2 Civil-aviation sector

This chapter provides an economic, institutional, and legal overview of the civil-aviation sector in Brazil. As flying is the fastest and safest way to travel between Brazilian states, the sector has a fundamental role in Brazilian economic development and national integration. In 2019, before the COVID-19 pandemic, aviation accounted for 1.4% of the Brazilian GDP and 1.5 million jobs. The main institutions responsible for issuing and implementing regulation, and overviewing the sector are the Ministry of Infrastructure, through the National Civil Aviation Secretariat (Secretaria Nacional de Aviação Civil, SAC), and the National Civil Aviation Agency (Agência Nacional de Aviação Civil, ANAC). The civil-aviation sector is highly regulated, including several technical requirements that follow international standards developed to ensure aviation safety and security. The OECD has identified 120 pieces of legislation related to the civil-aviation sector dealing with passenger traffic, on which this project focuses.

2.1. Overview of the civil aviation sector

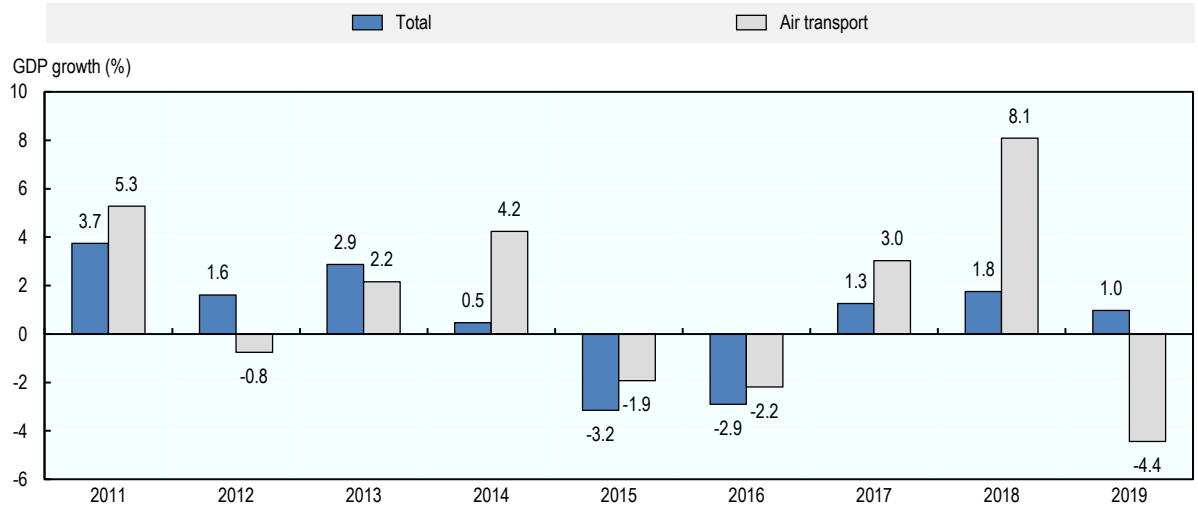
2.1.1. Economic overview

Air-transport services encompass passenger and freight air transport carried domestically or internationally (United Nations Department of Economic and Social Affairs, 2008, p. 198[1]). Service activities incidental to air transportation include those related to air transport of passengers, animals or freight, and operation of terminal facilities such as airway terminals, airport and air-traffic control activities and ground-service activities on airfields. All these activities, alongside others such as aircraft manufacturing, rental and

leasing services and refined petroleum manufacturing, may be considered as the civil-aviation industry. In this report, the term "civil-aviation industry" refers to the passenger-transport sector, the focus of the OECD's analysis.

The civil-aviation sector has a fundamental role in the economic development and national integration of such a large country as Brazil. In fact, with near-continental proportions, flying is the fastest and the safest way to travel between Brazilian states, making air travel a key transport service in the country.[1] In 2019, before the COVID-19 pandemic, civil aviation contributed to 1.4% of GDP and to 1.5 million jobs.[2] The pandemic severely affected the sector and by 2020, this had dropped to 0.3% of GDP and around 400 000 thousand jobs (ABEAR, 2021[2]). Although the civil-aviation sector may not represent a large share of Brazilian GDP, it is an important part of the economy by contributing to inter-industry linkages with both upstream and downstream sectors (OECD, 2020[3]). The performance of the civil-aviation industry tends to follow the performance of the economy, illustrating the linkage between this industry and the Brazilian economy as a whole (Figure 2.1).

Figure 2.1. Brazilian total GDP and air transport's share, 2011-19



Note: Data of air transport services encompass section H – Transportation and Storage, Division 51 (air transport), from the CNAE 2.0 (National Classification of Economic Activities). The data include passenger and freight transport, but not ancillary activities.
Source: IBGE National Account System; www.ibge.gov.br/estatisticas/economicas/contas-nacionais/9052-sistema-de-contas-nacionais-brasil.html?=&t=resultados.

Similarly, employment in the Brazilian civil-aviation sector, which includes air transport and activities incidental to air transportation, tends to follow overall economic trends. The air-transport sector was affected by the 2014 Brazilian economic crisis, losing around 10 000 jobs between 2015 and 2018. Auxiliary activities were less affected by the crisis and recovered more rapidly. In 2019, before the COVID-19 pandemic, civil aviation employed around 108 000 (Table 2.1). In 2020, due to the COVID-19 crisis, formal jobs in the sector fell to 85 000.

Table 2.1. Changes in employment in the civil-aviation sector, in thousands

Description	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Air transport (scheduled passengers)	57.7	62.3	60.9	60.1	62.0	59.5	55.3	55.5	54.0	55.3	41.0
Air-taxi service and crewed aircraft rental	6.1	6.5	6.7	6.9	6.5	6.0	5.7	4.8	5.2	5.3	5.3
Other non-scheduled passenger air-transport services	1.0	1.2	1.4	1.3	1.3	1.2	1.0	0.9	0.7	0.4	0.4
Air transport (cargo)	2.7	2.5	2.1	2.3	1.8	1.8	1.8	1.8	1.9	2.0	1.7
Operation of airports and landing fields	13.9	14.6	15.6	16.6	18.1	17.0	16.0	15.1	14.7	13.2	12.6
Auxiliary air-transport activities	26.7	29.3	27.4	27.5	27.9	28.1	25.4	26.8	30.4	31.4	23.9
Total	**108.1**	**116.5**	**114.2**	**114.8**	**117.7**	**113.7**	**105.2**	**104.9**	**107.0**	**107.6**	**84.7**

Note: The data encompasses section H – Transportation and storage, division 51 – Air transport; section H – Transportation and storage, division 52 – Warehousing and support activities for transportation, group 52.4 – Activities incidental to air transportation. The data include passenger, freight transport and ancillary activities.
Source: OECD calculations based upon MTE (2021), https://bi.mte.gov.br/bgcaged/caged_anuario_rais/anuario.htm.

In addition to contributing to inter-industry linkages, the civil-aviation sector contributes to world connectivity. In 2019, 4.5 billion passengers were transported by air transport globally. In 2020, the civil-aviation industry faced its worst crisis since the Second World War, as efforts to control the spread of COVID-19 closed borders, imposed lockdowns, and severely curtailed freedom of movement (International Air Transport Association, 2020[4]). In 2020, passengers numbers dropped 60% compared to 2019 to 1.8 billion (Table 2.2).

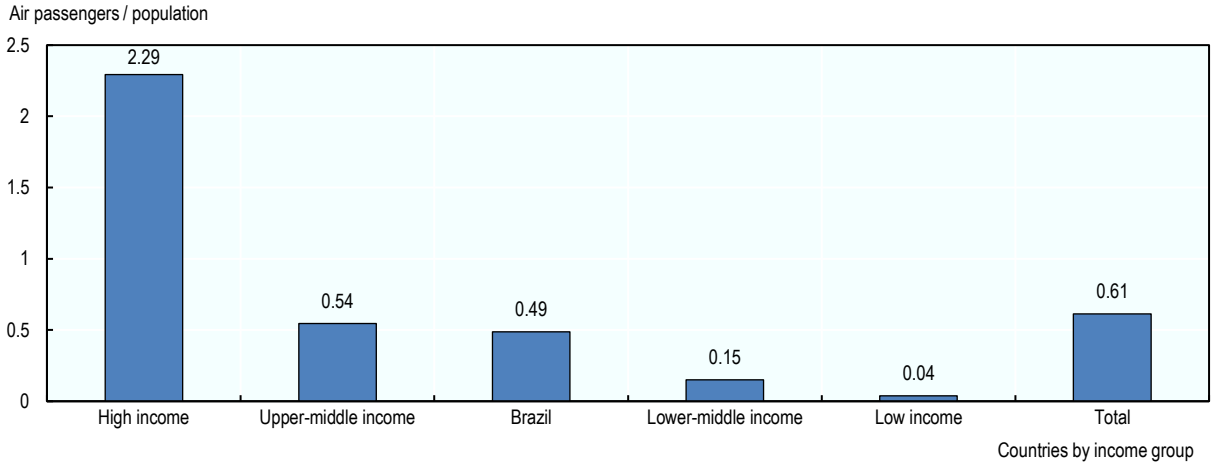
Table 2.2. Air transport passenger numbers, by region, in millions

Region	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
East Asia and Pacific	707	749	809	894	966	1 052	1 156	1 267	1 364	1 415	675
Europe & Central Asia	672	729	750	779	823	887	942	1.016	1.086	1 283	413
Latin America & Caribbean	178	198	217	234	249	264	267	276	293	305	121
Middle East & North Africa	151	160	175	189	205	217	239	258	265	276	98
North America	784	797	807	815	838	878	909	941	981	1 020	397
South Asia	79	91	90	94	102	120	142	163	190	191	80
Sub-Saharan Africa	38	43	45	44	44	48	50	54	65	66	25
Total	**2 609**	**2 767**	**2 894**	**3 048**	**3 227**	**3 466**	**3 705**	**3 974**	**4 242**	**4 558**	**1 809**

Note: Air passengers include both domestic and international aircraft passengers carried by air carriers registered in a country of each region.
Source: OECD calculations, World Bank Open Data, https://data.worldbank.org.

Brazil is the largest air transport market in Latin America and the Caribbean.[3] In 2019, before the COVID-19 crisis, around 103 million passengers were transported by Brazilian air carriers, representing 2.4% of the global total (4.55 billion) and 33.7% of all passengers transported by Latin American air carriers (305 million). In 2020, around 45 million passengers were transported by Brazilian air carriers, a drop of 56% compared to 2019.Passenger numbers in Brazil still represent only a small percentage of the overall population, the ratio of passengers to population was 0.49 in 2019. This rate is lower than regions like Europe and Central Asia (1.41) or North America (2.79), suggesting a substantial potential for growth. A similar comparison can be made by groups of countries aggregated by income level (Figure 2.2).

Figure 2.2. Passenger numbers as ratio of population, by income group, 2019



Source: OECD calculations based upon World Bank Open Data, https://data.worldbank.org.

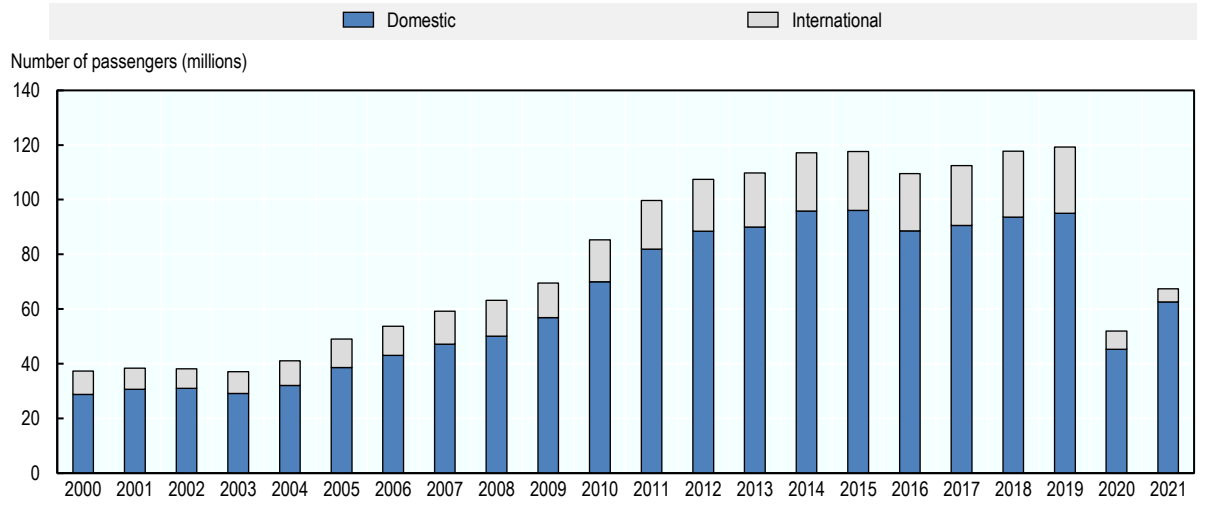
2.1.2. Sectoral growth

In the 1990s, Brazil began a process of deregulating the civil-aviation sector, aiming to promote competition by fostering entry and investment; this process accelerated in the early 2000s. Continuous regulatory changes in recent years, such as allowing airlines to explore any desired route and to set ticket prices freely, has contributed to intense sectoral growth.

Demand, supply and capacity

From the demand side, the civil-aviation industry has undergone significant growth. Passenger numbers for domestic flights[4] more than tripled from nearly 30 million in 2000 to more than 90 million in 2019 (Figure 2.3).[5] With the COVID-19 pandemic, passenger numbers decreased by half, but still remained higher than in the early 2000s at 45 million in 2020 and 63 million in 2021.

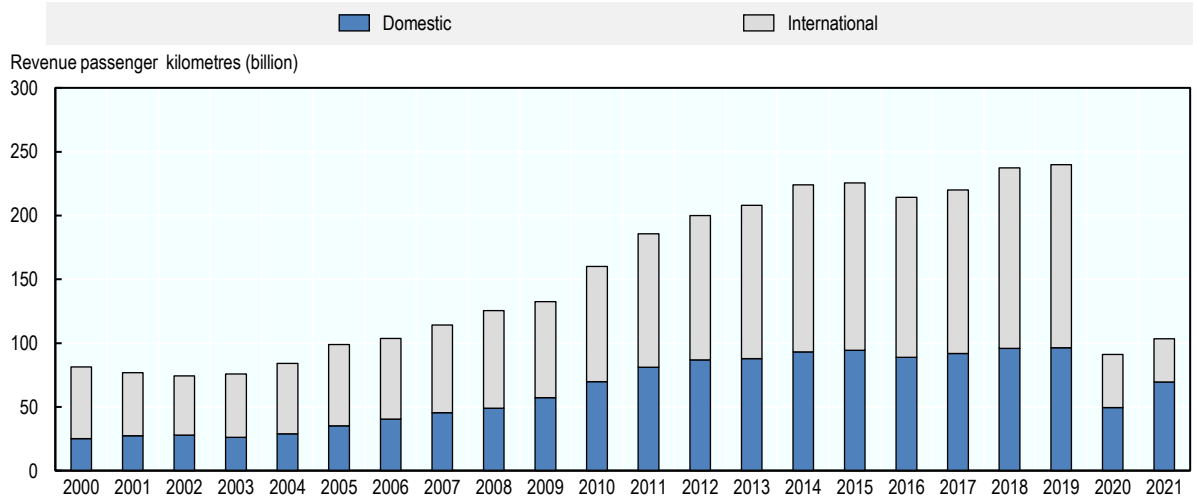
Figure 2.3. Passenger numbers in Brazil, 2000-21



Note: Slight differences exist in total passenger numbers in Brazil between the World Bank database (ICAO) and ANAC statistical data. These do not affect the trend analysis presented.
Source: ANAC Data and Statistics, www.gov.br/anac/pt-br/assuntos/dados-e-estatisticas.

The growth trend is also seen in terms of revenue passenger kilometres (RPK),[6] which for domestic flights increased more than 282% from 25.2 billion in 2000 to 96.4 billion in 2019. In 2020, with the pandemic, the RPK decreased but remained higher than in the beginning of the 2000s at 49.6 billion in 2020 and 69.7 billion in 2021.

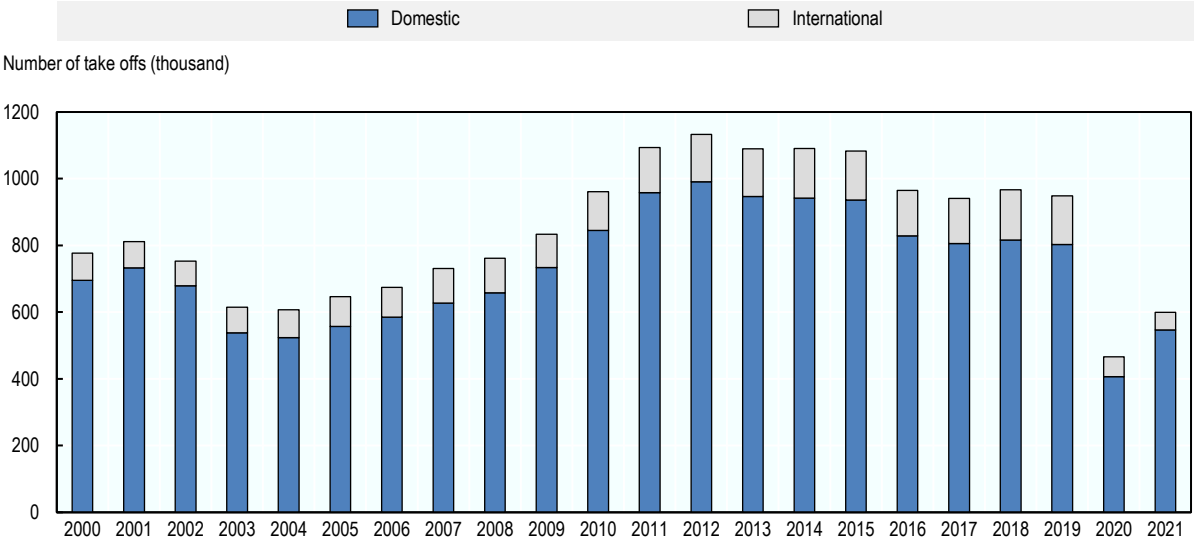
Figure 2.4. Revenue passenger kilometres (RPK) in Brazil, 2000-21



Source: ANAC Data and Statistics, www.gov.br/anac/pt-br/assuntos/dados-e-estatisticas.

On the supply side, the civil-aviation sector has also grown. In 2000, there were nearly 700 000 domestic flights, in 2012, nearly 1 million, and more than 800 000 before the COVID-19 pandemic, when the sector retracted and flight numbers plummeted to just under 400 000 (Figure 2.5).

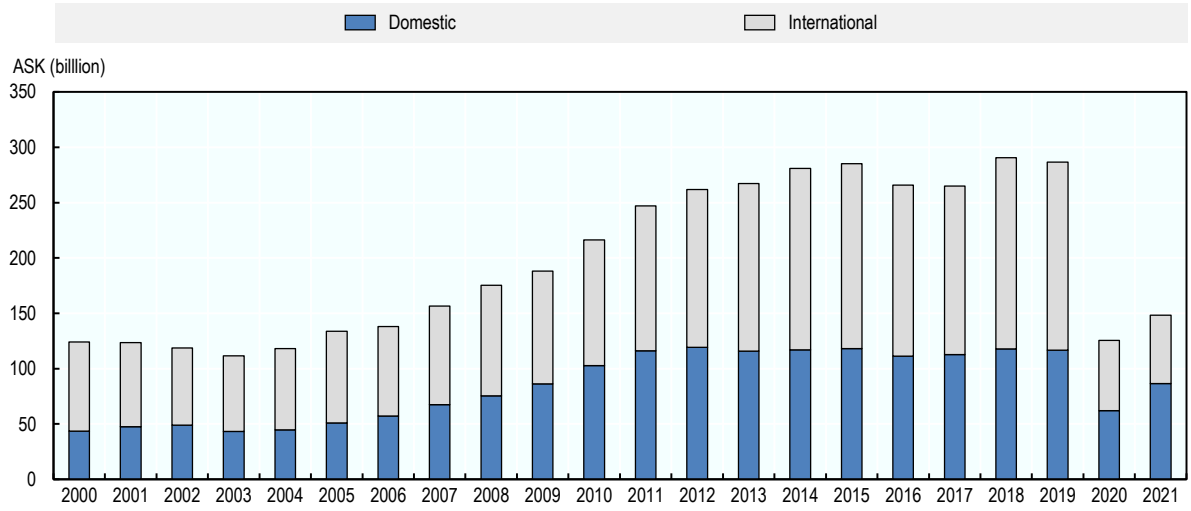
Figure 2.5. Number of flights in Brazil, 2000-21



Source: ANAC Data and Statistics, www.gov.br/anac/pt-br/assuntos/dados-e-estatisticas.

The growth trend is also seen in terms of available-seat kilometres (ASK),[7] which more than doubled from 43.6 billion in 2000 to 116.6 billion in 2019. Despite the pandemic, ASK remained higher in 2020 at 61.9 billion and 2021 at 86.6 billion than in the early 2000s.

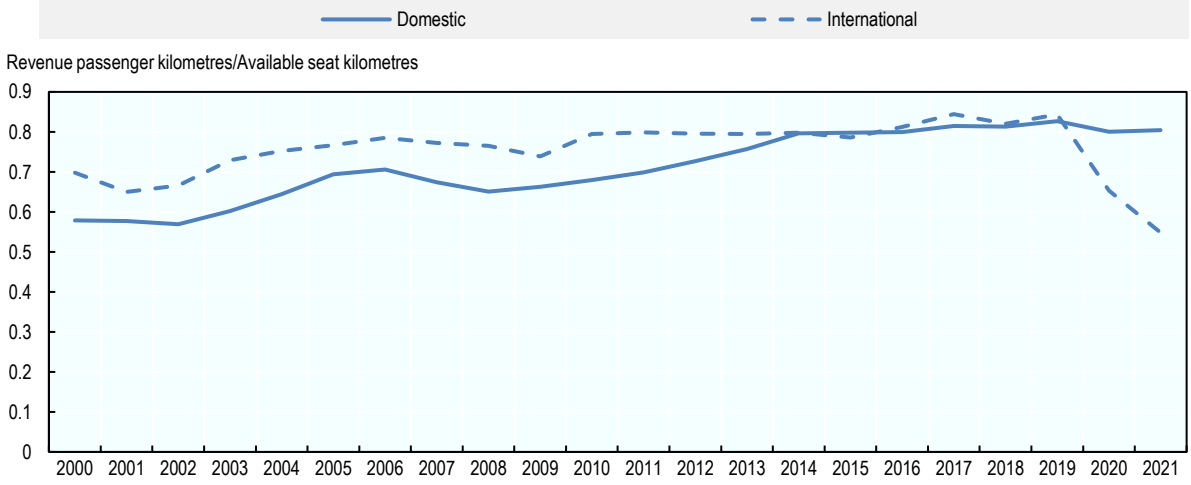
Figure 2.6. Available seat kilometres, Brazil, 2000-21



Source: ANAC Data and Statistics, www.gov.br/anac/pt-br/assuntos/dados-e-estatisticas.

In terms of capacity use, the load factor of domestic flights was 0.58 in 2000 and reached 0.83 in 2019, close to the global average of 0.8 [8] (Figure 2.7) (Gomes and Fonseca, 2014[5]).

