11 Small Community Impacts of Liberalisation and the Provision of Social Air Services

Aisling Reynolds-Feighan

Introduction

Air transportation is an important ingredient in the development and growth of economies and plays an important strategic role in these processes at varying spatial scales. Air transport provides a relatively low cost transport solution for facilitating rapid access to isolated communities or regions (islands; peripheral locations, difficult terrain) and in large countries, can provide political and economic cohesion by facilitating higher levels of interaction than other transport modes. Governments have funded air transport infrastructure provision historically, and while this is still the case in most global regions, there is greater use of public private partnerships as well as solely private sector provision. A report for the EU in 2016 suggested that 15% of airports around the world were fully privatised, 18% were in public-private partnership and the remaining 67% were in public ownership. The privatised or commercialised airports account for 50% of airport passenger traffic[i]. As well as providing facilities, governments have traditionally been heavily involved in the operational and regulatory aspects of the industry directly and through all sorts of agencies promoting various agendas such as tourism and local business development.

Air transport service provision has undergone significant changes in many countries and regions globally since the 1970s. The deregulation of the US domestic cargo and passenger air transport markets in 1977 and 1978 led to significant industry structure and performance changes in the following decade. The US industry has been extensively studied and has provided strong evidence for social benefits associated with a market-oriented approach to the determination of air service provision and pricing. Deregulation has permitted airlines to make determinations on which communities and routes to serve and on capacity and pricing; it has removed restrictions mandating airlines to serve particular communities (often small remote communities) and reduced the need for cross-subsidisation within the carrier's operations. In an international context, liberalisation of the traditionally restrictive bilateral air service agreements between pairs of countries gathered momentum during the 1980s and 1990s, giving airlines greater freedom to choose where and how they operate and price their services. Liberalisation relates to the trade rules determining market access, national treatment and levels of foreign ownership and other non-tariff barriers (Decurtins, 2007). The formation of multi-country trade blocs such as the European Economic Area, Latin American MERSOSUR (Southern Common Market) and Association of Southeast Asian Nations (ASEAN) which have common markets, and multilateral free trade areas such as the Common Market for Eastern and Southern Africa (COMESA), Greater Arab Free Trade Area (GAFTA), North American Free Trade Agreement (NAFTA), Pacific Alliance (PAFTA) have included air transport liberalisation agreements that facilitate and develop air transport services between countries. These types of agreements facilitate economic growth and development and are

linked with globalisation; connectivity and accessibility of the world's economies have been greatly facilitated by air transportation.

Under regulation, service provision to regional airports & small communities was required as part of carrier licenses. In some cases, regulation prevented entry and exit from an agreed list of routes, so some degree of cross-subsidisation was assumed between profitable heavily trafficked routes and thin routes to remote or small communities.

In liberalised markets, governments have developed frameworks to provide social air services so that small communities can have, or continue to have, access to regional or national air transport networks. Competitive tendering to provide social air services has emerged as the international best practice for filling air service needs or requirements when the market will not produce the service. In addition, governments continue to provide air transport infrastructure to small communities or remote regions. There is an implicit understanding that the infrastructure will benefit the community if services are provided – so service provision processes are increasingly being put in place.

For small and medium sized communities, access to national and international markets is important for economic and political cohesion and development. The processes of air transport deregulation and liberalisation have had significant and sustained impacts on the growth of the air transport industry. This chapter will focus on the distributional effects of these processes and in particular, examine how air transport services have evolved at small and medium sized communities worldwide. In the next section, major global trends are reviewed in a comparative regional analysis of key drivers and indicators of air transport activity in the last twenty years. Following from this, a classification of air transport locations is presented and focuses on the performance of medium and small communities as well as exploring the patterns of connectivity to the larger centres worldwide. The major global regions are compared and contrasted and particular features are highlighted that have shaped the development of air transport in different settings. In the final section, the provision of essential air services by government is reviewed before some general conclusions are set out in the concluding section.

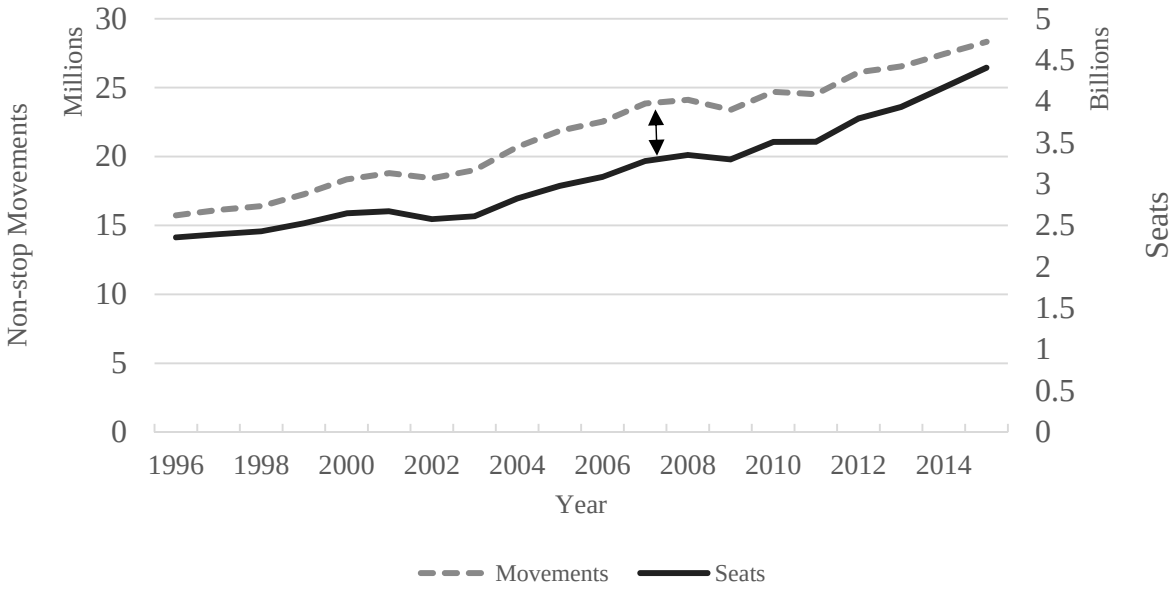
Major trends in air transport, 1996-2015

Detailed reliable air traffic data, covering all of the world's commercial air transport activity were sourced from the Official Airline Guide. The OAG Max Historical Plus databases give ex-post daily schedules of all of the commercial air transport services offered for sale. Using these databases, annual traffic capacity data series were compiled and matched with population data and basic geographic information on cities and countries. The analysis presented in the chapter draws from these data series and presents a supply-side view of air transport activity, since it is capacity rather than actual passenger volumes that are analysed. The analysis is restricted to jet services (including regional jets).

Passenger air transport activity, as measured by non-stop departure movements, has grown at an annual average rate of 3.2% throughout the 1996-2015 period, and a 3.4% average annual growth in available seats, despite two major global recessions in 2001/2 & 2008-2010 periods were observed. Figure 11.1 shows the trend in seats and movements over the period, with the gap between the two lines indicating the average aircraft size. The deployment of significant fleets of small regional jets during the 2000s, particularly in the North American market,

reduced the average aircraft size during this decade. In the more recent period, average aircraft size has increased and the trend is particularly influenced by the strong growth in the Asian market since 2008, where typically larger aircraft are used.

Figure 11.1 Global non-stop departure movements and seating capacity, 1996-2015



In order to compare trends in the major global markets, a regional nomenclature is utilised: the regional classification is IATA-based and does not align with economic trading blocs. For example, Europe is defined as all areas west of the Ural Mountains, so that Russia is split between Europe and Asia; North America consists of Canada and the USA but not Mexico which is included in Latin America (LA). The major regions are further subdivided into smaller country groupings (for example, there are four Latin American and four Asian sub regions), but these will not be presented in this chapter. Figure 11.2 shows the regional classification scheme used in the analysis.

