measures including “slow steaming,” trimming ports of call, reducing frequencies, and taking ships out of service.

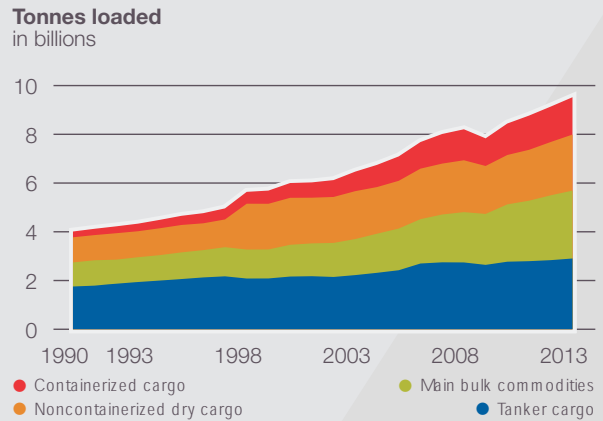
The global economy appeared to be recovering in 2010. Containership capacity was restored, and new ships were ordered. When the economic recovery slowed in 2011, the containership industry had a severe excess of capacity as the demand for shipping services declined. As a result, containership yields dropped to very low levels as operators struggled to maintain loads. At the same time, rising fuel prices led to increased operating costs. Growth of containership traffic dropped after the initial recovery from the global economic downturn, as did air cargo traffic. Average annual containership growth in RTKs fell to 3.9% from 2008 to 2013 after growing at an average annual rate of 10.6% the previous five years. While containership growth continued to exceed air cargo growth, the growth resulted from the increased transport of bulk goods, not from the transport of goods normally shipped by air. It is estimated that the top 20 container lines had combined losses of US\$6.5 billion from 2008 to 2012. Containership companies are currently trying to stabilize and increase yields to hold down continuing losses.

**Air cargo continues its role in world trade**

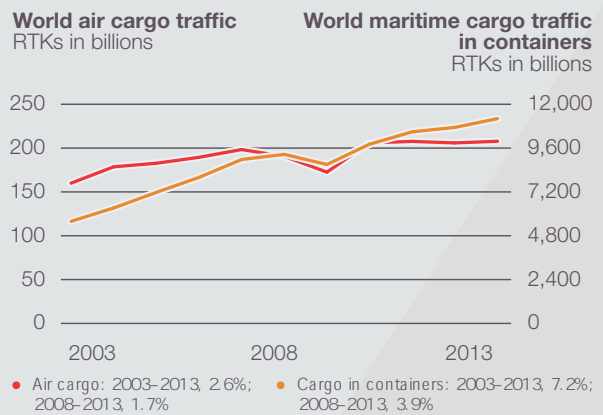
Throughout the economic turmoil and resulting world trade distress during the past few years, air cargo has proved to be resilient and has maintained its market share of the commodities historically shipped by air. For example, in the transpacific market, about 2% by weight of nonbulk, high-value commodities have been transported by air since 2000. Demand for these commodities has fluctuated, but the share shipped by air has remained steady. The speed and reliability provided solely by air cargo continue to play a vital role in world trade.

**Container trade has grown by taking market share from other maritime segments**

Source: UNCTAD, Fearnleys, CRSL

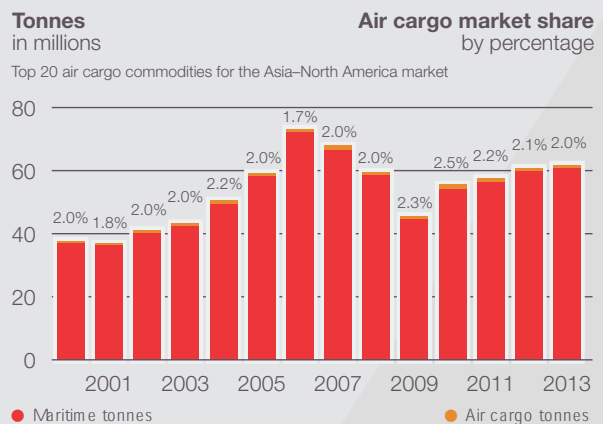


**Container trade has grown faster than air cargo through diversion of low-value bulk commodities**



**Air cargo has maintained its market share in the key transpacific cargo market**

Source: US DOC foreign trade data



## Forecasting methods

Several approaches can be used to handle the range and complexity of forecasting challenges. Each approach is carefully matched to the specific issue and application.

Four approaches—econometric modeling, evaluation based on judgment, trend analysis, and potential analysis—provide useful forecasts. Econometric modeling helps determine the overall importance of underlying economic factors (e.g., GDP) and provides forecasts that are linked to expectations of those factors. This method is useful for medium- and long-range forecasts in regional markets.

The demand for air freight depends on the economic activity in the importing region or country, conditioned by transportation costs, exchange rates, and relative prices. Econometric modeling may be used to predict demand, assuming that adequate capacity will be in place to meet the demand and that factors not included in the model will exert the same influence as in the past. Modifications based on judgment often account for expected changes in noneconometric growth factors. For example, estimating the effect of air service agreements, trade quotas, restrictions on airport night operations, and changes in trade patterns could be vital to an airline's strategic plan. Incorporation of anticipated increases in capacity, route restructuring, and market programs can contribute to more reasonable forecasts.

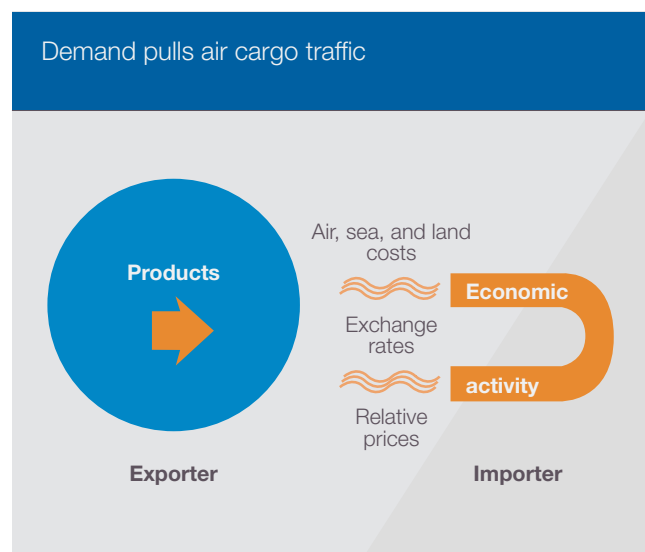
A simple trend analysis often is used to evaluate changes in economic factors. This approach is useful in evaluating general changes in the marketplace that can be attributed to the combined effects of a number of factors. Such trends can be extrapolated into the future. However, extrapolation from a small base with large growth can produce unrealistic results.

Potential analysis is particularly useful for forecasting markets in their early stages of development. For example, commodities transported by air tend to be valued at more than \$16 per kilogram. It is therefore possible to project a potential air cargo market based on the percentage of traded goods (regardless of transport mode) that are valued above \$16 per kilogram.

## Market environment

Although economic activity is the primary influence on world air cargo development, other factors must be considered.

Factors beyond the control of airlines include inventory management techniques, modal competition, environmental regulations, globalization, market liberalization, national development programs, and the introduction of new air-eligible commodities. All of these factors play significant roles in air cargo growth. Constraints on economic growth, primarily those originating outside the airline industry, can dramatically hinder air transport industry growth. A variety of air transport industry constituencies and policymakers address these interrelated growth concerns.



Fuel prices have been a persistent problem for air cargo. As fuel prices roughly tripled between 2004 and 2012, freight forwarders and the greater shipping community diverted a larger portion of general cargo to less expensive modes of transport. As of third quarter 2014, jet fuel prices clung to the elevated 2012 levels but remained below the historic highs of 2008. Fuel is forecast to remain relatively stable at current prices for the next few years.

Competition with other modes of transportation could present a challenge for air cargo. Changes in the containership industry have enticed shippers to move their freight away from air cargo when schedules and time commitments to customers permit. Containership pricing is generally 10 times less expensive per unit weight than air cargo but at the expense of longer and less reliable transit times. The goods that are shipped by air are high value, time sensitive, and perishable and require speedy and reliable transport. To continue to compete effectively with containerships, the air cargo industry must ensure that the service benefits of air transportation are not eroded. For example, track-and-trace tools, once the sole provenance of the air express industry, are now commonplace at surface transport providers.

Changes in the behavior of shippers have also affected the air cargo market. E-mail and the electronic transmission of documents have reduced the need to ship many types of small parcels and documents that are the life blood of express and courier companies. Better information and improved supply chain visibility allow shippers to plan and manage their supply chains with a higher degree of confidence, encroaching on one of the primary advantages of air cargo. Air cargo has traditionally offered shippers a unique means to recover from unforeseen events and emergencies. Anecdotal evidence suggests that improved supply chain visibility has reduced the occurrence of situations that demand the speed and reliability of air transport.

### Yield trends

Freight yields have declined at an average rate of 2.3% per year over the past 20 years.

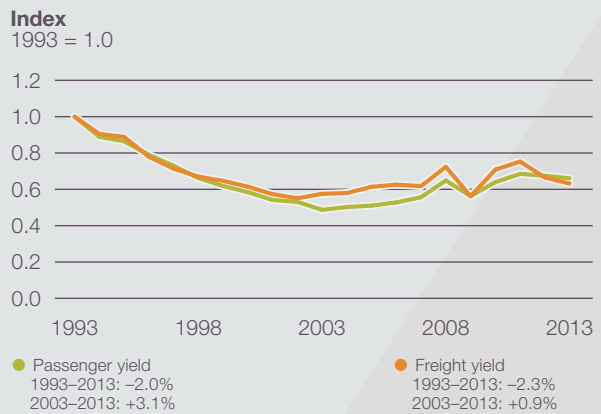
Cargo revenue represents approximately 14% of total air traffic revenue on average. Some airlines earn nearly 35% of their revenue from cargo. Continuing industrywide declines in yield for cargo and passenger services reflect productivity gains, technical improvements, and intense competition. Although declining yield creates pricing pressure on all industry segments, from service providers to airplane manufacturers, it also helps stimulate growth for the industry by enabling lower transportation cost for the consumer.

Within the past decade, the downward yield trend has reversed, with yield increasing on an inflation-adjusted basis. Freight yield increased 0.9%, and passenger yield increased 3.1% per year since 2003.

### Factors and constraints for air cargo growth



### International air freight yields fell in 2012 and 2013



From 2003 through 2008, freight yield increased approximately 4.7% per year. Much of the increase is owing to fuel and security surcharges that were first imposed in 2003. Significant fuel surcharges imposed in 2008 in response to the fuel crisis helped yields increase 17.2% compared with 2007. The global economic downturn drove freight yields down 22.4% in 2009. In 2010, when cargo traffic rebounded and demand growth outpaced capacity, freight yield increased 26.1%. In 2011, freight yield increased 6.3%, with air freight traffic growing 0.8%. The yield gain can be attributed to strong cargo traffic growth in the first four months of 2011.

From 2012 through 2013, as total cargo capacity increased and demand stayed nearly flat, the pressure on freight yield resulted in an annual yield decline of 8.4%.

Over the past two decades, freight yield has declined 2.3% per year. The second decade saw yield increase 0.9% per year compared with a 5.4% per year decline in the previous decade. Increased cost of shipping by air and the downturn in the world economy held world air cargo traffic growth to only 2.6% during the past 10 years, which is below the historical trend. Industrywide declines in freight yields are expected to continue in the future as more efficient airplanes enter the market, helping to stimulate market growth.

**World economic growth outlook**

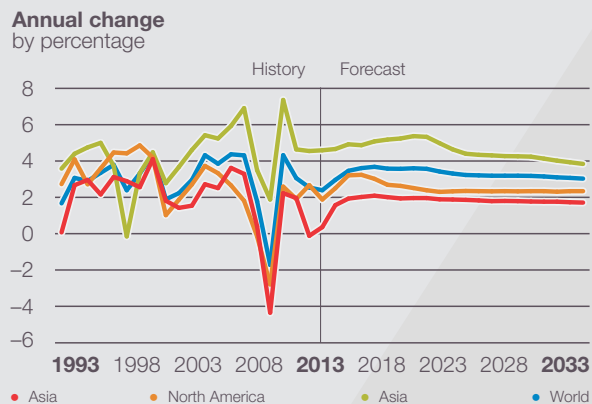
The world's economy is forecast to grow at an average annual rate of 3.2%.

Persistent weak growth characterized the past two years, continuing a painfully slow and uneven recovery since the global economic downturn. More recently, however, developed economies, especially that of the United States, seem to be leading the way toward gradual acceleration, albeit dampened by poor weather, financial market turbulence, regional political instability, and military conflicts in early 2014. World GDP growth of 3.5% to 3.6% is predicted over the next several years, reflecting increased globalization and broader diffusion of modern technology. These near-term growth rates exceed the forecast long-term rate, which averages 3.2% annual growth through 2033. Business sentiment is mostly consistent with an improving outlook.

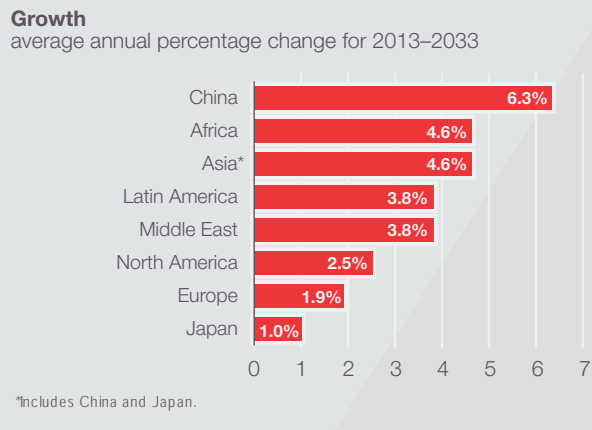
An increasingly integrated world economy is forecast to expand at an average 3.2% annually through 2033. The long-term growth rate for North America is expected to average 2.5% per year over the same period. Similarly, Europe's GDP is projected to grow about 1.9% per year during the next 20 years.

Asia will continue to lead the world's major economies with projected growth of 4.6% per year between 2013 and 2033. China, in turn, leads individual country long-term growth with a 6.3% average annual increase, in contrast to Japan at 1.0% per year. Asia's share of world GDP is projected to rise from 31% in 2013 to nearly 40% by 2033. The world GDP share held by North America and Europe, which together currently account for more than half of economic activity, will drop to less than 42% by 2033.

Historical and forecast world economic growth by region



Forecast average regional GDP growth rates





**World air cargo traffic forecast**

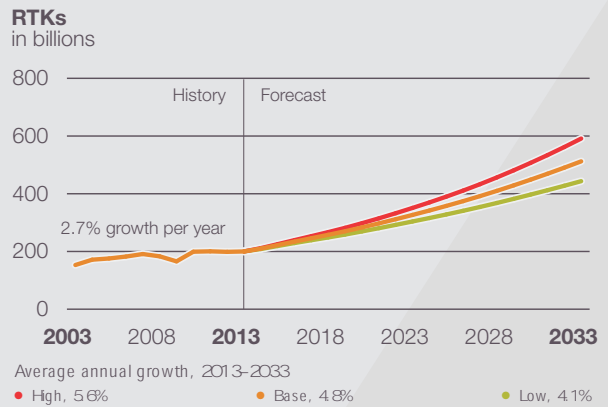
World air cargo is the sum of freight and mail. World air freight traffic is strongly related to GDP and average yield. The world airmail component, however, depends less on yield and therefore correlates most strongly with GDP.

Low, baseline, and high annual growth of 4.1%, 4.8%, and 5.6%, respectively, are forecast for world air freight traffic. High and low scenarios correspond to GDP growth of 0.5% above long-term projections and 0.5% below, respectively. Worldwide air freight is expected to more than double over the next 20 years, increasing from 200 billion RTKs in 2013 to 512.3 billion RTKs by 2033.

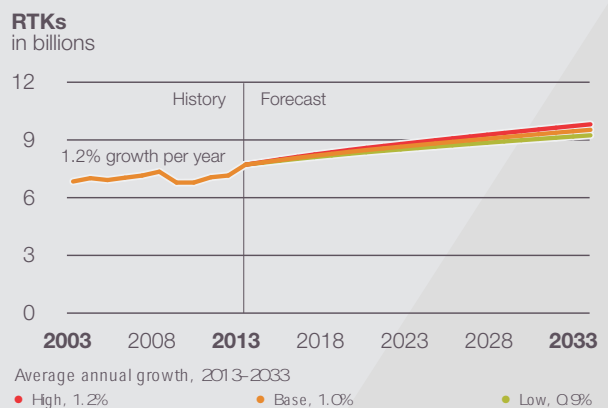
World airmail is forecast to grow at a consistent 1.0% per year. Risks that could affect future airmail growth include inroads by express operators into package mail, increasing reliance on Internet communication, entry of traditional postal services into express air freight operations, and more stringent security requirements.

The baseline forecast for total world air cargo predicts that traffic will more than double between 2013 and 2033. Worldwide traffic will grow from 207.8 billion RTKs in 2013 to more than 521.8 billion RTKs by the end of the forecast period. Sustained economic growth, along with decreasing yields, contributes significantly to the growth of the air cargo industry.

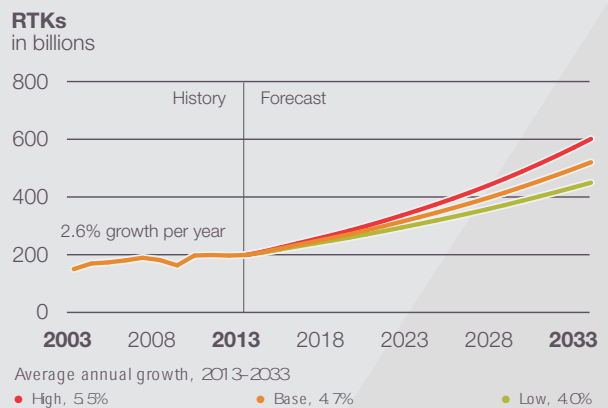
**World air freight will grow 4.8% per year through 2033**



**World airmail will grow 1.0% per year through 2033**



**World air cargo (freight and mail) will grow 4.7% per year through 2033**



**Regional air cargo markets**

Air cargo markets linked to Asia, especially to the Pacific Rim countries, will lead all other international markets in average annual growth between 2013 and 2033.

Nearly all trade lanes connecting to Asia over the past two years saw virtually no growth as a result of the slowdown in the US and Europe economies. Demand for air cargo traffic started to grow during the second quarter of 2013 as the world economy improved. Cargo demand continues to grow in 2014 with Hong Kong International Airport and Shanghai Pudong International Airport Cargo Terminal Company reporting air cargo traffic growth of 6.8% and 16.0%, respectively, through August 2014. Growth continues to strengthen and is now starting to return to the long-term trend.

Intra-Asia traffic is forecast to grow faster than any other international world market, averaging 6.5% growth per year. The Asia–North America and Europe–Asia markets will grow at an average 5.4% and 5.3% per year, respectively. Domestic China will be the fastest growing contiguous market in the world, averaging 6.7% annual growth for the forecast period.

The mature markets of North America and intra-Europe will grow more slowly, at 2.1% and 2.0% per year over the next 20 years. Also projected to lag behind the world average growth rate are the markets of Europe–North America at 3.1%, Middle East–Europe at 4.0%, and Africa–Europe at 4.3% growth.

The South Asia–Europe market is forecast to grow at the world average rate of 4.7% per year. Air cargo growth in the Latin America–Europe and Latin America–North America flows is forecast to exceed the world average at 4.8% and 5.2%, respectively. Market shares will continue to change as a result of varying regional growth rates. Intra-Asia is currently the fifth largest air cargo market, but because it is forecast to grow 6.5% per year over the next 20 years, it will be the third largest air cargo market by 2033. The share of world air cargo traffic associated with Asia, including the domestic markets of China and Japan and all international markets connected to Asia, will increase from 51.3% in 2013 to 61.1% in 2033.



## Regional Markets

# North America



For the purposes of this forecast, North America is defined as the United States and Canada.

### Air cargo traffic grew in 2013

Air cargo moving to, from, and within the United States and Canada accounts for 9.1% of the world's air cargo traffic in terms of tonne-kilometers and 14.1% in terms of tonnage alone.

The North American air cargo market grew modestly in 2012 and 2013, reflecting the slow recovery from the global economic downturn. North American air cargo traffic grew 1.9% in 2012 and 1.1% in 2013. US domestic air cargo, which accounts for 95.9% of the North American market, grew 1.9% in 2012 and 1.0% in 2013.

Canadian domestic air cargo, which is 2.2 % of the total North American market, grew 2.2% in 2012 and 2.7% in 2013. Transborder traffic from the United States to Canada accounts for 1.6% of the 2013 North American market, while transborder traffic from Canada to the United States accounts for 0.3% of the North American market.

### US domestic air cargo market

The US domestic market grew 3.0% during 2012 and 2013.

The US domestic market is mature and has remained relatively flat in recent years, except during the global economic downturn, which resulted in a drop of 12.4% in 2009. Traffic continued a slow recovery in 2012 and 2013, growing 1.9% and 1.0%, respectively. US domestic traffic grew to 18.0 billion revenue tonne-kilometers (RTK) in 2012 and 18.2 billion RTKs in 2013. Annual revenue for the US domestic air cargo industry was flat at \$27.9 billion in 2012 and in 2013. Revenues are still 15% below the industry peak of \$32.9 billion, which was set in 2007.

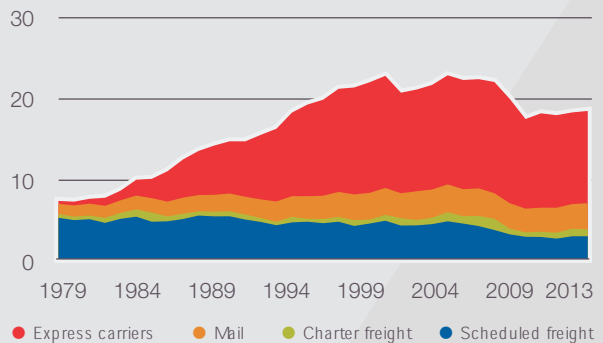
The express carrier share of the total North America air cargo market declined slightly to 62.6% in 2012 and to 62.3% in 2013. Express carrier traffic was 11.3 billion RTKs in 2012, a decrease of 1.0% from 11.4 billion RTKs in 2011. Traffic increased 0.6% in 2013 returning to 11.4 billion RTKs. After increasing consistently during the 1980s and 1990s, the shipment volume of the express carriers flattened between 2001 and 2007 as the market matured. Volumes have remained flat since the global economic downturn of 2008 and 2009. Express carrier volume was 5.4 million shipments per day in 2011 and 2012, growing to 5.5 million shipments per day in 2013.

Scheduled freight traffic in the domestic US market grew 11.4% in 2012 and remained flat at 2.8 billion RTKs in 2013. The market share of scheduled US domestic freight carriers increased from 14.2% in 2011 to 15.5% in 2012, then declined to 15.3% in 2013.

Scheduled mail accounted for 17.6% of the US market in 2013 with 3.2 billion RTKs. Mail traffic decreased by 0.6% in 2012 and increased 5.9% in 2013. Chartered operations accounted for 4.7% of the US market with 0.9 billion RTKs in 2013. The market share of charter operations has been volatile. After increasing 15.2% in 2011 and 25.5% in 2012, charter operations decreased 7.1% in 2013.