Figure 2.7. Load factor, revenue passenger kilometres / available seat kilometres, 2000-21



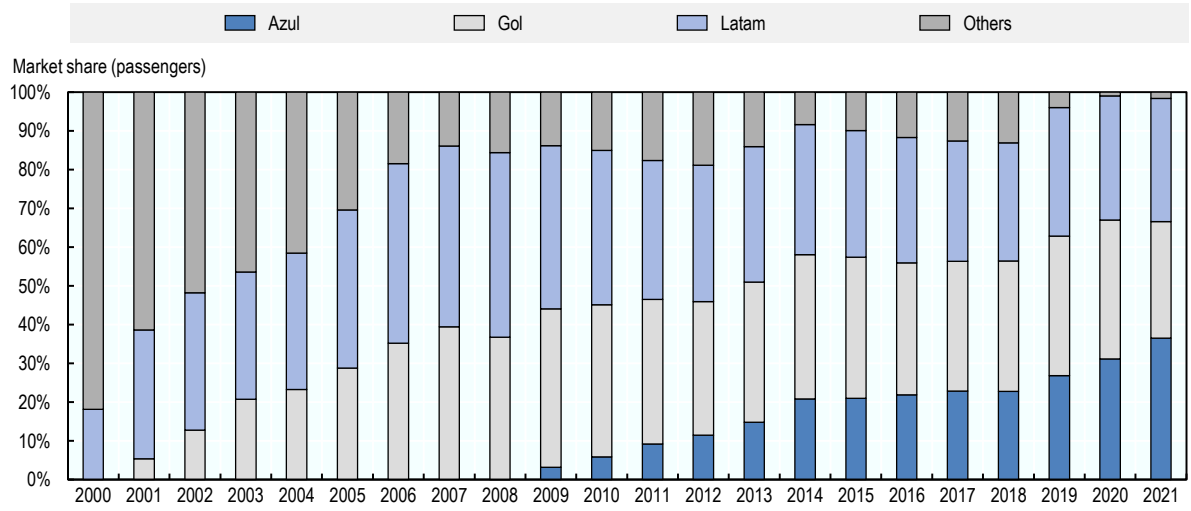
Source: ANAC Data and Statistics, www.gov.br/anac/pt-br/assuntos/dados-e-estatisticas.

2.1.3. Market structure

The air-transport sector presents characteristics of potentially high market concentration, such as high fixed costs, exposure to exogeneous shocks, particularly fuel-price fluctuation, and legal barriers related

to security standards (CADE, 2017[6]) (ANAC, 2021[7]). In 2021, three main airline companies – Latam, Gol and Azul – had a combined domestic market shares of 98%, and have dominated the Brazilian civil-aviation sector in recent years (Figure 2.8).

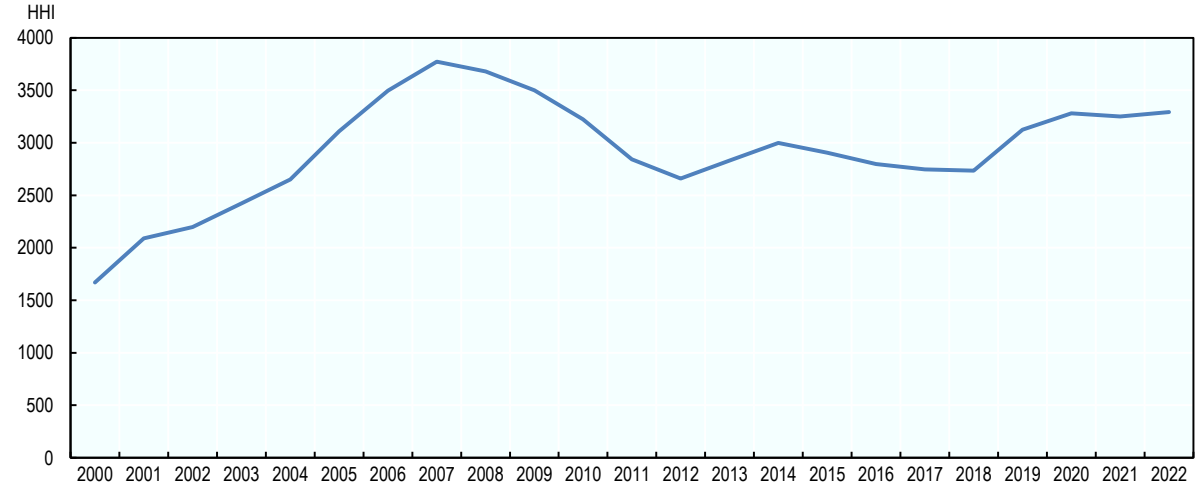
Figure 2.8. Market share of the domestic civil-aviation sector, 2000-21



Source: ANAC Data and Statistics, www.gov.br/anac/pt-br/assuntos/dados-e-estatisticas.

The sector's high levels of concentration is seen when measured on the Herfindahl-Hirschman Index (HHI). In 2000, the sector scored about 1 500 points or cusping on moderately concentrated, but by 2021, that figure had risen to more than 3 000 points or highly concentrated (Figure 2.9).[9]

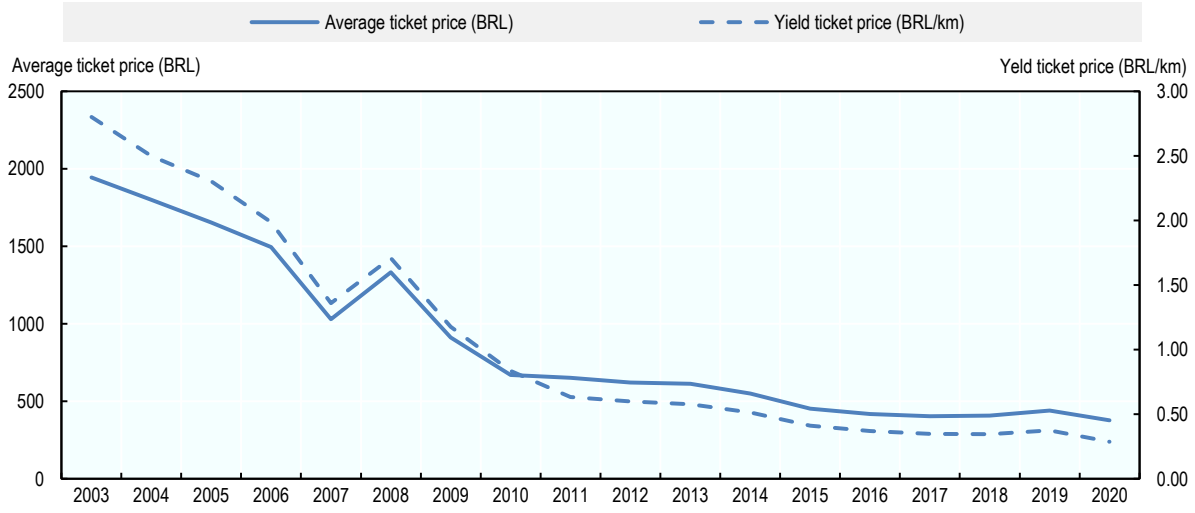
Figure 2.9. HHI score of the Brazilian domestic civil-aviation sector, 2000-21



Source: ANAC Data and Statistics, www.gov.br/anac/pt-br/assuntos/dados-e-estatisticas.

Despite the sector's high levels of concentration, the number of passengers flights has increased, while the average ticket price and yield ticket price have decreased in recent years.[10] While the yield ticket price was BRL 2.8 per kilometre in 2003, it was less than BRL 0.3 per kilometre in 2021 (Figure 2.10).

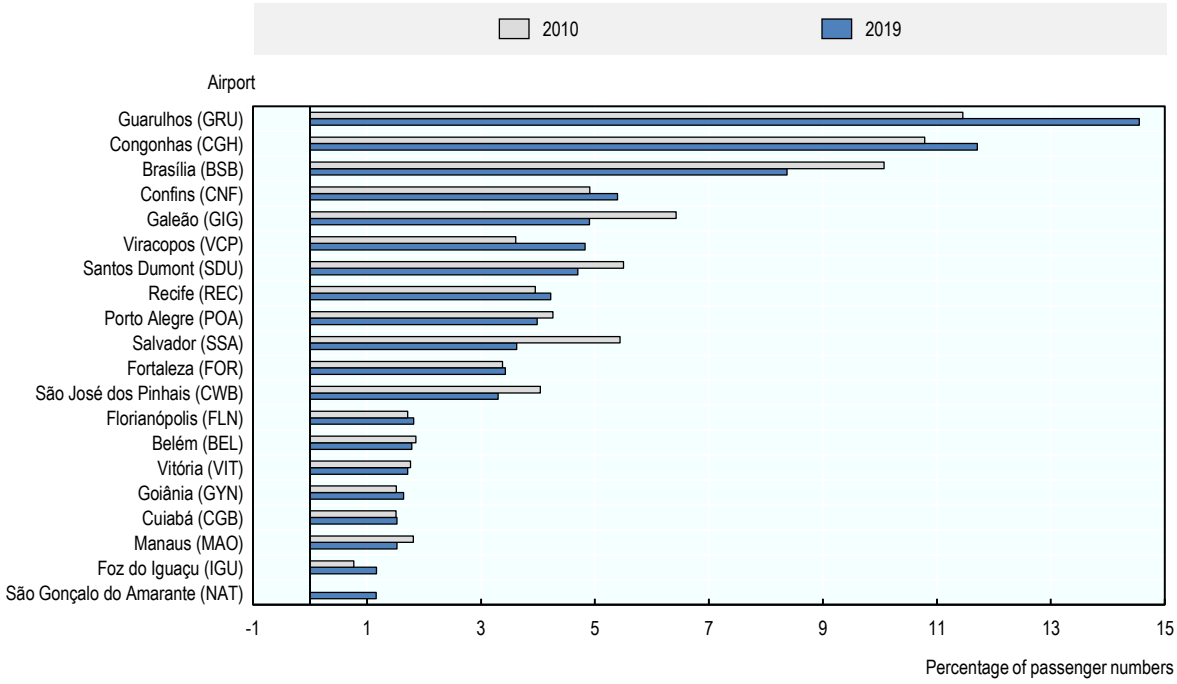
Figure 2.10. Average ticket price and yield ticket price in Brazil, 2003-20



Note: In constant values. Nominal values were adjusted by the broad consumer price index (IPCA) until December 2020, in order to allow the comparisons over time.
Source: ANAC Data and Statistics, www.gov.br/anac/pt-br/assuntos/dados-e-estatisticas.

The sector's concentration can also be seen geographically. The southeast region concentrates the most flights and the main airports of the country. Six of the seven busiest airports, measure by domestic-departure passenger numbers, are located in the southeast region. More than 46% passengers, in domestic flights, boarded at São Paulo Guarulhos; São Paulo Congonhas; Belo Horizonte Confins; Rio de Janeiro Galeão; Campinas Viracopos; and Rio de Janeiro Santos Dumont in 2019. São Paulo State presents the highest number of passengers, with Guarulhos, Congonhas and Viracopos airports accounting for more than 31% of domestic passengers in 2019 (Figure 2.11).

Figure 2.11. Brazil's 20 busiest airports, by domestic-departure passenger numbers, 2010 and 2019



Source: ANAC Data and Statistics, www.gov.br/anac/pt-br/assuntos/dados-e-estatisticas.

The sector's concentration is also particularly high in terms of routes. The 15 main routes, in number of passengers in domestic departures, present a HHI higher than 2 500. On the Rio de Janeiro Galeão to São Paulo Guarulhos route, for example, LATAM accounted for nearly 55% of the passengers and Gol for nearly 38% in 2020.[11]

Recent trends

As previously noted, the Brazilian civil-aviation sector has been undergoing a process of deregulation since the early 1990s, with the promotion of flexible tariffs and discounts, and the signature of the international Sub-regional Air Services Agreement, known as the Fortaleza Agreement, in 1996. As part of this process, the Brazilian Government have adopted policies and regulations that aim to foster investments for the development and expansion of the sector.

In 2011, the country started a process of introducing private-sector participation in Brazil's major airports (see section 2.2). This concession programme has so far been divided into six rounds and generated more than BRL 18 billion in investment (Table 2.3).[12] The second round of concessions, involving Brasilia, São Paulo Guarulhos and Campinas Viracopos airports, raised the most with nearly BRL 10 billion, which represented 53.5% of all investments in the first five rounds.

During these six rounds, 44 airports were awarded to private operators: 10 were individually awarded in the first four rounds[13] and 34 were awarded in six regional clusters in the fifth[14] and sixth[15] rounds (see section 2.2.1). The seventh[16] and eighth[17] rounds are in progress and planned to be completed in the second half of 2022 and first half of 2023, respectively. By the end of the process, all federal airports, which until 2011 were fully controlled by a state-owned enterprise, Infraero, will have been transferred to private-sector management.

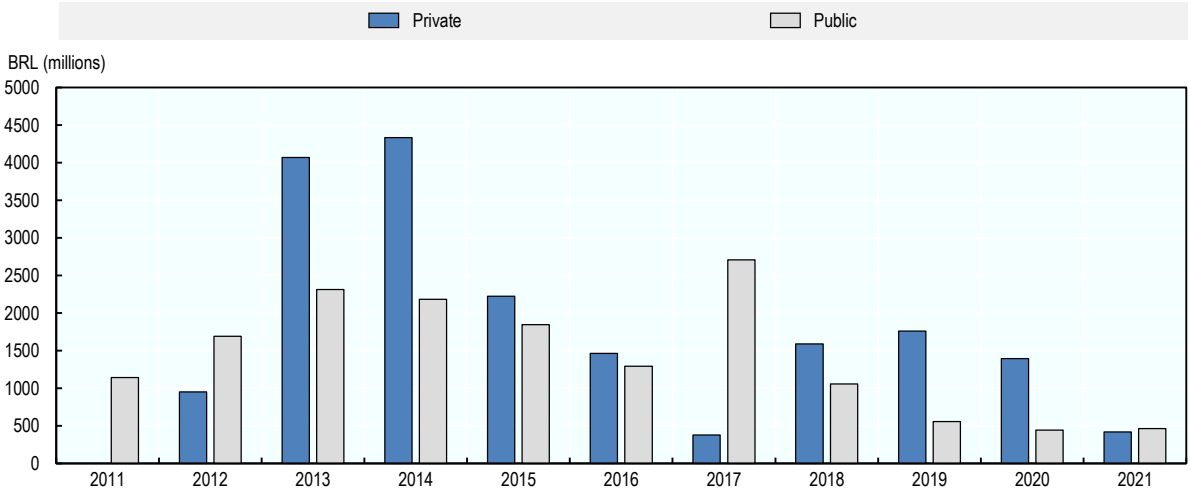
Table 2.3. Investments in airports under concession, by concession contracts, in BRL, millions, 2012-21

	Natal/São Gonçalo (NAT)	Brasília (BSB)	São Paulo/Guarulhos (GRU)	Campinas/Viracopos (VCP)	Belo Horizonte/Confins (CNF)	Rio de Janeiro/Galeão (GIG)	Florianópolis (FLN)	Fortaleza (FOR)	Porto Alegre (POA)	Salvador (SSA)	Northeast cluster*	Midwest cluster**	Southeast cluster***
Concession year	2012	2012	2012	2012	2014	2014	2017	2017	2017	2017	2019	2019	2019
Round	First	Second	Second	Second	Third	Third	Fourth	Fourth	Fourth	Fourth	Fifth	Fifth	Fifth
Contract value (BRL)	650	5 335	17 697	12 984	5 117	12 953	2 270	3 504	4 239	4 561	5 781	1 433	1 579
Expected investment	650	2 850	4 600	8 700	3 500	5 600	961	1 400	1 902	2 350	2 140	763	630
Total investment up to 2021	**638.21**	**1 481.76**	**4 428.54**	**4 038.73**	**971.49**	**2 528.57**	**578.49**	**817.78**	**1 620.30**	**842.35**	**453.97**	**74.60**	**121.16**

Note: Contract values are expressed in constant values following the data of studies used to support the public notices. Investment values are expressed in nominal values.
*Recife International (Guararapes – Gilberto Freyre); Maceió (Zumbi dos Palmares); Santa Maria International (Aracaju); Campina Grande (Presidente João Suassuna); João Pessoa International (Presidente Castro Pinto); and Juazeiro do Norte International (Orlando Bezerra Menezes). ** Cuiabá International (Marechal Rondon); Rondonópolis; Alta Floresta; and Sinop (Presidente João Figueiredo).
*** Vitoria Airport and Macae Airport.
Source: OECD calculations, SAC and ANAC data.

From 2012 to 2021, the total amount of public and private investments in Brazilian airports was nearly BRL 30 billion, of which almost 65% came from concessionaries and nearly 35% was made through public direct investments (Figure 2.12).

Figure 2.12. Public and private investments in federal airports, 2011-21



Note: In nominal values. Federal airports are managed either by Infraero or under concessions.
Source: OECD calculations; Infraero, SAC, Data of the General Budget of the Union (OGU), and SIAFI data.

2.1.4. Institutional overview

The institutions responsible for issuing or enforcing rules, instructions and guidelines in the civil-aviation sector play a significant role in the functioning of the market and can ultimately affect competition.

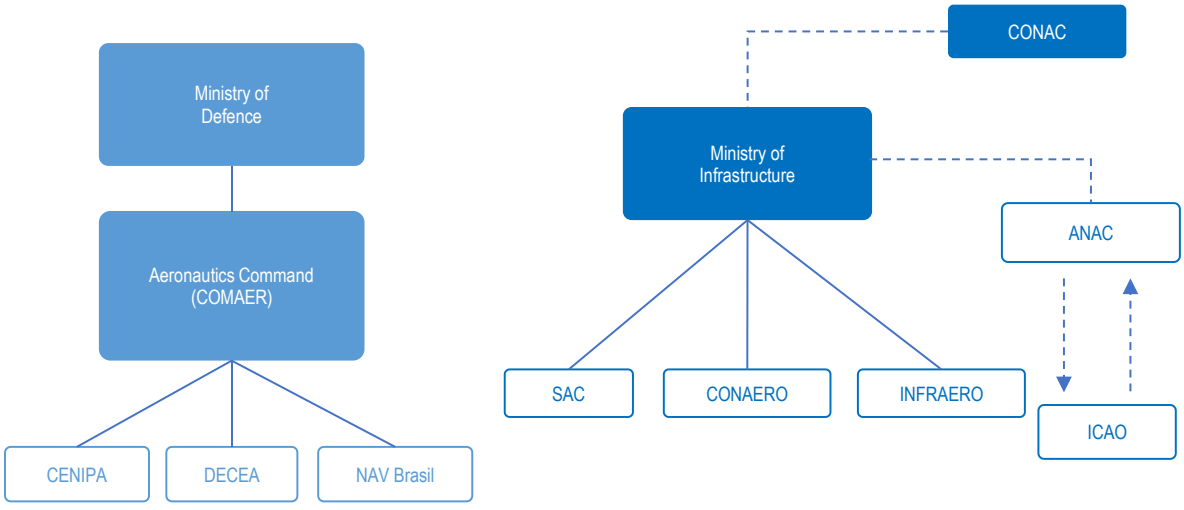
In Brazil, the following institutions are responsible for issuing and implementing regulation, and overviewing the civil-aviation sector.

- The **Civil Aviation Council (CONAC)** is an advisory body to the Presidency of the Republic established to support policy making in Brazilian civil aviation. It is composed of ministries that deal with civil-aviation matters.[18] CONAC has not met since 2010.
- The **Ministry of Infrastructure (MINFRA)**, through the **National Civil Aviation Secretariat (SAC)**, co-ordinates and supervises the institutions of the civil-aviation system. It is responsible for developing guidelines and public policies on civil aviation and airport infrastructure.
- The **National Commission of Airport Authorities (CONAERO)** is the consultative and deliberative forum composed of public bodies that work directly with airport management.[19] Its goal is to harmonise their actions to make airports more efficient.
- The **National Civil Aviation Agency (ANAC)** is an independent regulatory agency responsible for regulating and supervising civil-aviation activities, as well as aeronautical and airport infrastructure, in compliance with the guidelines and policies issued by the Federal Government.
- The **Brazilian Airport Infrastructure Company (INFRAERO)** is a state-owned enterprise charged with developing, managing and operating civil airports assigned by the Ministry of Infrastructure.
- The following bodies are linked to the **Aeronautics Command (COMAER)** of the Brazilian Air Force, which is part of the Ministry of Defence:
    - **Aeronautical Accidents Investigation and Prevention Centre (CENIPA)** is responsible for the investigation and prevention of aviation accidents

- **Department of Airspace Control (DECEA)** is in charge of the management of Brazilian airspace, regulating air-traffic control (ATC) and operating certain ATC units
- **Brazilian Air Navigation Services Company (NAV Brasil)** is a new state-owned enterprise in charge of developing, managing and operating aeronautical infrastructure and providing air-navigation services, assigned by the Aeronautics Command.

Brazil is a member of the UN agency, the **International Civil Aviation Organization (ICAO)**, whose main objective is the maintenance of an administrative and expert bureaucracy to support diplomatic and co-operative interactions between the signatory states of the Convention on International Civil Aviation (also known as Chicago Convention). In addition, ICAO researches new air-transport policy and standardisation innovations as directed and endorsed by its 193 member states. ICAO also provides governments with the best practice and advice to establish new international standards collectively and diplomatically and recommend practices for civil aviation internationally (International Civil Aviation Organization, 2022[8]).

Figure 2.13. Brazilian authorities in the civil-aviation sector



Source: Adapted from (ANAC, 2021[9]).

2.1.5. Overview of the legislation

The OECD has identified 120 pieces of civil-aviation legislation dealing with passenger traffic, including laws, decrees, ordinances, regulations, public-auction notices, and concession contracts. The civil-aviation sector is highly regulated, including several technical requirements that follow international standards developed to ensure aviation safety and security.

The Brazilian Aeronautical Code (CBA, Law No. 7.565/1986) provides the legal framework on civil aviation in Brazil. The CBA covers the majority of relevant issues for civil aviation in the country, such as safety, aircraft manufacturing, air-traffic control, aircraft registration, certification, and legal liability of air carriers, as well as airport infrastructure. Law for over 35 years, the CBA was enacted in a different regulatory environment in which the government controlled almost the entire sector, including routes and prices of flights. Indeed, the CBA predates the current Brazilian Constitution and the institutional framework in place today. This has left many of CBA's rules no longer in line with the current regulatory environment, with many obsolete provisions that while de facto repealed remain in the code. Nevertheless, the CBA has been gradually updated over the years. For instance, the recently enacted Law No. 14.368/2022 has explicitly

repealed most of these obsolete or superseded provisions. Furthermore, since 2016 a bill has been in Congress seeking to establish a new and fully updated aeronautical code.

Other relevant legislation is Law No. 11.182/2005, which created the National Civil Aviation Agency (ANAC), an independent regulatory agency responsible for establishing technical and economic regulation of the civil-aviation sector. The law aims to ensure aviation safety and security and to improve the quality of services, while fostering a competitive market. It also cemented the liberalisation of prices and routes in Brazil, followed by successive processes of modernisation and simplification of sectoral regulation. This has reduced the regulatory burden and improved the quality and effectiveness of regulations. These have included:

- in 2016, ANAC authorised airlines to charge for checked baggage, following international standards (see Box 2.1)
- in 2018, the civil-aviation market was opened to foreign investors (see Box 2.2)
- in October 2020, ANAC and the Ministry of Infrastructure launched the Simple Flight programme, with more than 60 initiatives to simplify civil-aviation regulation to align Brazil with international best practice; the aim of this initiative is to increase connectivity and foster a new business environment, without hampering aviation safety and security. Although the programme focuses on general aviation, commercial air transport may benefit from its outcomes.[20] Among the initiatives is Provisional Measure No. 1.089/2021 (recently converted into Law No. 14.368/2022), which the government has enacted to revoke and amend many outdated provisions in the CBA, and make it easier for foreign airlines to operate in Brazil.