Figure 11.3 shows the traffic shares for the major continental regions over the period 1996-2015. The North American (NA) region share fell from 46% of global departure movements in 1996 to 29% in 2015. The Asian region share rose from 15% in 1996 to 29% in 2015, while Europe slightly increased its share (22% in 1996 to 24% in 2015), reflecting slightly higher growth than the average annual rates cited earlier. The Middle East (ME) region increased its share from 2% in 1996 to 2.9% in 2015 while Latin America (LA) and the Southwest (SW) have maintained their shares.

Figure 11.4 shows the number of airports receiving passenger jet services in each region over the analysis period. There are dramatic increases in the number of Asian airports (from 447 to 655) and in the number of European airports (from 419 to 553). For North America, there was a significant drop in the number of airports receiving jet air transport services after deregulation in the US in 1978 and this was sustained until after 2010. Since 2010, there has been a significant increase in the total number of airports receiving scheduled jet services, from 361 in 2010 to 444 in 2015. Smaller increases are observed in the numbers of airports in Latin America, Africa, the Middle East and Southwest regions.

Figure 11.2: Map of OAG and IATA regional classification scheme, 2015

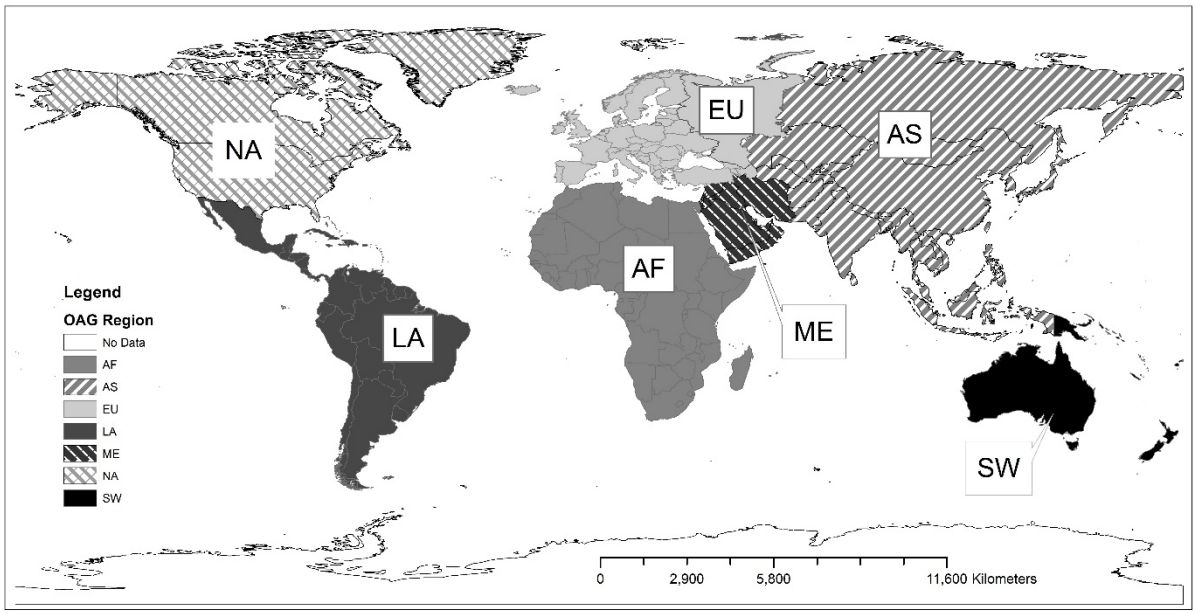
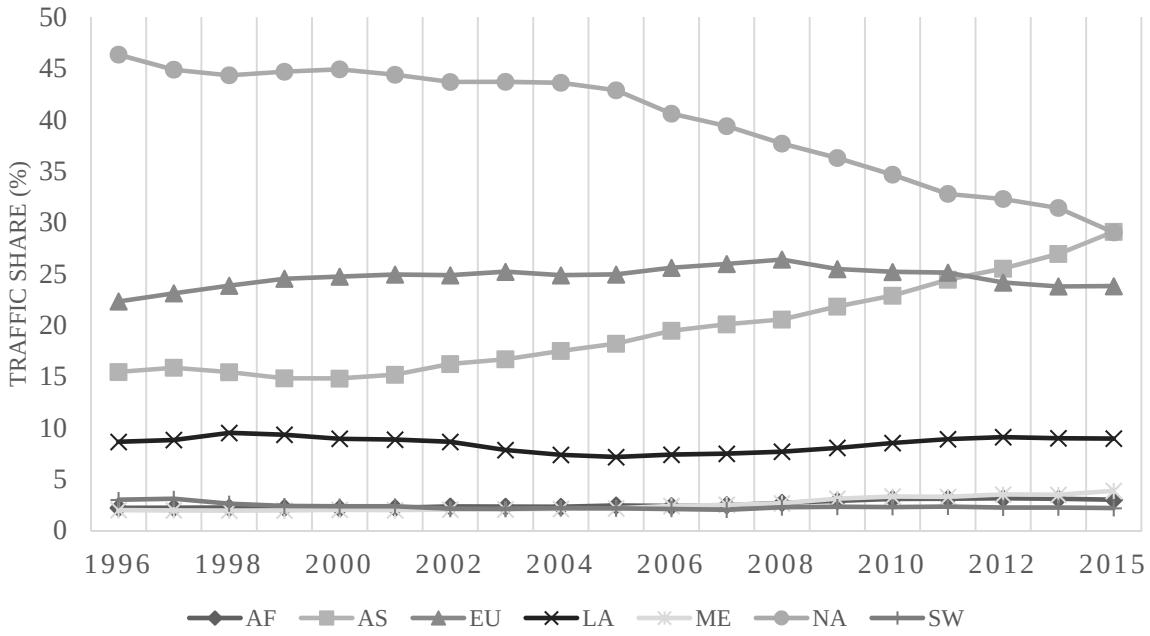


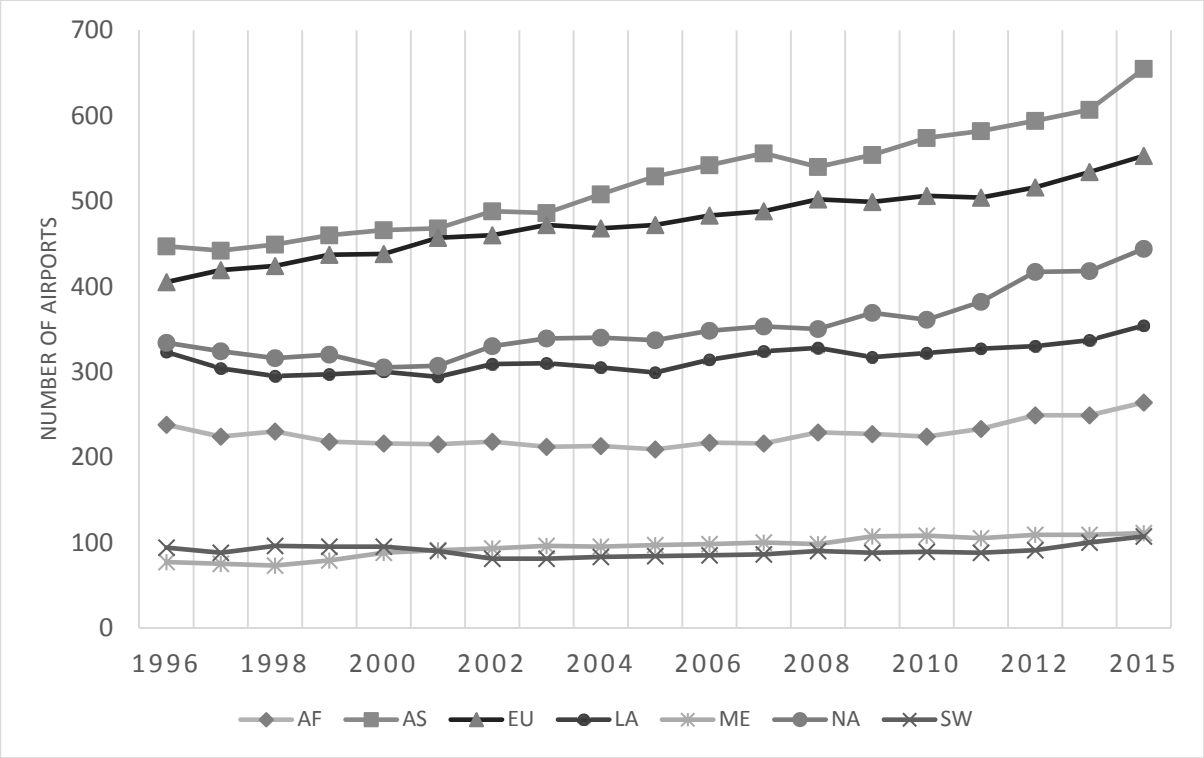
Figure 11.3: Non-stop jet movement air traffic shares for major regions, 1996 – 2015



In order to examine the distribution of traffic across these continental systems of airports over the analysis period, two approaches were used. The first approach uses the Gini Index which gives a measure of the extent of concentration in a traffic distribution, and summarises the deviations from an equal share traffic distribution. A score of 0 indicates an equal share across all airport communities; a score close to 1 indicates a highly concentrated distribution focused on a relatively small number of communities. Using traffic movement and seating capacity shares at each airport across the system of airports in each year and for each region, the Gini Index was computed and adjusted to take account of changes in the number of airports receiving services (see Reynolds-Feighan (2007) for a discussion on these adjustment factors).