### Express service dominates the US air cargo market

RTKs  
in billions



## Canada domestic air cargo market

Canada's share of the region's air cargo market has remained steady.

The Canadian domestic market accounted for 2.2% of the total North American air cargo market in 2013. Typical of a mature market, domestic Canada traffic grew slowly at 2.2% in 2012 and 2.7% in 2013 to log 411 million RTKs.

## Canada's economy grew 2.0% in 2013.

Economic recovery continued in 2012 and 2013 with GDP growth of 1.7% and 2.0%, respectively.

## US-Canada transborder air cargo increased in 2013

The transborder air cargo market was 351,000 tonnes in 2011 and 2012. In 2013, transborder air cargo traffic grew 3.2% to 362,000 tonnes. Traffic from the United States to Canada rose 2.3% in 2012 and 3.8% in 2013. Traffic from Canada to the United States was down 11.4% in 2012 and 0.7% in 2013 as the economic recovery slowed in the United States.

Canada's largest trading partner is the United States. In 2012 and 2013, air cargo represented 4.5% of Canada's total trade with the United States in terms of value. Northbound tonnage continued to exceed the southbound tonnage, as it has since the mid 1980s.

Commodities shipped from the United States to Canada included small packages, industrial machinery, electrical machinery, and ferrous products. Commodities shipped from Canada to the United States included industrial machinery, electrical machinery, specialized equipment, and small packages.

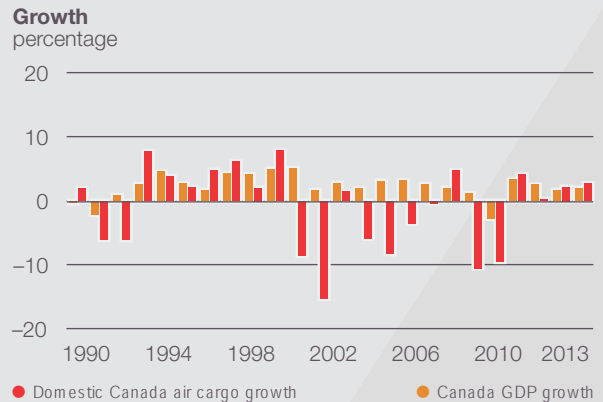
## Cargo carriers increase use of trucks

Reductions in the size of the passenger fleet, the predominance of narrowbody airplanes on domestic routes, and the demise of scheduled domestic air freight airlines has reduced North American domestic air cargo capacity, measured in available tonne-kilometers.

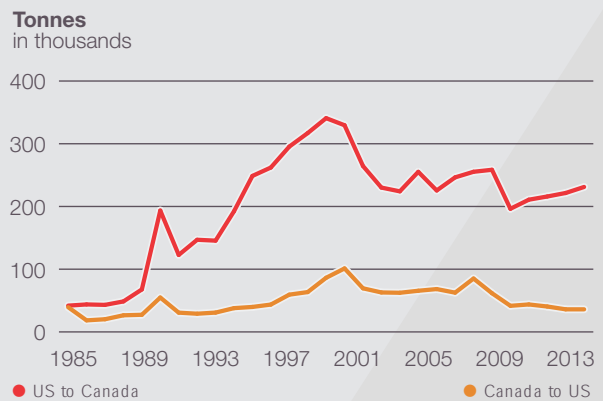
Continuing the trend of past years, combination carriers continue to rely on trucks to offset the loss of domestic air capacity that has resulted from reduced fleet size and the shift of widebody airplanes from domestic to international markets. Truck flights allow combination carriers to offer service comparable to that of pure cargo carriers. Rising fuel costs have magnified the inherent cost advantages of ground transport over air transport.

The economic recession dramatically decreased domestic shipping demand after years of fairly steady growth. In 2008 and 2009, both air and truck tonnage declined significantly. The slow economic recovery that began in 2010 is reflected in slow growth in both truck and air tonnage through 2013.

## Canada GDP and domestic Canada air cargo growth

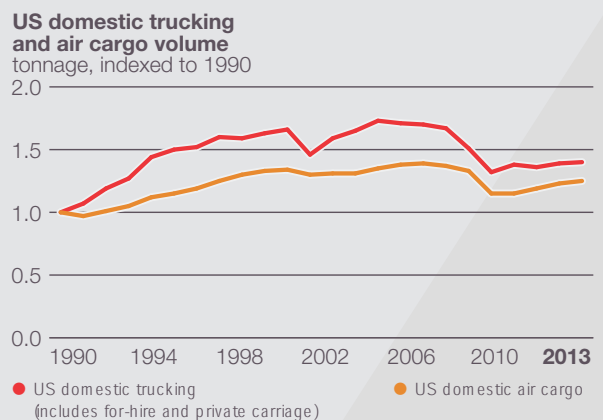


## Transborder tonnage northbound continues to exceed that southbound



## Trucking and air cargo volumes are slowly recovering

Sources: IATA, ACMG, and ATA





## North America economic forecast

The US economy grew 2.8% and the Canadian economy grew 1.7% in 2012. In 2013, the US and Canadian economies grew 1.9% and 2.0%, respectively.

In 2008 and 2009, the world and North American economies suffered the most severe downturn since the Great Depression. As the economies continued to recover slowly, the US GDP grew 2.8% in 2012 and 1.7% in 2013, and the Canadian GDP grew 1.9% in 2012 and 2.0% in 2013. In the long term, the US GDP is forecast to average 2.5% growth per year between 2013 and 2033, while Canada's GDP averages 2.4% annual growth during the same period.

## North America air cargo forecast

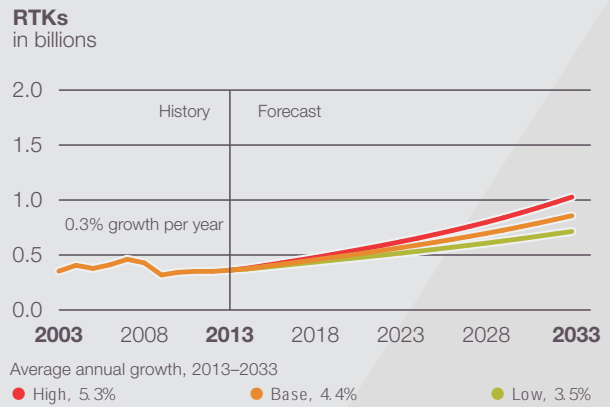
Air cargo traffic in North America grew 1.9% in 2012 and 1.1% in 2013, reflecting slow recovery from the economic recession. North America air traffic is projected to average 2.2% growth over the next 10 years and 2.1% over the full 20-year forecast period.

Transborder air cargo traffic is expected to exceed the growth rate of both the GDPs and the domestic air cargo markets of the two countries. Liberalization of air transportation agreements will foster increased use of relatively uncongested and accessible Canadian airports by US shippers for transport to Europe and Asia. Expansion of passenger airline networks across North America would increase transborder air cargo capacity and traffic. Transborder air trade between Canada and the United States is projected to grow 4.6% annually over the next 10 years and grow at an average rate of 4.4% for the entire forecast period through 2033.

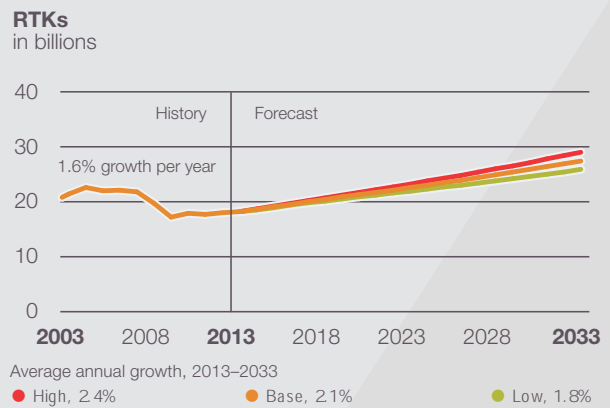
The US domestic market will maintain the dominant share of the total North American market, with about 95.3% of the total RTKs. The US domestic market is forecast to grow at an average annual rate of 2.2% over the 10-year period from 2013 to 2023 and 2.1% over the full 20-year period from 2013 to 2033.

The Canadian domestic market is forecast to grow at an average annual rate of 2.5% over the 10-year period from 2013 to 2023 and 2.3% over the full 20-year period from 2013 to 2033, roughly matching Canada's GDP growth. Overall, growth in both North American domestic air cargo markets could be limited by continued expansion of trucking services in the time-definite sector.

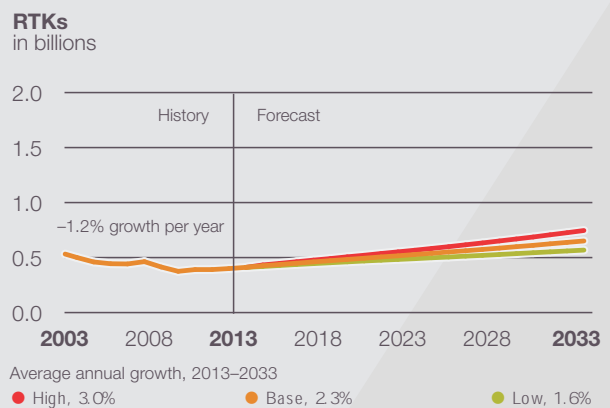
US-Canada transborder air cargo traffic will grow 4.4% per year



US domestic market will grow 2.1% per year



Domestic Canada air cargo market will grow 2.3% per year





For the purposes of this forecast, we define Latin America as South America; Central America, including Mexico; and the Caribbean Basin. We define North America as the United States and Canada.

**Air cargo grew 0.6% in 2013**

The Latin America–North America market, which represents 2.8% of the world’s air cargo traffic measured in tonne-kilometers and 3.3% measured in tonnes, grew 0.6% in 2013 following 3.2% growth in 2012.

**Market growth will return over the long term**

Growth in the Latin America–North America air cargo market slowed to 0.6% in 2013 after increasing 3.2% in 2012. Air cargo traffic from North America to Latin America declined 3.0% in 2012 and 3.7% in 2013. Offsetting this decline, air cargo traffic from Latin America to North America grew 8.2% in 2012 and 3.7% in 2013.

This decline in the southbound market has been primarily due to sluggish growth of the Brazilian economy. In the short term, Brazilian economic growth will continue to be slow, but in the medium and long term, economic health is expected to return and, with it, air cargo traffic.

**Latin America–US air cargo market**

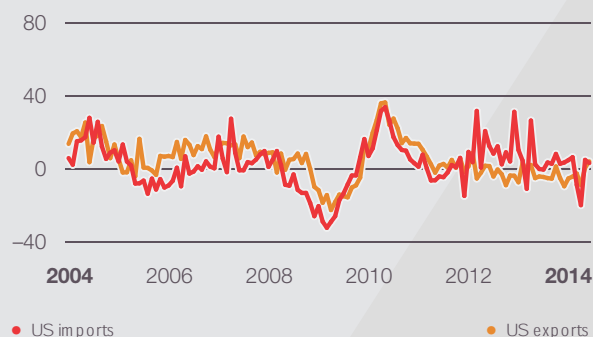
The United States is Latin America’s major North American trading partner, accounting for 90% of Latin America’s imports from North America and 93% of its exports to North America. Monthly Latin America–US trade, therefore, serves as a good approximation of month-to-month activity in the Latin America–North America air cargo market.

For the purposes of analyzing air traffic growth rates, Latin America can be divided into three subregions: South America, Central America, and the Caribbean Basin. During 2013, South America accounted for 75.2% of the total 1.4 million tonne Latin America–North America air cargo market, Central America accounted for 19.3%, and the Caribbean Basin accounted for 5.5%. Consistent with recent history, air cargo traffic between North America and the various subregions grew at different rates in 2013.

South America–North America air trade growth dropped from 4.5% in 2012 to 0.3% in 2013 as the Brazilian economy slowed. Brazil’s share of South America–North America trade, measured in tonnes, dropped from largest to third largest, as Chile and Colombia climbed to first and second largest. Central America’s air trade with North America grew by 1.9% in 2012 and was flat at 0.6% in 2013. Mexico remained North America’s largest Central American air trade partner and accounted for more than half of the air cargo tonnage shipped between North America and Central America.

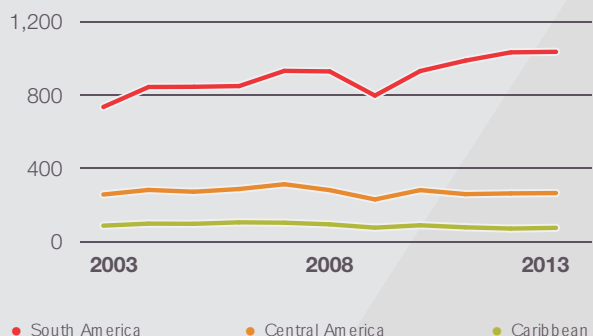
Latin America–US trade has been volatile since 2012

Monthly change in air cargo tonnage, year over year by percent

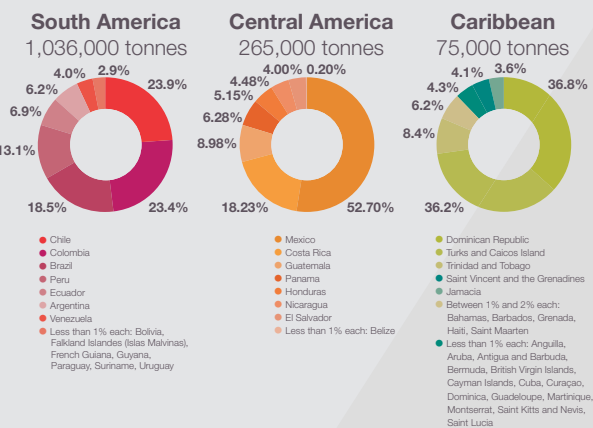


Latin America–North America air cargo is unevenly distributed

Tonnes in thousands



Latin America–North America trade can be classified into subregions



The Caribbean Basin's air trade with North America grew 5.8% in 2013 following a decline of 8.8% in 2012. In particular, air trade between North America and the Dominican Republic, one of the Caribbean Basin's larger traders, grew 8.6% in 2013 after declining 15.6% in 2012.

### Air trade commodities

Commodities data from 2013 show that cargo flows to Latin America consisted primarily of higher value manufactured commodities, while flows from Latin America were made up primarily of perishables.



## Latin America–North America air cargo forecast

The total Latin America–North America market for air cargo services is forecast to grow 5.2% per year between 2013 and 2033.

Although economic growth in Brazil was flat in 2013, the lull in growth is forecast to be short term, with the economies of Brazil and Latin America as a whole projected to exceed the world average economic growth rate for the next 20 years. In South America and Central America, GDP is forecast to grow 3.9% and 3.5% per year, respectively, through 2033. The Caribbean Basin economies are projected to grow 3.6% during the same period.

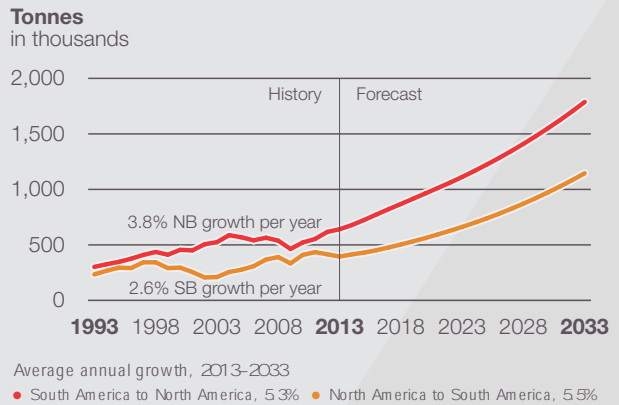
Spurred by economic growth, air trade from Latin America to North America is forecast to grow 5.2% per year over the next 20 years, while air trade from North America to Latin America is forecast to grow 5.3%.

For the South America subregion, bidirectional air trade with North America is projected to grow at an average annual rate of 5.3% over the next 20 years. Traffic from South America to North America is forecast to grow 5.3%, and traffic from North America to South America is expected to grow 5.5%. The growth projection assumes the continued strength of the South American economies and a stable political environment.

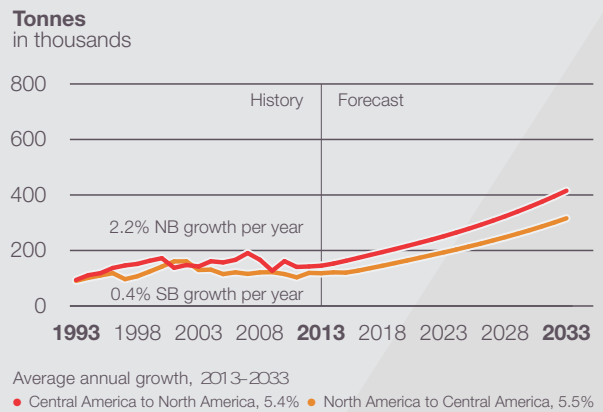
Mexico is forecast to drive Central America’s air trade with North America with growth of 5.4% per year during the next 20 years, exceeding the rates of the other Latin America subregions. Air trade from Central America is projected to grow 5.4% annually and air trade to Central America will grow 5.5% per year.

Air trade between the Caribbean Basin and North America is projected to grow modestly over the next 20 years at a rate of 1.8% per year, because the relatively short transit times and lower costs of ocean shipping make it a more cost-effective option for many shippers in this market.

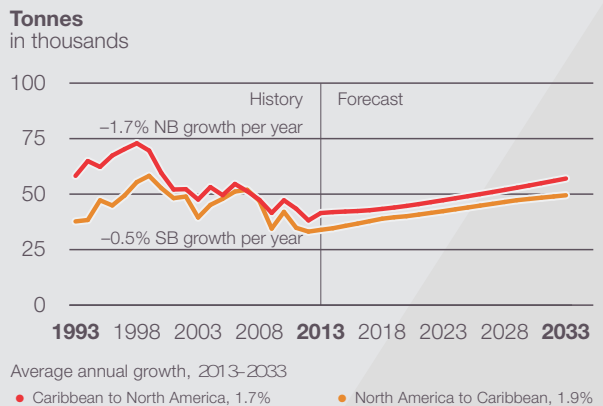
## South America–North America air trade will grow 5.3% per year



## Central America–North America air trade will grow 5.4% per year



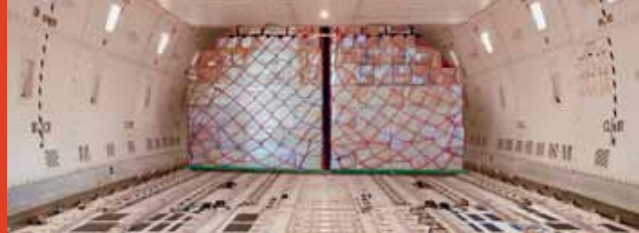
## Caribbean–North America air trade will grow 1.8% per year





# Regional Markets

## Latin America and Europe



For the purposes of this forecast, we define Latin America as South America; Central America, including Mexico; and the Caribbean Basin. We define Europe as all 27 member countries of the European Union plus Switzerland, Norway, Iceland, Turkey, Albania, Gibraltar, and all the countries of the former Yugoslavia.

### Latin America–Europe market growth resumes

The Latin America–Europe market, which represents approximately 3.2% of the world’s air cargo traffic in terms of tonne-kilometers and 1.8% in trade tonnage, declined 6.2% in 2012 and grew 3.7% in 2013.

After increasing 4.8% in 2011 during recovery from the global economic downturn, the Latin America–Europe air cargo market slowed with the economy, declining 6.2% in 2012 then recovering with 3.7% growth in 2013. Air cargo from Europe to Latin America saw minor changes, falling 1.9% in 2012 and rising 2.6% in 2013. Europe’s economic recovery from the global economic downturn has been erratic and is reflected in Latin America’s air cargo exports to Europe, which declined 11.8% in 2012 but rallied to grow 5.4% in 2013.

The European Union remains an important trade partner for Latin America, second only to the United States, and is also the region’s leading source of foreign direct investment.

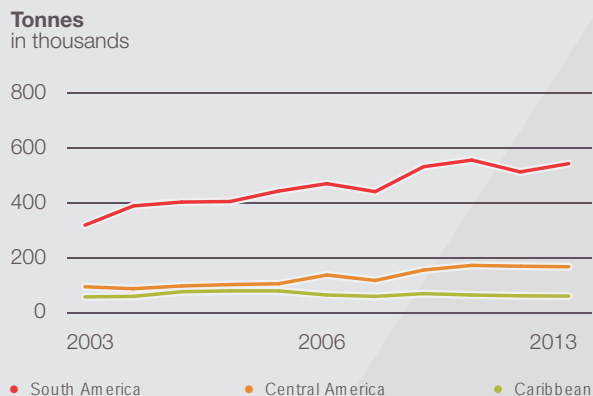
### South America dominates air trade between Europe and the Latin America subregions

Of the more than 770,000 tonnes of cargo transported by air between Latin America and Europe in 2013, South America accounted for 70.6% of the market, followed by Central America with 21.7%, and the Caribbean with the remaining 7.7%.

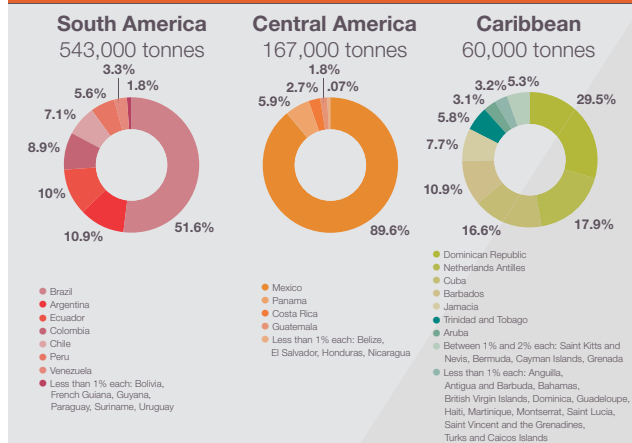
After growing 4.4% in 2011, South America’s air trade with Europe decreased 7.7% in 2012. A rebound in 2013 showed an increase of 6.0%. Brazil, South America’s largest economy, accounted for 51.6% of the subregion’s total air trade with Europe in 2013. Air imports to Brazil, which grew 13.8% in 2011, fell 4.8% in 2012 and rebounded with 9.6% growth in 2013. Brazil’s air exports to Europe grew 14.5% in 2011 but slid 17.4% in 2012 with a slight increase of 0.4% in 2013. Most of the larger South American importers, such as Argentina, Colombia, and Chile, remained steady from 2011 to 2013 with only slight changes. Argentina’s share of overall air trade with Europe rose to second largest in South America, followed closely by Ecuador and Colombia.

Air cargo traffic between Central America and Europe improved in 2010 and 2011, posting increases of 32.3% and 11.0%, respectively. However, these two years of strong gains were followed by declines of 1.6% and 1.0% in 2012 and 2013, respectively. Mexico, Europe’s most important Central American air trade partner, cemented its importance in the subregion with an 89.6% share of air cargo tonnage to and from Europe in 2013. Imports to Mexico grew 12.7% in 2011, then more modestly by 2.0% in 2012, before showing a decline of 1.4% in 2013. Exports from Mexico to Europe increased 8.1% in 2011 before declining 8.1% in 2012, with slight growth of 0.6% in 2013.