Box 2.1. Regulatory changes in the checked-baggage allowance

Until 2016, airlines operating in Brazil were required to offer passengers one piece of free checked baggage of up to 23 kilogrammes on domestic flights. This was supposed to protect consumers.

The provision increased costs for airlines and passengers, who had to pay for a checked baggage even if they did not have any. It also prevented companies from providing innovative services, as they were not able to offer different types of air tickets that best met users' interests. Furthermore, this requirement enhanced entry costs, especially for foreign firms and low-cost carriers, which considered it as an unreasonable regulatory burden to airlines. In fact, most countries allow airlines to decide whether to include or not checked baggage in the ticket price.

In December 2016, ANAC issued Resolution No. 400/2016, which entered into force in 2017, allowing airlines to charge for checked baggage. Since then, airlines have been able to sell air tickets with different checked-baggage allowances or without any checked-baggage allowance for passengers who choose not to use the service. Airlines must present offers transparently, allowing consumers to compare respective benefits and to select the service for which they wish to pay. In return, the maximum hand-baggage allowance was raised from 5 to 10 kilogrammes.

By unbundling checked baggage allowance from the air fare, airlines were able to offer new products to passengers, following international best practice. The regulatory change appears pro-competitive, with the potential to reduce entry costs and leading to innovative services. Accordingly, this may facilitate new firms entering the market, especially low-cost carriers with different business models.

A law enacted in 2019 to reintroduce a minimum checked-baggage allowance was vetoed by the Brazilian president, in line with an opinion issued by CADE's Department of Economic Studies. Law No. 14.368/2022 has introduced again a minimum checked-baggage allowance, vetoed again by the Brazilian president in June 2022. At the time of finalising this report, the Brazilian Congress has not yet assessed the veto, which may still be withdrawn.

Source: Administrative Proceeding (ANAC) No. 00058.054992/2014-33; (DEE/CADE, 2019[10]).

Box 2.2. Reforms of rules for foreign investment in Brazilian airlines

On 13 December 2018, Brazil implemented significant reforms of the rules for foreign investment in Brazilian domestic airlines through Providencial Measure No. 863/2018. Congress converted the measure into Federal Law No. 13.842/2019 on 17 June 2019, embedding the reforms into the CBA. Key reforms included the removal of a 20% cap on foreign participation in Brazilian airlines, allowing foreign companies full ownership of share capital and management of Brazilian airlines. Restrictions on the issuance and transfer of shares to foreigners were also lifted.

Foreign airlines can now invest in Brazil and hold up to 100% stakes in Brazilian airlines, but they must establish a subsidiary in the country and comply with the Brazilian legislation to operate domestic flights. According to ANAC, the objective for this is to ensure that all airlines operating in Brazil are subject to the same requirements and costs (e.g. taxes and social contributions). In practice, it protects domestic air carriers from foreign competition, ensuring that airlines will pay taxes in Brazil and create national jobs. Concerns of sovereignty and security can also be a reason to restrict domestic flights to national airlines. Furthermore, it can be argued that as cabotage rights are traded on a reciprocal basis, a broad liberalisation would not necessarily ensure the same right to operate domestic flights in foreign countries for Brazilian airlines. This requirement may raise entry costs for foreign firms. The need to operate (and not simply establish) a firm in Brazil may also increase costs for foreign companies willing to operate in the domestic market.

Article 7 of the Convention on International Civil Aviation (Chicago Convention) does not prohibit the freedom to provide cabotage services, which is the right of a carrier from one country to carry passenger and freight traffic exclusively between two points in another country. That provision does allow the contracting states to refuse such a service, however. In this light, the majority of countries prohibit foreign airlines from operating air cabotage (either the so-called consecutive cabotage or stand-alone, pure cabotage), in order to support and protect their national airline industry and a market that they consider to be exclusively their own.

One exception is Chile, which has granted cabotage rights on a unilateral basis since 1979. Cabotage rights are also provided through international agreements, but only among contracting states. For instance, in 1997, full cabotage rights were extended to all EU carriers, meaning that an airline from one EU state can operate domestic flights in another EU country. Other examples of cabotage rights exist between Singapore and the United Kingdom, the United Arab Emirates or Uruguay, between China and Albania, between New Zealand and Australia or Brunei, as well as between members of the West African Economic and Monetary Union: Benin, Burkina Faso, Guinea-Bissau, Ivory Coast, Mali, Niger, Senegal, and Togo.

According to the International Transport Forum (ITF), while liberalising cabotage is legitimate, it remains a sensitive issue across much of the world and little political will exists to pursue it in the foreseeable future. It indicates that the full liberalisation of rights of establishment can be an alternative to cabotage rights, with similar practical effects, however.

Indeed, liberalisation allows airlines incorporated and with their place of business in a given territory to operate domestic flights there, regardless of the nationality of their shareholders. In practice, this can open a domestic market to foreign operators, since they only need to establish a subsidiary in the country. The foreign-owned entity must operate as a domestically regulated carrier employing “localised” workers and abiding by local labour, tax, immigration, registration, safety, security and other laws. Few countries have implemented full liberalisation of rights of establishment, as Brazil did in 2018. Australia has also offered airlines a right of establishment to operate domestic routes since 1999.

Most countries still establish ownership and control restrictions on foreign investment in their air carriers. For example, the United States limits foreign ownership of US airlines to 25% and requires that US citizens control airlines. This is similar to the situation in Canada and Mexico. In the European Union, foreign investment cannot exceed 49% of ownership of an EU airline, which is also the cap in Israel, Morocco, Russia, and Ukraine.

Source: (OECD, 2020[11]); (ITF, 2019[12]); (International Civil Aviation Organization, 2016[13]).

Other issues not directly related to regulatory barriers may increase legal uncertainty and prevent new players from entering the market, such as the high level of litigation between airlines and passengers (Box 2.3).

Box 2.3. Airline-passenger litigation in Brazil

Airlines operating in Brazil both for domestic and international flights face a significant number of consumer lawsuits, due to causes such as baggage loss, flight delays, and cancellations. Indeed, the level of litigation is much higher in Brazil than in other jurisdictions: according to the International Air Transport Association (IATA), there is one lawsuit for every 7 883 flights in the United States, but in Brazil, that figure is one lawsuit every 1.35 flights. The Brazilian Institute of Aeronautical Law (IBAER) indicates that 98.5% of total global consumer claims against airlines are concentrated in Brazil.*

The Warsaw and Montreal Conventions, which establish rules relating to international carriage by air, are enforceable for material damages arising from international flights, following a 2017 ruling by the Brazilian Supreme Court. For national flights, the Consumer Protection Code is usually applicable for both material and moral damages, even when the code conflicts with the provisions of the Brazilian Aeronautical Code and the Warsaw and Montreal Conventions. Rather than granting in re ipsa moral damages, a recent change to the CBA by Law No. 14.034/2020 clarifies that moral damages will only be compensated if the passenger proves an actual occurrence of harm.

The high level of litigation and the legal uncertainty about the interpretation of provisions regarding liability increase airlines' costs and may discourage new entrants. This is likely to reduce competition in the market and lead to higher prices for consumers.

In recent years, the Brazilian Government has implemented measures to reduce litigation in the civil-aviation sector. One of these seeks to encourage consensual conflict resolution, through the official platform Consumidor.gov.br, managed by the National Consumer Secretariat (SENACON), the Brazilian consumer-protection authority. Since 2019, Consumidor.gov.br has been the official platform adopted by ANAC for the registration of consumer complaints against airlines operating in Brazil.

The platform is an online mechanism to connect consumers and companies that aims to solve consumer disputes rapidly without interference from third parties. Airlines operating in Brazil must adhere to the system and commit themselves to certain obligations, such as responding to consumer complaints made through the platform within 10 days. Personal data from consumers are kept confidential but the content of the claim and the answer are disclosed. The companies are also ranked by consumers and listed in general satisfaction level ranking, which also add incentives to co-operate in finding a solution. Consumidor.gov.br has proved relatively successful and has reduced the number of cases before Brazilian courts. In 2021, around 76% of complaints against airlines registered in Consumidor.gov.br were solved.

Note: * Some studies (e.g. (Ávila, 2020[14]) (Pompeu, 2021[15]) (Starling and Villa, 2022[16])) have attempted to explain the main reasons thereof.
Source: (International Air Transport Association, 2021[17]); (ABEAR, 2021[18]); (ANAC, 2021[19]); (Ministério da Justiça e Segurança Pública, 2022[20]); (Militão et al., 2020[21]).

2.2. Airport management

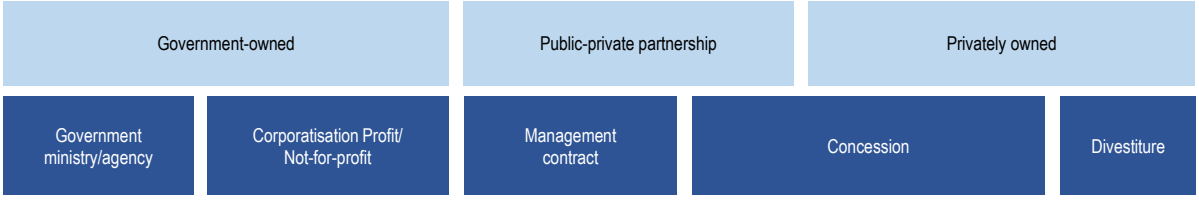
2.2.1. Background: Airport ownership and operating models

The international perspective

Airport ownership and operating models (Figure 2.14) vary substantially across jurisdictions, with different levels of public and private participation (International Air Transport Association and Deloitte, 2018[22]).

- In 2016, 67% of airports worldwide followed the public-ownership model (Steer Davies Gleave, 2016, p. 25[23]). The vast majority of public airports are operated by dedicated state-owned corporations, including Narita International Airport in Tokyo, Berlin Brandenburg Airport, and Changi Airport in Singapore. Other public airports are operated directly by a government ministry or agency, such as John F. Kennedy Airport in New York and Dubai International Airport.
- In 2016, 18% of airports worldwide used a public-private partnership model (Steer Davies Gleave, 2016, p. 25[23]) in which the airport operator is owned by a combination of private investors and public authorities. Generally, the airport operator does not own the land, but has exclusive rights to operate the airport under a fixed-term concession, with average contract lengths around 35 years (Airports Council International, 2018[24]). Examples of airports under a public-private partnership include Brussels Airport and Copenhagen Airport (majority private), Paris Charles de Gaulle and Athens International Airport (majority public) and Düsseldorf Airport (equal public and private participation). In rare cases, the operation of a publicly owned airport may be awarded to a private operator through a management contract, such as is the case at Albany International Airport, New York.
- In 2016, 15% of airports worldwide were fully privatised (Steer Davies Gleave, 2016, p. 25[23]). For the majority of these airports, the fully private operator does not own the land, but operates under a long-term concession contract; this is the case for the main airports in Australia (50 years with a 49-year extension option) and Portugal (50 years). In rarer circumstances, the airport and its land may be permanently divested to a private company, as in the major airports in the United Kingdom, including London's three main airports Heathrow, Gatwick and Stansted.

Figure 2.14. Airport ownership and operating models

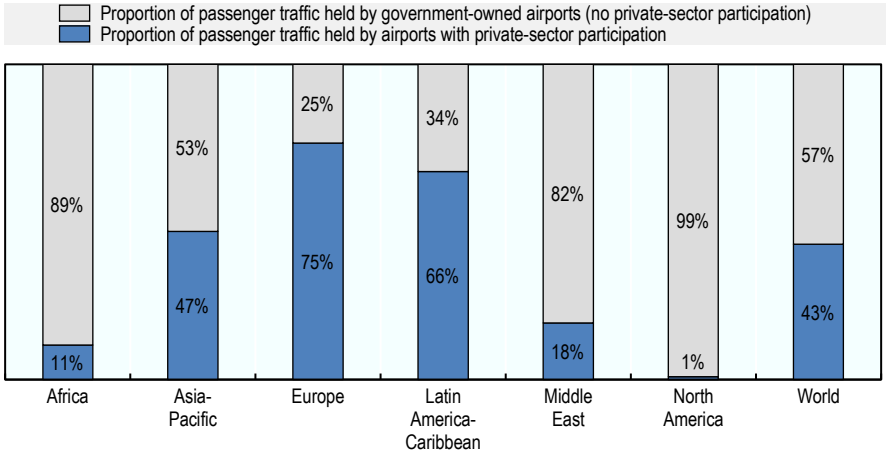


Source: Adapted from (International Air Transport Association and Deloitte, 2018, p. 12[22]).

Despite the current prevalence of fully public airports, there is a growing trend for the private sector to participate in the ownership and operation of large airports, particularly in Europe, Asia-Pacific and Latin America-Caribbean (Airports Council International, 2018, p. 6[24]). In fact, in 2017, 51% of the 100 busiest airports for passenger traffic globally had private-sector participation, and 39% of the top 500 airports were partially or fully privatised (Airports Council International, 2018, p. 5[24]). In the same year, partially or fully privatised airports accounted for 43% of total passenger traffic worldwide, and 75% in Europe, 66% in Latin America, and 47% in Asia-Pacific (Figure 2.15). As governments recognise the ability of the private sector to fund investment in capacity and improve management efficiency, private participation in airport ownership (or at least operations) is likely to keep growing in the future.

The award of airport concessions and privatisations has slowed since 2020, due to the near-collapse of the civil-aviation market during the initial stages of the COVID-19 pandemic, and it may take years to return to previous levels (Graham, 2020, pp. 7-8[25]).

Figure 2.15. Distribution of passenger traffic by ownership structure and region, 2017



Source: (Airports Council International, 2018, p. 6[24]).

The Brazilian airport-ownership and operating model

In Brazil, the Federal Constitution provides that the Federal Executive Branch must operate airports, directly or through concessions.[21] Following international trends of using a state-owned-enterprise (SOE) ownership model, Brazilian airports were historically run by Empresa Brasileira de Infraestrutura Aeroportuária (Infraero), an SOE established in 1973[22] with the purpose of developing, managing and operating civil airports under the Ministry of Infrastructure. In 2011, Infraero managed 66 Brazilian airports, accounting for more than 95% of Brazilian passenger traffic.[23]

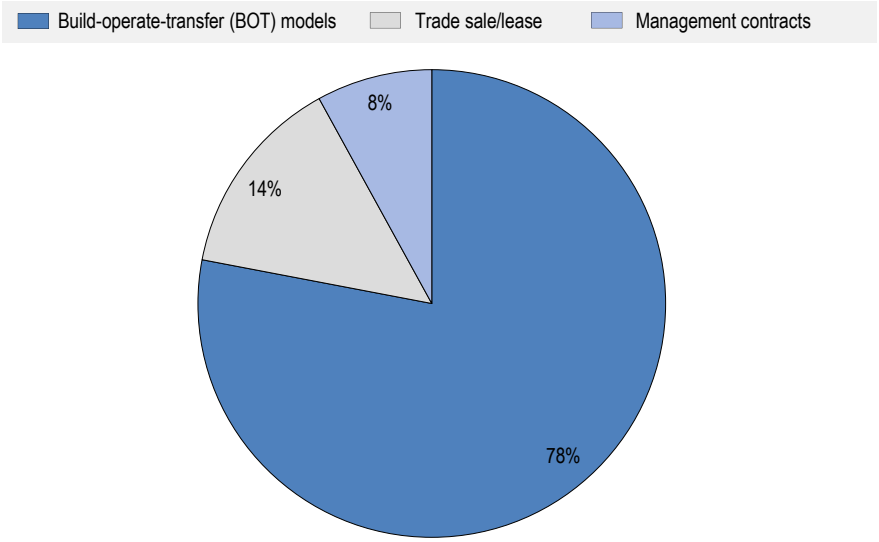
Since 2011, Brazilian airport infrastructure has been undergoing a process to introduce private-sector participation in the provision of airport services. This movement was mainly motivated by the need for large investments in Brazilian airports to cope with a substantial increase in passenger traffic and the limited resources of the Brazilian Government. Indeed, in 2010, many Brazilian airports were already facing operational congestion due to limited capacity of runways, aprons and passenger terminals. These limitations were expected to worsen as Brazil was due to host the FIFA World Cup in 2014 and the Olympic Games in 2016 (McKinsey & Company, 2010[26]).

The process of introducing private capital into airport infrastructure aimed to expand and modernise Brazilian airports and improve service quality to meet international standards, while boosting competition (see Section 2.2.2 Ownership restrictions).

The model chosen by the Brazilian Government was a build-operate-transfer (BOT) concession[24] in which private firms are granted rights to operate an airport for a limited period of time (Box 2.4) and receive the resulting revenue. The concessionaire pays a fee to the concession-granting authority in advance of and during the concession, invests in the airport, provides maintenance services, and collects payments from airport users. The state retains ownership of physical assets, but their use and operation are transferred to the concessionaire. At the end of the contract period, management of the assets reverts back to the government. Under BOT concessions, the risks of financing large capital expenditures are mainly transferred from the government to private investors.

BOT concessions are the most common model for private-capital involvement in airport management. According to industry body Airports Council International (ACI), BOT accounted for 78% of airport privatisations up to 2017, based upon a sample of 172 airports (Figure 2.16).

Figure 2.16. Distribution of major privatisation models worldwide, 2017



Source: (Airports Council International, 2018[24]), based upon a sub-sample of 172 privatised airports globally.

Box 2.4. Duration of concession contracts

Determining the duration of a concession can require trade-offs. Long concessions create appropriate incentives for the concessionaire to make long-term investments including maintenance, at least at the beginning of the concession. Short concessions may not provide sufficient incentives to concessionaires to make investments, while creating the problem of incumbents gaining advantage over other bidders in successive concession tenders. However, short concessions do allow for more frequent competitive tendering, which can facilitate entry and ensure that any benefits from increased competition are reflected more promptly. Since long-term concessions in the Brazilian aviation sector are not subject to renegotiation, short concessions better allow for uncertainty caused by, for example, future price fluctuations to be borne by the concessionaires in a transparent and predictable manner as such changes can be precisely reflected in the bid when these are more frequent. This in general reduces the subsidies or increases the fees gained by the government, since private players can better anticipate uncertainty about market developments, which reduces the need to calculate contingencies, allowing bidders to offer higher prices.

A concession duration is set to allow the recoupment of any investments that the concessionaire is contractually obliged to make, including a sufficient rate of return. Therefore, contract length should be determined and justified based on quantitative financial and economic analysis, and the contract should explicitly establish a minimum level of investment to be made by the operator.

In 2010, the OECD analysed data concerning the durations of concessions involving large infrastructure. It found that in 2008 the average length was around 30 years, though it ranged from 3 years to over 100 years in exceptional cases in the railway and roads sectors. Indeed, the study

indicated that the average duration of concessions was higher in the transport sector, with airport concessions ranging from 27 to 37 years (Araújo and Sutherland, 2010[27]).

According to ACI in 2018, based on a sample of 172 airports, the average length of BOT concessions was 35 years (Airports Council International, 2018[24]). IATA indicates that concession contracts usually last over 30 years, although a longer duration is possible, for instance in Australia (50 years with a 49-year extension option) and Portugal (50 years) (International Air Transport Association and Deloitte, 2018[22]).

The duration of airport concessions in Brazil ranges from 20 to 30 years.

Table 2.4. Airport concession contract length in Brazil

Airport(s)	Contract length (years)	Start of concession
Natal São Gonçalo do Amaranto (NAT)	28	2012
Brasília (BSB)	25	2012
São Paulo Guarulhos (GRU)	20	2012
Campinas Viracopos (VCP)	30	2012
Belo Horizonte Confins (CNF)	30	2014
Rio de Janeiro Galeão (GIG)	25	2014
Florianópolis (FLN)	30	2017
Fortaleza (FOR)	30	2017
Salvador (SSA)	30	2017
Porto Alegre (POA)	25	2017
Northeastern cluster (REC, MCZ, JPA, AJU, CPV and JDO)	30	2019
Midwestern cluster (CGB, OPS, ROO and AFL)	30	2019
Southeastern cluster (VIX and MEA)	30	2019
Southern cluster (CWB, IGU, NVT, LDB, JOI, BFH, PET, URG and BGX)	30	2021
Central cluster (GYN, SLZ, THE, PMW, PNZ and IMP)	30	2021
Northern cluster (MAO, PVH, RBR, CZS, TBT, TFF and BVB)	30	2021

Source: OECD using data from concession contracts, www.gov.br/anac/pt-br/assuntos/concessoes.

SAC states that the different duration of concessions is due to the development of the airport-concession process. Throughout the concession rounds, the government decided to increase the concession period in order to enhance legal certainty that the private sector would recover its invested capital. However, there may have been other considerations, such as the level of investment required in specific airports, given that different durations were awarded for airports during the same concession round.

It is worth noting that concession contracts (more precisely in their Annex 2) clearly state the minimum investments a concessionaire must make throughout the execution of the concession, with objective triggers and deadlines.

Source: (OECD, 2006[28]) (Araújo and Sutherland, 2010[27])

As noted above, the Brazilian airport-concession programme is divided into phases, called rounds, each with its own public auction.

In the two years following the first round of concessions,[25] the second and third concession rounds awarded the operation of five of the largest Brazilian airports,[26] then facing the severest operational congestion, to private operators. In these rounds the government imposed that Infraero retain a 49% share in all winning consortia to ensure the transfer of knowledge from private players to the SOE.

This hybrid governance entailed several drawbacks for private concession holders, since the mandatory participation of Infraero as public shareholder led to more rigid and complex governance. According to the concessionaires, this jeopardised their efficiency and increased their costs. Further, allowing Infraero to hold stakes in multiple airports may bring a risk of competition restriction, since minority shareholding can lead to co-ordination between competitors (Silveira, 2018, p. 552[29]).

In light of these shortcomings, the mandatory 49% Infraero share was removed from the fourth round, held in 2017, for the concessions of four airports.[27] In 2019, Infraero's stakes in the concessionaires of the second and third rounds were included in the scope of both the Investment Partnership Programme (PPI) and the National Privatisation Programme.[28] This means that these stakes will be sold by Infraero to private firms in the near future.

Unlike previous concessions, the fifth round introduced the innovation of awarding airports in clusters (or blocks),[29] instead of individually. Using a cross-subsidy policy, prospective concessionaires were required to bid for groups of airports that included the profitable and unprofitable. This model was also adopted in the sixth round,[30] in 2021, and the same will happen in the seventh round, planned for the second half of 2022.[31]

Although the number of bidders has varied with each rounds, average has been four bidders in each auction (Table 2.5). This level of participation is in line with international experience.[32]

The auctions for airport concession were deemed successful in terms of capital receipts received by the government. Indeed, the winning bidders have generally offered large premiums in addition to the minimum prices established in the public notices, resulting in a total of around BRL 52 billion in nominal values (Table 2.5).