Figure 11. 5 shows the Gini Index scores for the regional movements traffic distributions over the analysis period.

Figure 11.4: Number of airports by major region receiving jet air traffic, 1996-2015



The Gini scores range between 0.74 and 0.87, which reflects a high degree of concentration in the traffic flows in all regions. The Gini index scores for seating capacity are consistently about 2% higher but show a similar trend to the departure movement traffic trends shown in Figure 11.5, reflecting the fact that larger aircraft are deployed at the largest airports and therefore account for higher shares of seating capacity compared with movements. Traffic concentration declined in the European (EU), North American (NA) and Asian (AS) regional markets, while in the Middle East (ME), African (AF), Southwest (SW) and Latin American (LA) markets, concentration increased.

To explore these trends further, the second approach involves adapting the US Federal Aviation Administration (FAA) Hub Classification scheme[ii] and categorising air traffic communities based on the share of annual air traffic activity. The FAA developed its hub structure in the 1950s as a reporting and funding evaluation mechanism. This approach groups airports into communities based on the cities and metropolitan areas that they serve. The majority of communities are served by a single airport, but in the case of many large metropolitan areas, they may be served by multiple airports. In order to map airports to the cities that they serve, the IATA location identifier was utilised for each airport. IATA publishes location identifiers consisting of a 3-letter code for a location or airport in its *Airline Coding Directory*[iii]. The city code can be used to map airports to cities for communities served by multiple airports; only airports and the carriers utilising the airport can apply to have the location identifier changed. Table 11.1 shows the number of cities and number of airports serving the cities by continental region for 1996 and 2015.

Figure 11.5 Gini Index scores for movement traffic for each major region, 1996-2015

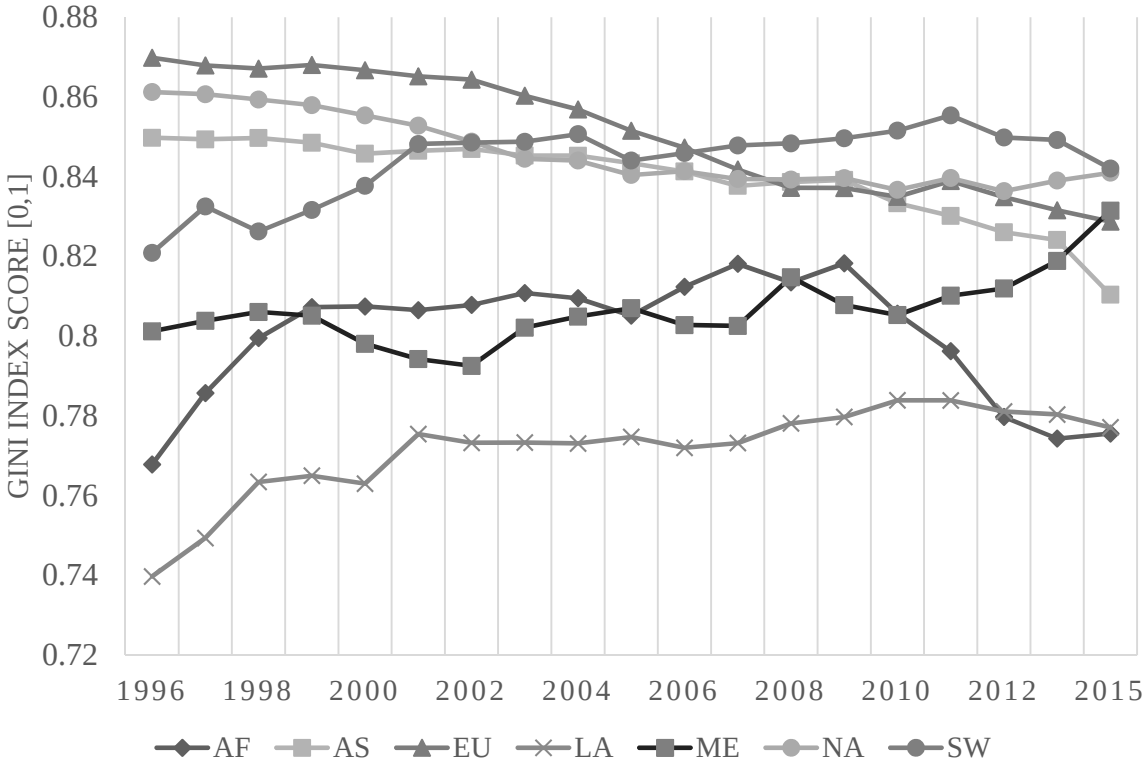


Table 11.1 Number of cities and number of airports serving the cities by continental region

No. Airports per city	1996 – Region								2015 - Region							
	AF	**AS**	**EU**	**LA**	**ME**	**NA**	**SW**	**1996 Total**	**AF**	**AS**	**EU**	**LA**	**ME**	**NA**	**SW**	**2015 Total**
1	238	439	361	313	73	316	94	1834	258	632	489	339	101	371	102	2292
2		4	16	5	2	6		33	3	10	18	6	5	27	1	70
3			1			2		3		1	3	1		5	1	11
4			1					1			2			1		3
5			1					1			1					1
6											1					1
Total	238	443	380	318	75	324	94	1872	261	643	514	346	106	404	104	2378

The FAA hub classification examines the total traffic in a one year period. In the adaptation here, large hubs are identified as those communities receiving 1% or more of the total annual traffic. Medium hubs are those communities receiving between 0.25% and 1% of annual traffic; small hubs receive 0.05-0.25% of annual traffic. Non-hubs are those communities receiving less than 0.05% of annual traffic. The non-hubs in this adaptation are further subdivided into three categories based on threshold numbers of departure movements so that the smallest air transport communities may be distinguished. The full scheme used for annual air traffic movements is set out in Table 11.2. The classification system is applied to the global air traffic distribution as well as the major regional markets and relates to the non-stop departure movements data series. Table 11.3 shows the numbers of each hub type for each region in 2010 and 2015, while Table 11.4 shows the share of departure movements associated with each region and hub class. The number of large hubs in the global scheme as well as in each region (shown in Table 11.3) has reduced over time, reflecting a less concentrated distribution of

traffic. The number of small hubs and non-hubs type ‘A’ have seen the biggest increases and their traffic shares have also increased slightly from 15% collectively in 2010 to 17% in 2015.