### Latin America and Europe traffic by subregion



### Europe–Latin America trade can be classified into three subregions



Air trade tonnage between the Caribbean and Europe declined 2.3% in 2013, following consecutive contractions of 6.3% in 2011 and 5.3% in 2012. Despite a decrease in its share of air tonnage, the Dominican Republic continued to be Europe's largest air trade partner in the Caribbean, accounting for 29.5% of the subregion's total trade with Europe in 2013.

Since 2003, air cargo flows between Latin America and Europe have generally been balanced. In the recovery after the global economic downturn, growth of air cargo shipments from Europe to Latin America outpaced those from Latin America to Europe. Europe shipped 451,000 tonnes of air cargo to Latin America in 2011. This number declined to 443,000 tonnes in 2012 before recovering to 454,000 tonnes in 2013.

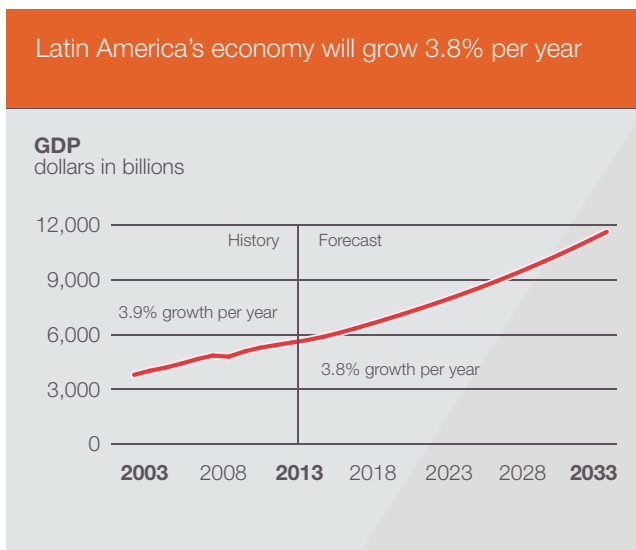
The Latin America-to-Europe air cargo exports have not been as strong. Totalling 340,000 tonnes in 2011, the route saw a significant decrease to 300,000 tonnes in 2012 before showing signs of recovery, increasing to 316,000 tonnes in 2013.

### Economic outlook for Latin America and Europe

The economies within the Latin America region grew by 2.6% in 2013 after 2.7% growth in 2012.

The economies of the Latin America region are forecast to grow an average of 3.8% per year between 2013 and 2033. The South American economy is projected to lead with an average annual growth rate of 3.9% over the forecast period. Brazil is expected to remain the region's largest economy, with forecast growth of 3.9% per year, accounting for 58.4% of South America's total GDP by 2033. Central America's economy, led by Mexico, the subregion's largest economy, is forecast to grow 3.5% per year during the 20-year forecast period. The Caribbean is projected to grow an average of 3.6% per year. Cuba is forecast to remain the largest economy in the region in terms of GDP through 2033, with forecast growth of 4.6% per year over the 20-year period.

Europe's economy is forecast to grow at an average annual rate of 1.9% from 2013 to 2033.



## Latin America–Europe air cargo market forecast

Latin America and Europe continue to work toward increased trade liberalization.

Europe and Latin America have maintained strong relations over many decades, based on historical, cultural, and economic ties. In an effort to further strengthen cooperation and trade, heads of state from the two regions have held regular summit meetings since 1999. The European Union and the South American countries of Colombia and Peru signed a trade agreement in 2012. In addition, the European Union and the Central American countries of Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama signed an association agreement that includes a trade component in 2012. The success of these agreements could provide an additional boost to air cargo demand between the two regions.

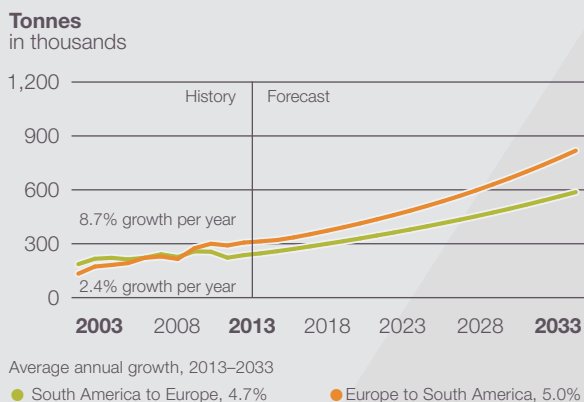
After growing at an annual rate of 4.8% during the past 10 years, the Latin America–Europe air cargo market is projected to continue to grow at 4.8% per year from 2013 through 2033. Europe-to–Latin America air trade is forecast to grow 5.0% per year on average, and Latin America–to–Europe air trade is forecast to grow 4.5%.

Air trade between South America and Europe is projected to grow an average of 4.9% over the next 20 years. Europe-to–South America air cargo traffic is forecast to grow 5.0% on average, while South America–to–Europe traffic is forecast to grow 4.7%. This rate assumes slow growth in the European economy and continued political and economic stability in South America.

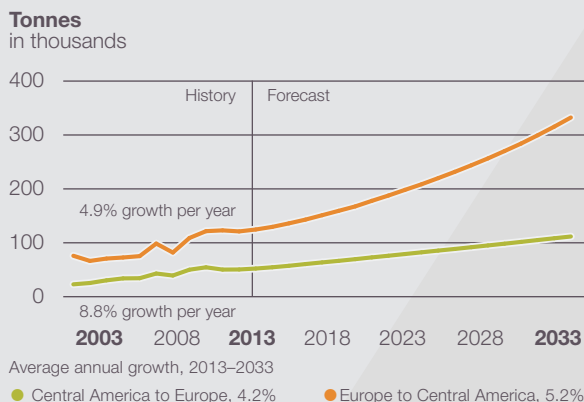
The Central America–Europe market is projected to grow 5.0% on average over the next 20 years. Europe-to–Central America traffic is forecast to grow at a rate of 5.2%, while Central America–to–Europe traffic is forecast to grow 4.2% per year through 2033.

Air trade between Europe and the Caribbean Basin is forecast to grow 3.5% annually over the next 20 years. Air cargo traffic from Europe to the Caribbean is forecast to grow at an average annual rate of 2.8%. Air cargo traffic from the Caribbean to Europe is forecast to grow an average 4.1% annually. Traffic growth rates for the Caribbean Basin will depend on continued political reform and integration in the region.

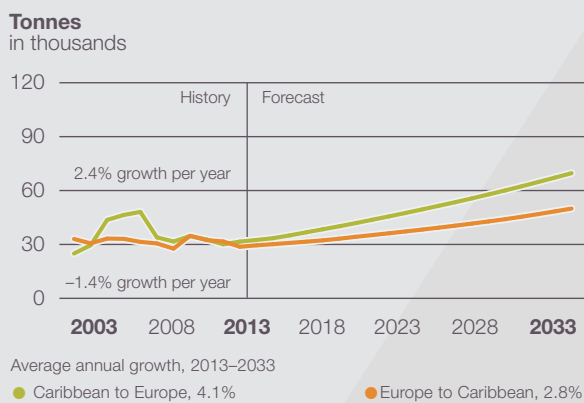
## South America–Europe air trade will grow 4.9% per year



## Central America–Europe air trade will grow 5.0% per year



## Caribbean–Europe air trade will grow 3.5% per year



# Regional Markets

## Europe and North America



For the purposes of this forecast, we define Europe as all 28 member countries of the European Union (EU) plus Albania, Gibraltar, Iceland, Norway, Switzerland, Turkey, and all the countries of the former Yugoslavia. We define North America as Canada and the United States.

### Market growth returns after two years of contraction

Europe–North America air trade accounts for approximately 6.6% of world air cargo tonnage and 8.4% of the world’s tonne-kilometers. Having fallen in four of the past six years, the market shrank 8.5% in 2012 and 1.2% in 2013. At 2.76 million tonnes in 2013, the market was off 16.3% from its peak of 3.3 million tonnes in 2007.

Air trade between Europe and North America has been volatile for the six years since the global economic downturn. After dropping 6.2% in 2008 and plummeting a further 21.1% in 2009, the market rebounded with gains of 19.8% in 2010 and 4.4% in 2011. The growth rate faltered, however, in the second half of 2011, foreshadowing a contraction that totaled 9.6% over the two years ending in 2013.

The United States accounted for 91% of North America’s air exports to Europe and 90% of the region’s air imports from Europe during 2013, so monthly Europe-US air trade closely approximates the overall North Atlantic air cargo market.

Total Europe-US air cargo tonnage fell 9.1% in 2012 and 1.5% in 2013. In the Europe-to-US direction, air trade fell 7.5% in 2012 and 2.5% in 2013. Monthly growth in Europe-to-US air trade was negative year over year until September 2013, when the market grew 9% relative to September 2012. Growth remained above 6% through the close of 2013. During the first six months of 2014, Europe-to-US flows continued to expand, jumping 10.3% compared with the first six months of 2013.

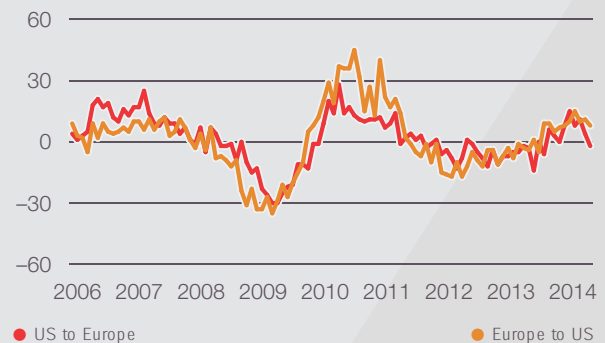
In the US-to-Europe direction, annual air trade fell 10.6% in 2012 and 0.5% in 2013. Year-over-year growth picked up in the fourth quarter of 2013, increasing 2.8% compared with fourth quarter 2012. This gain marked the first year-over-year quarterly expansion since third quarter 2011. The expansion continued during the first six months of 2014 as US-to-Europe air trade grew 7.4% compared with the first six months of 2013.

The volume of Canada air trade with Europe is much smaller than that of the United States. As a consequence, its growth patterns may not always coincide with those of the United States. Total Canada air trade with Europe declined 1.5% in 2012 but grew about 1% in 2013. In the Europe-to-Canada direction, air trade grew 7.8% in 2012 but fell 7.3% in 2013. In the Canada-to-Europe direction air trade fell 12.5% in 2012 but grew 13.1% in 2013.

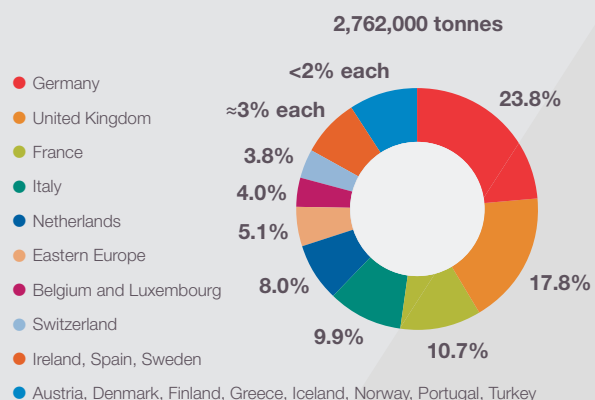
Total Europe–North America (including Canada) air trade fell 8.5% in 2012 and 1.2% in 2013. Europe-to–North America flows fell 8.9% and 1.2% in 2012 and 2013, respectively. The North America–to–Europe air trade flow contracted 8% in 2012 and 1.3% in 2013.

### Europe-US air trade began to recover in fourth quarter 2013

Monthly change in air cargo tonnage year over year percentage



### Five countries account for 70% of Europe–North America air trade



Since 1980, five European countries—Germany, the United Kingdom, France, Italy, and the Netherlands—have consistently accounted for approximately 70% of all European air trade with North America. Air trade with North America declined for all five of these countries during 2012 and 2013. Germany’s decline was deepest at 14%, with France following closely at 11.1% for the two-year period.

Air trade between North America and Eastern Europe declined 5.4% in 2012 but grew 2.2% in 2013. Trade with Hungary and Poland grew modestly at 3.1% during 2012 and 2.7% during 2013. Trade with the Czech Republic and Romania, however, both experienced 8% declines during the same two years.

### Europe–North America air trade and total transatlantic merchandise trade

In the 20 years between 1980 and 2000, the North Atlantic air cargo market surged with an average annual growth rate of 7.3%, growing from 708,000 tonnes to 2.92 million tonnes. The market has since slowed markedly, averaging only 1.7% growth from 2000 to 2007, the last period of sustained growth. The total Europe–North America air trade market was 5.4% smaller in 2013 than it was in 2000 and 16.3% smaller than it was at its peak in 2007.

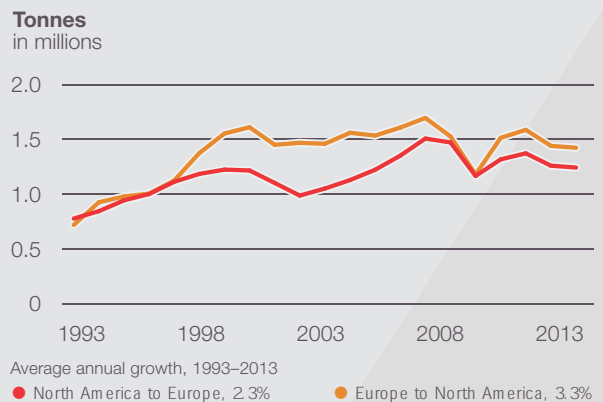
Even after taking into account the effects of the recessions in Europe and North America, the growth rate of the past 13 years hangs far below the norm set during the preceding 20 years. Notably, this slowdown was not confined to air trade. Growth in containership trade between Europe and North America also sagged, expanding only 1.5% between 2000 and 2013. The slowdown in total Europe–North America commerce may reflect the shift toward Asia of trade and investment on both sides of the Atlantic.

### Air trade commodities

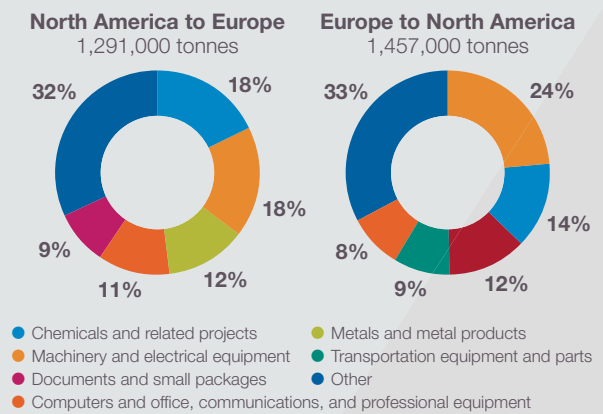
Five commodity categories account for approximately 70% of the air cargo flow between the major trading partners of Europe and North America. Industrial products and manufactured goods, which include work in progress shipped from manufacturing facilities on one continent to assembly facilities on the other, are key components of air cargo flows in both directions.

In the North America–to–Europe flow, chemicals, computing and telecommunication equipment, and capital equipment (machinery and electrical equipment) represent nearly one-half of all commodities shipped. Metals and express shipments (primarily documents and small parcels) comprise another 21% of flows in this direction. Other leading categories that do not figure among the top five European air imports from North America include textiles and apparel, transportation-related goods, vegetables, and wood products.

### Europe–North America air trade has grown 2.8% per year since 1993



### Top commodities account for approximately 70% of the directional flows





The top five commodity categories in the Europe-to-North America direction were capital equipment, chemicals, express shipments, transportation-related goods, and computing and telecommunication equipment. Other leading commodity categories that do not figure among the top five European air exports to North America include metal products, animal products, and textiles and apparel.

### Air trade forecast

The baseline GDP projections through 2033 for Europe and North America anticipate an average annual growth of 1.9% and 2.5%, respectively. GDP growth will continue to be the broadest based indicator of trade growth between Europe and North America. Low- and high-growth scenarios are based on projections of 0.5% below and 0.5% above baseline GDP growth rates.

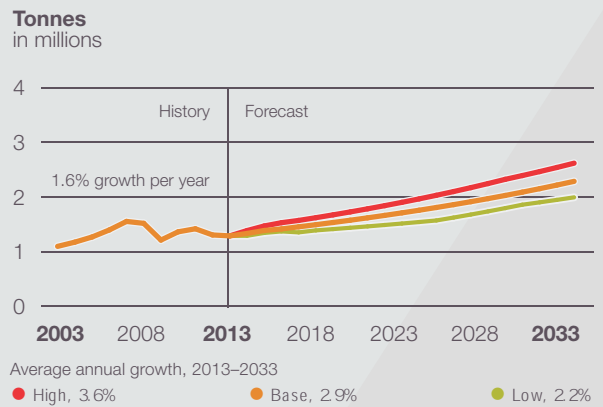
Baseline growth in North America-to-Europe air trade will average 2.9% per year and Europe-to-North America baseline growth will average 3.3% per year. The combined total market baseline growth for the next 20 years is projected to be 3.1%, compared with 2.8% average growth during the past 20 years.

The low growth rate projections assume that both continents will continue to focus on foreign direct investment and trade with Asia, at the expense of trans-atlantic business development. The low-growth North America-to-Europe scenario assumes restrained capital spending, slow economic and labor market reform, and continued generous social entitlements in southern EU member states. The low-growth Europe-to-North America scenario assumes poor management of deficits, lower capital investment, and relative weakness of the US dollar.

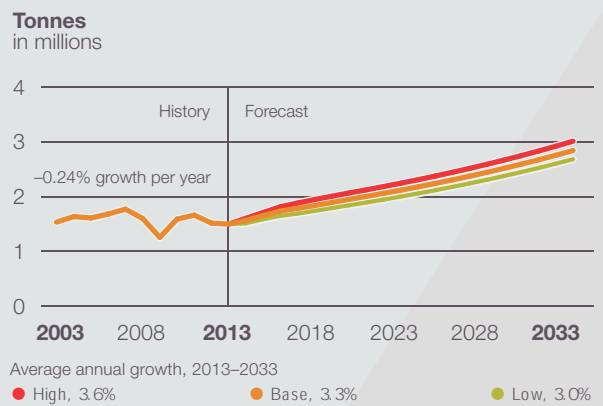
The high-growth North America-to-Europe scenario assumes an expanding European Union, substantive economic reform, deregulation in EU cross-border services, and increasingly flexible labor markets. The high-growth Europe-to-North America trade scenario assumes increased capital spending, a stronger dollar, and increased US fiscal discipline.

A country-by-country forecast was used to capture overall market growth in each direction. The effect of currency exchange rates figures in the forecast for each major country pair. Aggregate continent-to-continent flows were modeled in a convergent top-down approach to validate the country-level forecasts.

## North America-to-Europe air trade will grow 2.9% per year



## Europe-to-North America air trade will grow 3.3% per year



## Regional Markets Intra-Europe



For the purposes of this discussion, we define Europe as all 28 member countries of the European Union plus Switzerland, Norway, Iceland, Turkey, Albania, Gibraltar, and all the countries of the former Yugoslavia.

### Air cargo traffic within Europe reflected global downturn

The intra-Europe air cargo market comprises approximately 3.0% of the world's air cargo tonnage, but because the region is geographically compact, only 0.8% of the world's tonne-kilometers.

Approximately 70% of all air cargo moving into, within, and out of Europe passes through one or more of the north European countries of Germany, France, the United Kingdom, the Netherlands, Belgium, or Luxembourg. The compact geography of air cargo markets within Europe generally limits routes to relatively short hauls, typically between 900 and 1,200 kilometers.

The intra-Europe air cargo market has stagnated since 2011, after it recovered from the global economic downturn of 2008 and 2009. In revenue tonne-kilometers, intra-Europe traffic has grown only 1.0% per year since 2011. In contrast, traffic growth averaged 6.0% per year between 1990 and 2000, as express carriers built air networks and expanded their service offerings. Traffic growth has eroded since then, however, as relaxation of border controls and harmonization of transport regulations within the European Union allowed truck shipments to compete more effectively with air transport.

### Intra-Europe air cargo traffic comprises scheduled freight, mail, and express

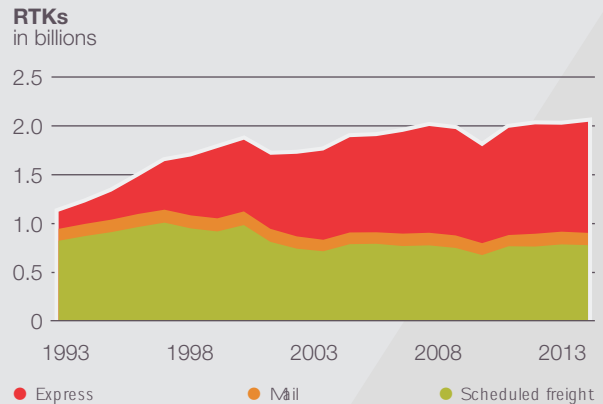
The three primary components of air cargo traffic within Europe—scheduled freight, mail, and express—grow at differing rates. Express traffic averaged 9.8% growth per year during the past 20 years. Scheduled freight and mail traffic, on the other hand, were stagnant during the same period. In fact in 2013, the sum of scheduled freight and mail traffic was 4.4% lower than it was in 1993.

Except during the global economic downturn, freight and mail traffic have been stable for the past decade, measured both in tonne-kilometers and in tonnage alone. The stagnation of these two segments means that the express segment alone accounts for nearly all growth in the intra-Europe air cargo market.

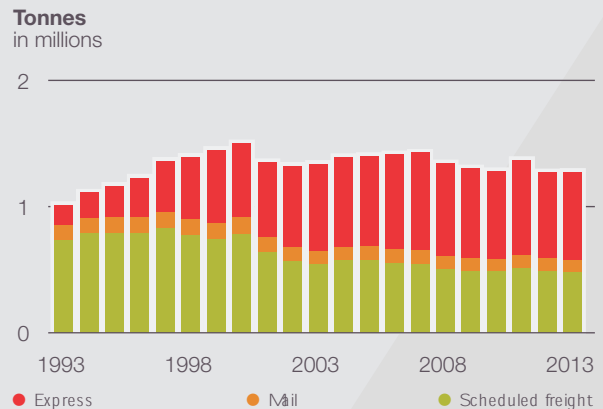
Express traffic decreased 2.2% in 2012 and increased 3.8% in 2013. Annual traffic growth over the entire decade averaged only 2.2%, a marked decline from the previous decade's 17.9% average annual growth.

Integrated express carriers accounted for more than half of all intra-Europe air cargo tonnage in 2003, reflecting the declining market share of scheduled freight and mail. The express carrier share has remained above one half of intraregional traffic over the past decade. It is important to note that express network traffic within Europe includes significant general freight to fill out freighter loads when traffic is light in the small parcels and documents that traditionally make up express cargo.

### The intra-Europe air cargo market recovered from global downturn and then stagnated



### Intra-Europe tonnage has not returned to precession levels



Nearly all air cargo growth in the past 20 years has resulted from the expansion of integrated air express carrier services. In addition to geographical ease of surface transport within Europe, the Schengen Agreement of June 1990, which removed customs inspection on goods moving between several countries in northern Europe (and later within most of the European Union), facilitated intra-Europe truck transport and reduced the need for expedited scheduled air freight service. Consequently, trucking has become the preferred mode of transport for most freight and mail, even for small-parcel express shipments in short-haul markets. The shift toward ground transport has held overall intra-Europe air traffic to only 1.6% average growth during the 10-year period from 2003 to 2013.