Table 2.5. Total amounts generated by airport-concession auctions, 2011-21

Concession round	Airport(s)	Total amount		Bidders' premium (compared to minimum price)	Number of bidders
		BRL, nominal	BRL, 2021*		
First round (2011)	Natal São Gonçalo do Amaranto (NAT)	170 million	306 million	229%	4
Second round (2012)	Brasília (BSB)	4.5 billion	7.6 billion	674%	8
	São Paulo Guarulhos (GRU)	16.2 billion	27.5 billion	374%	10
	Campinas/Viracopos (VCP)	3.8 billion	6.4 billion	160%	4
Third round (2013)	Belo Horizonte Confins (CNF)	1.8 billion	2.9 billion	66%	3
	Rio de Janeiro Galeão (GIG)	19 billion	30.5 billion	294%	5
Fourth round (2017)	Florianópolis (FLN)	211 million	263 million	58%	3
	Fortaleza (FOR)	1.5 billion	1.8 billion	18%	3
	Salvador (SSA)	1.6 billion	1.9 billion	113%	3
	Porto Alegre (POA)	382 million	476 million	852%	3
Fifth round (2019)	Northeastern cluster (REC, MCZ, JPA, AJU, CPV and JDO)	1.82 billion	2.09 billion	1 010%	5
	Midwestern cluster (CGB, OPS, ROO and AFL)	40.4 million	46.5 million	4 739%	2
	Southeastern cluster (VIX and MEA)	441 million	507 million	830%	4
Sixth round (2021)	Southern cluster (CWB, IGU, NVT, LDB, JOI, BFH, PET, URG and BGX)	2.12 billion	2.12 billion	1 534%	3
	Central cluster (GYN, SLZ, THE, PMW, PNZ and IMP)	754 million	754 million	9 156%	3
	Northern cluster (MAO, PVH, RBR, CZS, TBT, TFF and BVB)	420 million	420 million	777%	2

Note: *BRL in 2021 values. Converted to 2021 using IPCA. The sixth round saw fewer bidders, which may be explained by the COVID-19 pandemic.
Source: OECD, based upon airport-concession auction data, www.gov.br/anac/pt-br/assuntos/concessoes.

Data and stakeholder evidence suggest that concessions have also improved the capacity and quality of airports. Concession contracts establish minimum required investment and efficiency indexes based on quality goals, such as queue time for check-in and security screening, provision of facilities, and restroom cleaning. Since the beginning of the concession process, investments made by concessionaires appear to have reduced capacity constraints and increased passenger traffic (see Section 2.1.1).

Research published in 2019 assessed the airports awarded to private players in the second and third rounds to compare their performance with the airports still managed by Infraero (Castro et al., 2019, p. 120[30]). It concluded that, between 2012 and 2017, airports under concession invested 4.5 times more per passenger and had 10.6 higher gross capital expenditure than airports administrated exclusively by the SOE. In addition, the research showed that airports under private hands have increased by 109% their terminal space, while those still in public hands have increased it by only 31%. The research also highlighted that passenger satisfaction rose in airports where private capital was introduced, which confirms the improvement in the quality of airport services.

Concessions have restructured Brazilian airport infrastructure, modernising and expanding it, while increasing their capacity and quality, bringing it up to international standards. Different players, both national and foreign, have entered the market, once monopolised by a public operator. By the end of 2023, all airports once managed by Infraero will be run by private firms. Nevertheless, the government suggests that Infraero will remain a relevant player in the sector to promote the development of small, financially unsustainable, regional airports, financed by funds from the National Civil Aviation Fund (FNAC; Box 2.5). Furthermore, the Brazilian Government has recently announced that it would use FNAC's budget to develop sponsored public-private partnerships (PPP)[33] for private-sector construction or modernisation, maintenance and operation of small regional airports.

Box 2.5. The National Civil Aviation Fund and the development of regional airports

The National Civil Aviation Fund (FNAC) was created in 2011 by Law No. 12.462/2011, before the first rounds of concession tenders, to receive the airport-concession fees paid by concessionaires. Its main goal is to promote the civil-aviation sector, especially the construction, reform and expansion of regional airports. Indeed, even though concessions have modernised Brazil's major airports, the government believes that the country still requires that airport infrastructure be built in more remote areas of the country, in order to make flights more accessible, and to promote national integration and development.

In 2019, more than 580 airports were registered within ANAC, but only around 120 operated scheduled flights. While this is driven by a complex set of factors, the lack of adequate airport infrastructure is a factor. The government plans to increase the number of airports operating scheduled flights to 200 in 2025, and investment for improving regional airports has been put in place.

In practice, however, most of FNAC's budget has not been used for its main objective, but rather to meet general government expenses, particularly in reaction to severe fiscal restrictions. For instance, between 2012 and 2021, FNAC collected BRL 43.18 billion (in nominal values), but only BRL 14.14 billion (or 32.7%) were used in the civil-aviation sector. Furthermore, in order to reduce the impact of the COVID-19 pandemic, recent changes in the legislation (Law No. 14.034/2020, amending Law No. 12.462/2011) allowed FNAC's budget to be used as loans to airport concessionaires, airlines, and ground-handling service providers, until 31 December 2020, and to support the tourism industry. The government should consider using funds collected by FNAC for their original purpose of improving the civil-aviation sector.

Source: Ministry of Infrastructure. www.gov.br/infraestrutura/pt-br/assuntos/conteudo/execucao-orcamentaria and www.gov.br/infraestrutura/pt-br/assuntos/transporte-aereo/rede-de-aeroportos, CGU, www.portaltransparencia.gov.br/orgaos/62901?ano=2019, and Data of the General Budget of the Union (OGU); SIAFI platform and Siga Brasil.

As noted in the economic overview, the COVID-19 outbreak has had a substantial impact on the civil-aviation sector, greatly reducing expected traffic volumes.[34] Concession contracts pass the risk for events arising from force majeure to the Brazilian Government,[35] meaning ANAC will need to re-establish the original economic and financial equilibrium of such contracts. In this context, predictability is paramount for economic recovery, especially in case of long-term contracts.

2.2.2. Airport concession auctions

The economic consensus is that auctions are the most effective means of awarding concessions (OECD, 2006, p. 8[28]). In Brazil, any concession must be awarded through a competitive bidding process.[36] The design of the auctions is therefore critical for an effective concession.

In addition to common requirements provided in horizontal legislation[37] (see Chapter 4), two relevant potential competition limitations demand further attention: 1) technical-experience requirements, and 2) ownership restrictions.[38]

Technical-experience requirements

Description of the obstacle and policy makers' objective

The airport concession tender notices require the bidders to demonstrate technical experience to participate in the auction (Table 2.6). This aims to guarantee that the winning bidder, either independently or as part of a consortium, has previous experience of operating airports, and is technically qualified to meet the concession's goals.

Table 2.6. Technical experience requirements

Concession round	Airport(s)	Minimum required experience as airport operator, passenger numbers handled	Passenger numbers handled by airport(s) in year before tender notice	Technical operator's minimum stake in consortium
Second round	Brasília (BSB)	5 years' experience operating an airport handling 5 million passengers for at least 1 year in the previous 10 years	14.4 million	10%
	São Paulo Guarulhos (GRU)		25.9 million	
	Campinas Viracopos (VCP)		5 million	
Third round	Belo Horizonte Confins (CNF)	5 years' experience operating an airport handling 12 million passengers for at least 1 year in the previous 5 years	10.3 million	25%
	Rio de Janeiro Galeão (GIG)	5 years' experience operating an airport handling 22 million passengers for at least 1 year in the previous 5 years	16.9 million	
Fourth round	Florianópolis (FLN)	5 years' experience operating an airport handling 4 million passengers for at least 1 year in the previous 5 years	3.7 million	15%
	Fortaleza (FOR)	5 years' experience operating an airport handling 7 million passengers for at least 1 year in the previous 5 years	5.8 million	
	Salvador (SSA)	5 years' experience operating an airport handling 9 million passengers for at least 1 year in the previous 5 years	7.5 million	
	Porto Alegre (POA)		7.7 million	

Concession round	Airport(s)	Minimum required experience as airport operator, passenger numbers handled	Passenger numbers handled by airport(s) in year before tender notice	Technical operator's minimum stake in consortium
Fifth round	Northeastern cluster (REC, MCZ, JPA, AJU, CPV, JDO)	5 years' experience operating an airport handling 7 million passengers for at least 1 year in the previous 5 years	13.2 million	
	Midwestern cluster (CGB, OPS, ROO AFL)	5 years' experience operating an airport handling 3 million passengers for at least 1 year in the previous 5 years	3.3 million	
	Southeastern cluster (VIX and MEA)		3.2 million	
Sixth round	Southern cluster (CWB, IGU, NVT, LDB, JOI, BFH, PET, URG, BGX)	1 year's experience operating an airport handling 5 million passengers for at least 1 year in the previous 5 years	12.4 million	
	Central cluster (GYN, SLZ, THE, PMW, PNZ IMP)	1 year's experience operating an airport handling 1 million passengers for at least 1 year in the previous 5 years	7.3 million	
	Northern cluster (MAO, PVH, RBR, CZS, TBT, TFF, BVB)		4.6 million	

Source: OECD, from data from tender notices for airport concessions and ANAC, www.gov.br/anac/pt-br/assuntos/dados-e-estatisticas/mercado-de-transporte-aereo/consulta-interativa.

Harm to competition

Although the technical experience requirements may limit the participation of certain participants in the auction, they may be justified in light of the complexity of such contracts, which demand technical knowledge, in order to mitigate potential costs for the government and users.

It is worth mentioning, however, that tender notices have varied from round to round, and the technical requirements do not always seem proportionate to the contract being tendered. For example, the second round required bidders to prove 5 years' experience as airport operator and having handled at least 5 million passengers for at least 1 year in the previous 10 years.[39] This condition was required for the three concerned airports (Brasília, São Paulo Guarulhos and Campinas Viracopos), despite their large differences and levels of passenger traffic (Table 2.6).

From the third round, notices introduced specific experience conditions to participate in the bidding, more proportionate to the size of the airport (or group of airports) being put out to tender. Over the years, the requirements seem to have been relaxed (Table 2.6) and entry barriers reduced. For instance, the 2017 auction for Salvador (SSA), which had handled around 7.5 million passengers in the year prior to the tender notice's publication, required previous experience operating an airport handling 9 million passengers at least 1 year in the previous 5. In 2020, when the Central cluster was auctioned, bidders had to demonstrate they had previously operated an airport handling 1 million passengers. The traffic at all airports in that cluster in the year before the tender notice's release was 7.3 million passengers, similar to the traffic Salvador registered when it was tendered.

For foreign companies, technical-experience requirements made it necessary to bid as part of a consortium in the initial tender rounds. Because Infraero was a monopolist before the airport concession programme, no other Brazilian firm was able to comply with the technical conditions (Steer Davies Gleave, 2016, p. 43[23]).[40]

The rules require that the firm with demonstrated experience as an airport operator holds a minimum stake in any consortium.[41] This was intended to enhance an operator's commitment to the management of an airport, ensuring that its know-how would be effectively applied in the execution of the concession.

The sixth round introduced a new way of demonstrating technical qualifications. Rather than having previous experience, a bidder could submit a commitment to hire a technical provider that complied with the minimum technical experience requirement.[42] In order to prevent co-ordination among competitors, a technical provider was forbidden from participating twice in the same auction lot, even as part of a different consortium, and could not provide assistance to another bidder. The provision as a whole reduced entry barriers to potential bidders, allowing more players to take part in the auction, such as investment and pension funds. This was especially relevant due to the impact of the COVID-19 pandemic on the civil-aviation sector, which could have prevented airport operators from participating in the bidding procedure.

Recommendations

The OECD has two recommendations.

1. Brazilian authorities should implement a structured approach to determining the technical-experience requirements for airport-concession auctions. These requirements should be at the lowest possible levels and should be based on objective, proportionate and technical criteria, such as the size and characteristics of the airport.
2. The possibility of alternative ways to demonstrate technical-experience requirements – such as the submission of a commitment to hire a technical provider complying with the minimum technical-experience requirement – should be maintained.

Ownership restrictions

Another set of restrictions provided in airport concessions relates to ownership and aims to limit vertical and horizontal integration.

Restrictions on vertical integration

Description of the obstacle and policy makers' objective

Brazilian tender notices for airport concessions contain provisions that aim to prevent vertical integration between airport operators and airlines, following international practices, such as those in use in Australia and Mexico.[43]

Airlines and their related companies[44] were not allowed to participate in airport auctions, except as part of a consortium, and only with a reduced stake and no participation in corporate governance. Concession rounds have established different maximum stakes for airlines in consortia: 10% (first round); 2% (second round); 4% (third round); and again 2% (fourth to sixth rounds).

Since the third concession round, firms with ties to airlines[45] are allowed to take part in a consortium with a stake higher than the maximum established by the general rule, but only if they are also the company meeting the technical-experience requirement. Unlike these linked companies, an airline itself cannot be part of a consortium.

Furthermore, according to concession contracts from the first and second rounds, transactions that involve an increase of airlines' stakes in a concessionaire during the first five years of a concession are subject to approval by ANAC.[46] Since the third round, the concession contract expressly states that ANAC approval of such transactions is required at all times.

Additionally, concessionaire shareholders are also prevented from holding, either directly or indirectly, voting capital of airlines higher than the maximum stake provided in the general rule (10% in the first round; 2% in the second, fourth, fifth and sixth rounds; and 4% in the third round). Since the fourth round, a new

provision in the tender notice states that after the first five years of a concession the participation of the concessionaire's shareholders in the capital of an airline will be subject to prior approval by ANAC.

Although the participation of airlines in the auctions has been restricted, concession contracts do allow the transfer of shares between airport concessionaires (and their shareholders) and airlines during the execution of the concession.

Harm to competition

Research has noted that airlines may have incentives to restrict competing firms' access to an airport, especially at hub airports. Allowing vertical integration between airlines and airport operators could create a so-called "fortress effect", through which an airline could dominate an airport and increase barriers for competing airlines to enter the market or to increase their market share. This could reduce possible expansion of routes and frequencies, as well as increase prices for consumers (Pereira Neto et al., 2016, p. 14[31]) (Kuchinke and Sickmann, 2007[32]).

The United States Federal Aviation Administration (FAA) highlighted that providing access to new entrants and to carriers expanding their services is paramount to maintaining airline competition. The FAA has also indicated that fares in local markets at connecting hubs dominated by one major air carrier are considerably higher than comparable markets where there is no dominant airline at a hub airport (Federal Aviation Administration/Office of the Secretary of Transportation Task Force, 1999, p. 30[33]).

On the other hand, it should be mentioned that in some cases vertical integration between airports and airlines may lead to positive efficiency effects, such as the removal of double-marginalisation, co-ordination of optimal production and inventory in supply chains (Oum and Fu, 2008[34]).

In Brazil, the transfer of shares between airport concessionaires and airlines are subject to prior approval by ANAC, which seems justified in order to prevent any vertical integration that could harm competition at the airport.

Recommendation

The OECD recommends that the Brazilian authorities ensure that airport operators and airlines are not vertically integrated, either in concession contracts already in force or in future concessions, unless justified by significant proven economic efficiencies.

Restrictions on horizontal integration

Description of the obstacle and policy makers' objective

The creation of competition between airports has been one of the main reasons highlighted by the Brazilian Government to support airport concessions. With airports around the world are increasingly competing with each other (Box 2.6), international experience has shown the rationale for ensuring that different airports are operated by competing firms as opposed to horizontally integrated firms (Box 2.7).

Box 2.6. Competition between airports

Since the 1980s, economists have been challenging the idea that airports are natural monopolies not subject to competitive forces, but rather largely passive service providers that could do little to increase demand for their services or divert demand from other airports (Tretheway and Kincaid, 2005, p. 1[35]). This shift in the way airports have been perceived was motivated in large part by the deregulation of the aviation industry, which has led to airlines being less tied to specific airports and passengers having with more choice. Unlike in the past, airports now compete with each other for passengers and airlines, resulting in more commercially focused airports and a more dynamic and competitive airport market (Copenhagen Economics, 2012, p. 16[36]).

Airports are two-sided business engaged in a commercial relationship with both airlines and passengers. They seek to attract both customers when defining services and rates. Furthermore, passengers and airlines' decisions are interconnected, since air carriers seek to operate in airports that attract the greatest number of potential passengers, while travellers choose airports offering the most convenient and cheapest flights (Pereira Neto et al., 2016, p. 10[31]).

In 2012, one study based on empirical data from the European aviation market showed that airports of all sizes had been facing more competition, and as a result their individual market power had decreased (Copenhagen Economics, 2012, p. 80[36]). The report indicated that 96% of all European airports were actively marketing their airports to air carriers. In addition, many airports had responded to the increased competition by boosting quality and reducing prices. In 2017, these trends were confirmed by a study of the European aviation market that indicated competition between airports was both widespread and on the increase (Oxera, 2017, p. 74[37]).

Therefore, there seems to be potential or effective competition for different services and market segments, which vary on a case-by-case basis, including:

- catchment areas between airports serving a shared local market
- cargo traffic
- connecting passengers between airport hubs
- airlines' operating bases
- destinations
- service facilities, such as maintenance
- non-aeronautical services, such as retail and car parking
- means of transportation, such as high-speed trains.

Source: (Forsyth, Gillen and Niemeier, 2010[38]) (Tretheway and Kincaid, 2005[35]) (Copenhagen Economics, 2012[36]) (Pereira Neto et al., 2016[31])

Box 2.7. International experiences in restricting horizontal concentration of airports

United Kingdom

In the mid-1980s, the United Kingdom began a process of full divestiture of seven state-owned airports, including London Heathrow, which were managed by British Airports Authority (BAA). The UK Government privatised BAA as a single entity with all of its existing airports in 1986, with the aim of providing adequate airport capacity to meet expected demand and to support airline competition. By 2005, the seven airports operated by BAA accounted for over 60% of all British passenger numbers, including 90% of passengers in south-east England and 84% of Scottish passengers. In 2009, the UK Competition Commission (now the Competition and Markets Authority, CMA) concluded a market investigation into BAA and found that the common ownership of airports in south-east England and lowland Scotland had produced anti-competitive effects by preventing rivalry between potentially competing airports. This reduced incentives for investment in infrastructure capacity, better services and lower prices. The authority imposed a package of remedies, including the divestiture of London Gatwick and London Stansted airports (to different purchasers), as well as one of Edinburgh or Glasgow airports (Competition Commission, 2009[39]). In 2016, the CMA assessed the initial impact of the Competition Commission's interventions, and strong evidence was found to indicate positive changes at divested airports, partially as a result of having separated ownership of airports. For example, these airports increased the passenger traffic beyond other UK airports, which has improved connectivity and choices for passengers. Divested airports also enhanced the efficiency of their capital investment in facilities and services, improving their operational efficiency over time. In addition, service quality to passengers and airlines improved, including at London Heathrow, which implemented new commercial strategies after the airport's divestiture. Moreover, divested airports are now competing individually to attract airlines and passengers rather than acting as part of the BAA group. Further, the introduction of competition has led to more efficient use of existing capacity, especially because airport tariffs have been restructured in order to attract additional flights in off-peak hours (Competition and Markets Authority, 2016[40]).

Australia

In Australia, between 1997 and 2003, the operation of 22 federal airports managed by the Federal Airports Corporation (FAC) – including the country's largest airports, Sydney, Melbourne, Brisbane and Perth – was privatised using long-term leases in a competitive tender process (Commonwealth of Australia, 2009[41]). The Airports Act 1996 limits cross ownership of major airports (Sydney and Melbourne; Sydney and Brisbane; Sydney and Perth) to 15%, which allowed effective competition among these airports (Australian Productivity Commission, 2011[42]). Since 2002, these airports are subject to a light-handed regulation and are required to provide the Australian Competition and Consumer Commission (ACCC) with annual financial statements in relation to the provision of aeronautical services and non-aeronautical services, including car park. Annually, ACCC monitors the market to assess whether airports are pricing, investing and operating efficiently, in order to prevent abusive behaviour (Competition Commission, 2009[39]). In 2020, the Australian Competition and Consumer Commission (ACCC) reported that the monitored airports had made significant investments between 2018 and 2019, and that they maintained a rating of "good" for their overall quality of services in the period (Australian Competition and Consumer Commission, 2020[43]).

Mexico

Mexico began a process of airport privatisation in 1998. The 35 major Mexican airports, then managed by an SOE, Aeropuertos y Servicios Auxiliares (ASA), were split into four clusters. One company was incorporated to operate each cluster, and 50-year concessions were awarded. Firstly, between 1998

and 2000, a 15% stake in each operating company was sold to strategic private partners, through an auction. Later, in the 2000s, the remaining 85% was sold on the stock market. In this second stage, the Mexican Government imposed restrictions on cross-ownership, and strategic partners were prohibited from holding a stake in any other airport operator (Comision Federal de Competencia, 2007[44]). Mexico City International Airport has not been fully privatised and remains managed by an SOE (El Economista, 2020[45]).

In 2007, the then Mexican competition authority Comisión Federal de Competencia (CFC) conducted a market study of the Mexican airports sector. It proposed several recommendations in order to increase competition where possible and to make regulation better able to mitigate the exercise of market power. Among other measures, CFC recommended that the government progressively sell its share in Mexico City's other airport operators. It suggested that these airports should be managed by different players, which could compete for the regional market, and so increase economic efficiency, and improve quality and lower prices for users (Comision Federal de Competencia, 2007[44]).

In 2011, CFC prohibited the operator of Cancun airport from participating in the public tender for Riviera Maya airport, a greenfield project in the same region. The CFC aimed to prevent market concentration and promote competition between both airports, increasing service quality and reducing prices (Expansión, 2011[46]).

Most efficiency gains in airport privatisation stem not from the tender itself but rather from the permanent exposure of potential concessionaires to competition. Besides specific cases such as natural monopolies, introducing in-the-market competition in the operation of the service is more important than ensuring competition for the market (Bronchi, 2003[47]) (OECD, 2019[48]).

Brazil has imposed certain restrictions on airport cross-ownership. The second concession round established that a single player (and its related companies, individually or in a consortium[47]) could bid for all three airports, but could only be awarded one of them. The third concession round also restricted a firm to one airport and stated that shareholders of airports awarded concessions in the second round and their related companies[48] could not participate in the auction (except in a consortium, with a maximum stake of 15% and without participation in corporate governance). Finally, the fourth round provided that a same firm or consortium could bid for all airports being auctioned, but could only be awarded one airport in each region.

These restrictions were designed in light of qualitative and quantitative evidence supporting the existence of potential or actual competition among the airports being auctioned, especially for connecting passengers in hubs and, in some cases, for cargo traffic. Furthermore, the government intended to encourage the entry of a greater number of players into the Brazilian market, aiming to implement yardstick competition in regard to best practices for airport management.[49] In the fourth round, the tender notice did not establish any restriction for the concessionaire of Natal São Gonçalo do Amaranto airport and its related companies to bid for the airports of the Northeast region (Salvador and Fortaleza), although there seemed to be potential competition among these airports (Secretaria de Aviação Civil/Presidência da República, 2015[49]). In practice, however, the airports were awarded to different firms.

In the second round, the concession contract prevented any share transfer involving the shareholders of other concessionaires[50] and their related companies[51] in the first five years of concession. After that period, any transactions were subject to prior approval by ANAC. The third and fourth rounds loosened the cross-ownership prohibition. In the first five years of concession, any share transfer less than 15% related to shareholders of other concessionaires[52] and their related companies[53] were permitted, as long as ANAC approved. After the fifth year, ANAC only needs to authorise transactions involving share transfers higher than 15%.