Table 11.2 Hub Classification Scheme used to categorise air transport communities

Traffic criterion	**Hub Type**
1% or more of annual departure movements	Large
At least 0.25%, but less than 1% of annual departure movements	Medium
At least 0.05%, but less than 0.25% of annual departure movements	Small
More than 500 but less than 0.05% of annual departure movements	Non-Hub - Type A
Between 10 and 499 annual departure movements	Non-Hub - Type B
Less than 10 annual departure movements	Non-Hub - Type C

Table 11. 3 Number of each type of hub by region, 2010 and 2015

Region	Year	Large	Medium	Small	Non hub 'A'	Non hub 'B'	Non hub 'C'	Total
AF	2010	22	44	61	0	87	7	221
AS	2010	23	54	142	206	131	5	561
EU	2010	25	54	117	154	100	17	467
LA	2010	23	51	118	41	77	4	314
ME	2010	18	18	36	0	34	0	106
NA	2010	24	49	95	117	46	14	345
SW	2010	15	18	22	0	32	1	88
All	**2010**	**150**	**288**	**591**	**518**	**507**	**48**	**2102**
AF	2015	20	51	77	0	97	16	261
AS	2015	22	58	156	270	124	13	643
EU	2015	23	48	132	172	116	23	514
LA	2015	21	50	131	52	82	10	346
ME	2015	18	17	28	3	36	4	106
NA	2015	23	42	90	169	63	17	404
SW	2015	15	20	27	0	36	6	104
All	**2015**	**142**	**286**	**641**	**666**	**554**	**89**	**2378**

The number of communities being served by multiple airports has been growing over time. In 2015, 70 of the 2,378 global air transport communities had two airports, 11 had three airports while 5 cities had four or more airports (these were London (6), Paris (5), Milan (4), Stockholm (4) and New York (4))[iv]. The large hubs serve the world’s largest cities and metropolitan areas and are key connection nodes within continents and globally. There are consistently about 20-25 large hubs in each regional scheme handling well over half of the total traffic for their region. Table 11.5 shows the average number of seats per movement by regional hub class in 2010 and 2015. This table shows an increasing average aircraft size at all classes of hubs and non-hubs in all regions. Because of congestion at several of the large hubs, some have reduced the numbers of short haul or smaller aircraft services and focused on development of longer haul traffic and facilitating larger equipment. The medium and small hubs play an important role in providing connectivity for smaller communities and in connecting urban centres within the continents. It can be observed in Table 11.5 that as the hub size gets smaller, so does the average

aircraft size. The significantly smaller average aircraft size in the North American market at all hub classes may also be noted, though this has increased in the period since 2008.

Table 11.4 Share of total departure movements for hub classes and regions, 2010 and 2015

Region	Large	Medium	Small	Non-hub 'A'	Non-hub 'B'	Non-hub 'C'	Grand Total
AF	66%	23%	9%	0%	2%	0%	100%
AS	51%	29%	15%	5%	1%	0%	100%
EU	58%	25%	13%	4%	0%	0%	100%
LA	60%	23%	15%	1%	1%	0%	100%
ME	86%	9%	5%	0%	1%	0%	100%
NA	62%	24%	11%	3%	0%	0%	100%
SW	86%	9%	4%	0%	1%	0%	100%
2010	**60%**	**25%**	**12%**	**3%**	**0%**	**0%**	**100%**
AF	61%	26%	11%	0%	2%	0%	100%
AS	47%	31%	16%	6%	0%	0%	100%
EU	56%	24%	16%	4%	0%	0%	100%
LA	58%	23%	16%	2%	1%	0%	100%
ME	88%	9%	3%	0%	1%	0%	100%
NA	64%	21%	11%	4%	0%	0%	100%
SW	85%	10%	4%	0%	1%	0%	100%
2015	**58%**	**24%**	**13%**	**4%**	**0%**	**0%**	**100%**

Table 11.5 Average number of seats per movement for hub classes for each region

Region & Year	Hub Class						
	Large	Medium	Small	Non-hub 'A'	Non-hub 'B'	Non-hub 'C'	Regional Average
2010 – overall average for hub type	164	149	141	135	133	134	152
AF	163	162	148		132	105	157
AS	188	159	153	132	122	127	163
EU	169	156	149	147	143	142	157
LA	153	144	144	151	132	152	147
ME	183	123	117		122		167
NA	132	121	96	92	141	138	121
SW	190	155	147		133	100	172
2015 – overall average for hub type	174	160	154	141	139	162	161
AF	166	162	149		129	139	158
AS	189	164	158	139	132	154	165
EU	181	166	161	157	153	164	167
LA	163	158	153	150	120	127	156
ME	199	150	140	144	141	138	185
NA	143	143	115	103	150	189	135
SW	194	162	142		124	130	174

Table 11.6 Busiest city pairs in each region in 1996 and 2015

1996

Region	City Pair Code	City Pair		No. Airports	City Pair Distance	Percentage of regional traffic	Number of carriers
AF	JNBCPT	Johannesburg	Cape Town	2	1271	6.3	14
	DURJNB	Durban	Johannesburg	2	501	4.9	12
	BENTIP	Benghazi	Tripoli	2	669	1.6	1
AS	KHHTPE	Kaohsiung	Taipei	3	301	2.7	8
	PUSSEL	Busan	Seoul	2	336	1.2	4
	SELCJU	Seoul	Jeju	2	451	1.1	2
EU	DUBLON	Dublin	London	6	464	1.1	9
	ROMMIL	Rome	Milan	5	498	1.0	13
	MADBCN	Madrid	Barcelona	2	483	1.0	11
LA	RIOSAO	Rio de Janeiro	Sao Paulo	4	366	3.4	27
	GDLMEX	Guadalajara	Mexico City	2	459	1.8	5
	MEXMTY	Mexico City	Monterrey	2	713	1.3	6
ME	RUHJED	Riyadh	Jeddah	2	853	3.3	3
	DHARUH	Dharan	Riyadh	2	373	3.2	4
	BAHDOH	Bahrain	Doha	2	145	1.8	10
NA	NYCCHI	New York	Chicago	6	1166	0.8	17
	OGGHNL	Kahului	Honolulu	2	163	0.7	6
	HOUDFW	Houston	Dallas/Fort Worth	4	368	0.7	7
SW	SYDMEL	Sydney	Melbourne	2	703	9.4	21
	SYDBNE	Sydney	Brisbane	2	740	6.5	10
	WLGAKL	Wellington	Auckland	2	480	4.4	2

2015

Region	City Pair Codes	City Pair		No. Airports	City Pair Distance	Percentage of regional traffic	Number of carriers
AF	JNBCPT	Johannesburg	Cape Town	3	1271	5.1	12
	DURJNB	Durban	Johannesburg	3	501	3.0	9
	CAIJED*	Cairo	Jeddah	2	1217	3.0	9
AS	CJUSEL	Jeju	Seoul	3	450	0.9	8
	SPKTYO	Sapporo	Tokyo	4	801	0.6	9
	TYOFUK	Tokyo	Fukuoka	4	909	0.6	8
EU	ISTIZM	Istanbul	Izmir	3	336	0.5	9
	DUBLON	Dublin	London	7	463	0.5	9
	LONAMS	London	Amsterdam	7	341	0.5	11
LA	SAORIO	Sao Paulo	Rio de Janeiro	5	366	3.7	19
	BSBSAO	Brasilia	Sao Paulo	4	841	1.5	10
	BHZSAO	Belo Horizonte	Sao Paulo	5	505	1.4	7
ME	RUHJED	Riyadh	Jeddah	2	850	2.4	6
	DXBDOH	Dubai	Doha	3	370	2.3	5
	KWIDXB	Kuwait	Dubai	3	853	1.6	7
NA	NYCCHI	New York	Chicago	12	1175	0.7	16
	BOSNYC	Boston	New York	11	302	0.5	10
	SFOLAX	San Francisco	Los Angeles	2	544	0.5	5
SW	SYDMEL	Sydney	Melbourne	4	712	9.4	7
	BNESYD	Brisbane	Sydney	4	750	5.5	4
	BNEMEL	Brisbane	Melbourne	2	1379	4.2	4

It would be misleading to think of the large hubs as serving predominantly long haul and international traffic. Table 11.6 shows the three busiest **city pairs** in each of the major regions in 1996 and 2015. Many of the routes are short haul and have route lengths less than 500km. When the busiest **airport pairs** were identified, the average distance for the top three routes in each region fell, particularly in the 1996 period. For the Southwest region, the three busiest city pairs accounted for 19% of the region's traffic in 2015, just slightly lower than in 1996.