After growing an average of 8.6% per year during the 10 years between 1997 and 2007, the estimated number of daily international air express shipments declined as a result of the global economic downturn. Shipments revived, however, and have grown at a steady 5.6% per year since 2010. Intra-Europe express shipments have grown 2.6% on average per year, from 469,000 shipments per day in 2003 to about 608,000 shipments per day in 2013.

### Trucks complement scheduled airplane freight services

Air cargo has never been solely an airport-to-airport service. Rather, air cargo is a single component of a transportation infrastructure that links the shipper and the consignee. Trucking offers door-to-door and factory-to-distribution center service, which air transport alone cannot provide.

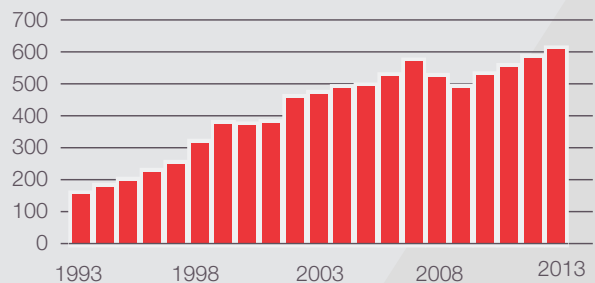
Scheduled airlines that serve the intra-Europe market have used truck flights, trucking services registered with their own flight number, to extend their networks and add scheduling flexibility.

Long-haul truck-flight operations in Europe supplement overall air logistics systems. Their dramatic rise over the past decade has clearly contributed to a decline in growth of scheduled freight carried by air. Since 2004, the number of airport pairs more than doubled, and weekly frequencies of truck-flights increased nearly fivefold. Truck-flight operations provide regularly scheduled freight service for high-value or work-in-progress goods between manufacturing facilities, especially to and from central and eastern Europe. Scheduled truck operations are often used where demand is too low or infrequent to warrant dedicated freighter airplane service.

### Express shipments have increased steadily since the global economic downturn

Source: ACMG

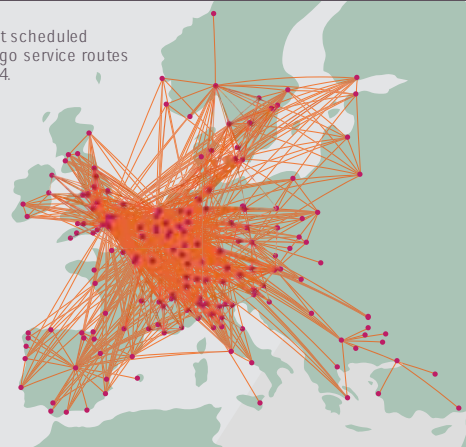
#### Estimated daily express shipments in thousands



Average annual growth, 2003–2013: 2.6%

### Truck flights augment scheduled airline capacity

Lines represent scheduled truck-flight cargo service routes as of May 2014.

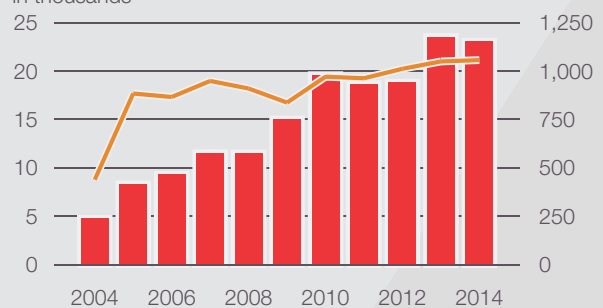


### Truck-flight airport pairs have increased 2.4 times and frequency 4.9 times

Source: OAG, May

#### Weekly frequency of truck flights in thousands

#### Airport pairs of truck flights



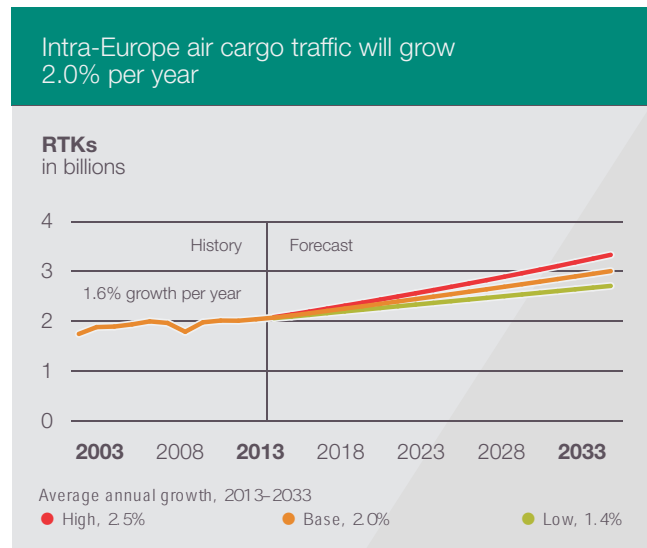
## Intra-Europe air cargo forecast

Led predominantly by express carriage and longer scheduled freight sectors to eastern and southern Europe, intra-Europe air cargo traffic is forecast to expand at an average annual rate of 2.0% per year through 2033. The 20-year forecast growth in air cargo traffic is lower than the 3.0% growth trend recorded during the previous 20-year period from 1993 to 2013.

Economic activity, as measured by GDP, and industrial activity will remain the primary drivers for traffic growth in this market. For the long term, the baseline GDP for Europe will average 1.9% growth per year through 2033. GDP projections of 0.5% below and above the baseline were assessed, and the results of these growth rates are reflected in the low- and high-growth scenarios. Intra-Europe air cargo traffic growth is forecast to range between 1.4% and 2.5%.

Inflexible labor markets, an aging population, expensive pension systems, and slow economic reforms will limit long-term economic growth, especially in the countries of northern Europe. In the near term, tight fiscal and monetary policies will continue to curb economic growth and entrepreneurial activity, thereby slowing air cargo growth.

On a positive note, the longer trucking times to distant eastern and southern markets may be unacceptable for some shippers, offering air cargo traffic growth prospects for the next two decades.



## Regional Markets Middle East



For the purposes of this forecast, we define the Middle East as Bahrain, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, the United Arab Emirates, and Yemen.

### Air cargo traffic expands strongly on economic growth

Air cargo moving into, within, and out of the Middle East is estimated to have accounted for 5.4% of the world's tonnage and for 4.6% of the world's revenue tonne-kilometers during 2013.

Despite ongoing instabilities in parts of the region, the overall Middle East economy continues to expand. The region's GDP growth moderated to 2.4% in 2013, down from the 5.2% average sustained during the previous 10 years, as contracting economies in Syria and Iran slowed growth, even with the strong boost from oil and gas production. Over the next 20 years, the annual growth rate is projected to average 3.8%. The largest economies in the region, those of Iran, Israel, Saudi Arabia, and the United Arab Emirates, commanded nearly 70% of the region's GDP in 2013.

The large volume of air cargo that flows through Middle East cargo hubs reflects the region's history as the crossroad between Africa, Asia, and Europe. Dubai, in the United Arab Emirates, is the largest air cargo center in the region and one of the largest reexport hubs in the world. Doha, in Qatar, and Abu Dhabi, in the United Arab Emirates, follow Dubai in traffic volume.

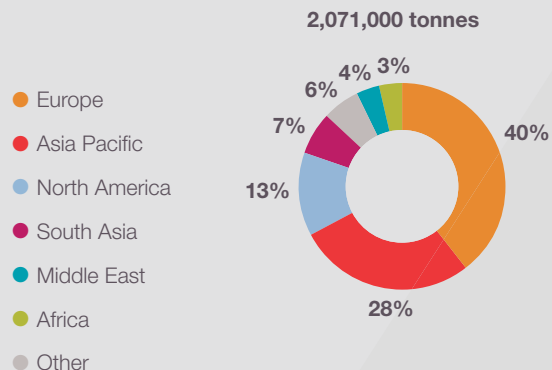
New infrastructure will reinforce the region's role as a hub. All three of the largest cargo centers in the region, Dubai, Abu Dhabi, and Doha, are expanding their cargo-handling capacity to meet growing passenger and cargo demand. Dubai's new Al Maktoum International Airport is planned to be the world's largest cargo hub. The airport will be home to an integrated operation, combining different transportation modes, logistics, manufacturing, and assembly in a single free-trade zone.

The region also has a significant sea-air market in which goods from South Asia arrive in the Middle East on ships and continue to other regions by air.

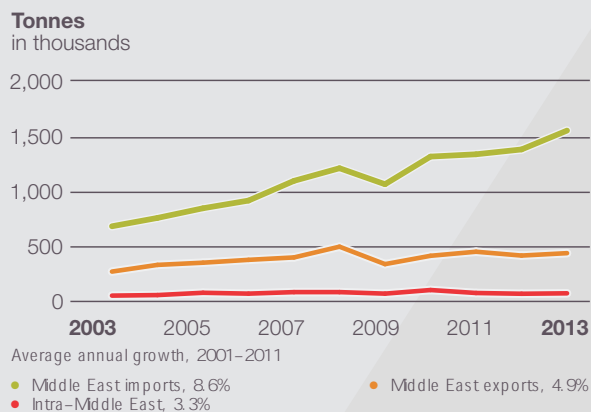
The Middle East is starting to diversify beyond the oil industry, broadening its industrial and business base. A long-term effort in Dubai, for example, has produced an economy that is strong in logistics, tourism, banking, and construction. This expansion will lead to growing air cargo flows.

There also has been movement toward economic liberalization and cooperation between countries. These changes should improve the investment climate and economic competitiveness of the region. New roads and trade agreements will facilitate increased cargo flows within the region. Middle East nations should benefit from combining their strength as trading hubs as well as from the growth of their own markets.

### Europe is the largest Middle East air trade partner



### Middle East air trade grew 7.4% per year, 2003–2013





## Middle East–Europe traffic is growing

Air cargo traffic between the Middle East and Europe has been growing strongly since 2003. Imports from Europe, the larger of the two directional flows, have averaged 5.4% growth per year, outpacing 3.6% growth of exports to Europe.

Accounting for 819,000 tonnes of air cargo in 2013, trade with Europe represented 36.4% of the Middle East’s international air cargo market. The primary commodities shipped to Europe are garments and perishables. Leading commodities shipped from Europe include telecommunication equipment, machinery, and finished goods. Overall air cargo traffic in both directions has averaged an impressive 5.0% annual growth for the past 10 years.

## Middle East–Asia Pacific traffic expands

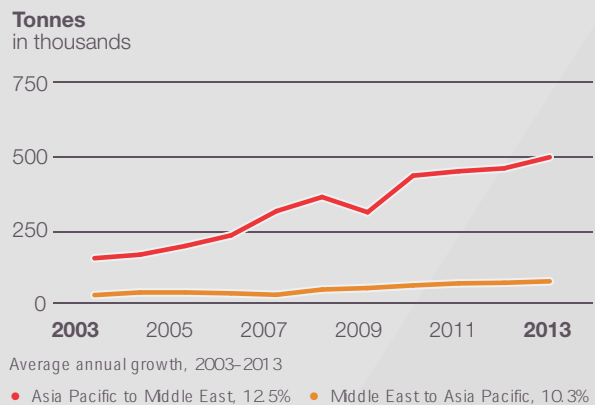
In 2013, Asia Pacific traffic accounted for approximately 25.6% of the air cargo market in the Middle East, at 574,000 tonnes.

Air cargo shipments arriving from the Asia Pacific region consisted predominantly of textiles, machinery and electrical equipment, and computer equipment. Imports from the Asia Pacific region have increased at a robust annual rate of 12.5%. The air export flow to the Asia Pacific region is very small but is growing quickly at 10.3% per year over the past decade.

Middle East–Europe air trade grew 5.0% per year, 2003–2013



Middle East–Asia Pacific air trade grew 12.2% per year, 2003–2013



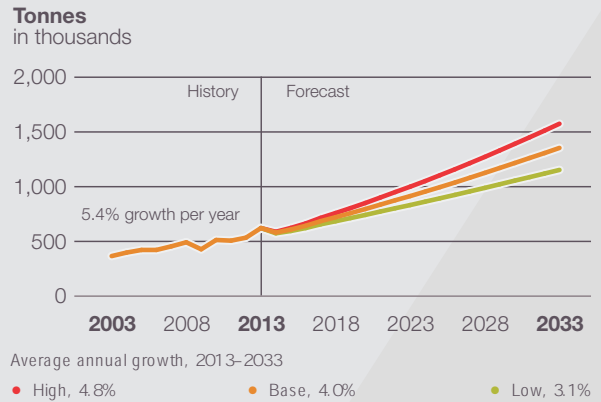
## Middle East forecast

Overall air cargo between the Middle East and Europe is forecast to grow at an average annual rate of 4.0% between 2013 and 2033.

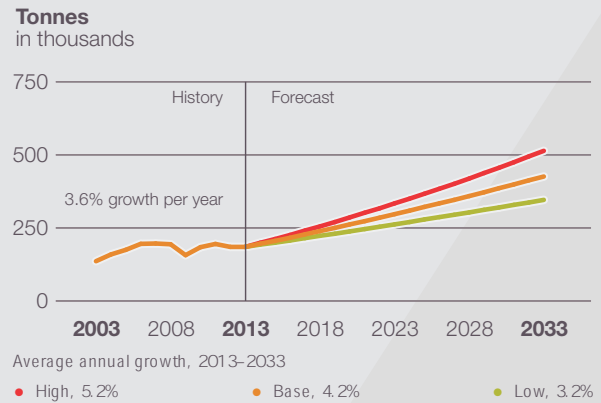
Direct flights connecting production centers in Asia and Europe pose some risk to air cargo traffic between the Middle East and Europe. Nevertheless, increasing local exports, coupled with the continued European market for goods transhipped from Asia and Africa, should keep growth in the Middle East air cargo market healthy.

The price of oil will have a significant effect on Middle East demand for products from Europe. The rate and extent of diversification from oil-related industries will affect the long-term growth prospects for air trade to and from the region. In particular, the competitiveness of local products, including perishables, fish, textiles, and the products of emerging light industries, will determine whether the long-term growth trend tends more to the high or low projection.

## Europe-to-Middle East air trade will grow 4.0% per year



## Middle East-to-Europe air trade will grow 4.2% per year



# Regional Markets

## Africa



For the purposes of this forecast, we define Africa as the entire continent of Africa plus the nations of Cape Verde, Madagascar, Reunion, the Seychelles, Mayotte, Mauritius, the Comoros Islands, and São Tomé and Príncipe. Data from ACI, IATA, ICAO, governments and airport authorities, the United Nations, and the US Department of Commerce were used to model air cargo flows associated with Africa.

### Africa air trade patterns are changing

The Africa-Europe market accounts for approximately 2.3% of the world's air cargo tonnage and 2.3% of the world's tonne-kilometers.

Based on the region's air trade and airports statistics, air trade originating in or destined for Africa is estimated at 1,730,000 tonnes in 2013. Principal markets in the region include Europe, the Middle East, and Asia.

Europe commands the majority of Africa's international air trade, with an estimated 56.9% share in 2013, owing to the proximity of the two continents and long-standing commercial and investment ties. Over the past decade, however, the Middle East and Asia have rapidly expanded their share of African air trade. In 2013 the Middle East accounted for 14.4% and Asia for 12.9% of international air trade for all nations in Africa combined. Middle East air trade with Africa expanded as fast-growing Middle East-domiciled airlines added capacity in lower-hold passenger airplanes and dedicated freighters. Asia has built new commercial ties to Africa, led by Chinese enterprises seeking sources of raw materials to fuel industrial expansion.

North America, which accounted for 7.2% of Africa's international air trade in 2013, remains a major partner, although Africa-North America trade is not growing as rapidly as Middle East and Asia trade. Africa-North America air trade has decreased slightly for the past three years as a result of reduced US demand for African manufactured goods.

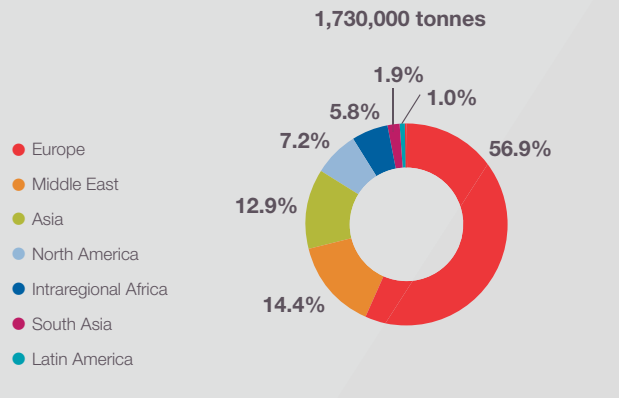
In general, African air exports consist predominantly of perishables, whereas air imports are composed primarily of industrial machinery and electrical equipment, computers and telecommunication equipment, and manufactured goods.

### Five countries lead Africa's international air trade

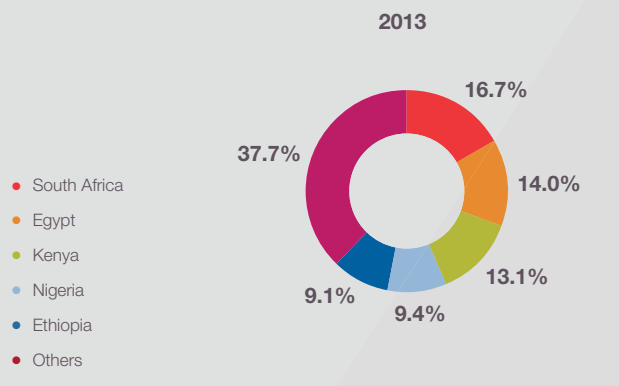
The majority of inbound and outbound African international air trade is conducted by only five of Africa's 57 countries.

Leading international markets on the African continent include South Africa with a 16.7% share, Egypt with 14.0%, Kenya with 13.1%, Nigeria with 9.4%, and Ethiopia with 9.1%. International air cargo tonnage for South Africa, Egypt, and Kenya have decreased for the past two years, while Nigeria and Ethiopia have grown.

Europe is Africa's primary partner; the Middle East and Asia have rapidly expanded shares



Five countries lead Africa's international air trade



**Africa-Europe traffic**

Air cargo flows between Africa and Europe declined in 2012 and 2013.

The imbalance between inbound and outbound air cargo flows is relatively small. Africa-to-Europe air cargo flows totaled 472,700 tonnes in 2013, while Europe-to-Africa flows totaled 512,300 tonnes. Africa air exports to Europe exceeded Africa air imports from Europe between 1995 and 2007, but air exports to Europe have been in decline since 2008. Air imports from Europe, on the other hand, rebounded from the global economic downturn in 2008 but declined in 2012 and 2013.

The resumption of growth in air imports after the global downturn can be explained by renewed growth in African extractive industries, related infrastructure development, urbanization, and demand for consumer goods. The growth, however, is easily affected by both African and European politics and economies. Total African air imports from Europe decreased in 2012 and 2013.

The continued decline of Africa-to-Europe air cargo flows are more complex. Possible downward influences include weak European economic growth and the disruption of North African industry during the Arab Spring uprisings of early 2011. In addition, shippers of perishables, Africa's main air cargo commodity group, have gained less expensive transport alternatives as refrigerated (reefer) container capacity increased at African ports of call. The rapid expansion of Middle East carrier cargo capacity may also explain part of the decline in African air exports to Europe by blurring the actual origins and destinations of cargo moving through the carriers' networks.

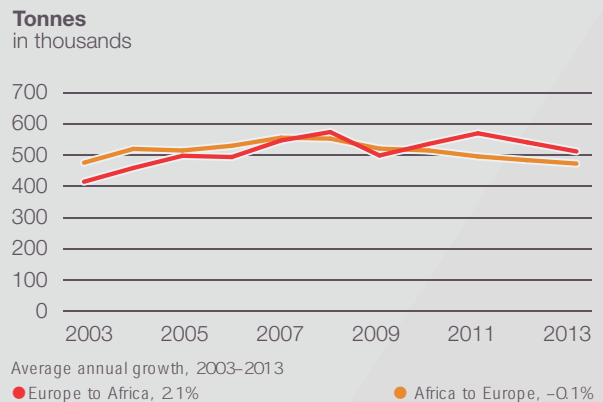
**Africa-Asia traffic**

Africa-Asia air trade is driven by continued Asian investment and African consumer demand.

The developing Africa-Asia air cargo market has averaged 27% annual growth during the past decade. The rate has slowed, however, in recent years. The average annual growth rate for bidirectional air cargo tonnage between Africa and Asia reached its peak between 2001 and 2006, hitting 65%. Growth dropped to 5.8% between 2006 and 2011. Total Africa-Asia air trade fell another 8.3% in 2012 but then rebounded by 3.1% in 2013. Capital investments in African extractive industries (e.g., oil from Sudan and copper from Zambia) and growing African economies that demand more consumer goods, particularly from China, will continue to drive Africa-Asia trade. Directional air cargo flows are significantly imbalanced, with about six times as much air cargo entering Africa from Asia as leaving Africa for Asia.

Two prominent factors continue to complicate estimating the size of this market. First, trade lanes that include both sea and air, principally via airports in the United Arab Emirates, offer the possibility of lower cost transportation between Africa and Asia. As a result, a great deal of Asian

Africa-Europe air trade has declined



Africa-Asia air trade has increased tenfold since 2003



cargo arrives in Africa as air cargo from the Middle East. Second, much air cargo from Asia arrives as the excess baggage of small traders who import goods for sale in Africa.

**Africa-North America traffic**

Africa-North America air trade is dominated by African imports from North America, which have grown 7.9% annually since 2003.

Air trade with North America represents 7.2% of Africa’s market for international air cargo. Africa’s inbound and outbound air trade with North America, which was very nearly in balance in 2003, began to diverge when demand for specialty oil and gas extraction equipment manufactured in North America began to grow. Both flows have stagnated recently. African imports from North America, which accounted for 76% of the market between the two continents in 2013, consisted largely of small parcels and documents, oil and gas equipment, industrial and mining equipment, and chemicals. African exports declined slightly during the past decade, largely as a result of reduced US demand for miscellaneous manufactured articles. Leading African air exports to North America include apparel, perishables, and automobile components.

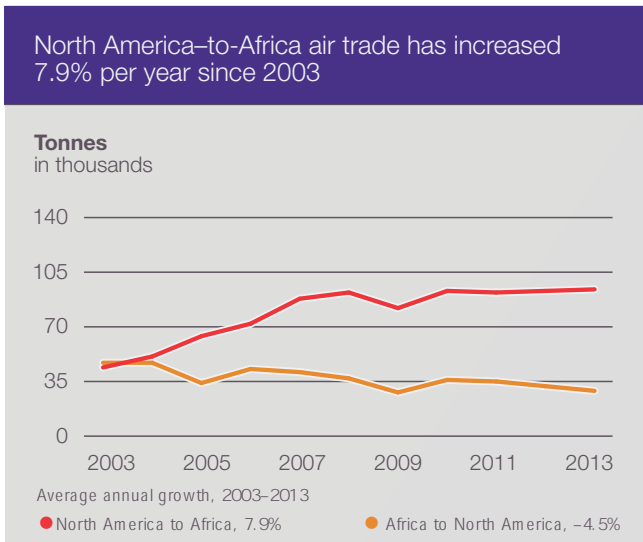
**Africa–Middle East and Intra-Africa traffic**

The Middle East is a hub of sea-air trade to and from Africa. South Africa leads the region in intra-Africa air cargo traffic.