Harm to competition

Although the concession contracts of the second, third and fourth rounds allowed transfer of shares between the concessionaires – which were awarded the airport in those rounds – and the shareholders and their related companies – which won the concession in other airports – during the execution of the concession, some of these transactions are subject to prior approval by ANAC.[54] This seems justified in order to ensure that the ownership restrictions imposed for the auction are not bypassed and so guarantee competition between airport operators.

Moreover, the fifth and sixth concession rounds did not include any cross-ownership restrictions, either among the clusters of each round or among a cluster and the airports awarded in the previous rounds. In theory, one could argue that there could be potential or actual competition among some of the airports. For instance, some airports from the Northeastern cluster (sixth round) could compete with Natal São Gonçalo do Amaranto (first round), Fortaleza or Salvador (fourth round), and some airports from the Southern cluster (sixth round) could compete with Florianópolis or Porto Alegre (fourth round). Nevertheless, according to ANAC, these rounds had a different rationale, namely awarding a set of airports together in order to favour cross-subsidisation between profitable and unprofitable ones. In the Central cluster, the airports were even spread over more than one region. Also, the airport market was already well diversified, with different players operating in the country. Although prohibiting cross-ownership could have been defensible from a competition point of view, the policy aimed to ensure the effective implementation of the concession programme, assuming that a competitive market already existed.

Additionally, there has been recent debate about multi-airport systems or cities served by more than one airport, for which the potential for competition between airports could be even clearer. For example, although the city of Belo Horizonte is served by two airports, Belo Horizonte Confins (CNF) and Belo Horizonte Pampulha (BHZ), the latter is currently restricted to general aviation and regional scheduled air services.[55] Pampulha was delegated to the State of Minas Gerais, which conducted an auction in 2021 to award a concession to a private operator. There was no restriction on the participation of Belo Horizonte Confins's concessionaire, and a shareholder of that operator won the bid. It is not clear whether the limitation to the operations of Belo Horizonte Pampulha will be maintained in the future. In any case, this outcome seems to be contrary to previous Brazilian tenders, as well as to the economic literature and international best practices on competition between airports. It could be argued, however, that under certain circumstances, especially in cases of low demand, introducing competition between airports may compromise the efficiency of a multi-airport system that may justify co-ordinated management.

The seventh concession round will auction Congonhas (CGH) in São Paulo, a city also served by two airports operated by private firms, Guarulhos (GRU) and Viracopos (VCP). Although in the upcoming public tender Congonhas will be part of a cluster with ten other airports across the country, the government has not restricted the participation of concessionaires of airports in São Paulo (and their related companies). Doing so would ensure that all airports in São Paulo are managed by different players, enhancing competition in several market segments.[56]

A discussion about the city of Rio de Janeiro's multi-airport system, a city currently served by two airports, arose during the design the seventh round of concessions. Galeão (GIG) is already run by a private firm, while the other Santos Dumont (SDU) is managed by Infraero and was set to be awarded to a private operator through a concession contract in the seventh round. Certain stakeholders have argued that introducing competition between both airports would be economically inefficient as there would be insufficient demand for both. In the meantime, financial difficulties led the concessionaire of Galeão to return the airport before the end of the contract term. Finally, in in early 2022, the government decided to withdraw Santos Dumont from the seventh round, and both airports are now set to be tendered together in 2023.

This outcome again appears to go against the Brazilian Government's policy in past concessions of promoting competition between airports. Despite other issues beyond competition possibly arising when

designing public policy, such as the availability of a multi-airport system, as well as socio-economic development and urban-planning issues, the potential benefits from a competitive environment for airports should not be neglected. In the absence of ownership restrictions in the oncoming auctions, competing airports may end up being managed by the same player, which is likely to harm competition.

Further, as stated above, Infraero's stakes in the concessionaires of the second and third concession rounds will be sold to private firms in the near future. If there are no cross-ownership restrictions when designing the sale, the public policy on competition between airports advocated by the government in the past may be compromised. There is a risk that a single firm acquires Infraero's shares in all concessionaires or a cross-ownership arrangement between concessionaires of the second and third rounds.

Recommendation

The OECD recommends that the Brazilian authorities ensure that one entity or related entities is not allowed to control competing airports, either in already awarded or future concessions. Minority holdings should only be accepted in exceptional cases and should be barred from participation in corporate governance.

2.2.3. Airport concession contracts

Description of the obstacle and policy makers' objective

As noted above, concession tenders have evolved since their inception. Many of these changes were positive, the result of incorporating lessons learned from earlier rounds. Nevertheless, successive concession contracts with different clauses may affect the sector's competitive environment.

For instance, the rules for defining how the concessionaire must pay the due fees have changed in recent rounds (Box 2.8). The first concession rounds were designed when the Brazilian economy was forecast to grow steadily alongside increasing demand for air transport, which led to extremely high bids in the initial rounds[57] (Table 2.5). Since 2014, however, the Brazilian economy has fallen into deep recession, worsened by the COVID-19 pandemic. This has deeply impacted upon airport operators, with certain concessionaires facing serious difficulties to pay concession fees.

As the original agreements stated that concessionaires were responsible in cases of demand-side shock – unless in cases of force majeure, such as the COVID-19 pandemic – the concession model has played a role in the current situation. In fact, three airport operators have recently requested that a concession contract be rebid (*relicitação*), based upon Law No. 13.448/2017. In practice, this has seen the concessionaire return the airport before the contract term, and a public tender awarded to a new private player with a revised concession contract in line with the most recent concession rounds.

The government seems to recognise these shortcomings, and some relevant changes in the concession model were implemented in later rounds to avoid the initial pitfalls.

Box 2.8. Airport-concession fees

Concession fees for the right to operate an airport or a set of airports are paid by the concessionaire to the National Civil Aviation Fund (FNAC), acting for the Federal Government.

Airport-concession auctions award a contract to the bidder that offers the highest amount above the minimum price defined in the tender notices. How the winner pays this amount has varied across different rounds, however.

In the first three rounds, the fixed fees – minimum price, plus bidders' premium – were divided by the number of years of the concession, with the concessionaire liable each year for the corresponding fraction, adjusted for inflation. This model has proved to be a risk for airports' investment and operation due to the substantial impact of the fixed fees on the concessionaires' budget. This was made worse by the collapse of the Brazilian economy in the mid-2010s, which saw forecasts of traffic growth and the accompanying revenue fail to materialise. In 2017, in view of concessionaires' precarious financial situations, and with the aim of ensuring the continuity of contracts and the provision of their relevant services, Law No. 13.499/2017 was passed to allow the rescheduling of payments by concessionaires of the first three rounds, based upon maintaining the net value of the fixed fees at the time of the auctions.

In the fourth round, the winning bidder was required to pay 25% of the minimum price plus 100% of the bidder's premium upon signature of the concession contract. The remaining 75% of the minimum price must be paid annually, but only from the sixth year of the concession, in a staggered and increasing fashion, until the tenth year, when the instalments become equal until the end of the contract. The grace period granted to concessionaires aimed to alleviate the financial burden of the largest investments being required in the first years of a concession.

Finally, from the fifth round on, the fixed fees were abolished and the winning bidder was required to pay 100% of the minimum price and the premium upon signature of the concession contract. As a result, the concessionaire did not have to pay a substantial amount at the same time as capital expenditure.

In addition to auction-related fees, concessionaires (except the first-round winner) must pay a variable annual fee, comprising a percentage of their revenue. This also evolved as the rounds progressed to establish the most suitable model with the best incentives. In the second, third and fourth rounds, the variable fee was due from the first year of concession. The percentage was the same for the entire concession period, while each airport had a different percentage: 10% for São Paulo Guarulhos; 5% for Campinas Viracopos; 2% for Brasília (second round); 5% for Rio de Janeiro Galeão and Belo Horizonte Confins (third round); and 5% for Florianópolis, Fortaleza, Salvador and Porto Alegre (fourth round).

From the fifth round on, a grace period of five years was established, and the percentage of revenues was staggered, increasing until the tenth year of concession, when it is fixed. The percentage also varies with each cluster of airports (from 0.04% to 8.16%), in light of economic viability.

Source: OECD, based upon airport concession contracts and (Machado et al., 2019[50])

Airport-tariff regulation has also varied substantially across concession rounds, from price-cap regulation in the first tender rounds to revenue-cap and light-touch regulations in the most recent (see section 2.3). Since airport tariffs are a relevant source of concessionaires' revenue, the regulatory approach has an impact on how firms can run their businesses. Some regimes are more flexible than others, allowing for more efficient management.

Concessionaires from the second and third rounds were also forced to have Infraero as a shareholder, which led to more complex governance and possibly to reduced efficiency according to stakeholders. Further, these contracts provided for certain obligatory Infraero engineering works, which had not been completed by the SOE. Concessionaires remain in discussions with ANAC about the issue.

The level of required investment is another issue. The first concession rounds – unlike later rounds – did not provide for objective triggers and deadlines for the realisation of mandatory investments resulting in an unbalanced relationship between investment and demand. As ensuring service quality is one of the reasons for investments and infrastructure investments are subject to depreciation and increased fixed costs, the results of any investments, such as infrastructure and new machines, should ideally be tied to their subsequent effective use to avoid idle capacity and unnecessary costs. Indeed, according to IATA, predetermined, fixed and overly rigid capital-investment plans do not meet demand for the right infrastructure at the right pace and price. It recommends that investments are linked to traffic volumes, not financial years (International Air Transport Association, 2020[51]).

This is particularly relevant for the early concession tenders, since pre-auction forecasts of traffic growth failed to materialise due to the 2014 economic crisis in Brazil, which was then aggravated by the COVID-19 pandemic. Despite the fact that these contracts have been amended by ANAC in recent years, establishing triggers related to increases in demand, certain investments remain that must be made before the end of the concession, without any link to demand. Further, whenever these changes are made to the contract, it is necessary to ensure the re-establishment of the original economic and financial balance of the concession contract in favour of the granting authority (Machado et al., 2019, p. 33[50]).

The most recent concession contracts do provide that mandatory investments be associated to demand triggers. The rationale is to allow concessionaires to determine the necessary investments for maintaining minimum quality standards related to facilities' capacity, such as aircraft movements on the runway and apron, and passenger terminal services such as check-in, security, immigration, baggage reclaim, and the number of gates.

Recently, ANAC has been working to harmonise concession contracts, either through contract amendments or through broader regulation. However, these changes focus more on ANAC's monitoring activities, rather than on substantial concessionaire duties.

Harm to competition

The differences between concession contracts across rounds, albeit justifiable, can subject concessionaires to distinct regulatory regimes, even for similar airports, which may compromise the level playing field. In practice, this may reflect different incentives and disincentives of each specific concession model used in Brazil – say, concession fees, tariff regulation and mandatory investments – which may influence the total costs and revenue sources faced by each concessionaire. This may affect the competitive environment for airports, running counter to the Brazilian Government's goal of creating a competitive airport market.

Ideally, all players operating in the market should be subject to the same rules to maintain a level playing field. Providing some stakeholders with advantageous tools to manage their concession may raise costs and disadvantage for others. For instance, setting distinct tariff regulation for certain concessionaires allows them to use a more flexible approach, enhancing the potential efficiency of their operations. This puts those whose concession term prevents flexible tariff setting at a competitive disadvantage, as they will not able to set tariffs in a more efficient fashion, such as implementing peak-load tariffs.

The anticompetitive impact may be more severe in multi-airport systems, such as that of the city of São Paulo, where the potential for competition between airports is clearer, as they serve a shared local market and may compete in the same catchment area, in addition to other market segments (such as connecting passengers and cargo). That city currently has two airports[58] subject to different rules of, say, tariff

regulation as one is managed by a private operator and the other by Infraero. In the near future, the airport run by the SOE will be awarded to a private player, which has the potential to further increase competition between both airports. This might leave the previous concessionaire in a disadvantaged position compared to the recent one.

Recommendation

The OECD recommends that the Brazilian authorities consider harmonising all airport-concession models, so as to ensure that all players are subject to the same regulatory environment, especially the tariff-regulation regime. Ideally, improvements implemented in the most recent concession rounds should be retrospectively applied to previous concession contracts. Certain of these changes may be difficult in practice since they may require contractual amendments and re-balancing to take into account any amendments' economic-financial impact.

2.3. Airport revenue

In general, airports' revenue structure is comprised of two sources: 1) charges for aeronautical services, known as airport tariffs; and 2) revenue from non-aeronautical sources. Aeronautical services include access to runways for take-off and landing, and to aircraft parking sites and taxiways, safety and ground handling services, including passenger check-in, arrivals and departures, and ramp services, such as passenger and baggage handling, fuelling, aircraft maintenance, water cartage, and cabin cleaning. Non-aeronautical services comprise concessions and other commercial services, such as supply of food, beverages and retail in terminal buildings, car parks, airport transfer services, office rentals, and other activities in airport buildings and on airport land.[59]

The regulation of airport tariffs varies substantially across jurisdictions and largely depends on an airport's ownership and operating model. In countries where airports are owned and managed by the government, tariffs are often either unregulated or directly set by the government. There are exceptions to this rule, including Ireland and the Netherlands, where government-owned airports are regulated by independent authorities. In countries where airports are privately owned or managed by a private company, airport charges are almost always regulated by an independent authority, since airports are assumed to possess market power in aeronautical services (Czerny, 2009[52]). In Brazil, airport tariffs are regulated in both privately managed (the vast majority) and SOE-managed airports by ANAC, an independent authority.

There are two main methods for regulating airport tariffs which differ as to the incentives they provide to regulated agents to minimise their costs (Marques and Brochado, 2008[53]):

- The first is rate-of-return regulation, where the regulated tariff is variable and conditional on observed costs and demand, enabling the airport operator to earn a fixed rate of return on its investment
- The second corresponds to incentive regulation, such as price caps or revenue caps. In that case, the maximum tariff or revenue is fixed for an entire regulatory period (usually three to eight years), taking into consideration expected costs and productivity gains over that period.

The large majority of forms of airport regulation are a variation of these two methods, with the exception of certain jurisdictions that apply a more "light-handed" regulatory approach.

Regulatory methods can also be classified as single till or dual till, depending on whether aeronautical services and commercial activities are treated as a single or separate businesses (Reynolds et al., 2018[54]) (Varsamos, 2016[55]). Single-till regulation consists of setting a tariff or rate of return for aeronautical

services that covers all agglomerated airport costs, deducted from the revenue of commercial activities. Under such an approach, aeronautical fees are generally lower, as they are cross-subsidised by commercial activities. Dual-till regulation sees the aeronautical charges fully cover the airport's infrastructure costs, without taking commercial services into account. Under the dual-till approach, authorities can choose to regulate only aeronautical services or both separately. Certain jurisdictions have adopted a hybrid-till approach in which a portion of non-aeronautical revenue covers aeronautical costs.

Box 2.9. International approaches to regulating airport tariffs

At present, the most common regulatory method appears to be price-cap regulation. While many airports apply a single-till price-cap, including London Heathrow, a dual-till approach is increasingly common in large airports where commercial services play an important role, including in Paris, Brussels, Copenhagen, Vienna, Rome, and Mexican airports. India, Singapore and Portugal apply a hybrid approach, whereby portions of commercial revenues are allocated to the regulatory till. Rate-of-return regulation is becoming less common as it has not tended to provide adequate incentives for cost efficiency, though it is still in use in countries including Switzerland, the Netherlands and Greece. Light-handed regulation applies mostly in several German cities, as well as in New Zealand. In Australia, the largest airports are subject to price monitoring, while the others are free of any control. Finally, there is no economic regulation at all in several countries where airports are owned and managed by the government, including Sweden and Finland. In the United States, although the FAA can regulate prices of airports, this power has rarely been exercised, since many airports are owned and managed by municipal governments through not-for-profit entities, and are considered to lack incentives to set unfair prices.

Source: (Reynolds et al., 2018[54]) (Varsamos, 2016[55]) (Oum and Fu, 2008[34]).

In general, Brazil has adopted a dual-till regulatory model, with ANAC regulating airport tariffs, both in airports under concession and those operated by Infraero (see section 2.3.1).[60] The adoption of a dual-till approach was justified since the main reason for airport concessions was the need for large investments in a time of fiscal restrictions on public investments (Resende and Caldeira, 2020[56]), and dual till tends to create better incentives for an operator to invest in airport infrastructure (Oum and Fu, 2008[34]).

In Brazil, non-aeronautical charges are not subject to any form of economic regulation, as prices are directly negotiated between airport operators and private firms providing commercial services in and around the airport.

2.3.1. Aeronautical revenue

Background

Airport tariffs cover services and infrastructure related to aircraft-movement areas and passenger-processing areas. Although airport tariffs may vary from one airport to another, in general they can be classified into four broad categories: 1) landing tariffs; 2) passenger-processing tariffs; 3) parking charges; and 4) other tariffs (Varsamos, 2016[55]).

At present, there are six different airport tariffs in Brazil, concerning different aeronautical services provided by airport operators[61] to passengers (boarding and connection tariffs), to airlines (landing and parking tariffs), and to other companies (storage and handling tariffs), the last related to cargo transport. Airport operators are prevented from creating their own airport tariffs.[62]

There are currently four different regimes for the economic regulation of airport tariffs in Brazil: 1) price-cap regulation (used in the first three airport-concession rounds); 2) price-cap regulation with possibility of tariff management (fourth concession round); 3) revenue-cap regulation (fifth and sixth concession rounds, and by Infraero for large and mid-sized airports and scheduled and non-scheduled air services, except air taxis); and 4) light-handed regulation (fifth and sixth concession rounds, and by Infraero for small airports, air taxis and general aviation). Each of these approaches offers more or less flexibility to the airport operator (see Table 2.7).

Table 2.7. Regimes for airport-tariff regulation in Brazil

Airport-concession round	Regulation regime	Flexibility	Parameters for setting tariffs	User consultation	ANAC intervention
First round	Price cap	Charge tariffs below the price-cap	Objective criteria, previously disclosed (if tariffs are below the price-cap)	N/A	N/A
Second round					
Third round					
Fourth round		Tariff management: reduce or increase tariffs up to 100% of the price-cap	Objective and non-discriminatory criteria	In case of raising tariffs beyond the price-cap	ANAC may refuse the revision of tariffs if it considers an airport operator's justification for the increase does not lead to a more efficient use of the airport infrastructure or is not objective and non-discriminatory, or if a relevant stakeholder was not consulted by the concessionaire
Fifth round	Revenue cap for large and mid-sized airports, scheduled and non-scheduled air services, except air taxis or light-touch regulation for small airports, air taxis and general aviation	Constructive engagement: airport operator and airlines may establish different revenue cap and alternative tariffs, as well as other relevant concession elements, if approved by ANAC	Best practices for pricing airport services: ICAO, IATA and ACI examples, and objective, non-discriminatory criteria	In case of increasing tariffs: users must be informed of the changes at least 30 days before their implementation	ANAC may suspend tariff changes if it deems that the justification for the modification does not meet requirements (international best practices and objective and non-discriminatory basis), and if they can potentially harm final users
Sixth round					

Note: The airports not yet subject to concessions and still managed by Infraero follow the regime set in the fifth and sixth rounds (Resolution ANAC No. 508/2019)".
Source: OECD, with data from airport concession contracts, https://www.gov.br/anac/pt-br/assuntos/concessoes.

Description of the obstacle and policy makers' objective

The increasing flexibility for setting tariffs introduced by ANAC throughout the concession rounds (including tariff management, revenue-cap regulation, light-handed regulation and constructive engagement) was intended to allow operators to improve efficiency and cost-effectiveness in the provision and operation of airport services.

Including stakeholders in this process through consultations aims to reduce potential risk of abuse of market power and to produce a mutually agreed solution, as recommended by ICAO.[63] After all, airport operators and other market players (such as airlines and ground-handling service providers) are better informed than the regulator about the costs of services and other relevant issues for the management of airports. In any case, ANAC should monitor the implementation of these mechanisms, and may intervene if any requirement is not met by the airport operator.

Since the fourth concession round a user consultation is required for airport operators to increase tariffs, and ANAC is entitled to intervene in case of potential abusive behaviours. Yet the current regulation does not ensure that all interested parties can play a proper role in the consultation procedure. In fact, it provides no guidelines for user consultations, such as standards for defining which stakeholders should be consulted.

According to the ICAO, airport operators must establish a clearly defined, regular consultation process (International Civil Aviation Organization, 2012[57]). It also recommends that users be given notice of revision of charges at least four months in advance, and they should be provided with transparent and appropriate financial, operational and other relevant information to allow them to make informed comments. Further, airport operators should take users' views into account in their decision, which must indicate its rationale, especially when comments from users have not been accepted (International Civil Aviation Organization, 2020[58]). In fact, consultations should not only be considered a procedural step, but rather an opportunity for parties to effectively seek to achieve mutual understanding.

Harm to competition

As currently conducted, the process of user consultation brings a risk of favouring the views of incumbent airlines operating at the airport at the time and who might attempt to increase entry costs for (actual or potential) competitors. These procedures do not offer an opportunity for the interests of final users – passengers – to be taken into account, although ANAC is supposed to consider whether their interests are harmed when assessing the consultation implementation. In some cases airports and airlines have reached agreements to gain and share rents, not necessarily to the benefit of consumers (Oxera, 2007[59]).

Additionally, the current regulations provide no details on how airport operators should conduct a user consultation, such as procedures to be followed and standards for defining which stakeholders should be consulted. This may increase legal uncertainty.

Moreover, although it is crucial that ANAC carefully assesses any proposal arising from user consultation or constructive engagement, the provisions establishing when the regulator may intervene are vague and ambiguous. For instance, ANAC may step in if it considers that the justification given by the airport operator for increasing tariffs does not lead to a more efficient use of the airport infrastructure or is not objective and non-discriminatory; if a relevant stakeholder was not consulted by the concessionaire; or if final users might be potentially harmed. Nevertheless, there is no guidance as to *how* ANAC should assess these issues, which in practice may lead it to commit discretionary behaviour. For example, it is not clear what a more efficient use of the airport infrastructure might actually entail, neither how to determine when a proposal might harm final users. The most recent concession rounds did include requirements that concessionaires and ANAC must follow international practices, such as those issued by ICAO, IATA and ACI, when assessing consultations. While this has indeed reduced the discretion of concessionaires and ANAC, a degree of vagueness still remains.

Recommendations

The OECD has two recommendations.

1. ANAC should clarify the regulation regarding user consultation, including the procedures to be followed, in order to ensure that it is implemented correctly. Potential new entrants and consumers should also take part in the consultation.
2. ANAC should establish minimum standards for refusing a proposal. These should be transparent, objective and non-discriminatory.