Population characteristics

The air traffic communities were linked to urban population data gathered from the United Nations Population Division reports, the World Bank and from the Tableau databanks[v]. For smaller communities, internet searches were conducted to find up to date urban population information[vi]. The average population of each category of hub is presented by region in Table 11.7 for 2015. The large hubs generally serve large cities with populations in excess of 1.5 million. For the Asian and Latin American markets, the average large hub city size is significantly greater than in other regions. In Asia, the medium hubs are also very large urban centres with an average population of 2.5 million. The relatively low propensity to travel by air in Asian markets is associated with lower incomes, low rates of private consumption and a small middle class population. The leading industry forecasts produced by Airbus and Boeing point to changes in these factors as the key drivers behind their forecast annual growth rates of between 4.5% and 4.8% until 2035 (Airbus, 2016; Boeing, 2016), with strong growth in private consumption in Asia, particularly in the Chinese domestic market expected over the forecast period. For Africa, it is anticipated that there will be 22 cities with populations of at least 4 million by 2025 (Airbus, 2016). While intra-regional traffic has increased significantly in the last five years, the propensity to travel by air is well below rates in other global regions. For the North American market, the smaller average size of the hub populations is an indicator of the high propensity to travel and higher incomes in this region. The small hubs and non-hub communities have substantial populations, particularly in Asia, Latin America, the Middle East and Africa. By contrast, the North American and Southwest non-hubs have populations of under 100,000 and less than 30,000 in the case of the Southwest.

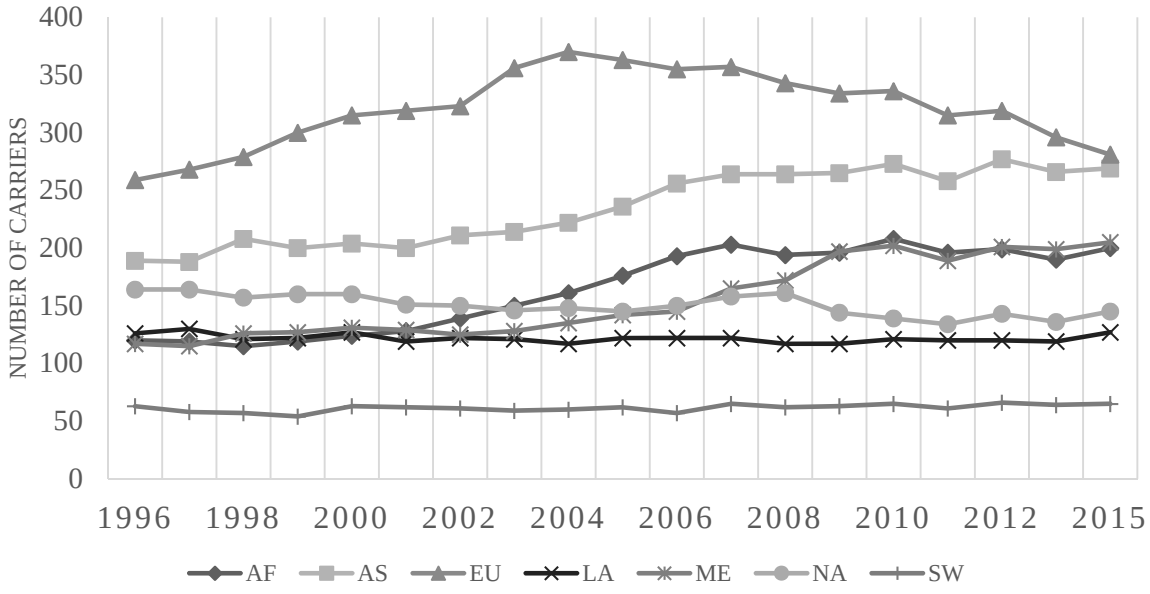
Table 11.7 Average population of air transport communities for major regions and hub types in 2015

Region	Large	Medium	Small	Non hub 'A'	Non hub 'B'	Non hub 'C'	Average for region
AF	2,576,220	1,011,142	372,920		209,307	70,433	587,116
AS	7,749,732	2,681,584	850,734	439,460	314,056	124,408	962,677
EU	2,358,831	813,727	382,665	219,958	136,902	105,486	389,538
LA	3,921,544	849,151	427,915	183,557	194,455	64,580	598,274
ME	1,904,106	828,383	325,665	161,303	234,413	173,228	632,931
NA	1,333,028	461,868	158,670	68,781	48,144	90,624	199,773
SW	1,150,177	75,945	24,220		29,864	23,335	198,467
Average per hub type	3,104,298	1,131,526	456,197	267,258	187,128	92,019	566,948

Airlines and market structures

Figure 11.6 shows the total number of airlines operating in each region over the period 1996 to 2015, including externally registered carriers. The North American, Latin American and Southwest regions saw very little change in the total number of carriers serving the markets over this period. There was an increase in North America during the 2000s, but numbers have fallen again since 2008. The European market has seen the most dramatic change over the period, with a rapid and substantial increase in the number of carriers between 1996 and 2004/5. Since then, numbers have fallen equally dramatically due to consolidation, code sharing arrangements through alliance partners and withdrawal by some international carriers. The Asian, Middle East and African markets have seen increases in the number of carriers since the mid-2000s, though numbers stabilised in the most recent period.

Figure 11.6: Number of airlines operating in each region, 1996-2015



The total numbers of city pairs departing from each region are shown in Figure 11.7. It is clear that Europe has by far the most extensive network of city pair routes and this has continued to increase over time. Many of the routes have a low frequency of service, but facilitate very high levels of connectivity and accessibility compared to other regions. It can be noted that the Asian route network is expanding significantly in the most recent period. The North American market has a relatively small number of city pairs that typically have high frequency of service. The route networks in the African and Southwest markets are relatively small by contrast.

Table 11.8 shows the average number of carriers operating on city pair routes for the different hub classes by region in 2010 and 2015. The large hubs in all regions typically have 2 carriers operating on routes departing from these communities. Asian markets have more carriers per route compared with other regions, while the North American, Latin American, Middle East and African markets have between 1.8 and 1.9 carriers per route from their large hubs. As the community size gets smaller, the number of carriers per route declines also, with most non-hub routes having just one carrier. This trend is observed in all regions. The average number of carriers per route has increased marginally over the 2009-2015 period for medium and small hub and for non-hub types A and B communities.

Figure 11.7: Number of city pairs served by region, and total worldwide city pair routes, 1996-2015

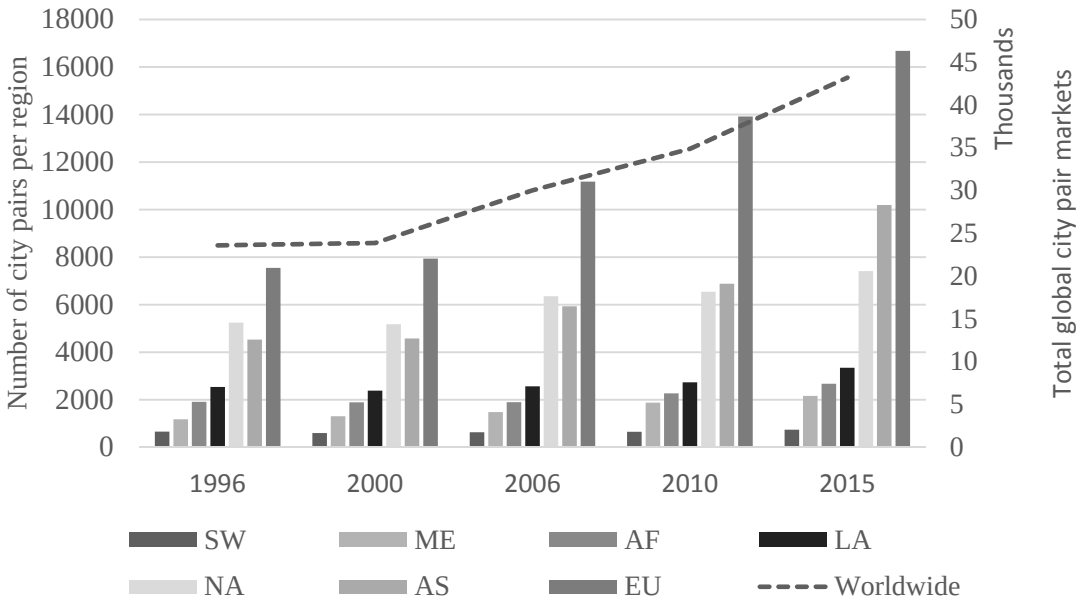


Table 11.8 Average number of carriers per city pair route for regions and hub classes, 2010 & 2015