The Middle East market accounts for 14.4% of African air cargo. The Middle East serves as a distribution hub for goods traveling to and from Africa. Outgoing goods include meat products, fruits and vegetables, and flowers. The predominant incoming goods are products related to the oil industry, followed by pharmaceuticals and machinery. Emerging oil and gas production in Uganda and other east Africa nations will expand this trade flow because of the proximity to the Middle East.

Intra-Africa air cargo represents 5.8% of African air cargo. International air cargo flows within the continent are dominated by the diverse economy of South Africa, which functions as a manufacturing and trading hub for the region. South African investment in other African economies also spurs air cargo growth. The region’s limited ground infrastructure continues to drive the need for air cargo within Africa. New bilateral agreements and further implementation of the Yamoussoukro Decision will encourage operators to develop new air cargo flows within Africa.

Domestic African air cargo is not included in this analysis but is estimated to total 206,000 tonnes. Domestic air cargo in Africa is strongest in some of the largest economies: Congo-Brazzaville, Democratic Republic of the Congo, Nigeria, South Africa, Angola, and Sudan. Air cargo often offers the most secure and reliable transit in these markets.





**Africa forecasts**

Overall, air trade between Africa and Europe will grow 4.3% per year, while Africa-Asia air trade will expand at an average annual growth rate of 6.6%. Air trade between Africa and North America will grow 5.2% per year, albeit from a smaller base than either Europe or Asia.

Base, low, and high models were developed to forecast the Africa-Europe air cargo market. GDP projections of 0.5% below and above the baseline were assessed, and the results of these growth rates are reflected in the low- and high-growth-rate scenarios.

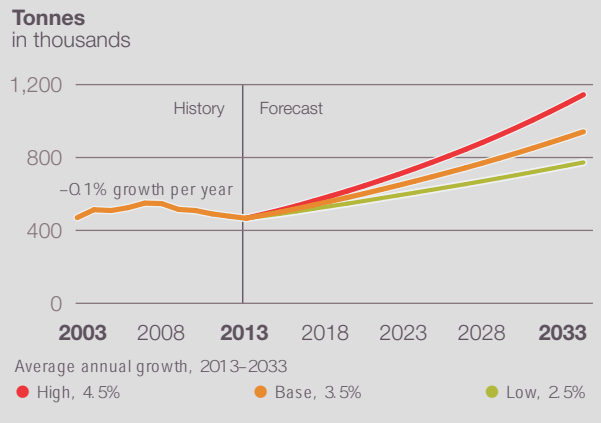
In the Africa-to-Europe direction, growth is expected to average 3.5% per year. The baseline forecast for this air trade flow assumes recovery of Europe’s economy, continued diversification of African manufacturing, and moderate growth in production of perishables.

The projected strong growth of Africa’s economies will spur air trade in the Europe-to-Africa direction to grow more rapidly than in the Africa-to-Europe direction. The base forecast of 5.0% air traffic growth assumes rising African consumer buying power for goods that arrive by air and increased investment in industries that depend on air cargo for time-critical shipments. As the manufacturing base in Africa continues to develop, the diversity of inbound air cargo should increase, reducing vulnerability to swings in commodity prices.

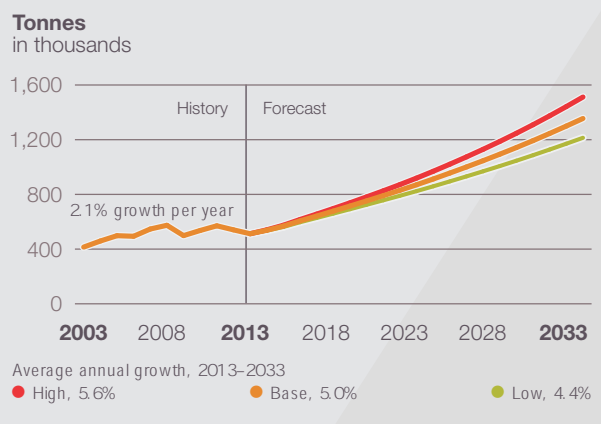
Asian imports to the continent will be the principle driver for growth of African trade with Asia. Follow-on investment by China in extractive industries, continuing urbanization, and rising demand for consumer goods will propel air trade growth in the Asia-to-Africa direction to average 6.9% per year for the forecast period. Trade in the Africa-to-Asia direction will expand at a slower rate of 4.8% per year as industrial ties with Asia develop gradually.

Development of African air trade with North America will also remain directional. North America-to-Africa flows are expected to grow 5.2% per year through 2033, driven by continued US and Canadian investment in African extractive industries. Africa-to-North America air trade will grow at the nearly identical rate of 5.1% per year, as African light manufacturing develops export markets in North America.

**Africa-to-Europe air trade will grow 3.5% per year**



**Europe-to-Africa air trade will grow 5.0% per year**



# Regional Markets

## Asia and North America



For the purposes of this forecast, we define Asia as Australia, Cambodia, China, Hong Kong, Indonesia, Japan, Macau, Malaysia, New Zealand, the Philippines, Singapore, South Korea, Taiwan, Thailand, and Vietnam, and. We define North America as Canada and the United States.

### The Asia–North America market contracted 2.2% in 2013

The Asia–North America market represents 21.1% of the world’s air cargo in terms of tonne-kilometers and 8.8% in terms of tonnage.

The overall Asia–North America market contracted 2.2% in 2013 and 1.9% in 2012. These declines reflect lackluster North America economic growth of 2.7% and 1.9% for the two years, respectively. Market growth in the North America–to–Asia direction contracted 6.3% in 2012 and 2.6% in 2013. In the Asia-to–North America direction, which accounts for nearly 60% of the total flow, traffic retrenched 1.8% in 2013 after gaining 1.4% in 2012.

Air freight tonnage in the Asia-to–North America direction was 2.2 million tonnes. The tonnage in the North America–to–Asia direction was approximately 1.5 million tonnes.

The United States accounts for 92% of the overall Asia–North America air trade. US monthly market activity can therefore be taken to approximate the overall transpacific market. The overall Asia-US market contracted 3.0% in 2012 and 1.7% in 2013. Asia-to-US air cargo traffic saw no growth in 2013, while US-to-Asia traffic contracted 3.6%. During the first six months of 2014, overall Asia-US air cargo traffic grew 4.7% compared with the first six months of 2013. In the Asia-to-US direction, traffic grew 7.8% while US-to-Asia traffic grew 0.9%.

China now accounts for the largest share of the Asia–North America air cargo market. Growing at an average annual rate of 12.7% since 1993, China’s market share rose from 11.6% to 26.2% by 2003 and reached 45.6% by 2013. Japan, the second-largest air cargo market in Asia, has a 15.1% market share. As China’s market share rose, Japan’s declined, dropping from 32.2% in 1993 to 15.2% in 2013.

Total transpacific air tonnage is influenced by a combination of factors, including economic activity in North America and Asia, international trade patterns, and commodity mix. The directionality of the flow, on the other hand, is determined by economic growth and purchasing power in the importing region.

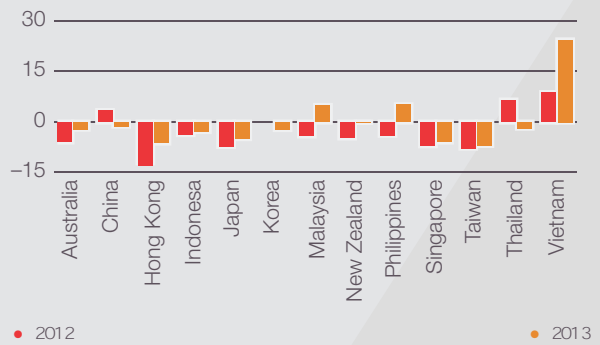
### Air freight grew 4.7% January to June 2014 compared with January to June 2013

Monthly change in air cargo tonnage, year over year percentage

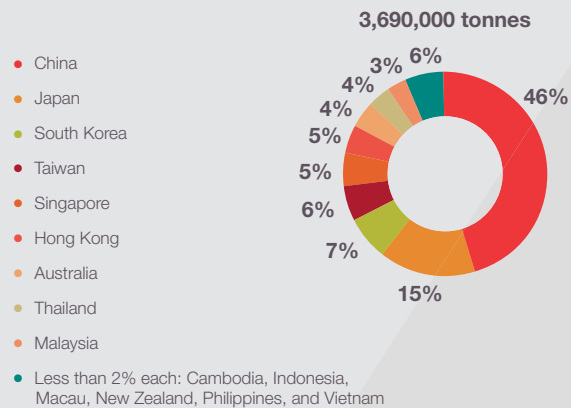


### Air freight market contracted 2.2% in 2013

Annual growth percentage



### China accounts for 46% of the transpacific air cargo market



Exchange rates affect the price of imported goods in local currencies, which in turn, influences the directionality of cargo flows. A strengthening US dollar increases traffic from Asia to North America. Conversely, a weakening dollar increases flows from North America to Asia.

By way of illustration, between 1985 and 1995, when the US dollar dropped approximately 25% with respect to Pacific Rim currencies, the air cargo flow from Asia to North America dropped from 68.3% to 49.3% as a share of the total air cargo traffic between Asia and North America. Conversely, between 1995 and 2001, when the US dollar gained nearly 40% against Asia's currencies, the flow from Asia to North America rose from 49.3% to 60.0% as a share of total Asia–North America air cargo traffic.

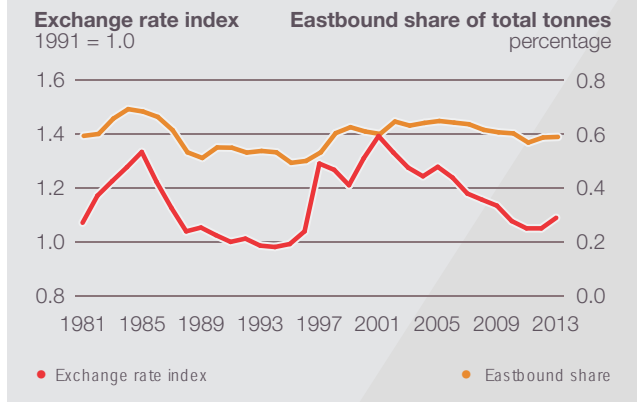
### Asia–North America air trade commodities

Three commodity categories account for 58.5% of Asia-to–North America air cargo traffic: apparel, telecommunication equipment, and general industrial machinery and equipment. Five categories account for 50.3% of the North America–to–Asia traffic: general industrial equipment, documents and small packages, electrical machinery, scientific and specialized equipment, and chemical materials.

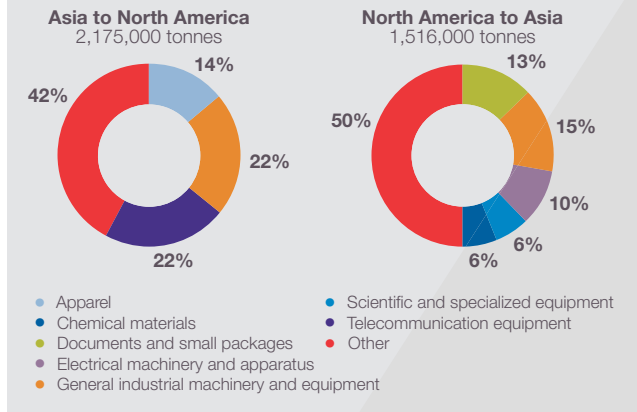
In the Asia-to–North America flow, the share of Asia's exports represented by the apparel category grew 8.9% in 2012 and 0.6% in 2013. The telecommunication equipment category stagnated in 2012 then declined 2.9% in 2013. The general industrial machinery and equipment category share declined 6.4% in 2012 and 6.6% in 2013.

In the North America–to–Asia flow, the general industrial equipment, documents and small packages, and chemical materials categories all declined in 2012 and 2013. The electrical machinery category share decreased 9.7% in 2012 but gained 2.7% in 2013. The scientific and specialized equipment category share rose 1.7% in 2012 but fell 3.4% in 2013.

### Exchange rate affects directionality of transpacific trade flow



### Consumer goods drive eastbound transpacific flow; manufacturing materials drive westbound flow

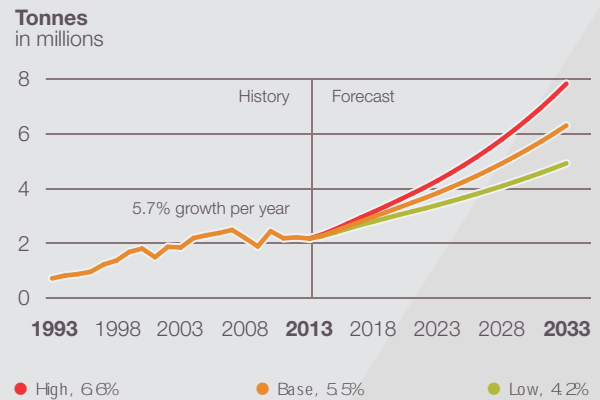


## Asia–North America air cargo traffic forecast

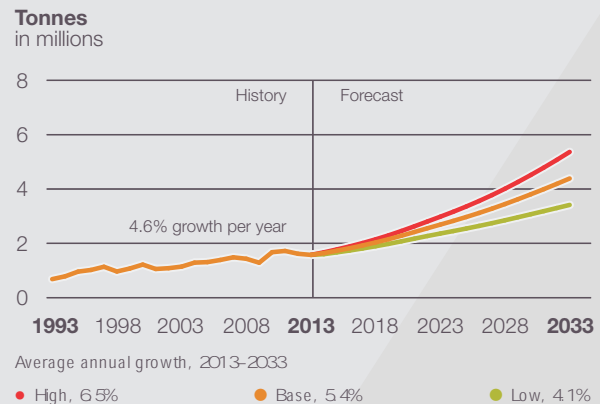
Air trade flowing in both directions across the Pacific is forecast to grow an average of 5.4% per year over the next 20 years. The flow from Asia to North America is forecast to grow at an average rate of 5.5% per year. The flow from North America to Asia is forecast to grow 5.4% per year over the next 20 years.

Air trade scenarios for Asia, to and from North America, were developed for baseline, low, and high economic growth rates. The low- and high-growth scenarios reflect GDP performance that falls 0.5% below and above baseline GDP projections.

Asia-to–North America air trade will grow 5.5% per year



North America–to–Asia air trade will grow 5.4% per year



# Regional Markets

## Europe and Asia



For the purposes of this forecast, we define Europe as all 27 member countries of the European Union plus Switzerland, Norway, Iceland, Turkey, Albania, Gibraltar, and all the countries of the former Yugoslavia. Asia is defined as Japan, China, Hong Kong, Taiwan, South Korea, Singapore, the Philippines, Indonesia, Malaysia, Thailand, Vietnam, Macau, Cambodia, New Zealand, and Australia.

### Air cargo traffic growth remains strong

The Europe-Asia market comprises approximately 19.6% of the world's air cargo traffic in tonne-kilometers and 10.0% in tonnage.

Europe-Asia air cargo traffic has averaged 5.5% growth per year since 1998. The market contracted 3.1% in 2012 but then grew 1.4% in 2013. The Europe-Asia annual growth chart shows overall air traffic flows between Europe and Asia that also contain some sixth-freedom traffic that flows into or out of other regions. The chart does not represent the actual trade flows by direction. Therefore, comparisons should not be made between the chart and the following air trade flow analysis.

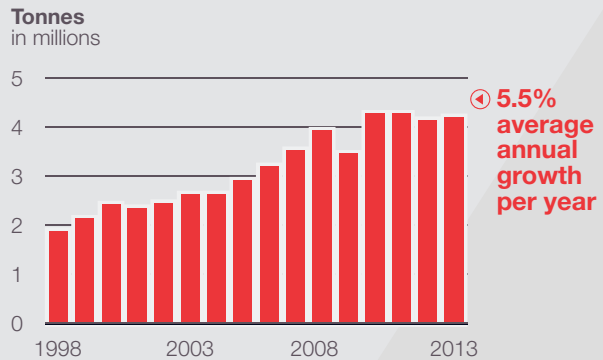
During the early 1990s, Europe's imports showed no growth as the recession that followed the 1991 Gulf War took a heavy toll on the European economy. At the same time, Asia's demand for Europe's goods increased dramatically.

Since 1998, Asia-to-Europe flows have exceeded Europe-to-Asia flows. By 2008, Europe was importing 2.3 million tonnes from and exporting 1.6 million tonnes to Asia. The gap between Europe's imports and exports has reversed as a result of the global economic downturn of 2008 and 2009 and of attendant aggressive financial stimulus in Asia. China led the way with a stimulus package equivalent to 3.2% of its GDP in 2009, exceeding the 2% GDP stimulus recommended by the International Monetary Fund. The European economy continued to struggle from 2011 through 2013, leading European imports to contract. In 2012, the gap between Europe's imports and exports was approximately 2,800 tonnes. In 2013 Europe's exports surpassed imports by approximately 62,000 tonnes.

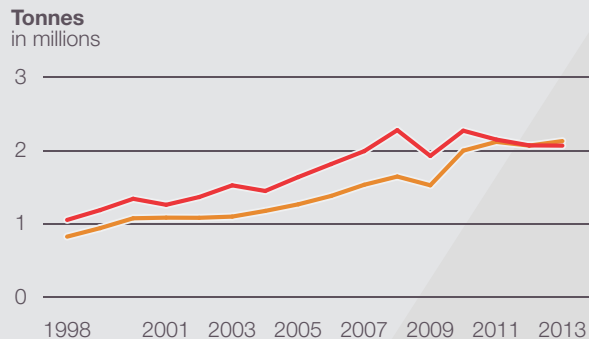
The overall Europe-Asia market grew 1.4% in 2013 after contracting 3.1% in 2012. The Europe-to-Asia flow grew 3.0% in 2013 after declining 2.4% in 2012. In the Asia-to-Europe direction, the flow declined 0.1% in 2013 and 3.7% in 2012. The contraction in Europe's imports reflects the state of the European economy, which grew at a lackluster pace of 0.4% in 2013 and contracted 0.1% in 2012.

Long-term air cargo growth has maintained a steady 5.5% average annual rate since 1998 despite these temporary reversals. The air cargo market in the Europe-to-Asia direction has grown 6.5% per year over the same 15-year period. In the Asia-to-Europe direction, the market averaged 4.6% growth.

### Europe-Asia air cargo market traffic has grown 5.5% per year since 1998

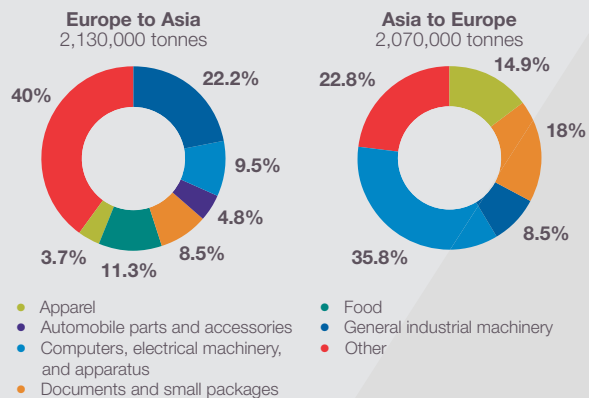


### European air exports to Asia overtake imports from Asia



Average annual growth, 1998-2013  
 ● Asia to Europe, 4.6% ● Europe to Asia, 6.5%

### Europe-Asia eastbound flows are more diverse than westbound flows





## Europe-Asia air trade commodities

The Asia-to-Europe flow consists primarily of consumer goods, while the Europe-to-Asia flow is primarily manufactured goods.

In the Europe-to-Asia direction, the top six commodity categories account for 60% of air cargo traffic. In descending order, the categories are general industrial machinery, food, computers, electrical machinery and apparatus, documents and small packages, automobile parts and accessories, and articles of apparel. In the Asia-to-Europe direction, the top four commodity categories account for 77% of air trade. The categories are computers, electrical machinery, and apparatus; documents and small packages; articles of apparel; and general industrial machinery.

One particularly fast-growing market segment between Europe and Asia has been documents and small packages, sometimes referred to as “traditional express traffic.” This trade flow has averaged 5.9% annual growth in daily shipment count in both directions since 1998, as the movement of business samples, legal documents, and other expedited small-batch items between Europe and Asia has increased. The total bidirectional express market averaged nearly 375,000 shipments per day in mid-2013.

## Europe-Asia air cargo market forecast

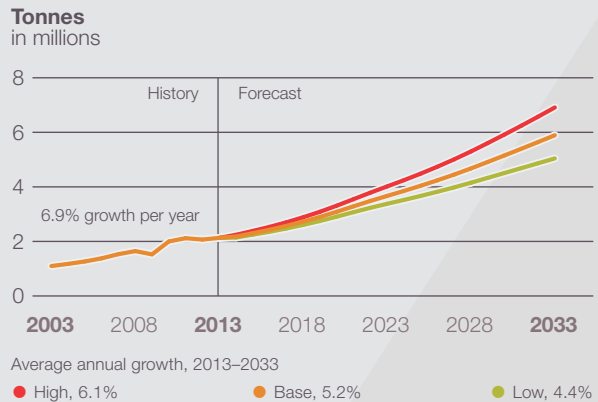
Asia’s GDP will grow 4.3% per year over the next 20 years. China will continue to play a major role in Asia, buoyed by China’s membership in the World Trade Organization (WTO) and the expected GDP growth of 6.3% per year over the next 20 years. The established economies of Europe are expected to grow 1.9% per year.

Base, low, and high models were developed to forecast the Europe-Asia air cargo market. GDP projections of 0.5% below and above the baseline were assessed, and the results of these growth rates are reflected in the low- and high-growth scenarios.

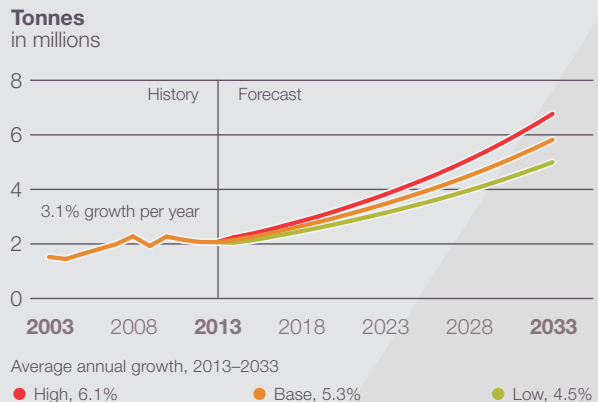
Europe-to-Asia flows will average 5.2% growth as China continues to open its markets in accordance with WTO guidelines. Several hundred million people in Asia will become moderately affluent and are expected eventually to demand increasing quantities of goods from Europe.

Asia-to-Europe flows will grow slightly faster, with long-term growth averaging 5.3% during the forecast period.

Europe-to-Asia air trade will average 5.2% growth per year through 2033



Asia-to-Europe air trade will average 5.3% growth per year through 2033



## Regional Markets

# Intra-Asia



For the purposes of this forecast, we define Asia as the eastern Pacific Rim countries: Japan, China (including the special administrative districts of Hong Kong and Macau, unless otherwise noted), Taiwan, Singapore, Thailand, Malaysia, the Philippines, Indonesia, South Korea, Australia, and New Zealand.