2.3.2. Non-aeronautical revenues

Background

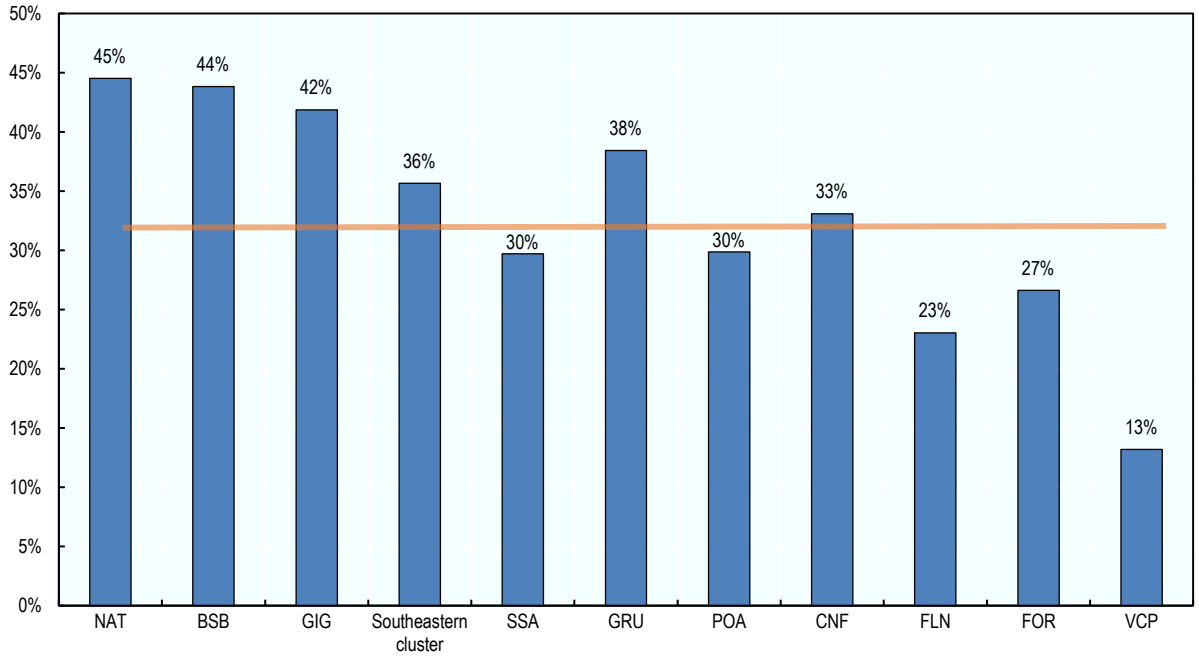
Commercial services are an increasingly important component of airport operations, comprising the provision of food, beverages, retail, currency exchange, transfers, car rental, car parks, and other income derived from airport buildings and development of airport land. As noted, there are also several activities related to aeronautical services that are not directly provided by airport operators, especially ground-handling services; these services are usually considered as non-aeronautical.

Technically, Brazilian regulations refer to tariff and non-tariff revenues, the latter comprising any charge other than airport tariffs. This includes commercial services, but also other airport operational services not charged through tariffs, such as different ground handling services, including passenger check-in, ramp services, fuelling, and aircraft maintenance, as well as rentals of hangars and other airport operational areas (Section 2.3.2. Revenues from operational services).

Historically, aeronautical revenue is the primary source of revenue for airports. Nevertheless, airports have increasingly been seeking other sources of revenues (Air Transport Research Society, 2019[60]). Since aeronautical charges are often regulated, non-aeronautical services, which are generally non-regulated, allow airports to increase their total revenue (Oum and Fu, 2008[34]). This can also allow airports to reduce aeronautical charges to attract more passengers and airlines, which in turn may enhance demand for commercial services and the non-aeronautical revenues (as previously noted, airports are two-sided businesses).

In 2019, at Brazilian airports under concession, non-aeronautical revenues accounted on average for 33% of airports' total gross revenue[64] (Figure 2.17), lower than the 2019 global average of 40.2%.[65] Three Brazilian airports under concession had non-aeronautical revenue share above the global average: Natal (NAT) with 45%; Brasília (BSB) with 44%; and Rio de Janeiro Galeão (GIG) with 42%.

Figure 2.17. Non-aeronautical revenue share for Brazilian airports, 2019



Note: The horizontal line represents the average non-aeronautical revenue share of the Southeastern cluster and 10 Brazilian airports under concession: Natal (NAT); Brasília (BSB); Galeão (GIG); Salvador (SSA); Guarulhos (GRU); Porto Alegre (POA); Confins (CNF); Florianópolis (FLN); Fortaleza (FOR); Viracopos (VCP).
Source: OECD, based upon ANAC, www.gov.br/anac/pt-br/assuntos/concessoes/aeroportos-concedidos.

Revenues from commercial services

Description of the obstacle and policy makers' objective

For the majority of commercial services, the airport operator awards private suppliers with exclusive rights to operate in a designated area, generally through a concession contract,[66] although the airport operator may also provide some of these services – such as car parking – directly to airport users.

In Brazil, commercial services are governed by private law, so are freely negotiated by airport operators and private firms as long as they meet obligatory safety and quality standards. Discriminatory and abusive practices are expressly prohibited.[67]

For airports managed by Infraero, the term of these contracts should be up to 120 months (contracts without investment) or 240 months (contracts with investment).[68] In either case, the costs a firm must incur to execute the contract are taken into account when defining its length.[69]

As for airports under concession, the duration of commercial contracts may last as long as the concession but there are no criteria for determining how long these contracts should take (for example, depending on the level of investment incurred by the operator). Nevertheless, these contracts may in exceptional circumstances be longer than the duration of the concession, if SAC issues an authorisation.[70] In such cases, it is necessary to prove that a longer term is required for a contract's economic feasibility and the recoupment of investments. For that purpose, documents must be submitted to SAC, such as the economic outlook of the project, and there are several requirements and limitations for the contract, including periodic remuneration, in equal or increasing instalments.[71] These requirements and limitations may prevent concessionaires from signing contracts that may harm the interests of any future concessionaire.

According to airport-concession contracts, ANAC may require information of commercial concession contracts at any time and they may be publicly disclosed, as long as they contain no competitive sensitive information. ANAC is yet to do so.

Harm to competition

The current design of commercial concession contracts may restrict competition in the provision of commercial services at Brazilian airports. The barriers identified may prevent more aggressive competition between commercial providers inside the airport, leading to higher prices for airport users, but also lower quality and reduce variety. Even if the high revenues generated by commercial services may partially cross-subsidise airport tariffs, passengers may still end up spending more in total.

The relatively long lease terms of commercial-concession contracts may limit the frequency with which bidders compete for the market, preventing the timely entry of more efficient operators with better offerings. Long lease terms can be justified if contracting parties must undertake substantial investments. In these cases, the contract length should be sufficient to guarantee that the contracting firm can recoup investments and obtain a return on invested capital under normal operating conditions. By contrast, if commercial concession contracts do not impose any minimum investment requirements, these contracts should have short terms.

Furthermore, airport operators are free to determine the optimal tenant mix at the airport, including potentially strong tenants, such as popular chain stores, to satisfy the needs of passengers and increase overall consumption at the airport and so its revenue. However, this may restrict market entry and increase prices in case of exclusivity agreements that prevent competing firms from operating at the airport (Box 2.10). Except in special circumstances and duly justified based on economic grounds, airport operators should promote competitive markets at the airports to lower prices and improve products and services for consumers.

Box 2.10. Exclusive contracts in duty-free shops in Korea

A 2012 market study by KFTC, the Korean competition authority, on duty-free shops in Incheon International Airport (ICN) showed a sharp increase in prices of liquor and tobacco just after ICN Corporation, the SOE that rented retail space in the airport, consolidated its contracting and awarded one corporation an exclusive contract for duty-free liquor and tobacco sales in the airport from 2008 to 2013. Comparing prices before and after changing to monopoly contract, the price of 30 kinds of liquor and tobacco increased by an average of 9.8% in one year (2008-2009). KFTC recommended that ICN Corporation change the procurement regulation to allow more companies to operate duty-free liquor and tobacco shops in the airport, just as for cosmetics or electronics. ICN Corporation duly contracted with two companies for duty-free alcohol and tobacco from March 2013.

Source: (OECD, 2019[61])

Among the quality indicators monitored by ANAC in airport-concession contracts (through consumer surveys) are a number related to commercial services, including quality, variety, and price-performance ratio of restaurants, retail shops and car parks.[72] The price-performance ratio of such services is not considered as a quality factor (Q factor),[73] which is used to increase or reduce the tariff or revenue cap, and therefore incentivise airport operators to achieve better outcomes.

Recommendations

The OECD has three recommendations.

1. ANAC should more effectively monitor prices and the quality of commercial services at airports. For that purpose, ANAC could build upon the current consumer surveys provided for in airport-concession contracts, and consider including indicators related to the price-performance ratio of commercial services as a quality factor in future airport concession contracts. Any suspicious behaviour of anti-competitive practices should be duly notified to CADE.
2. Brazilian authorities should adopt non-exclusivity clauses for commercial contracts in airports, except in justified situations subject to prior ANAC approval.
3. Brazilian authorities should require airport operators, when defining the lease terms of commercial-concession contracts, to take into consideration the minimum level of investment that will be incurred by the contracting party. If no investment is required, the contract should have short terms.

Revenues from operational services

Description of the obstacle and policy makers' objective

Certain services comprising aeronautical activities are rarely provided directly by the airport operator, particularly ground-handling services, such as dispatch of aircrafts, passengers and luggage, aircraft loading and unloading, fuel and oil handling, and aircraft maintenance, which are usually provided by third parties or airlines and therefore considered as non-aeronautical services (see section 2.4). To provide these activities, firms need to have access to airport facilities, which may require leasing an airport space, such as hangars and other operational areas.

As with the regime for commercial services, the cost for the use of operational areas is not set by regulation. Rather, parties are free to negotiate prices and other conditions, and their contractual relationship is governed by private law. Regulatory differences between renting airport spaces for commercial services and for operational activities do exist, however, as the latter are directly related to aeronautical services.

A competitive tender for allocating airport space to airlines and ground-handling service providers is not necessary, even if the airport is managed by Infraero.[74] The rationale for this approach is to ensure that anyone willing to enter the market for providing air transport services or ground-handling services can do so, enhancing competition at the airport. The airport operator is responsible for determining the location at and area of the airport required by companies to provide their activities.[75]

Nevertheless, in case of shortage of physical spaces to allocate to all companies operating scheduled air transport, the regulation provides specific non-exhaustive criteria to assist airport operators with the task of in distributing space. First, at least 10% of existing areas for activities of dispatch of aircrafts, passengers and luggage should be allocated for shared use by all airlines operating or intending to operate at the airport.[76] This aims to ensure that all airlines can operate at the airport by ensuring the permanent availability of airport infrastructure to potential new entrants, while preventing the maintenance of idle spaces.

The airport operator must then limit the allocation of exclusive-use areas for activities of dispatch of aircrafts, passengers and luggage using a ratio of the number of passengers handled by the airline at the airport and the total number of passengers handled at the airport in the six months preceding the request.[77] The exclusive-use areas for aircraft loading and unloading and aircraft maintenance and related services

should be allocated according to the ratio of the number of take-offs and landings of the airline at the airport and the total number of take-offs and landings at the airport in the 12 months preceding the request.[78]

These rules are based upon objective criteria for allocation of airport space and aim to ensure a more efficient use of airport infrastructure, with spaces allocated to each airline in proportion to the numbers of services it provides. The allocation of spaces for each airline is regularly reviewed according to its market share at the airport. Moreover, newcomers will always be able to enter the market, since there is a minimum percentage of space available for shared use.

The airport operator may limit access of ground-handling service providers if there is no available space or capacity for allocation to all firms. In these cases, the airport operator must present a justification for such a restriction to ANAC, as well as possible measures to reduce the constraints. The concession contracts also provide that in case of shortage of space for ground-handling service providers, the concessionaire must require ANAC authorisation to restrict the number of players, and ANAC may establish a minimum number of providers. This intends to prevent abusive and discriminatory behaviour, as well as to ensure a minimum level playing field at the airport. Nevertheless, it should be noted that when the entry of ground-handling service providers is not possible, airlines may still hire the services of those firms, which can operate in *their* allocated spaces.[79]

As noted, airport operators and suppliers are free to negotiate the fees for the use of airport space. Since the fourth concession round, contracts have stated that these fees must follow objective and non-discriminatory criteria, such as service level, available facilities and investment forecasts. The setting and modification of prices must be subject to user consultation. This is especially relevant when leasing airport space to ground-handling service providers, because airport operators may also perform these activities and could therefore have incentives to discriminate against competitors in the downstream market (see section 2.4). To this end, concession contracts require that concessionaires keep separate accounts for their airport-management activities and the supply of ground-handling services, in order to maintain fair competition.

Unlike the contracts for leasing airport space for commercial services, ANAC can mediate potential conflicts between parties of rental contracts.[80] It operates upon receipt of complaints and then seeks to identify whether the airport operator was involved in any abusive practices. ANAC may assess prices and compare them with market rates, including prices for similar spaces at airports in Brazil and abroad, as well as carry out cost analyses. As a last resort, in cases of abusive and discriminatory behaviour, ANAC may introduce economic regulation for leasing of operational spaces, either through a price cap, revenue cap or another regulatory mechanism.[81]

Finally, airport-concession contracts establish that a concessionaire may enter into contracts with airlines for the construction, maintenance or use of airport terminals or parts thereof, in an exclusive or preferential manner. Since the third concession round, however, ANAC must authorise such agreements, in order to prevent anti-competitive practices.

Harm to competition

It seems reasonable not to require airport operators to use competitive tenders to select firms for leasing airport space for the provision of operational services, and this seems in line with international practices (Box 2.11). Yet, with no rules determining the allocation process for airport spaces among all players, including airlines and ground-handling service providers, airport operators are allowed a discretion that may lead to discriminatory behaviour, especially against ground-handling service providers. As airport operators may also provide these services, although this is not common in Brazil, they may have incentives to allocate less attractive spaces to their competitors.

Box 2.11. Direct awards for leasing airport spaces

Direct awards for leasing airport spaces are common in other jurisdictions. For example, in the European Union, an invitation to tender is required only when the number of ground-handling service providers is limited at an airport (Article 11 (1) "b" of Council Directive No. 96/67/EC of 15 October 1996). In fact, the EU allows member states to limit the number of suppliers authorised to provide certain categories of ground-handling services for safety, security, capacity and available-space constraints. That number may not be fewer than two for each category of service, and one must be an independent and not related to the managing body of the airport or to an incumbent airline (Article 6 of Council Directive No. 96/67/EC). In line with EU law, leases for most ground-handling services in Portugal can be directly awarded by an airport operator (Article 11, paragraph 3 of Decree-Law No. 254/2012).

In the United States, an airport operator may lease airport space without seeking competitive proposals when it is in the best interest of the airport or community and described or offered as part of a vision document such as an airport master plan.

Source: (Airport Cooperative Research Program, 2011, p. 70[62])

In practice, holding an airport space is a barrier to entry for ground-handling service providers, as this requires signing a contract with the airport operator, which is in turn subject to price negotiation, space and time constraints. Although these firms may still offer services to airlines if they do not have a leasing contract, in these cases they can only access the airport if they present a contract with an airline, and they are charged every time they enter the airport facilities. According to stakeholders, this is much more expensive than a leasing agreement, which in practice makes such operations unfeasible from an economic point of view. Ensuring a transparent and impartial procedure for selecting suppliers of ground-handling services is crucial where the number of such firms is limited, as recognised by the European Union regulation (see Box 2.12).

Box 2.12. Selection of ground-handling service providers for limited spaces at EU airports

In the European Union, at airports where the number of ground-handling providers is limited, an airport operator is required to launch an invitation to tender, and airport users must be consulted on the selection of suppliers due to their interest in the quality and price of services. However, when the airport operator also provides similar services or has direct or indirect control over any undertaking providing such services, the selection must be conducted by an independent body. Where the number of ground-handling service suppliers is limited, it may also be necessary to establish a maximum contract length to ensure competition. In the EU, these contracts should not exceed a duration of seven years.

Source: Article 11 (1) "b", "c" and "d", of Council Directive No. 96/67/EC of 15 October 1996.

In addition, although airport concessionaires may enter into exclusive-use or preferential-use contracts with airlines, such arrangements may restrict competition, even though the airport operator has always to ensure any airline can enter the market. In fact, dominant airlines could use their monopsony power to influence airport operators to discriminate against competing airlines or to create barriers to entry for new firms or for expansion of airlines already operating at the airport (Pereira Neto et al., 2016, p. 14[31]).

Box 2.13. Exclusive-use or preferential-use contracts between airport operators and airlines in the United States and the European Union

In the United States, an airport is prohibited from awarding an exclusive right to conduct a particular aeronautical activity (U.S.C. 40103(e) and 47107(a)(4)). This is driven by the concern that an exclusive right may limit the usefulness of the airport and deprive the public of competitive benefits. However, the current understanding of the US regulation is that exclusive-use, long-term leases do not contravene the prohibition against granting an exclusive right when there is no intent to exclude other reasonably qualified airlines. Such leases, though, should be limited only to such space as is demonstrably needed by the airline to which an exclusive-use agreement is granted. In any case, airport managers have a legal obligation to accommodate all qualified airlines that wish to serve their airport (Federal Aviation Administration/Office of the Secretary of Transportation Task Force, 1999, pp. 22-22[33]).

In this regard, the US FAA indicates that certain contractual arrangements between airports and airlines, especially long-term, exclusive-use gate-lease agreements, may create a barrier to entry or to expansion, especially at concentrated hub airports. Certain stakeholders defend such agreements as a necessary means of financing the construction of new and improved facilities. According to the FAA, however, such agreements often give incumbent airlines the right to use the facilities regardless of their gate usage, even allowing them to decide on sublease terms and conditions, as well as the sub-lessees themselves.

As a way to promote more competition at airports, in 1999 the FAA already suggested requiring airport operators that sign exclusive-use agreements to submit a plan demonstrating how they will provide for access to new entrants and for expansion by airlines with a limited presence at the airport. The FAA has also concluded that an airport manager generally has the authority to require an exclusive-use airline tenant to share or sublet unused gate space when requested by another airline. Indeed, this is necessary to prevent inefficient use of airport infrastructure. The FAA also pointed out that the popularity of exclusive-use leases had dropped over the years in favour of preferential-use leases. Unlike traditional exclusive-use lease arrangements, preferential-use contracts afford the airport explicit contractual authority to use a tenant's gates for new entrants or carriers wishing to expand operations (Federal Aviation Administration/Office of the Secretary of Transportation Task Force, 1999[33]).

In the European Union, exclusive-use agreements between airport operators and airlines are deemed lawful when they do not preclude other airlines from entering the market. For example, in May 2011, the European General Court did not rule on the complaint of an airline against the European Commission for its failure to act against an alleged abuse of dominant position by the operator of Munich Airport, which had entered into an agreement with an airline for the exclusive use of one terminal. Even though the Court did not deliver a substantive decision, it concluded that the applicant did not demonstrate it had been precluded from entering the airport as it had been offered the use of a terminal used by other airlines (Judgment of the General Court (Fifth Chamber) of 19 May 2011. Case T-423/07).

Furthermore, the European Commission has indicated that an airport manager does not necessarily confer an economic advantage on an airline by providing it with the exclusive use of all the check-in desks and office space at a terminal. It has noted that this could only be the case if an airport operator grants exclusive use of space in excess of what an airline needs, which could prevent other airlines from using physically available capacity or when an abnormally low rent is charged. The EC has also stated that it was expected that low-cost carriers (LCCs) would require exclusive allocation of gates, sales and check-in counters, which has actually happened (Commission Decision (EU) 2015/506 of 20 February 2014. Case C 27/07).

In Brazil, as noted, exclusive-use agreements between airport operators and airlines are possible, but ANAC must authorise them, in order to prevent anti-competitive or discriminatory practices. However, there are no clear guidelines for assessing these contracts, nor the need to consult CADE on their potential anti-competitive effects. This may lead to legal uncertainty and discretionary treatment by ANAC, but also to arrangements that may hamper competition at the airport.

Recommendations

The OECD has four recommendations.

1. ANAC should consider requiring airport operators to follow transparent, objective and non-discriminatory criteria for allocating airport areas for the provision of operational services.
2. ANAC should require airport operators to follow a transparent, objective and non-discriminatory procedure for selecting ground-handling service providers where their number is limited by an ANAC authorisation. Airport users should be consulted in these procedures. ANAC should also consider establishing a maximum duration for these contracts, in order to ensure competition.
3. ANAC should consider issuing guidelines for the analysis of exclusive-use or preferential-use lease agreements between airport operators and airlines. Accordingly, ANAC should establish minimum requirements for these agreements, such as requiring the airport operator to demonstrate that other airlines' entry and expansion of operations will be ensured. Exclusive-use lease agreements should be required to include minimum operations or gate-usage requirements, as well as the possibility of making underused facilities available to other airlines. Furthermore, preferential-use lease agreements should provide transparent, objective and non-discriminatory criteria for accommodating other air carriers. CADE should also be consulted to provide its technical expertise on the existence of potential anti-competitive effects of such agreements;
4. Airports should report periodically to inform ANAC of how their compliance with this guidance and competitive principles.

2.4. Ground-handling services

According to Annex 6 to the Convention on International Civil Aviation, ground handling is all the services necessary for an aircraft's arrival at and departure from an airport, other than air-traffic services. This includes ground administration and supervision; passenger handling; baggage handling; freight and mail handling; ramp handling; aircraft services; fuel and oil handling; aircraft maintenance; flight operations and crew administration; surface transport; and catering services (International Civil Aviation Organization, 2019, pp. 79-81[63]). In Brazil, ground-handling services also comprise activities related to aviation security – such as screening of passengers, aircrew and baggage; searching and checking aircraft; protection of aircraft; access control to security restricted areas; and security controls of cargo – as well as to air-freight forwarding.[82]

Ground-handling services are usually provided by one (or a combination) of the following methods: 1) directly by the airport operator; 2) handled by airlines themselves; or 3) by third-party, independent ground-handling companies. Although models for providing ground-handling services varies across the world,[83] there has been a trend towards third-party ground-handling service providers. In fact, according to the ICAO, around 75% of all ground-handling operations worldwide are outsourced to third-party handlers (International Civil Aviation Organization, 2019, p. 16[63]).

In Brazil, despite the fact that the legislation provides for the three aforementioned alternatives for the provision of ground-handling services,[84] most airlines use third parties, with the exception of one major airline, which self-handles around 90% of its own operations (Steer Davies Gleave, 2016, p. 48[23]). In fact, in 2015, around 70% of total commercial flights in Brazil involved a third-party ground-handling service provider at some point (ABESATA, 2016, p. 41[64]).

The ground-handling market was liberalised in Brazil in 2009,[85] and since then an authorisation is no longer required for providing such services (except for aviation-fuel supply, as discussed in section 2.4.3). Indeed, there are no relevant regulatory restrictions to enter the market. As noted in section 2.3, to access an airport a ground-handling service provider does not need to hold an airport space,[86] only a contract with an airline. In addition, the provider must demonstrate compliance with airport regulations and the airport's operations manual, especially for aviation safety and security requirements. Further, the firm is required to provide insurance to cover any damage to people and goods arising from its operations. The supplier's personnel must also hold the appropriate qualification for the duties to be performed, and they must hold an airport identification card.

Ground-handling services are generally not directly regulated in most jurisdictions, and therefore there are no globally applicable regulatory provisions for these activities. This had led to the creation of industry-developed and implemented standards for the management and operation of ground-handling services and standardised operational procedures (International Civil Aviation Organization, 2019, p. 16[63]).[87]

2.4.1. Provision of ground-handling services by airlines

Description of the obstacle and policy makers' objective

In Brazil, airlines are not allowed to provide ground-handling services to other air carriers, unless they operate codeshare flights.[88] At the time the provision was enacted the objective was to stimulate the development of specialised companies providing ground-handling services in Brazil. CADE stated that allowing airlines to provide ground-handling services to their competitors could also reduce competition between them, including facilitating co-ordination. However, considering the current market situation, the OECD could not find the objective of the provision. According to ANAC, this is a historical prohibition, but there appear no technical or economic reasons for the restriction.