Region	Large	Medium	Small	Non-hub 'A'	Non-hub 'B'	Non-hub 'C'	Regional average
AF	1.8	1.9	1.6		1.2	1.0	1.7
AS	2.4	2.2	1.7	1.5	1.2	1.0	2.0
EU	2.0	1.7	1.5	1.3	1.1	1.0	1.7
LA	2.0	1.7	1.5	1.3	1.1	1.0	1.7
ME	1.8	1.6	1.3		1.2		1.7
NA	1.8	1.6	1.3	1.2	1.0	1.1	1.6
SW	2.0	1.5	1.3		1.0	1.0	1.7
2010 average	**2.0**	**1.8**	**1.5**	**1.3**	**1.1**	**1.0**	**1.7**
AF	1.7	1.7	1.5		1.1	1.0	1.6
AS	2.4	2.3	1.7	1.4	1.2	1.0	2.0
EU	2.1	1.8	1.6	1.3	1.2	1.0	1.7
LA	1.9	1.7	1.6	1.4	1.1	1.1	1.7
ME	1.8	1.9	1.6	1.4	1.4	1.0	1.8
NA	1.9	1.7	1.4	1.2	1.1	1.0	1.7
SW	1.9	1.5	1.3		1.1	1.0	1.6
2015 average	**2.0**	**1.9**	**1.6**	**1.3**	**1.2**	**1.0**	**1.8**

The extent of competition on city pair routes is explored further in Table 11.9 where the percentage of all routes with just a single carrier providing service is presented, while Table 11.10 shows the percentage of departure movements on single carrier and two carrier routes for 1996, 2000, 2006, 2010 and 2015. While the majority of routes in every region are single carrier routes, these routes account for just below 20% of all traffic worldwide in 2015. The African market has the largest share of single carrier routes at 67% in 2015, and this accounted

for 28% of total movements. The number of single carrier routes has declined over time as the network of city pairs has expanded in every region. New routes tend to be single carrier routes initially, but as traffic expands the number of carriers increases. Air transport markets are generally becoming more competitive, particularly those routes operating from the large hubs.

Table 11. 9 Percentage of single carrier city pairs by region for selected years

Region	**Year**				
	1996	**2000**	**2006**	**2010**	**2015**
AF	71%	67%	63%	63%	67%
AS	58%	59%	55%	54%	56%
EU	61%	60%	62%	63%	61%
LA	58%	54%	59%	57%	55%
ME	64%	66%	64%	62%	62%
NA	62%	65%	66%	60%	60%
SW	55%	59%	63%	60%	62%
Worldwide	61%	61%	62%	60%	59%

The simple average stage lengths for city pair routes from each type of hub and non-hub was computed for each period and are presented for 2010 and 2015 by region in Table 11.11. This gives an indication of the range of services operated from each hub type and is not weighted by the share of movements. Ignoring the small number of type 'C' non-hubs in each region, as the hub size increases, the average route stage length increases[vii]. The Southwest region has the highest average stage length as many of the long haul services operated from the large hubs in Australia and New Zealand connect to Europe, North America as well as to Asia. In other regions by contrast, there are high numbers of short and medium haul routes operating from the large hubs. The small hub and non-hub communities in most regions have shorter average stage lengths.

Table 11.10 Percentage of departure movements on single and two carrier routes for selected years, 1996-2015

Region	1996		2000		2006		2010		2015	
	Number of carriers per route									
	1	2	1	2	1	2	1	2	1	2
AF	38%	21%	34%	25%	28%	22%	24%	21%	28%	27%
AS	21%	23%	22%	28%	15%	24%	13%	16%	13%	13%
EU	21%	26%	29%	31%	32%	32%	22%	22%	20%	21%
LA	18%	19%	15%	19%	19%	25%	16%	23%	14%	21%
ME	40%	19%	34%	25%	32%	24%	24%	25%	25%	25%
NA	26%	24%	38%	33%	41%	32%	28%	32%	24%	23%
SW	12%	29%	12%	32%	17%	33%	13%	17%	12%	28%
All Regions	23%	24%	31%	30%	31%	30%	21%	24%	19%	20%

The growth of movement traffic was examined across hub classes and average changes are presented for the 2009-2015 period in Table 11.12. The number of communities losing air service and the number of new communities receiving service are recorded in the table. The large hubs experienced strong growth in all regions over the period and averaged 24.5%

increase in movements, with the lowest growth experienced in the North American market. The Asian, Latin American and Middle East regions had the highest growth. Growth was even stronger in these regions at the medium and small hubs. The non-hubs in all regions had a more varied experience. For European, Latin American and Asian non-hubs type A, very strong traffic growth was recorded and many new communities began receiving air services over the period (402 in total). A total of 90 non-hub communities lost jet air services over the period and these were distributed across all of the regions.

Table 11.11 Average city pair distance (km) by regional hub classification in 2010 and 2015

Region & year	Large	Medium	Small	Non hub 'A'	Non hub 'B'	Non hub 'C'	Average for region
2010	**2243**	**1772**	**1554**	**1390**	**1230**	**1510**	**1862**
AF	2445	2239	1809		1054	420	2131
AS	2324	1613	1754	1321	1219	1705	1830
EU	2074	1703	1515	1462	1121	1080	1740
LA	2266	2074	1648	2164	1450	5796	2010
ME	2355	993	1006		1106		2002
NA	2186	1874	1256	1021	1334	1543	1873
SW	3297	2132	1970		1788	357	2752
2015	**2323**	**1837**	**1640**	**1326**	**1206**	**1712**	**1893**
AF	2434	2173	1691		904	784	2052
AS	2366	1662	1622	1251	1134	1893	1781
EU	2186	1765	1640	1457	1470	2101	1811
LA	2310	2260	1855	1547	966	2217	2063
ME	2554	1180	1105	794	1146	605	2191
NA	2210	2022	1514	1142	1329	1875	1927
SW	3438	2110	1947		1173	573	2752

Table 11.12: Average percentage change in departure movements from 2009-2015, and number of non-hub communities losing service and receiving service between 2009 and 2015

Region	Large	Medium	Small	Non hub 'A'	Non hub 'B'	Number of non-hubs losing service	Number of new non-hub communities receiving jet services
AF	24.2	17.4	36.1		-61.4	20	47
AS	36.1	44.4	46.5	54.8	-8.5	21	120
EU	22.9	18.7	21.9	29.8	-74.5	27	82
LA	27.9	30.9	32.2	43.4	-11.8	15	54
ME	36.9	50.3	3.7	2.4	-197.6	12	15
NA	9.8	-7.6	-2.9	27.0	-91.7	12	69
SW	12.9	18.5	30.6		32.3	4	15
All regions	**24.5**	**23.8**	**27.8**	**40.2**	**-51.2**	**111**	**402**

Social air service provision

In examining the trends in global air transport, a number of observations may be made regarding the experience of small communities. The small communities in all regions have small volumes of air traffic and the service provided uses smaller aircraft with typically just one carrier operating on routes. The typical stage length is around 1250 km. These small communities are more vulnerable to significant traffic changes associated with the economic cycle. The populations of the small and medium sized air transport communities are generally substantial and between 100,000 and 250,000 outside of the North American and Southwest markets. With deregulation in many domestic markets, and liberalisation of cross-border air routes in all global regions, governments have recognised the vulnerability of smaller communities to traffic volatility as carriers make commercial decisions on the services to provide.

Social air services are air transport services identified and mandated by regional or national governments and deemed to be essential for reasons of social or economic development. Where carriers will not provide an air service on a commercial basis, governments may identify a requirement for an air service. Such services are being established in an increasing number of jurisdictions worldwide. Social air service provision typically involves the government offering exclusive concession and if necessary financial support to an airline to provide air services to remote or economically disadvantaged regions or communities. Legislation in most cases sets out the basis for identifying communities, selecting airlines and criteria for the supports. The driving principles of transparency and openness characterise social air service processes.