Please note that this section does not examine domestic flows within the nations in Asia. Domestic flows for China may be found in the Regional Markets, Domestic China section. A high-level treatment of Japan's historic and future air cargo growth is presented in the World Overview section and in the Appendix, though Japan's less dynamic domestic market is not analyzed separately.

### Global economic and political uncertainty continues to negatively impact near-term air cargo volumes

The intra-Asia air cargo market constitutes 14.4% of the world's air cargo traffic in tonnage and about 7.2% in tonne-kilometers. After rebounding strongly in 2010 from the effects of the global economic downturn of 2008, air cargo traffic growth within Asia stagnated, reflecting the slow pace of worldwide economic recovery. Nearly half of Asia's total exports represent trade among countries within the region. More than 60% of this trade consists of subassemblies or components to be assembled within Asia for shipment outside the region. Air cargo traffic is therefore sensitive to world economic conditions.

Air cargo traffic within Asia paralleled broader worldwide market trends, declining slightly in 2012, then increasing slightly the following year. Global economic and political uncertainty, compounded by an inward economic focus in China tended to weaken regional traffic growth more than domestic traffic growth. During the first three quarters of 2014, traffic growth has exceeded the worldwide average, indicating a return toward the long-term historical trend of consistent annual growth.

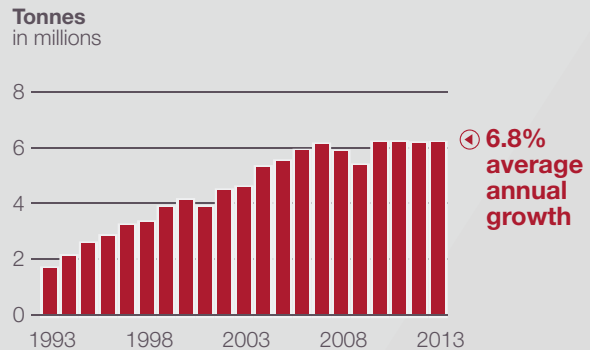
Trade among countries within Asia is expected to expand. This burgeoning commerce, which currently accounts for nearly half the exports of the countries in the region, drives Asia's overall air cargo traffic growth. Global production chains that move in-progress manufactured items through a sequence of factories in various countries ultimately generate intercontinental exports. Rising per capita incomes are creating indigenous markets for consumer goods that somewhat insulate traffic within the region from economic downturns outside the region.

### Significant market considerations

Vast distances, wide expanses of water, and minimal ground transport alternatives make air cargo essential to the development of international markets within Asia.

It is particularly difficult to differentiate between international air traffic within Asia and the region's intercontinental air traffic. A large volume of in-progress manufactured items pass through multiple airports within Asia before shipping to final destinations outside the continent. The region's growing consumer market complicates the picture. A vast expanse of challenging terrain and a lack of developed ground transport services between countries limits land-based transportation alternatives. With the exception of China, where ground infrastructure is developing rapidly, the region remains highly dependent on air transport for economic growth.

Recent intra-Asian air cargo market stagnation reflects broader world economic weakness



Well over half the region's requirement for cargo services is generated by in-progress manufactures moving between factories within Asia. Maritime transport is an attractive alternative to meet this requirement because many of the region's manufacturing centers are separated by water, and intercontinental cargo ship routings serve multiple ports. Yet the demand for air cargo services will continue to grow, spurred by the development of national economies within the region. The attendant growth in per capita incomes will stimulate air trade within the region by broadening demand for high-value industrial goods, consumer products, and perishables, which are the core commodities of air cargo services.

Intra-Asia air cargo traffic is concentrated among relatively few high-volume market segments. In fact, nearly half of all traffic is generated by 10 pairs of regional trade partners. China, Hong Kong, or Taiwan belongs to seven of the 10 pairs, underscoring China's important role in the region's air cargo commerce. Note that Hong Kong (as intermediary for all of China) and Japan each appear four times in the top 10 flows. South Korea's economic strength is demonstrated by its participation in the three largest intra-Asia air cargo markets.

Although exports to North America and Europe continue to be a primary source of Asia's air cargo growth, air transport is also crucial to efficient production in the region's industries. In addition to a prompt and dependable supply chain for raw materials, components, and subassemblies flowing between manufacturing centers, air commerce gives manufacturers flexibility to take advantage of locally specialized skills, labor cost differentials, and optimal inventory practices.

The requirement for freighters to serve within the region is mitigated by the abundant lower-hold capacity on widebody passenger flights, which provide, on average, the equivalent of more than 50 medium-widebody freighter flights per week in the top 10 markets. In addition, large freighters serving intercontinental markets also link the largest intra-Asia markets, further limiting the requirement for regional freighters.

**Economic performance and outlook**

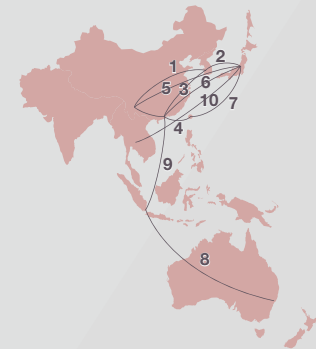
**Strong regional demand builds as Asian and global economic challenges ease.**

Despite recent moderation within the region, Asian economic growth rates are still among the world's highest. The liquidity created by monetary easing since the global economic downturn of 2008 has tended to offset the negative effects of political and economic uncertainty in the markets that these export-dependent economies rely on. Although currency depreciation and high fuel prices dampened gains, intra-Asia trade continued to increase at well above the average world growth rate. In the near term, increasing private consumption, declining personal savings rates, and expanding regional markets are projected to continue.

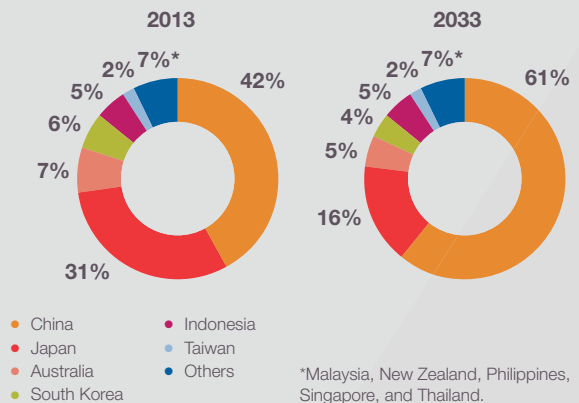
The top 10 economy pairs constitute nearly half of the intra-Asia market

**Top economy pairs for intraregional air cargo traffic**

1. China-Korea
2. Japan-Korea
3. Hong Kong-Korea
4. Hong Kong-Taiwan
5. China-Japan
6. Hong Kong-Japan
7. Japan-Taiwan
8. Australia-Singapore
9. Hong Kong-Singapore
10. Japan-Thailand



Asian economic power distribution continues dramatic shift toward China



During the forecast period, Asian economies (apart from Japan's) are projected to grow at an average annual rate of more than 4%, which is among the fastest regional economic growth rates in the world. China's GDP is expected to grow well over 6% per year, compared with 1.0% for Japan, less than 2% for Europe, and 2.5% for North America. China will continue to buoy overall Asian economic growth during the forecast period as it competes with current trading partners for investment and market share, graduates to higher value manufactures, and migrates production to underdeveloped interior areas.

Risks to the region include trade wars and protectionism; political tensions; reliance on foreign consumption; global imbalances exacerbated by structural rigidity in Asian economies; and the threat of a natural disaster, pandemic, or major terrorist activity.

The combined economies of Japan and China currently constitute more than 70% of Asia's aggregate economy. China's share alone has grown from less than 20% a decade ago to more than 40% in 2013. Remarkably, China's share is projected to surge to more than 60% of the region's total economy by the end of the forecast period, in 2033. Other major economies in the region, apart from Japan's, will nearly maintain their current shares as Asia's overall GDP increases by nearly two and a half times.

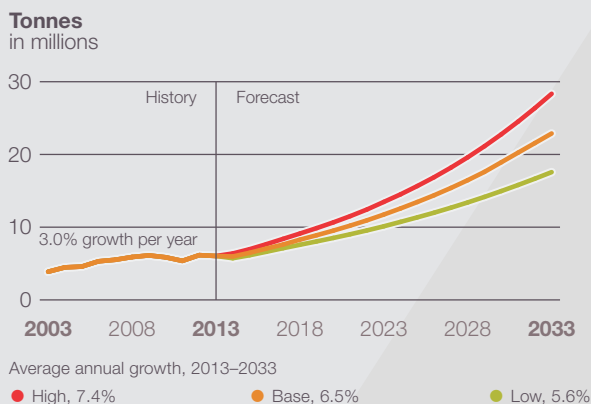
### Intra-Asia air cargo traffic forecast

Strong regional economic growth, coupled with continuing demand from North America and Europe, are projected to sustain a healthy annual air cargo growth baseline of 6.5% through 2033.

Projections of rapid GDP growth for countries within Asia support prospects for strong expansion of air trade in the region. China's projected GDP growth rate of well over 6% per year for the next 20 years will be a major driver of the region's air commerce expansion. Demand generated by intercontinental export markets and increasing consumption within the region contribute to the baseline forecast of 6.5% average annual air cargo growth. Among the highest average annual air cargo growth rates forecast for any region, this rate compares favorably with the 20-year historical rate of 6.8% and contrasts with the 10-year historical rate of 3.0%.

GDP projections of 0.5% below and above the baseline were assessed. The results of these growth rates are reflected in the low and high scenarios. The low-growth-rate scenario depicts slowing growth in China and the region in general. The high-growth rate corresponds to a regional growth rate even more vibrant than the baseline 6.5% through 2033.

### Intra-Asia air cargo market will grow at 6.5% over the next 20 years



# Regional Markets

## South Asia



For the purposes of this forecast, South Asia (sometimes referred to as the Indian Subcontinent) comprises Afghanistan, Bangladesh, Bhutan, India, the Maldives, Nepal, Pakistan, and Sri Lanka. Data from IATA, ICAO, European governments, the Indian government and airport statistics, the United Nations, and the US Department of Commerce are used to model South Asia air trade flows.

### South Asia air cargo flow exceeds 1.67 million tonnes per year

The South Asia market constitutes approximately 4.0% of the world's air cargo traffic in tonnage and 4.0% in tonne-kilometers.

South Asia continues to expand economically. The region saw 4.9% collective economic growth in 2013. South Asia remains one of the largest population centers in the world with more than 1.6 billion people, nearly one quarter of the world's population. India is the international air trade hub of South Asia. Its population alone exceeds 1.2 billion people, and the country has one of the 10 largest economies in the world. Total international air cargo flowing to, from, and within South Asia amounted to 1.68 million tonnes in 2013.

The three largest air cargo trade flows account for more than 75% of the total South Asia international air cargo market. Asia Pacific is South Asia's leading air trade partner, accounting for 30% of the region's total air trade. Air trade with Asia Pacific grew 11% in 2013 to 504,000 tonnes.

Europe is South Asia's second largest trade partner. Air cargo tonnage between South Asia and Europe expanded 2.5% in 2013 to 477,000 tonnes a year. Foreign carriers transport much of the cargo to and from the region. In India, the largest air cargo market in the South Asia region, foreign carriers transported more than 80% of all international cargo to and from the country. Many cargo flights between Europe, the Middle East, and Asia incorporate intermediate stops in South Asia as an add-on service.

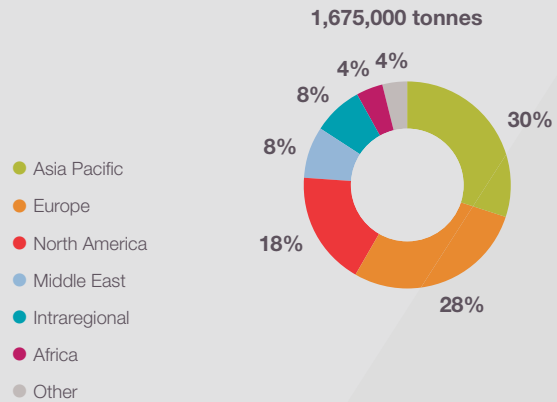
Overall air exports from the region comprise primarily textiles and apparel. Other smaller, yet growing, air export commodities for the region include meat and produce. The leading imports to South Asia are computing equipment; small packages; and capital, electrical, and telecommunication equipment.

### Air trade with Europe increased 2.5% from 2012 to 2013

In 2013 air trade between South Asia and Europe increased 2.5% to 477,000 tonnes from 465,000 tonnes in 2012.

The air cargo market between South Asia and Europe continues to favor exports over imports. In 2013 South Asia's air total export tonnage outweighed air import tonnage by a ratio of more than 2 to 1. Air exports from South Asia to Europe include apparel, vegetables, fruit, and industrial chemicals. The leading air imports from Europe to South Asia are capital equipment, chemicals, computers, and office and communications equipment.

### Asia Pacific is the largest South Asia trade partner



### South Asia–Europe air trade grew 5.8% per year, 2003–2013



### South Asia–Asia Pacific air trade grew 10.4% per year, 2003–2013





**South Asia air trade with Asia Pacific sustains a high growth rate**

South Asia's air trade with Asia Pacific has grown 7.0% annually since 2001.

The imbalance in South Asia–Asia Pacific air trade has been increasing for the past decade. South Asian exports to Asia Pacific have grown more slowly than South Asian imports from Asia Pacific. In 2013, overall air trade between South Asia and Asia Pacific increased 10.9% to 504,000 tonnes from 454,000 tonnes in 2012. South Asia's leading air import commodities consist of computers, office and communications equipment, machinery and electrical equipment, and apparel and textiles. South Asia's air exports to Asia Pacific consist primarily of animal products, fruits and vegetables, and textiles and apparel.

**Indian domestic air cargo market expands**

The Indian domestic market has grown rapidly over the past decade, paralleling the development of the Indian economy. From 2003 to 2013, the domestic Indian air cargo market expanded at a 6.9% average annual rate. In 2013, domestic Indian air cargo increased 2.3% over 2012 to 371,000 tonnes. The expansion is projected to continue at a rate of 6.3% per year from 2013 to 2033, when it will reach 1.2 million tonnes flown per year.

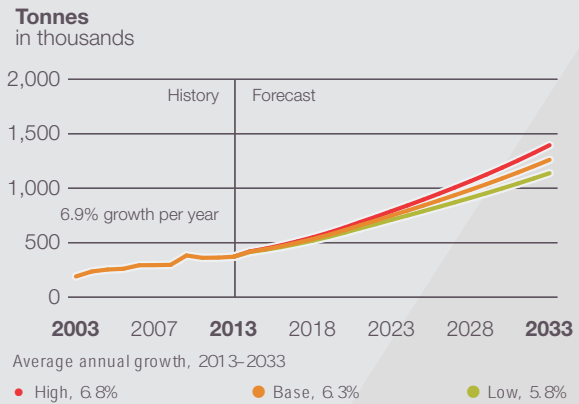
**South Asia–Europe air cargo traffic forecast**

South Asia's air trade with Europe is expected to continue to expand as the South Asia economies continue to develop. The South Asia–Europe market has expanded 7.9% per year from 2003 to 2013.

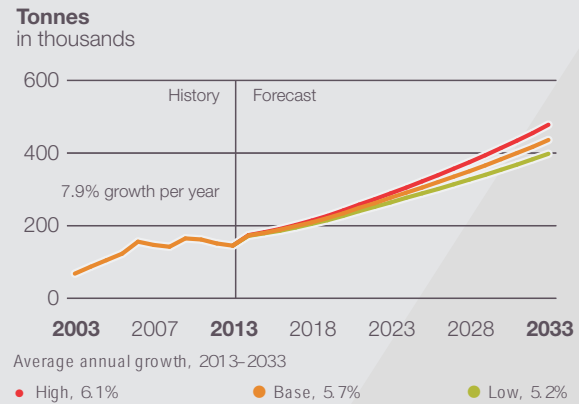
Base, low, and high models were developed to forecast the South Asia–Europe air cargo market. GDP projections of 0.5% below and above the baseline were assessed, and the results of these growth rates are reflected in the low- and high-growth scenarios. Flows from Europe to South Asia will grow an average 5.7% per year in the base model.

Flows from South Asia to Europe will expand approximately 4.2% per year for the forecast period. Continued privatization should make India's industry more cost competitive with its counterparts in Southeast Asia, leading to increased demand for South Asia's goods in Europe. Diversification into other light industries—particularly into sectors other than textiles and garments—bode well for this trade lane.

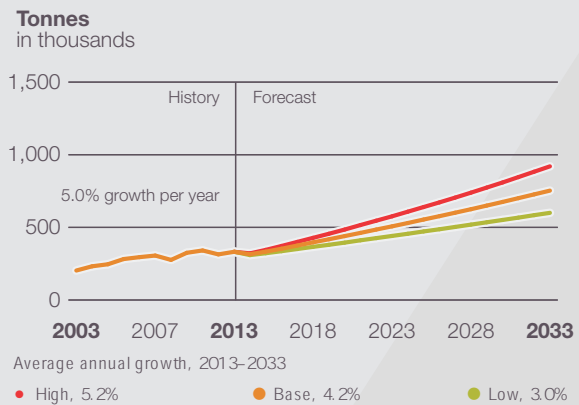
**Domestic India air trade will grow 6.3% per year**



**Europe-to–South Asia air trade will grow 5.7% per year**



**South Asia–to–Europe air trade will grow 4.2% per year**





The Commonwealth of Independent States (CIS) region comprises 12 of the 15 republics of the former Soviet Union: Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, the Russian Federation, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan. Although Georgia is no longer a member of the CIS, it is bound by common historical, business, and language ties.

**Overall CIS air trade fell in 2012 and 2013**

The CIS market is estimated to account for approximately 3.0% of the world's total air cargo traffic in terms of tonne-kilometers and 1.7% in terms of tonnage.

Air trade originating in or destined for the CIS is estimated at 1.27 million tonnes in 2013, based on the region's airport statistics. Growth averaged 3.5% from 2003 to 2013, based on tonnage handled at airports. Principal markets in the region include domestic Russia, Europe, and Asia. Russia commands the largest share of regional air commerce because of its size and economic concentration. Helped by high oil and gas prices, CIS air trade expanded 52% between 2009 and 2011, during the recovery from the global economic downturn. However, CIS air cargo volumes fell 0.7% in 2012 and a further 3.6% in 2013 as investment in the region's extractive industries slowed, consumer sentiment turned pessimistic, and concerns over the region's political future led to accelerating capital flight.

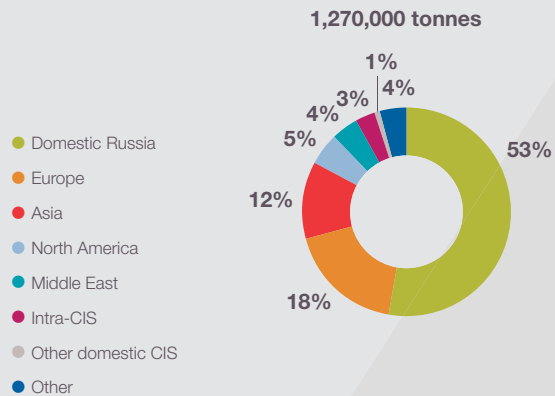
**Domestic air trade**

Domestic air trade is a vital part of commerce in this expansive region, particularly in Russia. In 2013, Russian domestic air cargo comprised about 669,000 tonnes, as reported by airports. As reported by airlines, however, the Russian air cargo flow totals slightly less than one-half of this figure. The region's vast distances and relatively underdeveloped surface transportation links often necessitate air transport, especially to remote oil and gas extraction projects in the Arctic regions, Siberia, and the Russian Far East.

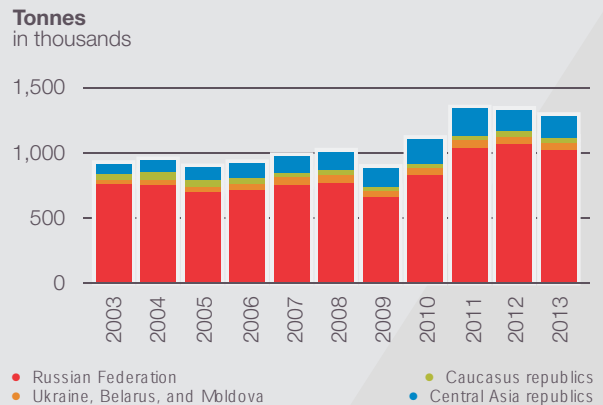
**International air trade**

International trade within and outside the region, accounts for 582,000 tonnes of CIS air cargo. Of that tonnage, 341,000 tonnes flow to and from Russia. Kazakhstan, Ukraine, Azerbaijan, and Uzbekistan account for most of the other 241,000 tonnes. CIS international air trade centers almost exclusively on Europe and Asia.

Domestic Russia leads all CIS-related air trade



CIS airport air cargo traffic has grown 3.5% from 2003 to 2013



## Imports to CIS

Demand for electronics, apparel, and other consumer goods, particularly from China, Japan, Korea, and Thailand, helps make CIS-Asia traffic one of the region's strongest flows. However, Russia has implemented customs regulations since 2002 that have curbed direct air import to Russia from Asia, leading some importers to transport Russia-bound freight to nearby countries by air. The freight then enters Russia by truck.

The development of the region's containership ports, particularly on the Baltic Sea, the Black Sea, and Russia's Pacific coast, also dampens air imports to the region. Container port activity has grown an average 9.5% per year in Russia and Ukraine over the past decade, reducing the need to transport relatively low-value consumer goods by air. CIS container port activity reached 4.5 million twenty-foot equivalent units in 2013, of which approximately 70% are imports. Steady improvements in and expansion of the region's port and road infrastructure have diverted cargo from air transport to containerships.

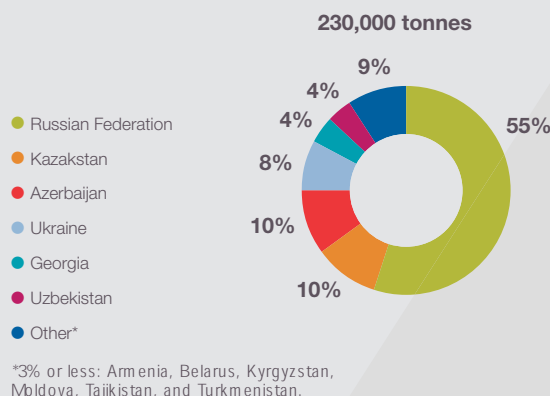
CIS-Europe traffic is a large market for this region. Total CIS air trade with Europe was 230,000 tonnes in 2013, of which about 188,000 tonnes are imports from Europe. CIS air imports consist primarily of industrial machinery, automotive components, luxury consumer goods and apparel, pharmaceutical and medical products, computing and telecommunication equipment, and oil and gas extraction equipment. CIS airborne exports to Europe totaled about 42,000 tonnes in 2013. Apparel, industrial machinery, industrial chemicals and metals, scientific instruments, specialty sporting goods, luggage, and transportation equipment are the main products flown from the CIS to Europe.