Harm to competition

Restricting airlines to perform only their own ground-handling services limits their ability to expand their operations and to take advantage of economies of scale and scope. This may reduce the number of suppliers at a given airport, which may lead to higher prices.

The provision of ground-handling services by airlines to other air carriers is unlikely to reduce competition in their core business activity – provision of air transport – as ground-handling services represent just a small fraction of airlines' total operating costs (ABESATA, 2016[64]) (ABEAR, 2021[2]). In other jurisdictions, it is also common that airlines provide ground-handling services to other air carriers, and this may lead to more players providing these services, possibly resulting in lower prices and higher quality.

Box 2.14. International experience of the provision of ground-handling services by airlines

In the European Union, an airline may be involved in the ground-handling process as a customer, as a self-handler or as a third-party handler, the last when it strives to optimise opportunities for economies of scale and scope by offering ground handling on behalf of other airlines. This process may be further enhanced by closer co-operation within the context of strategic alliances (of which codesharing is one possible arrangement), although airlines do not need to have had any previous relationship (Meersman et al., 2011, pp. 128-129[65]).

In the United States, the provision of ground-handling services is dominated by the major airlines' own operations, either directly or through subsidiaries, which typically operate at regional airports. Even though these operations primarily exist to supply services to their parent companies, they also offer services to other airlines, and are considered as competitors by international ground handlers (Steer Davies Gleave, 2016, p. 157[23]).

In India, the major airlines also provide ground-handling services to other air carriers. Likewise, in Japan it is common for foreign airlines to request local air carriers to perform ground-handling services (Steer Davies Gleave, 2016, pp. 67, 79[23]).

Recommendation

The OECD recommends that Brazilian authorities allow airlines to provide ground-handling services to other air carriers, regardless of whether there is any code-share arrangement between them.

2.4.2. Provision of ground-handling services by third parties

Description of the obstacle and policy makers' objective

Brazilian regulation establishes that the corporate purpose of third-party ground handlers can only be the provision of ground-handling services, and that these firms can only provide services related to activities regulated by ANAC, except for the supply of aviation fuel (which is also regulated by ANP, as discussed in section 2.4.3).[89] These companies are able to hold shares in any other undertakings.

As with the previous restriction, according to ANAC, there are no technical or economic reasons for the limitation. Its historical justification was to stimulate the development of specialised companies providing ground-handling services in Brazil.

Harm to competition

Requiring independent ground-handling suppliers to provide only ANAC-regulated services may represent a barrier to entry, since some firms already providing similar services will be prevented from entering the ground-handling market or face higher costs in order to be able to offer such services. Moreover, the restriction may also prevent ground-handling service providers to diversify their activities in other related markets, and this may reduce the number of participants in the market over time, which would likely lead to higher prices and lower innovation.

Performing activities not covered by ANAC's regulation would not exempt firms from meeting the requirements for providing ground-handling services, including mandatory insurance and qualified personnel, which ensures aviation safety and security.

In any case, according to some stakeholders, the provision is not being applied, and many firms performing activities other than ground-handling services (and therefore not regulated by ANAC) are operating in the market. This is particularly common in the provision of surface transport, catering services and security activities (ABESATA, 2016, pp. 34-35[64]).

Nevertheless, obsolete or inactive legislation can give rise to legal uncertainty and discriminatory behaviour from competent authorities. Further, such provisions potentially raise regulatory and compliance costs for suppliers and market players, notably increasing legal costs. This may lead to extra cost for operators willing to enter the market, and may discourage new entrants.

Recommendation

The OECD recommends that the Brazilian authorities allow third-party ground handlers to provide services not regulated by ANAC.

2.4.3. Aviation-fuel supply

Background

There are two main types of aviation fuel: jet fuel and aviation gasoline (AVGAS). The two most commonly used jet fuel types for commercial aviation are Jet A and Jet A-1, while aviation gasoline is used in smaller aircraft. More recently, the industry has been developing aviation biofuel (also known as "sustainable aviation fuel") as an alternative to conventional fossil-based aviation fuels (Davidson et al., 2014, p. 3[66]).

In Brazil, the main aviation fuel used is Jet A-1, while aviation gasoline accounts for only a small percentage of fuel used in the country (Figure 2.17). Since October 2021, the sale of Jet A has been permitted in Brazil (Box 2.15).

Table 2.8. Aviation fuel sales in Brazil, cubic metres

Aviation fuel type	2017	2018	2019	2020
Jet A-1	6 694 000	7 164 000	6 980 000	3 546 000
Aviation gasoline	51 000	48 000	43 000	39 000

Source: (ANP, 2021, p. 140[67]).

Box 2.15. Liberalisation of sales of Jet A

Jet A is primarily used in the United States and Jet A-1 is used in most of the rest of the world. Aircraft operators may use both fuels interchangeably, the main difference being the freezing point: Jet A-1 freezes at -47ºC and Jet A at -40ºC. Jet A is also simpler to produce than Jet A-1, and therefore usually cheaper. According to the Brazilian National Agency of Petroleum, Natural Gas and Biofuels (ANP), the oil sector's independent regulator, Jet A could reduce fuel costs up to 0.6%.

In October 2021, ANP liberalised the sales of Jet A in Brazil, allowing it to be produced in and imported into Brazil. The objective of the regulatory change was to increase the offer of jet fuels in the market, which might lower costs for airlines and ultimately, passengers.

Source: Resolution ANP No. 856/2021 and (Ministério da Infraestrutura, 2021[68]).

The jet-fuel supply chain is a complex process, from extraction plant to aircraft, in a process that includes jet-fuel production (or import), storage and transport. Although the Brazilian oil sector has officially been fully liberalised since the early 2000s, in practice, an SOE, Petrobras, holds a quasi-monopoly in the production and import of fuels, including jet fuel. Petrobras also controls most pipelines for transportation of fuel from production sites to airport fuel-storage facilities, which exist in few airports, or more frequently, intermediate storage facilities (Subcomitê de Abastecimento de Combustíveis de Aviação, 2021[69]). A recent divestment agreement signed between Petrobras and CADE might increase competition at these stages of the supply-chain process (Box 2.16).

Box 2.16. Petrobras refinery divestments

In 2019, CADE and Petrobras signed a cease-and-desist agreement, amid ongoing investigations by the Brazilian competition authority into the alleged abuse of dominant position by Petrobras in the refinery market.

Under the agreement, Petrobras committed to sell eight refineries, including assets related to fuel transportation, which accounted for around 50% of Petrobras' national fuel-refining capacity at the time. It should be noted that some of these refineries produce jet fuel.

The agreement aimed at boosting competition in the refinery market, by allowing new firms to enter the market. The agreement also prevented the sale of refineries located in the same geographical region to the same player, in order to ensure a more competitive environment.

The divestment of the refineries was due to have been completed by 30 December 2021, but CADE authorised the deadline extension in view of internal and external circumstances that have impacted the sector, as well as ongoing negotiations with potential purchasers.

Source: (CADE, 2020, p. 24[70]) (CADE, 2022[71]) and Administrative Proceeding No. 08700.002715/2019-30.

Furthermore, just three firms control more than 99% of the jet-fuel distribution market in Brazil. In general, they transport jet fuels from the intermediate storage facilities to the airport, mostly by tanker trucks, but in a few cases, pipelines transport jet fuel directly to the airport. At the airport, each distributor may have its own storage tank or may operate a shared storage tank under a joint-venture agreement (Subcomitê de Abastecimento de Combustíveis de Aviação, 2021[69]).

After the fuel reaches an airport's storage tank, it is delivered to an aircraft in two ways: a hydrant system or refuelling truck. The first method is operated at airports with underground-pipe networks connecting the storage tanks to each gate, and a special dispenser vehicle used to connect aircraft-tank inlets with the underground system. The second method uses a truck designed to carry fuel and transfer it to aircraft directly. The type of system used at a given airport usually depends on the rate of aircraft movements (Airport Cooperative Research Program, 2010, p. 120[72]). The hydrant system is used to fuel aircraft at most large commercial airports worldwide (Airport Cooperative Research Program, 2015, p. 25[73]) (Chevron, 2007, p. 76[74]). In Brazil, however, few airports have these facilities; those that do are amongst others São Paulo Guarulhos, Rio de Janeiro Galeão, Brasília, Recife, Fortaleza and Salvador. Most airports use refuelling trucks.

According to Brazilian regulations, both distributors and resellers[90] (which buy the fuel from a distributor or other reseller) can sell aviation fuels to aircraft operators, and could therefore compete. However, in practice, most air carriers obtain jet fuel from one of the three major distributors, while other distributors and resellers compete for the provision of aviation fuel in the general aviation segment (CADE, 2020, p. 42[75]). Although there is no regulatory restriction on airlines buying and supplying the fuel for their own aircraft, those operating in Brazil appear to have no interest in using this model (ANP/ANAC, 2019, p. 15[76]).

It should be noted that jet-fuel prices in Brazil are higher than the international average. For example, jet fuel in Brazil is between 30% to 40% more expensive than in the United States, based on data up to December 2020 (ABEAR, 2021, p. 55[2]). For that reason, jet fuel accounts for around 30% of total operating expenses of Brazilian airlines, which is also higher than the international average (see Table 2.9).

Table 2.9. Jet-fuel cost share of major Brazilian airlines and international average

Airline	2017	2018	2019	2020	2021
Latam	26.88%	33.64%	31.79%	19.47%	*
Gol	31.53%	36.96%	34.50%	27.66%	23.36%
Azul	26.69%	31.50%	32.79%	20.80%	32.83%
International average	19.8%	23.5%	23.5%	16.2%	19%

Note: *Data unavailable at time of writing.
Source: OECD, based upon airlines' financial statements, www.latamairlinesgroup.net/pt-pt/tam-sa-financial-statements; https://ri.voegol.com.br/conteudo_pt.asp?idioma=0&conta=28&tipo=53858; https://ri.voeazul.com.br/informacoes-e-relatorios/resultados-trimestrais/; and Statista www.statista.com/statistics/591285/aviation-industry-fuel-cost/#statisticContainer.
In addition to the fact that the market is highly concentrated (in all stages of the supply chain), the tax regime for jet fuel also plays a relevant role for the high costs of the product in Brazil.

Aviation-fuel supply is regulated by ANP and ANAC; the former regulates the production, distribution, storage and sales of aviation fuels, the latter is responsible for regulating activities within airports. In light of this project's scope, the OECD has focused on the final stage of the supply chain, namely how jet fuel is received into an airport storage and delivered to an aircraft, known as into-plane supply or retail supply.

In order to become an aviation-fuel distributor or reseller a firm must obtain an authorisation from ANP, which assesses, among other things, if it has suitable facilities to ensure compliance with the technical and quality-control requirements.[91] Distributors and resellers can only sell aviation fuel to final users if they have a storage tank at the airport, which may be jointly operated with other firms. However, a new entrant may face severe difficulties accessing an airport's infrastructure for storage and delivery of jet fuel.

Access to jet-fuel supply infrastructure at the airport

Description of the obstacle and policy makers' objective

According to Brazilian regulations, airport operators are required to allow access to their operating areas to all qualified firms, including ground-handling service providers, such as jet-fuel suppliers, willing to enter the market, except if there is a shortage of physical infrastructural space. Abusive or discriminatory practices are forbidden.[92] In the event of infrastructure limitations, the airport operator must submit a justification to ANAC, indicating the measures it will implement to reduce such constraints.[93]

The airport-concession contracts provide similar provisions, but go further and establish that concessionaires need to request authorisation from ANAC to restrict the number of ground-handling service providers at the airport, and the regulator may set a minimum number of providers.

In addition, since the fifth airport-concession round, the contracts also indicate that ANAC has the power to determine that a concessionaire must limit or prohibit companies operating jet-fuel pipeline and hydrants to also supply jet fuel at the airport, in order to promote more competition. Moreover, the concessionaire must submit to ANAC all contracts involving the construction and operation of jet-fuel pipelines and hydrants, prior to the signature of such agreements, for analysis and the adoption of appropriate measures, if any.

Despite the legislation currently in place that aims to enhance entry to the airport, in general, and at the jet-fuel supply infrastructure, in particular, many stakeholders have said that the provisions are unclear about whether an open-access right to new entrants exists.

Harm to competition

In most Brazilian airports, incumbents control storage tanks and – at airports with the system – hydrant facilities, which makes it difficult for new firms to enter the market. This is one important reason for the market concentration, since incumbent firms often do not enable new entrants to access the distribution and fuelling infrastructure (Subcomitê de Abastecimento de Combustíveis de Aviação, 2021[69]).

Brazilian regulations are unclear about the scope of open-access rights to airport space. For instance, there is ambiguity about whether an airport operator is required to allocate a suitable space for new entrants to operate at the airport or if an airport operator must ensure new firms gain access to pre-existing jet-fuel supply infrastructure, for example, through their becoming members of a joint venture responsible for managing the infrastructure or on a fee-for-service basis. Even if it is assumed that open-access rights comprise all relevant airport infrastructure, new entrants could face significant barriers when attempting to use infrastructure, since the legislation states neither who assesses any request for entry nor the requirements for such a request. In practice, this has seen incumbent firms running facilities needing to agree to a new firm's terms of access. This raises concerns about potential conflicts of interest, because incumbents have clear incentives to deny potential competitors market entry. At best, incumbents have a relevant margin of discretion in fixing prices and terms of access for new entrants.

This is especially relevant at airports with a hydrant system, which usually is jointly managed by incumbent distributors, and can present a clear competitive advantage, especially for fuelling aircraft operating international flights, over refuelling trucks. Indeed, the hydrant system is an optimal fuelling method as it provides a fast and reliable refuelling method, and has with overall positive impact on the safety and efficiency of daily airport operations (Hromádka and Cíger, 2015, p. 62[77]).

Some stakeholders argue that the construction of hydrant facilities is expensive and may be operationally impractical to implement due to space limitations at an airport, or at least financially unsustainable (ACIL Allen Consulting, 2018, p. 7[78]). Whether having access to these facilities is necessary for effective competition should be assessed on a case-by-case basis, in light of an airport's characteristics and

operational requirements. Box 2.17 provides an overview of international experience of access to these facilities and the competitive issues that may arise.

Box 2.17. International experience of access to jet-fuel supply infrastructure

In the EU, pursuant to Article 8 of Council Directive No. 96/67/EC of 15 October 1996, member states may reserve for the airport operator or for another body the management of centralised infrastructure used for the supply of ground-handling services whose complexity, cost or environmental impact does not allow division or duplication. This includes fuel-distribution systems. Suppliers of ground-handling services may be required to use this infrastructure, making it necessary to ensure that the management of centralised infrastructure is transparent, objective and non-discriminatory and that it does not hinder access for ground-handling services suppliers.

Nevertheless, the European Commission has already recognised the inappropriate legal framework for the management of centralised infrastructure under this regulation (European Commission, 2011, p. 15[79]). It sees Council Directive No. 96/67/EC as unclear about what the centralised infrastructure necessary for the execution of ground-handling services actually covers and how it is managed. The absence of a clear legal framework can lead to competitive distortions in the market; for example, as the management of centralised infrastructure is often reserved for incumbent suppliers, in the case of fuel distribution, oil companies, which also provide third-party ground handling services, fees levied for its use can deter competitors.

The Australian Productivity Commission has also highlighted the existence of potential competition concerns in the jet-fuel supply market, which is found to be generally characterised by a small number of vertically integrated suppliers, with high barriers to accessing infrastructure at multiple points in the supply chain (Australian Productivity Commission, 2019, p. 33[80]). This made it difficult for new jet-fuel suppliers to establish a supply chain at some airports, and was likely to lead to higher fuel prices. For that reason, Australian airports have been introducing lease arrangements for specialised infrastructure known as joint-user hydrant installation (JUHI), which incorporates open-access for third-party fuel suppliers and could allow them to gain supply-chain access and increase competition.

At Melbourne Airport, for example, all JUHI users, whether equity and non-equity holders, are charged the same reference tariffs, which cover the operating costs of airport storage and distribution, a return on capital investments in airport infrastructure, and off-airport-to-airport delivery fees, if applicable. Potential JUHI users are also charged an application fee, but if access is granted the fee is offset against reference tariffs in the first 12 months of use (ACIL Allen Consulting, 2018, p. 11[78]).

The Commission also recognised that infrastructure owners need certainty, including long-term leases with airport operators, to make investments in jet-fuel infrastructure. Further, long-term investment should be supported by good planning and consultation with all stakeholders, including fuel suppliers, airport operators and airlines (Australian Productivity Commission, 2019, p. 33[80]).

In New Zealand, jet-fuel supply infrastructure is also operated by joint venture, with participants responsible for the importation, storage, transfer and sale of jet fuel at each stage of the supply chain. According to a 2019 government inquiry, this could give rise to a conflict of interest, since incumbent joint-venture participants have an incentive to deny or inhibit access to new entrants that will compete as jet-fuel providers (New Zealand Government, 2019, pp. 111-114[81]). The inquiry also highlighted the lack of transparency around the decision-making processes for access to on-airport fuel infrastructure, which may make it more difficult for new firms to enter the market. It concluded that open access to infrastructure in the supply chain is likely to reduce barriers to entry.

Open-access fuel supply was successfully implemented at Hong Kong International Airport in 1998. Any fuel supplier or airline with its own supply and meeting certain qualification requirements now has the right to bring fuel to the airport and have it stored and handled for its customers' aircraft in return for a transparent, fair and reasonable fee, regardless of their stake – or lack of one – in the facilities. The introduction of this system increased competition in fuel supply at the airport, as the market grew from 7 fuel suppliers to 13, 6 of which hold no stake in the fuel facilities (Board of Airline Representatives of Australia, 2018, pp. 25-26[82]).

In Mexico, in March 2022, competition authority COFECE presented the preliminary findings of a 2019 investigation into the jet-fuel sector, including retail sales to aircraft operators. COFECE found the existence of barriers preventing entry and growth of market participants. In addition to a concentration in bulk sales and fuel storage outside airports, COFECE identified a monopoly in in-airport fuel storage and retail sales, held by the Mexican state-owned aircraft maintenance company Aeropuertos y Servicios Auxiliares (ASA). COFECE recommended that the Secretariat of Infrastructure, Communications and Transportation (SICT) modify airport licences to eliminate the exclusivity clauses that granted ASA the provision of airport fuel storage and retail sales to airlines. This aimed to allow other fuel suppliers to sell to airlines and other aircraft operators, which was thought likely to lead to better prices for consumers (Comisión Federal de Competencia Económica, 2022[83]).

Note: JUHI infrastructure consists of an extensive list of specialised assets, including storage tanks and hydrant infrastructure (Airports Council International, 2018, p. 6[24]).

The Brazilian Government has attempted to improve the regulatory framework in the most recent concession contracts. For that purpose, concessionaires are required to submit to ANAC all contracts involving the construction and/or operation of jet-fuel pipelines and hydrants, prior to the signature of such agreements, for analysis and possible remedial measures. While this may be useful for preventing potential anti-competitive arrangements, no established criteria have been established for this assessment, which may lead to discretionary treatment and legal uncertainty.

In addition, ANAC may, for competition purposes, restrict vertical integration between firms operating in the jet-fuel supply market by determining that a concessionaire must limit or prohibit companies operating jet-fuel pipelines and hydrants to also supply jet fuel at the airport. According to ANAC, this intervention in the market might reduce entry barriers and enhance market contestability, but only in specific cases. Despite the fact that such restriction could be a regulatory measure to promote competition in the jet-fuel supply market, it may lead to discretionary treatment and legal uncertainty, as there are no established criteria indicating when and how ANAC should use it. In fact, ANAC itself recognised that it did not set a specific limitation because this would require further studies.

Recommendations

The OECD has five recommendations.

1. Brazilian authorities should clarify the legislation and ensure proper enforcement towards a genuine open-access regime for jet-fuel supply infrastructures, especially at large international airports that handle more flights with larger, more fuel-consuming aircraft, where access to hydrant systems can give those firms using them a competitive advantage vis-à-vis others using refuelling trucks. Open access should be based on transparent, objective and non-discriminatory criteria, while regulation still ensures other public policy objectives, such as safety, security, environmental protection and recoupment of the investments. Any dispute arising from the enforcement of open-right access should be decided by an independent third party.
2. Authorities should issue guidelines on an assessment methodology for contracts involving the construction and/or operation of jet-fuel pipelines and hydrants.
3. Authorities should develop technical reports to monitor the open-access regime and to identify potential measures for continuous improvements.
4. Authorities should clarify potential measures and corresponding conditions that may be adopted when assessing contracts involving the construction and/or operation of jet-fuel pipelines and hydrants.
5. Authorities should clarify the regulation currently allowing the restriction of vertical integration between companies operating jet-fuel pipelines and hydrants and those providing jet-fuel supply at the airport.

2.5. Slot allocation

Airport capacity determines the number of take-offs and landings allowed in any given period of time. Since it depends on the configuration of runways, the size of the apron and terminal infrastructure, an airport may not be able to accommodate all requests for take-offs and landings (Pellegrini, Castelli and Pesenti, 2012, p. 1009[84]).

Capacity restrictions can be eased by increasing capacity. This can be done by building new facilities, which involves costly, long-term projects and may not be possible, due to geographical, environmental or socio-economic constraints. The alternative is establishing demand-management strategies, which are any administrative or economic policies and regulations restricting airport access to users. Those strategies, which may be categorised as administrative controls and market-based mechanisms, can be used to restore demand capacity with little investment and within a short-time horizon (Vaze and Barnhart, 2012[85]).

The solution adopted by most jurisdictions in this regard has been an administrative mechanism known as slot allocation. The airline trade association International Air Transport Association (IATA) has developed Worldwide Airport Slot Guidelines (WASG), which are followed by Brazil and many other countries. The WASG are not a legally binding instrument, and jurisdictions can follow their own local rules for allocating slots, or complement the WASG with specific additional rules (Egeland and Smale, 2017, p. 26[86]).

Since 2020, the WASG have been jointly published by IATA, airport-operator group Airports Council International (ACI) and slot co-ordinators, the Worldwide Airport Co-ordinators Group (WWACG), which now work together to provide and enhance global standards in airport slot allocation (Airports Council International, International Air Transport Association and World Wide Airport Coordinators Group, 2020[87]).

Applying a mechanism based upon the WASG can reduce congestion and, if appropriately designed, achieve significant welfare benefits for aviation users. Indeed, the WASG provide a mechanism to balance the benefits of competition and of slot concentration, which largely reflects current industry consensus (Egeland and Smale, 2017, p. 26[86]).

An airport slot is defined as "a permission given by a co-ordinator for a planned operation to use the full range of airport infrastructure necessary to arrive or depart at a Level 3 airport on a specific date and time" (Airports Council International, International Air Transport Association and World Wide Airport Coordinators Group, 2020, p. 10[87]). Level 3 or co-ordinated airports are those in which the demand for airport infrastructure – such as runways, aprons and terminals – significantly exceeds the airport's capacity, and this cannot be solved through expansion in the short term or voluntary schedule adjustments.[94]

According to IATA, there are more than 200 slot co-ordinated airports over the world, accounting for 43% of global traffic, and this number is expected to rise (International Air Transport Association, 2022[88]).[95] To land or take off in a slot co-ordinated airport, airlines and other aircraft operators must have a slot allocated by the local airport co-ordinator.