ICAO and WTO (2005) collaborated in developing a framework for the establishment of social air services in domestic markets as well as in international markets where such services may help to drive the development of new tourism products in the Least Developed Countries (LDCs) (ICAO (2005). The criteria set out in the framework are based on analysis of social air service provision in developed country markets. ICAO and WTO in their study set out a template for the design of social air service schemes under the following criteria:

- *Route Selection* – identification of socio-economic objectives and economic justification/assessment
- *Service level specification* – determination of minimum service standards
- *Carrier selection* – carrier eligibility, and competitive tendering process and selection criteria
- *Contract duration* – review process, monitoring, audit and enforcement considerations
- *Subsidy payment* – assessment of scheme costs and other considerations (e.g. efficiency of service provision)
- *Sources of financing*
- *Supplementary options* – indirect subsidies; alternate incentives and consideration of distortionary market effects

In reviewing the provision of social air services in different global regions, these criteria are focused and the scale of the programmes are indicated.

United States

The Airline Deregulation Act of October 1978 contained a provision for social air services under the Essential Air Services Program, which guaranteed small communities that had been receiving air services continuity of service for a decade initially. The programme was initially funded for 10 years, but has been extended and reorganised on several occasions, most recently under the 2012 *FAA Modernization and Reform Act* and 2015 *Consolidated and Further Appropriations Act (Public Law No. 113-235).* The programme mandates the US Department of Transportation to provide qualifying communities with access to the national air transport system, typically by subsidising two round trips per day with 30-50-seater aircraft to medium or large hub airports (i.e. airports serving at least 0.25% of total annual passenger enplanements). The eligibility requirements for communities have changed since 1978 and set out minimum distances for eligible communities from larger commercial airports as well as minimal passenger volumes on existing subsidised services (see Tang (2015) for a more detailed review of the programme's history). In 2016, 175 communities were covered by the scheme, 60 of which are in the northern state of Alaska. A maximum subsidy cap of $200 per passenger is imposed. The appropriations for the programme have risen steadily from $68.9 million in 1979 to $261 million in 2015. The scheme is funded from overflight fees paid by non-US carriers using US airspace.

A second scheme, the Small Community Air Service Development Program (SCASDP) was established in 2000 to promote new or enhanced community air service initiatives, or to address higher than average air fares. This is a grant programme that supports small communities (air transport communities receiving less than 0.05% of total annual passenger enplanements) developing or maintaining air services through revenue guarantees, grants for marketing, start-up expenses and research studies. Priority is given to communities where air fares are higher than average, where public-private partnerships have been established to facilitate air service provision, where enhanced services are expected to bring benefits to a wide range of users or where multiple communities can cooperate to source a consolidated air service at a single airport. Annual allocations vary ($7 million in 2014; $5.5million in 2016), with typical grants of $500,000 per community.

Canada

Canada does not operate an essential air service programme, but funds 13 remote airports through the National Airports Policy. Since the mid-1990s, the federal government has moved to transfer ownership and operation of regional and local airports to locally based authorities who take on the responsibility for funding their maintenance (see Metrass-Mendes et al (2011) for a more detailed description of the process). At the same time the nationally funded Airports Capital Assistance Program funds projects aimed at protecting the airport assets at c.200 regional and local airports. A consultant report in 2015 to the Canadian Assembly recommended against introducing an essential air service process (and thereby subsidising air carrier operations) in Northern Canada (RP Erickson (2015).

Australia

The Remote Air Service Subsidy Scheme (RASS) was introduced in 1983, though the Australian Government had been subsidising air transport services to remote regions since

1957. It is part of the Federal Government's Regional Aviation Access Programme (RAAP). The RASS aims to ensure access to scheduled air transport services for remote and isolated areas. Communities apply to be included in the scheme and through a competitive tendering process, carriers are selected to meet the various service requirements, typically for a period of 2 years (though it can be for up to 4 years). In 2015, the scheme covered 366 communities, with populations of up to 200 persons and seven airlines providing the air services. The budget allocation was AU$56.8 million in the 2015-2019 period[viii], which included grants for maintenance and upgrades of airstrips. The scheme is funded from enroute air navigation charges levied by Airservices Australia.

European Union

Europe's air transport market was gradually liberalised between 1993 and 1997 under the so-called Third Package Air Transport Liberalisation measures which came into effect in 1993 (Council Regulation No 2408/92). As part of this package, Public Service Obligation (PSOs) air routes were permitted when allocated under competitive tendering procedures detailed in the regulation and revised in 2008 (Council Regulation (EC) 1008/2008, Articles 16-18). States nominate eligible routes to communities that are peripheral or where such routes are necessary for reasons of regional economic development and expect to have less than 10,000 passengers per year. Each member state administers its own scheme but is subject to the terms of the European regulations. The 2008 regulation gave the European Commission legislative force to investigate any tender competition or evaluate the basis for the imposition of a PSO. States are required to consult with other states and publically advertise tender competitions through the *Official Journal of the European Union*[ix]. The states may limit access to the PSO routes and if necessary subsidise the air service. States are required to submit detailed information on the tender competition outcome and selection of carriers and service arrangements. There were 237 PSO routes in operation in 13 EU member states in December 2015[x].

In addition to the PSOs, the European Union permits member state governments to support airports and air carriers in line with EU state aid guidelines[xi] and there are three schemes through which state aid may be allowed. These are (i) State aid for investment in airport infrastructure, which is permitted if there is "*a genuine transport need and the public support is necessary to ensure the accessibility of a region*" ; (ii) Operating aid to regional airports with less than 3 million passengers per year, for up to 10 years to facilitate airports adjusting their business models towards fully commercial operations; (iii) Start-up aid to airlines to launch new air routes with the aim of increasing the connectivity of a region. These guidelines regularise and update the 2005 guidelines, introduced to harmonise the public financing of airports and new route development funding.

Member states can also devise their own initiatives as long as they comply with EU regulations. For example, the UK Government introduced its *Regional Air Connectivity Fund*[xii] in November 2014 with a view to expanding UK regional airport routes within the UK and Europe, while avoiding linkages to the large London airports because of capacity constraints. These new routes are expected to be commercially viable after three years and 15 routes were initially selected.

India

Under the 1992 Route Dispersal Guidelines (RPG), the Indian Ministry of Civil Aviation set out requirements for carriers to distribute their capacity across three different categories of routes and thus cross-subsidise air services to small and more remote communities. The 2016 National Civil Aviation Policy rationalised the RPG policy and categorisation of routes and will take effect from 2017. The route categories at present are (i) 12 high density (Category I) routes (heavily trafficked routes between the major urban centres of Mumbai, Kolkata, Hyderabad, Bangalore, Trivandrum and Chennai) (ii) routes to more remote parts of the country in the Northeast, Jammu and Kashmir and island territories (Category II routes); (iii) routes within Northeast India and Jammu and Kashmir (Category IIA) and (iv) all other routes (Category III). The guidelines require that 10% of a carrier's Category I capacity be deployed on Category II routes, 1% on Category IIA and 35% on Category III routes[xiii]. This policy has forced carriers to connect small and remote communities within their regions and to the main urban centres.

Latin America and Brazil

Airport privatisation has taken place in several South American countries during the 1990s and 2000s. Airport concessions are the approach adopted in Colombia (1993), Mexico (1995), Chile (1997), Bolivia, Costa Rica, Peru, Venezuela, Argentina (1997) and the Dominican Republic (Lipovich (2008). In Latin America, military-operated airlines traditionally served remote communities. As these airlines have been phased out or become commercial operations, retaining the regional air services has become an issue for government.