## International air cargo traffic on CIS airlines fell in 2013

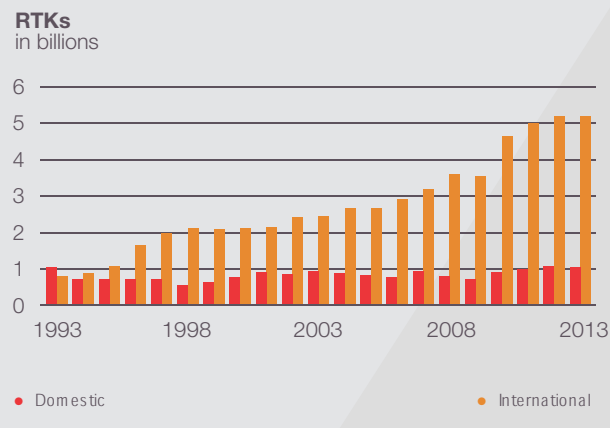
Overall, air cargo traffic on CIS-based airlines fell 0.4% in 2013, after growing 7.9% in 2011 and 4.3% in 2012. After expanding 7.6% in 2011 and 3.7% in 2012, international traffic on CIS-domiciled carriers fell 0.1% in 2013.

During the past 21 years, international revenue tonne-kilometers carried by CIS-domiciled operators have grown to exceed domestic traffic by a factor of 5. Domestic CIS traffic fell 1.5% in 2013, after growing 9% and 7.5% in 2012 and 2013, respectively.

## Russia and Kazakhstan lead CIS air trade with Europe



## Traffic on CIS-based carriers fell 0.4% in 2013



### CIS carriers transport considerable non-CIS cargo

To accurately assess CIS air cargo traffic volumes, it is necessary to distinguish between true origin-and-destination traffic and cargo flights that stop in the CIS in transit to and from countries outside the region. CIS-based operators carry a significant portion of the region's international cargo on scheduled international flights that pass through the CIS. CIS-based operators also provide charter services for multinational firms and foreign governments, carrying freight to and from markets unconnected to the CIS. Russian airlines carried an estimated 445,000 tonnes of non-CIS international cargo in 2013, representing approximately 65% of the total international traffic on Russian carriers.

Some Russian-domiciled carriers take advantage of their central location to serve fast-growing routes between Europe and Asia. In 2013, Russian carriers transported about 244,000 tonnes between Europe and Asia, transiting Russia without commercial stops inside the country. This represents more than a nine-fold increase over 2004 tonnage.

### Military-design freighters remain essential to regional air trade

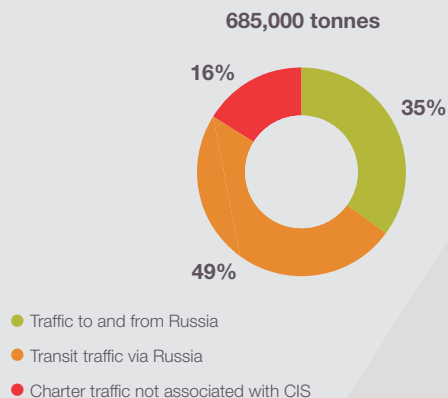
CIS-based airlines operate a sizable fleet of former Soviet military turboprop and jet airplanes with rear-ramp loading that are used to serve charter markets.

The combined effects of an ample supply of used military airplanes, low acquisition costs, and lagging airport infrastructure investment have kept indigenous military airplanes in CIS fleets for the past two decades. As of mid-2014, approximately 190 CIS-built freighters domiciled in the region are airworthy and serving civilian air freight markets, a decline of 150 airplanes since 2004. CIS airlines are augmenting or upgrading their fleets with Western-built freighters in response to aging airplanes, high fuel consumption, and community noise issues associated with their military freighters.

Certain CIS cargo carriers have parlayed their military aircraft assets to become unique providers of air transport for freight that is too large or too heavy for civilian widebody freighters. A select group of carriers in Russia and Ukraine uses very large ramp-loading military freighter aircraft to serve this specialized sector, which accounts for more than 94,000 tonnes of freight annually worldwide. It should be emphasized that most of the outsize cargo traffic does not originate or terminate in the CIS.

Most outsize traffic is conducted by charters to transport industrial shipments between Europe, North America, and Asia. These flights typically serve groups or companies involved in humanitarian aid, oil and gas extraction, aerospace manufacturing, electrical power generation, entertainment, or infrastructure development.

### Russia-domiciled carriers depend on international traffic flows



**CIS-Europe air cargo forecast**

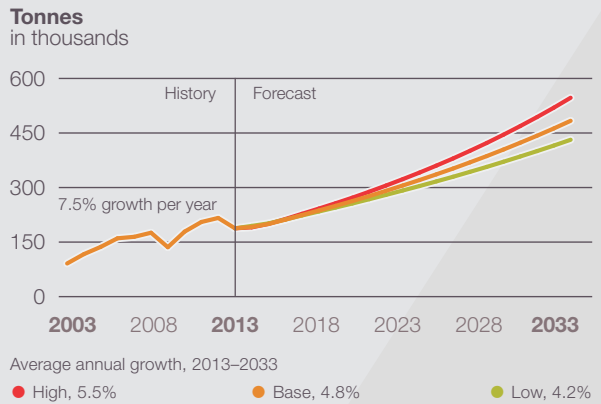
Assuming peaceful resolution to regional conflicts, the CIS-Europe combined import and export air cargo market will grow at an average annual rate of 4.8% for the next two decades.

The outbreak of war in eastern Ukraine in 2014 has cast a pall of uncertainty over the political and economic future of the entire CIS region. The current CIS air trade forecast assumes a quick (less than one year) and peaceful resolution to this conflict.

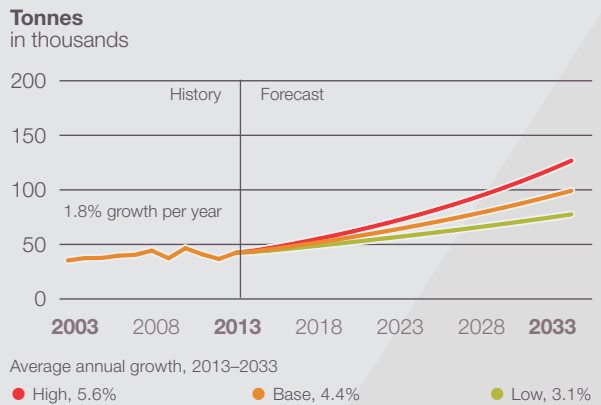
CIS air imports from Europe are forecast to grow 4.8% per year, expanding from 188,000 tonnes in 2013 to 484,000 tonnes by 2033. This growth will continue to depend on petroleum prices and the development of the CIS middle class. If petroleum prices remain high by historical standards, CIS demand for European consumer goods, industrial equipment and spare parts, and oil and gas extraction equipment will remain strong. CIS air import traffic should then develop in accordance with the baseline forecast or even the high-growth projection. Conversely, a decline in petroleum prices, a lack of CIS economic diversification, and continuing regional conflicts will drive the trend toward the low-growth projection.

CIS air exports to Europe will grow at a rate of 4.4% to reach nearly 99,200 tonnes by 2033. European demand for CIS-produced apparel, specialty chemicals and industrial metals, specialized scientific equipment, and aerospace goods will bolster growth for the forecast period. Pro-business legislation and an improved foreign investment climate could promote an export-driven economy for a wide array of manufactured and semi-manufactured goods, leading to the high-growth projection. Conversely, continuance of regional conflicts, laws and/or regulations adverse to new businesses, or renationalization of industries would impede air trade growth, leading to the low-growth projection.

Europe-to-CIS air trade will grow 4.8% per year



CIS-to-Europe air trade will grow 4.4% per year





## Regional Markets

# Domestic China



For the purposes of this forecast, we define domestic China as the mainland, or what is commonly referred to as the People's Republic of China. The special administrative regions of Hong Kong and Macau are not examined in this section.

### Domestic China air cargo traffic to grow 6.7% annually

China's domestic air cargo traffic currently accounts for an estimated 10.0% of the world's total air cargo traffic by tonnage, but only about 2.9% of the world market in terms of tonne-kilometers.

China has rapidly become the world's premier manufacturing center, with key industries producing commodities such as apparel and computing and telecommunication equipment. Most of these goods are intended for export and have traditionally been transported by air.

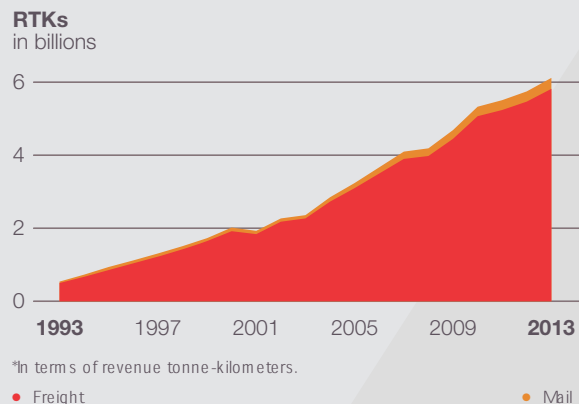
The tremendous increase in air trade with other countries throughout Asia, Europe, and North America has long been a major driver of growth in China's domestic air cargo traffic. During the past decade, consumer demand in China's rapidly developing large cities has become another important driver.

Strong economic growth, rising foreign investment, and extremely competitive labor rates stimulated 15.2% average annual growth in domestic air cargo throughout the 1990s. In 2013, China's domestic air cargo market grew only 4.7%, following growth of 3.5% in 2012, reflecting the global economic slowdown.

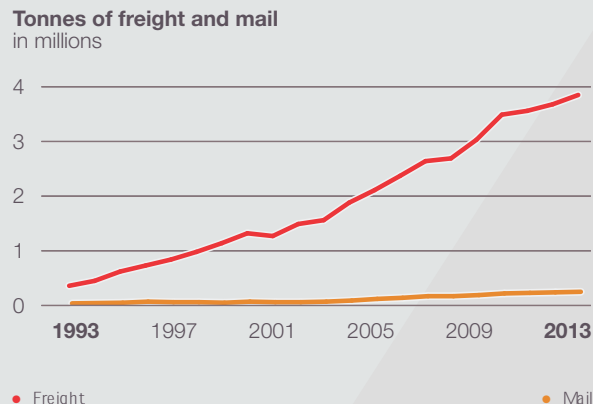
At 4.1 million tonnes transported annually, China's domestic air cargo market is second only to that of the United States. Scheduled freight accounts for 94% of China's domestic air cargo traffic. Mail accounts for the remaining 6%. Air cargo activity is concentrated in the coastal and southern provinces, where the bulk of the country's 1.4 billion people and \$7.5 trillion economy are situated.

The types of goods transported on China's domestic routes vary by region of the country. In the southeastern provinces, especially in the Pearl River Delta, domestic air cargo consists largely of apparel, home electronics, telecommunication equipment, and light industrial products. From the eastern provinces, goods transported by air include textiles, apparel, electronics, perishable foods, and live animals. In the northern regions, apparel, electronics and precision instruments are the primary commodities. And in the western provinces, pharmaceuticals, cashmere, cut flowers, and industrial equipment constitute the bulk of the cargo flow.

Domestic China air cargo traffic has grown 13.0% per year since 1993\*



China's domestic air cargo market is more than 4.0 million tonnes



## Infrastructure development remains key to continued growth

In the four years from 2006 to 2010, China invested 250 billion yuan (US\$39 billion) in aviation-related infrastructure, equivalent to the aggregate investment in civil air transportation infrastructure during the previous 25 years. The investment brought 33 new airports, increasing the total number of airports for commercial services to 175 in 2010. Shanghai Pudong airport became the third largest cargo airport in terms of tonnage. Air transport services, which have become accessible to 76% of the population, are associated with economic activities that account for 91% of the GDP.

In the past three years of China's 12th Five-Year Plan, which concludes in 2015, China has invested more than 200 billion yuan (US\$31 billion) in aviation-related infrastructure, of which 150 billion yuan (US\$23 billion) was for airport construction and upgrades, including 16 new airports.

The first 10 years of the Go West policy has shown impressive results. In response to tax and investment incentives and growing local market demand, many multinational companies, including HP, Intel, Foxconn, and Cisco, have either established new or moved existing manufacturing centers from the coastal provinces to interior cities such as Chengdu, Chongqing, and Xi'an. Go West policy success has laid a strong foundation for continued growth as the second decade of the development plan begins.

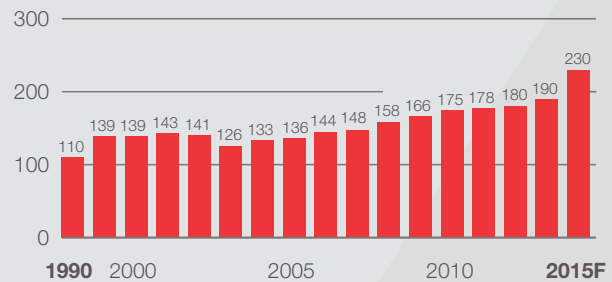
China began investing in road infrastructure in the mid-1980s and made it a national priority during the 1990s. The government invested heavily to develop road networks connecting major industrial centers in the coastal regions and to improve roads in provinces and towns. Originally, most of the road development resources went to the coastal regions, but the government has shifted its investment focus to the west as part of a strategy to develop that region.

By the end of 2013, China had a network of more than 100,000 kilometers of expressways, of which more than 80,000 kilometers is part of the National Trunk Highway System. The National Development and Reform Commission recently announced a long-term plan to build a network of more than 400,000 kilometers of expressways by 2030, of which 120,000 kilometers will be part of the National Trunk Highway System. The National Trunk Highway System will then comprise a network of 7 radial highways, 11 north-south highways, and 18 east-west highways.

The 12th Five-Year plan calls for a 40,000-kilometer network of express rail lines and over 100,000 kilometers of highway. When completed, the road network could ignite competition between air and ground transport modes for time-definite, short- to medium-distance domestic transport services. New surface transport alternatives could divert traditional air cargo traffic from airplanes to trucks, as happened in North America.

## China's airport development

China's airports open for civil services  
1990–2015 year end



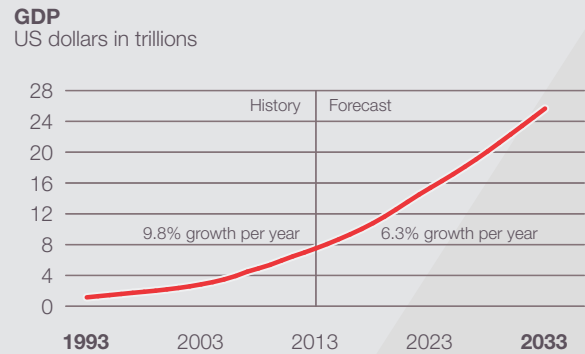
## Domestic China air cargo traffic is projected to expand

China's GDP is projected to grow 6.3% per year on average during the forecast period. Considering population growth predictions, per capita GDP is expected to exceed its current level by a factor of 3.4 in 20 years.

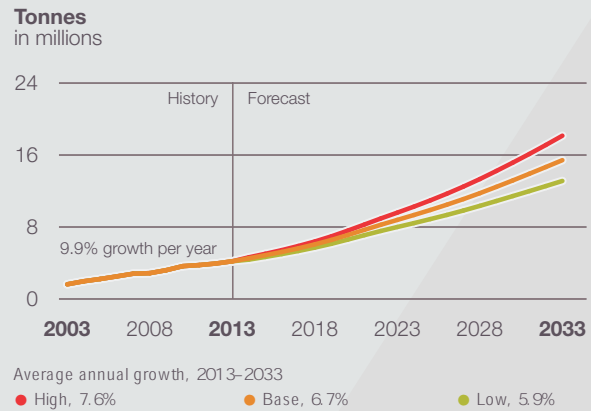
Base-, low-, and high-growth GDP models were developed to forecast China's domestic air cargo growth. The low- and high-growth air cargo scenarios reflect GDP projections for 0.5% below and 0.5% above the baseline GDP growth, respectively.

Overall air trade within China will grow 6.7% annually for the forecast period, with growth most rapid in the first decade of the forecast period.

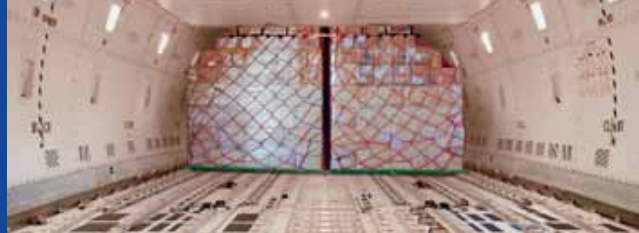
China's GDP is expected to more than triple over the next 20 years



Domestic China air cargo is forecast to grow 6.7% per year for the next 20 years



# World Freighter Fleet



## Air cargo market and the role of freighters

Despite costing more than other modes of transportation, worldwide air cargo traffic remained fairly stable through the political and economic turmoil of the past several years, and signs of renewed growth are evident. The nature of the core demand for air cargo services gives freighter airplanes competitive advantages over lower-hold capacity on passenger airplanes. Freighters continue to carry more than half of the world's air cargo (measured in revenue tonne-kilometers), even as lower-hold capacity expands.

The unusually challenging business environment over the past several years kept air cargo traffic volume relatively flat, resulting in persistent overcapacity and weak yields. Recently, however, traffic growth has strengthened as a variety of industries that require transport of time-sensitive goods and high-value commodities have stepped up production. Typical commodities that demand the speed of air transport include perishables, consumer electronics, high-fashion apparel, pharmaceuticals, industrial machinery, and high-value components such as auto parts. With unequalled speed and punctuality, air cargo retains an indispensable role in the global economy despite improvements in less expensive surface modes.

Cargo capacity on passenger flights has been expanding as airlines deploy new jetliners, such as the 777-300ER and 787, that have large lower-hold cargo capacities, even with a full load of passenger baggage. Yet dedicated freighter services still provide significant advantages, including more predictable and reliable volumes and schedules, greater control over timing and routing, and a variety of services for outside, hazmat, and other types of cargo that passenger lower holds cannot accommodate. For these reasons, it is expected that freighters will continue to carry more than half of the world's air cargo, even as lower-hold cargo capacity expands faster than freighter capacity. It should be noted, however, that the faster growth and economical pricing of passenger lower-hold capacity makes the freighter share of the cargo market subject to greater volatility when air cargo traffic growth is constrained.

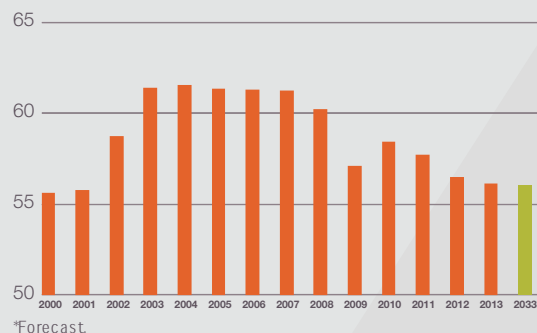
## Freighter fleet growth and change

The number of airplanes in the worldwide freighter fleet will increase by more than half during the next 20 years, as demand for air cargo services more than doubles. The role of large production freighters continues to increase, climbing from a 21% share of the world's freighter fleet today to a 30% share by 2033. By leveraging the efficiency and capability of large freighters, carriers will be able to manage projected air cargo traffic growth without a proportionate increase in the number of airplanes.

In response to challenging market conditions, freighter operators have adjusted freighter utilization, temporarily grounded portions of the fleet, and/or retired older freighters. In the long term, the industry will benefit from this removal of surplus capacity and replacement of older freighters with more efficient airplanes. The overall balance between demand and capacity is expected to return within a few years.

## Freighters carry more than half of air cargo traffic

World RTKs carried on freighters by percentage



## Fleet growth reflects shifts toward large production and converted standard-body freighters



The industry's resilience is projected to prevail once again over the most recent adverse pressures, with traffic more than doubling by 2033. This demand growth will spur the world freighter fleet to expand by more than half, from the current 1,690 airplanes to 2,730 airplanes by the end of the forecast period.

The imperative for efficiency favors large production freighters and will drive their share of the fleet to grow from 21% to 30% during the forecast period. Growing demand for regional express services in fast-developing economies will drive the standard-body share of the fleet to increase from 35% today to 40% in 20 years. All new deliveries of standard-body freighters will be converted passenger airplanes.

Of the 2,170 projected freighter deliveries, 1,130 will replace retiring airplanes, with the remainder expanding the fleet to meet projected traffic growth. More than 60% of deliveries will be freighter conversions, nearly 85% of which will be from standard-body passenger airplanes. A projected 840 new production freighters, valued at \$240 billion, will be delivered, of which more than 70% will be in the large freighter category.

Cargo capacity, measured in available tonne-kilometers, supplied by lower-hold passenger airplanes will continue to rise slightly faster than dedicated freighter capacity. Although by 2033, more than 60% of the world's air cargo capacity will be from the lower hold of passenger airplanes, freighters will still carry more than half the revenue tonne-kilometers because of the significant operating advantages of dedicated freighters. Underscoring the importance of freighter capabilities, more than 85% of industry revenues are generated by operators who have freighters in their fleet.

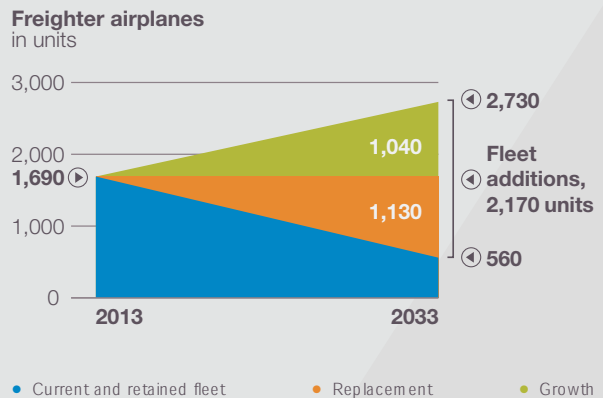
### Significant developments and trends

The diverse factors that affect world freighter fleet growth often exert contrary pressures. For example, high fuel prices increase air cargo transport costs, depressing demand for services. At the same time, high fuel costs are a compelling incentive for airlines to replace aging airplanes, bolstering demand for new freighters.

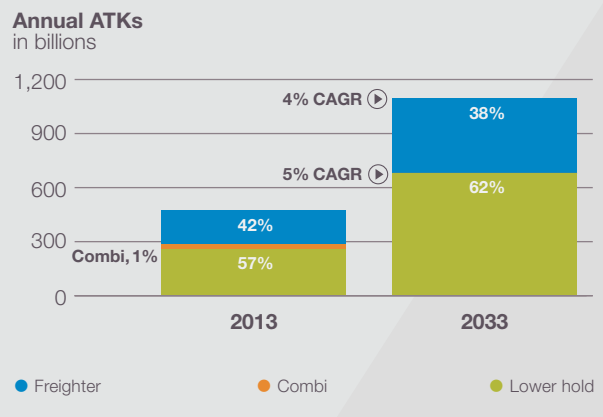
The forecast takes into account the following significant world freighter fleet developments and trends.

- The introduction of widebody passenger airplanes that can carry significant revenue cargo in addition to a full load of passenger baggage continues to moderate freighter demand. The unique advantages of freighter operations, however, often offset the lower price of shipping in the lower hold of passenger airplanes.
- Volatile fuel prices accelerate freighter retirements and enhance the value of newer airplanes that offer higher operating efficiency. Near-term overcapacity exerts downward pressure on the market for new freighters when yield, load factor, and utilization decline.