Brazil has experienced significant growth in air transport activity in the last 10 years. In 2012, the Brazilian government set out plans to build or adapt 70 airports for commercial use as part of a strategic infrastructure programme (Logistics Investment Program PIL). The plan envisaged investment of US$2 billion to develop a network of airports that would serve remote regions (with the support of government funding) as well as larger cities and tourist destinations (where private investors and concessionaires would be sought). The plan aims to have 96% of the Brazilian population living within 100km of an airport. In 2015, the plan was renewed and extended to fund the development of regional hubs through the concession of four state airports. An additional 6 state airports were expected to be concessioned to the private sector in 2016 with either 20 or 30 year terms. Couto et al (2015) describe the national network structure characteristics and identify regional subnetworks with relatively low traffic volumes and connectivity. In January 2015, the government enacted legislation to set up the Program of Development of Regional Aviation (Programa de Desenvolvimento da Aviação Regional - PDAR). This act relates to airports with less than 600,000 annual passenger throughput (embarking & disembarking), which are designated as regional airports for the purposes of the programme, except airports located in the Amazon where the passenger threshold is 800,000. There were 689 local and regional airports in Brazil in 2016. The aims of the PDAR are to

"*I - increase access of the population to the air transport system, with priority to those living in less developed regions of the country, considering both the increase in the number of municipalities and routes served by scheduled air transport*

II - integrate isolated communities to the national civil aviation network in order to facilitate the mobility of its citizens; and

III - facilitate access to areas with tourist potential, subject to the provisions of section I."

The act authorises the payment of a subsidy to qualifying carriers of up to 50% of the capacity on direct domestic flights to regional airports, to a maximum of 60 seats. Airport landing fees may also be waived. The service contracts are granted for a 5 year period, with scope for extension to a second 5 year period. The subsidies are financed through the National Civil Aviation Fund with an estimated maximum budget allocation ceiling of US$320 million, (30% of the NCAF). The implementation of the PDAR programme was deferred in mid-2015 because of budgetary constraints[xiv].

Conclusions

Air transport activity has grown steadily in all global regions over the last two decades and is expected to continue this growth trend as Asian, Latin American and African regions particularly develop economically. The urbanisation of the world's population is leading to the spatial concentration of people and of economies in relatively small spaces and these act as anchor points for the global air transport system. Changes in domestic and international regulations governing air transport activities have led to a more market oriented industry and approach to providing air services. The number of air transport communities has expanded substantially with the airports at the world's largest population centres handling the majority of air transport activity. Medium and small communities are enjoying increasing levels of service with jet aircraft which enable them to connect to national and international centres. The size of communities with regular jet air services is still substantial in most regions, so that many communities with populations of under 100,000 do not have services. For these communities and for much smaller and more remote locations, social air service policies have been devised to enable access to national air transport systems and it can be expected that these kinds of policies will be deployed in developing countries over the next couple of decades. Based on experiences to date, these programmes can provide cost effective means of enabling accessibility for small communities, many of which may become commercial over time. The approach to social air service provision makes explicit the need for cross-subsidisation and for government intervention to identify and provide transportation services in certain circumstances.

References

Airbus Industries (2016) *Global Market Forecast: Mapping Demand: 2016-2035*, Airbus SAS, 2016. Access online in December 2016 at http://www.airbus.com/company/market/global-market-forecast-2016-2035/.

Boeing (2016) *Current Market Outlook*, Boeing, 2016. Access online in December 2016 at http://www.boeing.com/resources/boeingdotcom/commercial/about-our-market/assets/downloads/cmo_print_2016_final_updated.pdf

Couto, G.S, A. P. Couto Da Silva, L.B. Ruiz , F. Benevenuto (2015) *Structural Properties of the Brazilian Air Transportation Network*, Anais da Academia Brasileira de Ciências (2015) 87(3): (Annals of the Brazilian Academy of Sciences) 1653-1674

Câmara Dos Deputados (2015) *Law No. 13,097*, 19 January 2015 Government of Brazil.

Decurtains, C.G, (2007) *The air transport review at the WTO: Bilateralism versus Multilateralism*, PhD Thesis, Université De Genève Institut Universitaire de Hautes Études Internationales, Geneva.

ICAO (2005) *A study of an essential service and tourism development route scheme*, International civil Aviation Organisation, May 2005. Accessed online in October 2016 at http://www.icao.int/sustainability/EssentialServicesStudy/EssentialServicesStudy_en.pdf

Lipovich, G.A. (2008) *The privatization of Argentine airports*, Journal of Air Transport Management, 14(1), pp.8-15.

Metrass-Mendes, A. , R. de Neufville, A. Costa (2011) *Air Accessibility In Northern Canada: Prospects and Lessons For Remote Communities*, Paper presented at Cranfield University. Accessed online, October 2016 at http://ardent.mit.edu/airports/ASP_papers/Alda%20Canada_AMM_RDN_AC_V02.pdf

Reynolds-Feighan, A.J. (2007) *Competing Networks, Spatial and Industrial Concentration in the US Airline Industry*, Spatial Economic Analysis, Volume 2, 2007 - Issue 3, 237-257.

RP Erickson & Associates (2015) *Comparison of Approaches for Supporting, Protecting & Encouraging Remote Air Services*, report prepared for CTA Review Secretariat Transport Canada, RP Erickson & Associates, Calgary.

Tang, R (2015) *Essential Air Service (EAS)*, Congressional Research Service paper R44176, September 2015. Accessed online at https://www.fas.org/sgp/crs/misc/R44176.pdf, October 2016).

UK Department for Transport (2014*) Appraisal Framework for UK Startup aid for airports with fewer than 3 million passengers per annum*, Department for Transport, London. Accessed online at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/396896/start-up-aid-appraisal-framework-2a.pdf

US Trade & Development Agency (2015) *Brazil's Priority Transportation Projects – A resource guide for US Industry: Aviation*, accessed online , October 2016.

Notes

[i] Steer Davies Gleave (2016) "Study on airport ownership and management and the ground handling market in selected non-EU countries", Final Report June 2016, European Commission DG MOVE (ref MOVE/E1/SER/2015-247-3)

[ii] FAA Hub classification system

1% or More	Large
At least 0.25%, but less than 1%	Medium
At least 0.05%, but less than 0.25%	Small
More than 10,000, but less than 0.05%	Non-Hub Primary
At least 2,500 and no more than than 10,000	Non-Hub Non-Primary

Primary Airports are Commercial Service Airports that have more than 10,000 passenger boardings each year. Hub categories for Primary Airports are defined as a percentage of total passenger boardings within the United States in the most current calendar year ending before the start of the current fiscal year.

Nonprimary Commercial Service Airports are Commercial Service Airports that have at least 2,500 and no more than 10,000 passenger boardings each year.

[iii] The last printed edition is the *IATA Airline Coding Directory* 2012; the ACD is now licensed electronically on a monthly subscription basis.

[iv] Moscow had 4 airports in 2010, but three in 2015.

[v] UN city population data are available at https://esa.un.org/unpd/wup/. Tableau is a business intelligence service offering data analytics capabilities and available at http://www.tableau.com/. The World Bank datasets are available at http://data.worldbank.org/ .

[vi] Data for the populations of many small island communities were not available in the UN and World Bank databases.

[vii] The non-hub type C communities have less than 10 movements per year. The communities in this category change significantly from year to year as operating carriers can add or cut services and change the classification. Several of these communities are remote islands with ad hoc service, but located at substantial distances from the mainland.

[viii] Press Statement by Warren Truss MP
http://minister.infrastructure.gov.au/wt/releases/2015/May/wt133_2015.aspx

[ix] The Official Journal of the European Union is an online daily gazette record for the European Union and includes invitations to tender, information notices as well as regulations, directives, decisions, recommendations and opinions from the EU institutions.

[x] The European Commission Transport Directorate maintain a listing of current PSO contracts at http://ec.europa.eu/transport/modes/air/internal-market/public-service-obligations-psos_en

[xi] See Communication from the Commission 'Guidelines on State aid to airports and airlines (2014/C 99/03)', February 2014.

[xii] See the *Airport Appraisal Framework for UK-Start-up aid for airports with fewer than 3 million passengers per annum* m, UK Department for Transport, 2014, (accessed in Ocober 2016 at https://www.gov.uk/government/publications/airports-with-fewer-than-5-million-passengers-per-year-start-up-aid)

[xiii] Prior to 2016, carriers were required to deploy 50% of their category I capacity on Category III routes.

[xiv] www.ch-Aviation.com, June 2015.