### Freighter fleet additions for growth and replacement



### Growth in capacity shifting slightly toward lower hold



- Freighter fleets will be concentrated at the most efficient operators that focus on the business and on market flexibility. There will be further industry consolidation and fleet rationalization among existing carriers.
- Passenger airlines continue to exploit the revenue potential of carrying cargo in the lower hold. Yet airlines that operate freighters in addition to passenger airplanes typically enjoy 20% higher cargo load factors and higher yields on lower-hold cargo than airlines that fly only passenger airplanes.
- Cost-effective ground transport alternatives and abundant lower-hold capacity will moderate growth of medium widebody fleets, even within regions where internal trade is expanding rapidly. In addition, the 20% to 30% operating cost advantage that large freighters enjoy presents a formidable barrier to profitable intercontinental operations for medium widebody freighters.

## Forecast approach

The model mix within the three freighter payload categories remains unchanged from previous forecasts. Our integrated top-down/bottom-up approach combines a thorough analysis of macro trends in the industry with detailed consideration of regional and operator-specific information, developments, and strategies.

We divide the current and projected fleet into three categories based on fuselage width and payload capability. Production freighters and conversions are both included in these categories, regardless of airplane range or service market. The three payload categories are standard body (all freighters less than 45 tonnes), medium widebody (40 to 80 tonnes), and large (more than 80 tonnes).

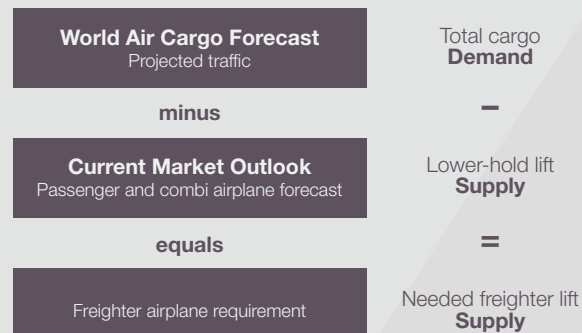
We begin with a top-down analysis of worldwide air cargo flows and traffic. Next, we subtract current and projected lower-hold cargo capacity (adjusted for passenger baggage requirements) from the total air cargo demand, as developed for the *World Air Cargo Forecast*. We use analysis from the companion Boeing publication, *Current Market Outlook* ([www.boeing.com/commercial/cmo](http://www.boeing.com/commercial/cmo)), to evaluate available lower-hold lift for each carrier by region, as well as actual reported load factors. Developments such as the imposition of checked baggage fees and restrictive security requirements on lower-hold capacity are considered. The freighter fleet lift requirement is calculated from the difference between total demand for air cargo services and the supply of revenue cargo capacity provided by the passenger fleet. Remaining air cargo traffic is apportioned to regional domiciles and specific carrier freighter fleets.

After we identify the nature and timing of likely future freighter offerings, we assess airplane capability, performance, and availability. At the regional domicile level for each airline (that is, from the bottom up), we factor in variables such as fleet type and age, airplane size, retirements, utilization, load factor, market share, service,

## Freighter size categories

Standard body <45 tonnes	Medium widebody 40–80 tonnes	Large >80 tonnes
707	767 series	747 series
727 series	787	777 series
737 series	A300 series	A350
757	A310 series	AN-124
A320 series	A330 series	Il96-T
BAe-146	DC-10 series	MD-11
DC-8 series	Il-76TD	
DC-9 series		
MD-80 SF		
Tu-204		

## Freighter fleet forecast methodology





and market strategies. We round out the top-down/ bottom-up analysis by balancing these variables with total air cargo lift, traffic, and availability of passenger airplanes for conversion.

## Freighter fleet development

Highlighting the importance of size and efficiency for freighter operations, fleet growth has concentrated on widebodies and particularly on the large freighter category.

Several striking comparisons illustrate the importance of freighter efficiency and capability. Widebody freighters account for about 65% of freighters in the current fleet, yet they supply 95% of the fleet's capacity. In particular, the 747 Freighter, the largest regularly scheduled freighter in service, represents less than 20% of the fleet, with more than 250 production and conversion freighters flying. Yet its size, high utilization, and high load factors allow it to provide more than half of the world's total freighter capacity.

Profitability margins are much narrower for freight carriers than for passenger carriers, owing in large part to competition from ground transport and lower-hold passenger alternatives. Freight operators are therefore sensitive to tonne-kilometer costs. This sensitivity has created a trend for operators to replace retiring freighters with larger models. This trend toward up-gauging is projected to continue during the forecast period.

## Production and conversion freighters

Although more than half of fleet additions will come from converted passenger airplanes, operators targeting premium, long-range service often find production freighters more attractive than conversion freighters. Their greater reliability, utilization, and capability can be significant competitive advantages.

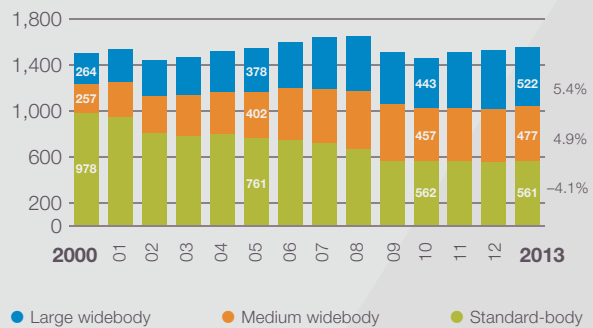
Production freighters will continue to play an important role because their superior reliability, operating cost, and capability can outweigh the advantage of the lower acquisition cost of conversions. Because cargo payloads, on average, generate only half as much revenue by weight as passenger payloads, freighter profitability is extremely sensitive to airplane size. The profit margin for smaller freighters is tighter than for larger freighters, so the lower acquisition cost of freighter conversions is attractive for the standard-body freighter size category. It is not surprising, then, that all additions to this fleet will be conversions.

Current market dynamics and the overlapping roles of large and medium widebody conversion freighters have made it difficult to model long-term demand for the two size categories separately. This year, therefore, we condense the forecast for large and medium widebody conversion freighters into a single category.

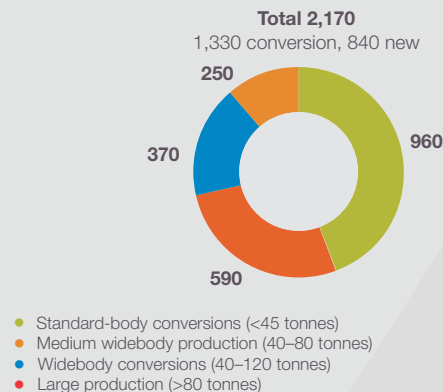
Nearly 65% of freighters added to the world fleet will be conversions. Growing demand for regional express services in fast-developing economies will drive an increase in the standard-body share of the fleet. The ready availability of the latest generation of medium widebody

## Significant up-gauging of freighter fleet size continues

Freighter fleet units



## Economic and operating advantages drive preference for large production freighters



passenger airplanes will encourage operators to accelerate airplane replacement plans. As a result, many relatively new medium widebody airplanes will be candidates for conversion before the typical 15- to 20-year average service life for passenger airplanes. In the high-yield, long-distance markets that large freighters typically serve, however, production freighters still hold the advantage of higher utilization and greater profit potential.

### Freighter deliveries by carrier domicile and operational model

Continuing a trend of many years, all-cargo and combination carriers will take the majority of large freighters, which are uniquely suited to long-haul, intercontinental markets. Express carrier networks will take the majority of medium widebody production freighters, which are ideally sized to support high-yield, time-critical operations. Standard-body freighters will serve emerging regional niche and express markets.

More than 40% of all freighter deliveries during the 20-year forecast period will be to Asian carriers, which also continue to receive the highest proportion of large freighters. These freighters serve their long-haul, intercontinental routes. Historically, up to three-quarters of medium widebodies, production and conversion, have supported express operations, in which relatively low airplane utilization makes converted freighters economically attractive. North America receives the largest number of medium-widebody deliveries because of the high concentration of express carriers in that region.

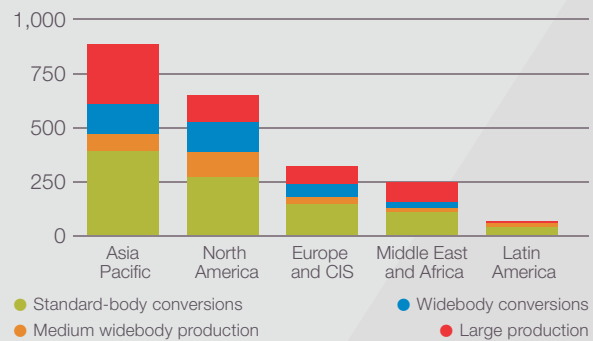
Standard bodies will continue to support the needs of emerging regions, niche segments, and express operations. Competitively priced surface transport and lower-hold air freight alternatives constrain expansion of the medium widebody fleet in Asia and Europe. Deliveries to the Middle East and Africa will be more balanced in terms of freighter size. Latin America is forecast to receive mostly standard-body freighters for use within the region and will rely predominantly on medium widebodies, rather than on large freighters, for service to other regions.

The largest share of medium widebody production freighters delivered during the next 20 years will go to dedicated express operators or airlines that support express operations. High-yield express traffic is growing faster than the industry average. Medium widebodies are particularly attractive to express carriers that seek to expand their networks and replace retiring smaller freighters. Airplane utilization tends to be relatively low for express carriers, so converted freighters are particularly suitable for these operations.

All-cargo and combination carriers tend to favor the economics and reliability of large production freighters. Widebody conversions are generally balanced among all carrier types. Regional and niche carriers, challenged by cost-competitive ground transport modes, tend to favor standard-body converted freighters for their lower purchase price and low trip costs. The large freighter category enjoys the highest potential for new freighter market growth.

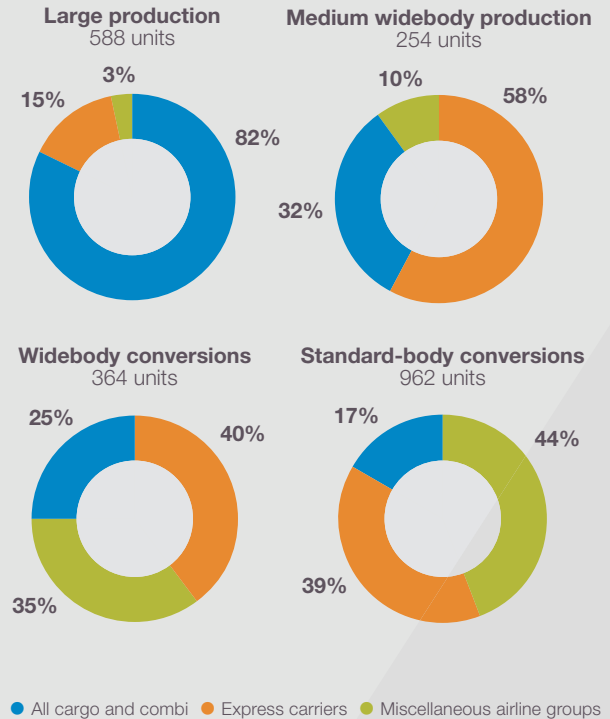
### Asia leads in total deliveries; North America follows

Number of airplanes



### Large freighters go to general carriers; medium widebodies to express carriers

2014–2033, new and converted



# Glossary

<b>A4A</b>	Airlines for America
<b>ACI</b>	Airports Council International
<b>ACMG</b>	Air Cargo Management Group
<b>Agreement on Textiles and Clothing</b>	A World Trade Organization agreement in place between 1995 and 2004 that required nations to remove gradually the textile quotas allowed under the Multifiber Arrangement.
<b>aircraft, crew, maintenance, and insurance (ACMI)</b>	Package (or wet) lease of an airplane. The package includes the airplane, crew, maintenance, and insurance but excludes fuel.
<b>ATA</b>	Air Transport Association
<b>available tonne-kilometer (ATK)</b>	One tonne of available freight capacity for one kilometer. Basically, the number of tonnes that can be carried multiplied by the number of kilometers flown.
<b>bottom-up approach</b>	Analysis technique that begins at the most detailed (micro) level and moves with less specificity toward the macro level only after considering complex, interrelated foundational effects.
<b>CAAC</b>	Civil Aviation Administration of China
<b>CAEP</b>	Committee on Aviation Environmental Protection. An ICAO consultative body that studies the impact of aviation on the environment, concerning noise and emissions, consistent with the Kyoto Protocol framework to the United Nations.
<b>CAGR</b>	compound annual growth rate
<b>CAPA</b>	CAPA Centre for Aviation
<b>cargo</b>	Freight, express, and airmail (for the purposes of this document).
<b>CIS</b>	Commonwealth of Independent States
<b>combi (combination)</b>	An airplane capable of simultaneously carrying passengers and cargo on the main deck.
<b>combination carrier</b>	A commercial operator (scheduled and chartered) that carries both passengers and cargo on revenue flights. Most do so on passenger airplanes with cargo in the lower hold, but many of the world's largest cargo carriers also operate freighters in addition to passenger airplanes.
<b>CPB</b>	CPB [Central Planning Bureau] Netherlands Bureau for Economic Policy Analysis
<b>CRSL</b>	Clarkson Research Services Limited
<b>daily shipment count</b>	An alternative method of recording revenue cargo traffic volume in addition to more conventional measures such as weight (e.g., tonnes and tons) and combining weight with distance (e.g., revenue tonne-kilometers and revenue tonne-miles). Most often used by integrated (express) carriers because their business is composed largely of smaller parcels.
<b>DOC</b>	US Department of Commerce
<b>DOT</b>	US Department of Transportation
<b>east-west market</b>	For the purposes of this forecast, we define east-west markets as the bidirectional cargo flows connecting Asia and North America, Europe and Asia, and Europe and North America.

<b>European Union (EU)</b>	A political and economic region in Europe that consists of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the United Kingdom.
<b>express</b>	Cargo with a guaranteed or time-definite service component. Express carriers usually are characterized as integrated because, in addition to carrying mostly airport-to-airport, time-definite cargo, they also offer many other services, such as door-to-door pickup and delivery.
<b>foreign direct investment</b>	Investment in a country's manufacturing or service sector by an entity domiciled in another country. Normally a holding of 10% or more in an enterprise.
<b>freight tonne-kilometer (FTK)</b>	One tonne of cargo carried one kilometer.
<b>gross domestic product (GDP)</b>	The total output of goods and services of a country.
<b>global economic downturn</b>	The most severe period of economic contraction since the Great Depression. Exacerbated by the mid-2008 doubling of fuel prices, culminating in financial collapse during 2009. Full calendar-year, aggregate worldwide GDP declined 2%.
<b>Go West policy</b>	An official Chinese policy strategy developed after 2000 to stimulate economic development of six western provinces. It includes the following infrastructure components: transport, hydroelectric power plants, energy, and telecommunications.
<b>IATA</b>	International Air Transport Association
<b>ICAO</b>	International Civil Aviation Organization
<b>integrator</b>	A cargo company that offers its customers complete services: pickup, airport-to-airport transport, delivery, and all the supporting ancillary services. Usually synonymous with a carrier that provides express services.
<b>jet fuel price</b>	Price for a one-time open market transaction covering immediate delivery purchased at current market rates.
<b>load factor</b>	Revenue tonne-kilometers divided by available tonne-kilometers.
<b>OAG</b>	Official Airline Guide
<b>outsize cargo</b>	Freight that is larger than can be accommodated on standard pallets but that is often carried by nose door-equipped 747 or purpose-built Russian freighters.
<b>Pacific Rim</b>	For the purposes of this document, the major Asia-Oceania economies: Australia, Indonesia, Japan, South Korea, Malaysia, New Zealand, China (including Hong Kong and Macau), the Philippines, Singapore, Taiwan, and Thailand.
<b>revenue tonne-kilometer (RTK)</b>	One tonne of revenue freight carried one kilometer. Usually used interchangeably with freight tonne-kilometer but can include passenger weight for total revenue.
<b>Schengen Agreement</b>	An agreement initially ratified by Belgium, France, Germany, Luxembourg, and the Netherlands on June 19, 1990. The agreement exempts the citizens of signatory nations from customs inspections. Other countries have since ratified the agreement.

<b>sea-air market</b>	A market in which cargo is transported from origin to destination by sea and air, taking advantage of the lower cost by ship between seaports and the speed of air over landmasses to balance time and cost.
<b>sixth freedom</b>	The right to carry passengers or cargo from a second country to a third country by stopping in one's own country.
<b>Southeast Asia</b>	Thailand, Malaysia, Indonesia, and Singapore.
<b>top-down approach</b>	An analysis technique that begins with a broader (macro) perspective and applies trends and conclusions to more specific situations.
<b>truck flight</b>	Also known as "road feeder service" or "RFS." Cargo that is transported by surface, usually by a dedicated truck, on an airway bill. Carriage between origin and destination may be exclusively by surface or also may feed into airport-to-airport or surface transportation.
<b>twenty-foot equivalent unit</b>	A unit of measure representing a standard, usually seaborne, shipping container approximately 20 feet long and 8 feet wide. Often transferred between modes of transportation.
<b>UNCTAD</b>	United Nations Conference on Trade and Development
<b>US</b>	United States
<b>wet lease</b>	An arrangement that covers all facets of operating an airplane on a carrier's behalf. Includes the airframe, crew, and most, if not all, of the airplane-related expense items.
<b>WACF</b>	World Air Cargo Forecast
<b>WTO</b>	World Trade Organization
<b>Yamoussoukro Decision</b>	A 1999 multilateral agreement among African states designed to liberalize air transport markets for the carriage of passengers, freight, and mail.
<b>yield</b>	Airline charges as measured in units of aggregated weight and distance (e.g., revenue per tonne-kilometer). Inclusion of surcharges, usually security or fuel or both, varies by the carrier reporting.

# Appendix

## World airlines by region of domicile RTKs in millions

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013*
<b>Africa</b>											
Scheduled freight	1,870	2,069	2,033	2,394	2,379	1,983	1,830	2,558	2,477	2,907	2,965
Charter freight	1,748	2,155	1,833	905	144	234	231	274	285	120	47
Mail	46	56	64	54	244	273	249	30	35	41	56
<b>Total</b>	<b>3,664</b>	<b>4,280</b>	<b>3,930</b>	<b>3,352</b>	<b>2,767</b>	<b>2,490</b>	<b>2,310</b>	<b>2,863</b>	<b>2,797</b>	<b>3,067</b>	<b>3,068</b>
<b>Asia and Pacific</b>											
Scheduled freight	53,313	61,150	63,438	66,829	71,459	67,156	62,634	77,236	73,527	69,499	68,976
Charter freight	651	689	623	755	678	285	523	843	626	1,094	778
Mail	1,230	1,331	1,367	1,421	1,536	1,657	1,613	1,785	1,917	1,903	2,125
<b>Total</b>	<b>55,194</b>	<b>63,171</b>	<b>65,429</b>	<b>69,005</b>	<b>73,673</b>	<b>69,098</b>	<b>64,770</b>	<b>79,864</b>	<b>76,070</b>	<b>72,496</b>	<b>71,878</b>
<b>CIS</b>											
Scheduled freight	1,303	1,593	1,687	2,078	2,435	2,620	2,671	3,837	4,234	4,427	4,486
Charter freight	2,008	1,873	1,750	1,558	1,611	1,686	1,521	1,622	1,655	1,719	1,639
Mail	59	74	62	66	79	79	80	105	114	115	114
<b>Total</b>	<b>3,369</b>	<b>3,540</b>	<b>3,499</b>	<b>3,702</b>	<b>4,124</b>	<b>4,385</b>	<b>4,272</b>	<b>5,564</b>	<b>6,002</b>	<b>6,261</b>	<b>6,239</b>
<b>Europe</b>											
Scheduled freight	32,675	35,797	36,481	37,929	39,347	38,346	32,625	37,509	39,389	38,441	38,983
Charter freight	3,670	4,775	4,464	4,818	5,598	4,875	4,073	4,440	4,464	4,003	3,948
Mail	988	1,033	1,067	1,038	1,054	1,048	1,002	917	988	1,034	1,110
<b>Total</b>	<b>37,333</b>	<b>41,605</b>	<b>42,012</b>	<b>43,785</b>	<b>45,999</b>	<b>44,269</b>	<b>37,700</b>	<b>42,866</b>	<b>44,841</b>	<b>43,478</b>	<b>44,042</b>
<b>Latin America</b>											
Scheduled freight	4,379	4,452	4,918	4,236	4,767	4,473	4,259	5,167	5,772	5,617	5,613
Charter freight	266	255	233	375	604	279	254	297	199	160	139
Mail	104	145	123	100	89	71	41	33	73	106	103
<b>Total</b>	<b>4,749</b>	<b>4,852</b>	<b>5,273</b>	<b>4,710</b>	<b>5,459</b>	<b>4,822</b>	<b>4,554</b>	<b>5,497</b>	<b>6,044</b>	<b>5,884</b>	<b>5,855</b>

\*Preliminary.



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013*
<b>Middle East</b>											
Scheduled freight	6,462	8,091	9,107	10,251	11,734	12,554	12,751	16,174	17,596	20,092	22,481
Charter freight	127	115	64	210	248	437	155	146	94	104	139
Mail	113	126	127	155	186	224	242	266	161	135	161
<b>Total</b>	<b>6,702</b>	<b>8,333</b>	<b>9,298</b>	<b>10,616</b>	<b>12,168</b>	<b>13,216</b>	<b>13,148</b>	<b>16,586</b>	<b>17,852</b>	<b>20,330</b>	<b>22,781</b>
<b>North America</b>											
Scheduled freight	37,675	39,952	39,966	41,697	41,818	39,744	34,818	39,489	39,695	39,285	37,507
Charter freight	5,579	6,878	7,415	6,503	6,496	6,461	5,437	7,023	7,913	8,848	9,818
Mail	4,318	4,241	4,109	4,214	3,977	3,995	3,564	3,657	3,787	3,821	4,043
<b>Total</b>	<b>47,572</b>	<b>51,071</b>	<b>51,490</b>	<b>52,414</b>	<b>52,291</b>	<b>50,200</b>	<b>43,819</b>	<b>50,170</b>	<b>51,395</b>	<b>51,954</b>	<b>51,368</b>
<b>South Asia</b>											
Scheduled freight	1,356	1,702	1,723	1,823	1,814	2,038	1,948	2,565	2,563	2,389	2,512
Charter freight	0	0	0	0	0	0	0	0	0	0	0
Mail	44	63	56	45	39	51	54	54	43	49	44
<b>Total</b>	<b>1,400</b>	<b>1,766</b>	<b>1,780</b>	<b>1,868</b>	<b>1,853</b>	<b>2,089</b>	<b>2,003</b>	<b>2,619</b>	<b>2,606</b>	<b>2,437</b>	<b>2,557</b>
<b>World airlines</b>											
Scheduled freight	139,033	154,808	159,353	167,237	175,754	168,914	153,538	184,536	185,253	182,656	183,523
Charter freight	14,049	16,740	16,382	15,124	15,378	14,255	12,194	14,647	15,237	16,049	16,508
Mail	6,902	7,070	6,975	7,092	7,203	7,399	6,845	6,847	7,117	7,204	7,757
<b>Total</b>	<b>159,984</b>	<b>178,618</b>	<b>182,711</b>	<b>189,454</b>	<b>198,335</b>	<b>190,569</b>	<b>172,576</b>	<b>206,029</b>	<b>207,607</b>	<b>205,909</b>	<b>207,788</b>

\*Preliminary.



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