In a Level 3 airport, the slot-allocation process has three main actors: 1) the airport operator, which sets the supply-side inputs, i.e. the airport capacity for the given period or the available slots per hour; 2) the airlines, which define the demand side, seeking to obtain slots to operate at the airport; and 3) the slot co-ordinator, an independent authority responsible for allocating the slots according to WASG rules (Jiang and Zografos, 2021, p. 2[89]).

In general, slots are allocated for a six-month "season", and requests usually consist of a set of demands for the same time, normally on the same day of the week and for a period of at least five weeks. After defining the co-ordination parameters, which include the maximum capacity available for allocation at a given airport, the co-ordinator proposes an initial allocation of slots to airlines based on their requests. Airlines and co-ordinators then meet at the biannual IATA slots conference, where airlines have the opportunity to discuss schedule adjustments with co-ordinators and may trade slots, thorough bilateral approaches. Following the slot conference, slot allocation may continue until the beginning of the season, either for new requests or modification or exclusion of existing requests (Fairbrother, Zografos and Glazebrooka, 2020, p. 116[90]).

Concerning the criteria for slot allocation, the WASG establish a principle of historic precedence (also known as a grandfather clause), according to which "an airline is entitled to retain a series of slots for the next equivalent season if they were operated at least 80% of the time during the period for which they were allocated" (Airports Council International, International Air Transport Association and World Wide Airport Coordinators Group, 2020, p. 33[87]).

Slots are therefore first allocated to airlines that had the corresponding series of slots in the preceding season, as long as they complied with minimum slot usage of at least 80%, the so-called "use it or lose it" rule. Incumbent airlines are also entitled to request a change to the time of a slot. Only after meeting the slot-allocation requests from incumbent airlines are remaining slots allocated to new entrants. An airline is considered a new entrant when it does not have significant presence at the airport (Fairbrother, Zografos and Glazebrooka, 2020, p. 116[90]).

The slots remaining after the initial allocation of historical slots constitute the slot pool. According to the guidelines, 50% of the slots from this slot pool should be allocated to new entrants and the other 50% should be allocated to non-new-entrant requests, unless the corresponding requests are less than 50%.

The WASG also state that when slots cannot be allocated through the criteria outlined above, co-ordinators should consider a set of factors to determine how to allocate the remaining slots. Those factors include the effective period of operation, operational factors, type of consumer service and market, connectivity, competition and environment (Airports Council International, International Air Transport Association and World Wide Airport Coordinators Group, 2020, pp. 35-36[87]).

"Slot mobility" through the swapping or transferring of slots between airlines in a secondary process, whether for compensation or free of charge, is not prohibited by WASG. However, special attention should be given to newly allocated slots, namely in the case of transfers, in order to prevent airlines taking advantage of an enhanced priority to obtain slots simply to transfer them to another airline (Airports Council International, International Air Transport Association and World Wide Airport Coordinators Group, 2020, pp. 35-36[87]).

2.5.1. Slot allocation in Brazil

Description of the obstacle and policy makers' objective

Brazil uses an administrative mechanism that follows WASG for managing congested airports with slot allocation currently regulated through Resolution No. 338/2014, issued by the National Civil Aviation Agency (ANAC), the slot co-ordinator in Brazil. The main goal of the mechanism is to allocate scarce capacity in the most efficient possible way, with slots allocated to those airlines that can use them to the greatest benefit of aviation users (Egeland and Smale, 2017, p. 25[86]).

The slot-allocation process is primarily based on precedence: slots allocated to an airline in the previous equivalent season entitle it to claim the slots the next year season.[96] To retain historical slots, airlines must comply with the "use it or lose it" rule: a minimum regular operation of not less than 80% and a maximum tolerated delay in arrival or departure of not more than 15 minutes.[97]

Use of allocated slots is monitored by ANAC,[98] and if the minimum-usage requirement is not met, the respective slots are returned to the slot pool for the next equivalent season.[99] Slot monitoring also intends to prevent "slot hoarding" or misuse of slots by incumbent airlines, which can include use of airport infrastructure at a co-ordinated airport to operate a flight without an allocated slot, operation of a flight in a significantly different way to the allocated slot (such as a different aircraft type, capacity or time), and holding slots that the airline does not intend to operate.[100] According to Resolution ANAC No. 338/2014, in case of misuse of slots an airline loses its precedence.[101]

After the allocation of slots to incumbents, any remaining slots in the pool – usually around 50% – are distributed between incumbents and new entrants.[102] When ANAC designates an airport as co-ordinated or Level 3, it establishes the percentage of slots from the pool that needs to be allocated to new entrants. The minimum percentage is 50% (in line with the WASG), but ANAC may determine a higher number.[103] ANAC must also determine the criterion for the definition of new entrants. Resolution ANAC No. 338/2014 provides that airlines holding at most five slots on a specific day at a co-ordinated airport are considered new entrants. Nevertheless, ANAC may establish that airlines holding more than five slots are also considered new entrants.[104]

The remaining slots from the pool (usually 50%) are allocated to new entrants and incumbents. Requests for the continuation of the previous season's slots are prioritised over new operations.[105] If there are similar requests based on the same grounds – either for continuation or for new operations – the slots are allocated equally among all airlines that presented a request.[106]

Resolution ANAC No. 338/2014 forbids the sale or lease of slots, even fee free, but regulatory changes have recently been made.[107]

Allocated slots may be exchanged between air carriers, however, but only one for one and each transaction is subject to ANAC approval. Slot swaps may be annulled by ANAC if one of the airlines does not effectively use the corresponding slot. Resolution ANAC No. 338/2014 prohibits swapping slots allocated to a new entrant, unless 1) the series of slots have been operated for two equivalent seasons; 2) both airlines are new entrants; or 3) the swap benefits the airport infrastructure, at the discretion of ANAC.[108]

At the time of drafting this report, ANAC was in the process of approving Resolution ANAC No. 682/2022 to replace Resolution ANAC No. 338/2014, which occurred in June 2022.[109] The new resolution retains the main features of the old regulation, but makes two important changes.

First, slot trading becomes legal, with ANAC approval. Only slots operated for three equivalent seasons are allowed to be traded. If an airline transfers its slots, it will not be entitled to obtain new slots from the pool for three equivalent seasons, unless no other airlines are interested. These limitations aim to prevent speculation and distortions through a market-based mechanism.

Second, when designating a given airport as co-ordinated, ANAC may establish a slot cap for each airline, unless no other airlines are interested in obtaining the slots. When this is the case, the ceiling also applies to slots acquired through trading and mergers. This intends to limit concentration and foster market contestability.

Harm to competition

Economic literature and international experience

Although administrative-demand management strategies, particularly WASG scheme, aim to reduce delays and increase the efficient use of airport infrastructure, several competition problems may arise from the current system.

The main issue concerns the grandfather clause, which grants incumbent airlines more favourable treatment, possibly preventing (or at least restricting) new entries. In fact, the need for slots is the most critical barrier deterring entry into congested airports, especially on certain routes, since in these cases most of slots are already allocated to incumbent airlines (OECD, 1999, p. 11[91]) (OECD, 2014, p. 15[92]) (Egeland and Smale, 2017, p. 26[86]).

Indeed, incumbent airlines are the leading firms at the largest co-ordinated airports in Europe and in the United States, controlling most slots at these airports (Table 2.10).

Table 2.10. Market share of leading airline at major Level 3 airports in Europe and the United States, 2017

Airport	Dominant airline	Percentage of total flights
Amsterdam Schiphol (AMS)	KLM	48.61%
Barcelona El Prat (BCN)	Vueling Airlines	39.87%
Frankfurt (FRA)	Lufthansa	64%
Istanbul Atatürk (IST)*	Turkish Airlines	78.86%
London Heathrow (LHR)	British Airways	47.76%
London Gatwick (LGW)	easyJet	43%
Madrid Barajas (MAD)	Iberia	31.48%
Moscow Sheremetyevo (SVO)	Aeroflot	79.60%
Munich (MUC)	Lufthansa	58.07%
Paris Charles de Gaulle (CDG)	Air France	49.21%
Rome Fiumicino (FCO)	Alitalia	39.64%
New York John F. Kennedy (JFK)	Delta Air Lines	26.09%
New York LaGuardia (LGA)	Delta Air Lines	40.03%
Washington Ronald Reagan (DCA)	American Airlines	52.20%
Total average		**49.88%**

Note: In April 2019, all scheduled commercial passenger flights were transferred from Istanbul Atatürk airport to the new Istanbul airport. The IATA airport code (IST) was also transferred to the new airport.
Source: (Air Transport Research Society, 2019[93])

One 2013 study indicated that the non-availability of slots at major airports was perceived as the most severe entry barrier to aviation markets by managers of airlines from the European Union and European Free Trade Association states (Kappes and Merkert, 2013, p. 62[94]).

Due to the grandfather clause, slot mobility is low at many congested airports. A 2011 study for the European Commission indicated that at the most congested airports in the European Union, only one – London Gatwick, then in the EU – had undergone a relevant change in slot holdings in the previous five years (Steer Davies Gleave, 2011, p. 123[95]).

Furthermore, the current system contributes to the market's low contestability, since the new-entrant rule results in schedule fragmentation, allocating a small, post-incumbent number of slots to a large number of airlines, which may not have sufficient presence at the airport to be able to provide effective competition (Steer Davies Gleave, 2011, p. 196[96]). Indeed, mid-sized incumbents, already holding a set of slots, are a stronger competitive threat to dominant airlines than smaller new entrants, with no or only few slots (Haylen and Butcher, 2017, p. 13[97]).[110]

From a competitive perspective, the present model may also lead to sub-optimal or undesirable mergers and acquisitions, which may contribute to market concentration. A merger or acquisition consolidates all slots previously held by the airlines involved in the transaction. Although concentrations may create synergies, they may also be used by the buyer solely as a means to acquire slots, without any further efficiency arising from the merger. Even if competition authorities might require divestiture of certain acquired slots, the others remain available for use by the acquiring airline to develop its own route portfolio (Gillen and Starkie, 2015, p. 8[98]).

Besides the lack of contestability, the slot-allocation system is criticised as inefficient from an economic point of view. Indeed, the mechanism may discourage airlines from optimal use of available airport infrastructure as the regulations may allow incumbent airlines to cancel unprofitable flights systematically, while retaining the ability to deter the entry of potential rivals at congested airports (Miranda and Oliveira, 2018, p. 201[99]). The "use it or lose it" rule may not be enough to ensure the efficient use of the infrastructure, since airlines may not have incentives to cede slots out of fear of rival entry (Avenali et al., 2015, p. 27[100]).

In fact, the literature points out several cases of so-called "slot hoarding" behaviour (also known as "slot babysitting"), when airlines use slots sub-optimally by operating low load factors or small aircraft at highly congested airports, in order to preserve their slots. This limits the total number of passengers transported and may lead to higher fares (Haylen and Butcher, 2017, p. 12[97]).

Moreover, the current slot-allocation mechanism is insulated from market forces (Ball, Berardino and Hansen, 2018, p. 190[101]). Airports are not allowed to charge market-clearing prices for slots, which means airlines with the greatest willingness to pay have no opportunity to do so, and incumbents may pay less than a possible market price, thus earning economic rents (Haylen and Butcher, 2017, p. 12[97]). This prevents efficient outcomes, such as the possibility of creative use and novel business models (Ball, Berardino and Hansen, 2018, p. 193[101]).

Slot allocation can also lead to higher prices for consumers (Ball, Berardino and Hansen, 2018, p. 190[101]) (Oliveira, 2016, p. 44[102]). For example, one 2014 study found that routes involving slot-controlled airports have airfares 7.0% higher on non-stop routes and 4.3% higher on one-stop routes, which suggests the scarcity value of airport slots (Zou and Hansen, 2014, p. 63[103]).[111]

In 2017, the International Transport Forum (ITF) held a roundtable to discuss how to improve the efficiency of airport-infrastructure use, and promote a more competitive environment at congested airports (Box 2.18).

Box 2.18. ITF roundtable on capacity building through efficient use of existing airport infrastructure

In March 2017, ITF held a roundtable discussion on capacity building through the more efficient use of existing airport-infrastructure, during which different measures were examined to improve the efficiency of airport capacity.

Experts agree that the WASG have worked, albeit not perfectly, where airport capacity is managed with administrative slot allocation. Two specific weaknesses of the WASG were highlighted: failure to re-allocate some of the existing capacity to new entrants and failure to deliver new capacity to new entrants in practice.

Pairing WASG with market-based mechanisms, such as secondary slot trading and auctioning, was seen as a way to increase economic efficiency, even if they might lead to extreme disruption to airline businesses and the reallocation of windfall rents. Peak pricing was also considered as a policy option, but its use in practice has not produced the desired outcomes.

The introduction of traffic distribution rules (TDRs) was also discussed. Banning specific types of aviation – say, general or military – from civil-aviation airports may have positive impacts on air connectivity. For instance, London Heathrow airport has banned general aviation flights completely and freight-only flights at peak times. Paris Le Bourget now serves general aviation and business jets, freeing up capacity at Paris's two other airports, Charles de Gaulle and Orly, for additional scheduled passenger services.* On the downside, segregating traffic usually leads to poor efficiency and air-connectivity outcomes. If TDRs are introduced, they should be easy to understand and non-discriminatory, with interventions targeted and proportionate, implemented in a transparent fashion with independent and impartial overseers.

Furthermore, developing technical innovations to improve use of available airport capacity may foster more efficient use of existing airport infrastructure, especially reducing the need for policy restrictions that constrain capacity in order to reduce adverse impacts of aviation activity, particularly in terms of noise and air pollution. Accordingly, there may be room for relaxing policy constraints on airport capacity in view of technological advancements enabling production of quieter, more environmentally friendly aircraft.

In addition, technological advancements to improve airport efficiency should also be considered. These include collaborative decision making; co-ordinated arrival-departure management; implementation of time-based separation rather than distance-based separation for aircraft arrivals; and better airside and landside co-ordination through simulation modelling.

Moreover, if incentivising the use of larger aircraft by airlines might reduce capacity pressure at more congested airports, then any airport charging higher charges for bigger aircraft should review its policies.

Finally, a discussion was held about how governments could increase efficiencies of multi-airport systems by redistributing traffic across different airports in the same city conurbations, namely by removing access barriers to airports, particularly in relation to surface access.

Note: *A similar idea was suggested by SEAE for Brazilian airports in 2021 (Secretaria de Advocacia da Concorrência e Competitividade, 2021[104]).
Source: (Egeland and Smale, 2017[86]).

The Brazilian market

Today, Brazil has 5 Level 3 or co-ordinated airports: Belo Horizonte Pampulha (PLU), São Paulo Congonhas (CGH), São Paulo Guarulhos (GRU), Recife (REC), and Rio de Janeiro Santos Dumont (SDU).[112]

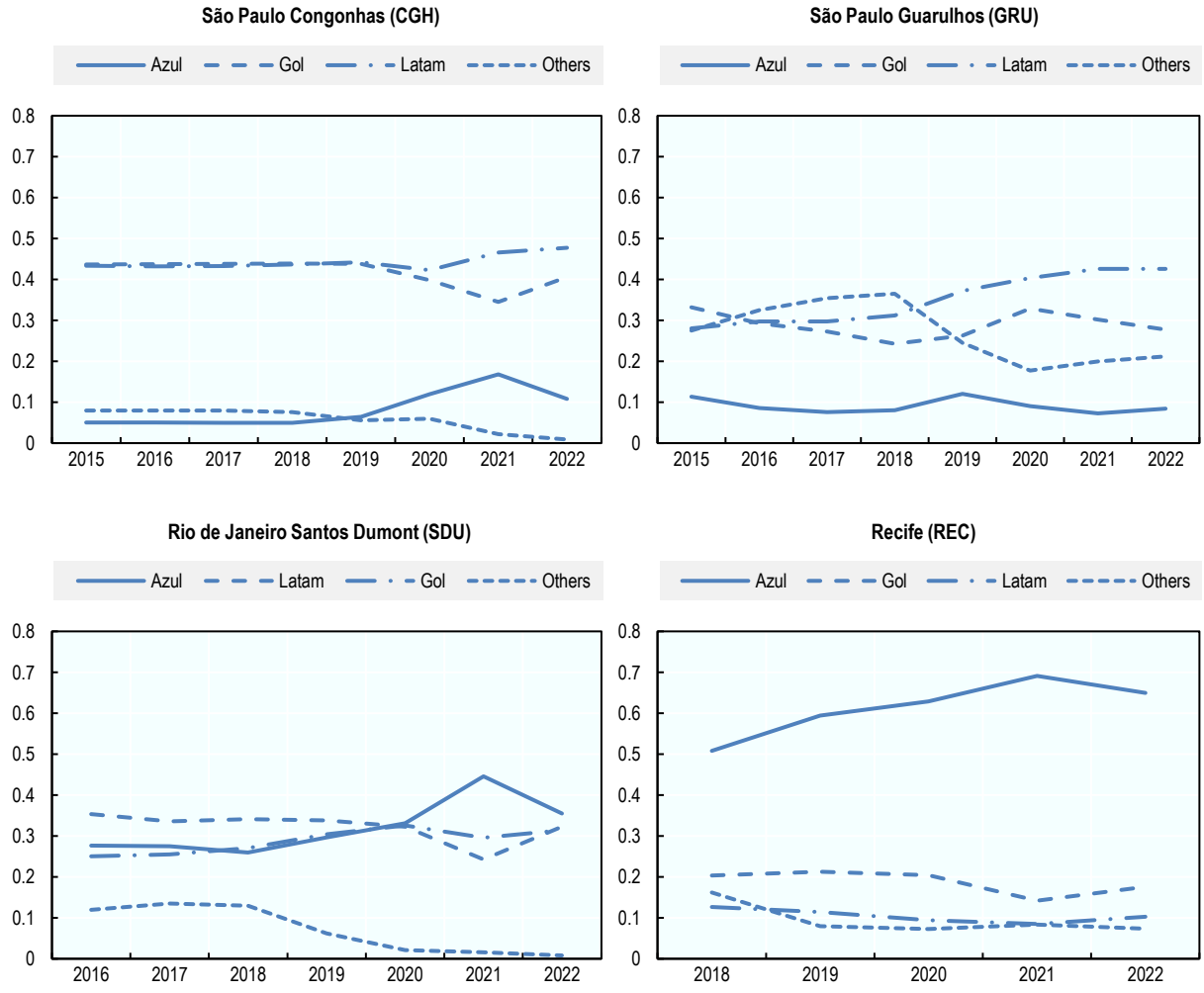
The concerns raised in academic literature and international experience of slot allocation also apply to Brazil. Indeed, the current system may actually be increasing concentration, enhancing market power of incumbents, preventing new airlines from entering the market, and promoting inefficient use of airport infrastructure.

São Paulo Congonhas airport (CGH) is the most congested airport in Brazil. It is located in the centre of the country's largest city and economic capital, which prevents any further increase of its capacity. Congonhas was the second busiest airport in Brazil in 2019, third busiest in 2020, and fourth busiest in 2021 (ANAC, 2022[105]). This makes discussions about slot allocation particularly important at Congonhas.

Two major carriers have traditionally provided most flights at Congonhas: Varig and Tam in the early 2000s, and Tam (later Latam) and Gol from the mid-2000s. In 2007, Varig was acquired by Gol, allowing the latter to access its once-competitor's slots at Congonhas (Box 2.20). From 2008 to 2013, Tam/Latam and Gol together accounted for around 90% of all flights at the airport, a concentration that remained similar until 2018 (Miranda and Oliveira, 2018, p. 206[99]) (DEE/CADE, 2019, p. 9[106]). In 2019, Avianca, at the time the fourth-largest airline in Brazil with the third-largest market share at Congonhas, went bankrupt. This allowed ANAC to take innovative decisions to increase competition at that airport, even if the two dominant air carriers maintained their market share (Box 2.19).

Figure 2.18 demonstrates how slots were allocated at four Brazilian co-ordinated airports from 2015 to 2022, and shows that the main Brazilian airlines holding large market shares at these airports has changed little over this time.

Figure 2.18. Allocated slots at co-ordinated Brazilian airports, 2015-22



Source: ANAC, https://sistemas.anac.gov.br/dadosabertos/Voos%20e%20operapercentageC3%A7%C3%B5es%20apercentageC3%A9reas/Slots%20Alocados/2021/..

Box 2.19. Reallocation of Avianca's slots at São Paulo Congonhas airport, 2019

In 2019, a discussion on slot allocation emerged after the bankruptcy of Avianca. At São Paulo Congonhas airport, Latam held 236 slots; Gol, 234; Avianca, 41; and Azul, 26. According to the general rule provided in Resolution ANAC No. 338/2014, an airline with more than five slots at a given airport is considered an incumbent. This meant that at Congonhas Azul had no right to preferential treatment over Latam and Gol for Avianca's slots. In practice, following that rule would have seen Latam and Gol further increase their (already large) share of slots.

In line with opinions issued by CADE's Department of Economic Studies and the Brazilian consumer-protection authority, SENACON, and based on the flexibility provided in Resolution ANAC No. 338/2014 for the definition of certain slot-allocation parameters, ANAC took the innovative decision to allocate Avianca's slots to new entrants first (DEE/CADE, 2019[106]) (Secretaria Nacional do Consumidor, 2019[107]). This was possible following Resolution ANAC No. 338/2014, which allowed the agency to establish the percentage of slots from the pool that shall be distributed to new firms at the airport (not less than 50%).

Furthermore, ANAC changed the criterion for defining new entrants. Instead of a maximum of 5 slots, an airline at Congonhas would be considered a new entrant even if it held up to 54 slots a day (or the equivalent to 10% of the airport's total slots).

In doing this, ANAC took into account the hypothesis that the new-entrant rule then in place resulted in schedule fragmentation by allocating a small number of slots to a large number of airlines, many of which were without the economic scale to compete effectively at the airport.

With the new rules, Azul was considered a new entrant and the new allocation procedure left it with 41 slots at Congonhas. Two small airlines obtained the remaining slots: Passaredo finished with 14 and Map with 12. Latam and Gol acquired no new slots. This solution promoted more competition at the airport, albeit in a limited way.

ANAC had previously fixed the minimum slot usage ("use it or lose it") at CGH at 90%, and that level was left in place.

The decision also indicated that ANAC was willing to review Resolution ANAC No. 338/2014 in order to evaluate new mechanisms that aimed to reduce entry barriers and promote competition at congested airports. The issue was part of ANAC's regulatory agenda for 2021/2022 and resulted in June 2022 in Resolution ANAC No. 682/2022. ANAC has also re-established the parameters for slot allocation at Congonhas, including: 1) reducing the minimum slot usage to 80%; 2) setting the level that an airline is considered a new entrant at up to 18 slots a day; 3) establishing that 100% of slots from the pool are first allocated to new entrants; and 4) establishing that one airline must not hold more than 45% of the airport's total slots.

Source: (ANAC, 2021[108]) and Proceeding No. 00058.047435/2020-12.

The issue of slots at co-ordinated airports has been highlighted by CADE as a relevant barrier to entry in the airline market. For instance, Brazil has experienced mergers whose main goals appeared to be the acquisition of airport slots, such as Gol's acquisition of Varig in 2007. In particular, a merger may be a practical solution to bypass the prohibition of trading slots. Box 2.20 illustrates how CADE has assessed airport slots in some merger-control cases involving airlines.

Box 2.20. CADE analysis of airport slots in merger cases

Over the past two decades, following the liberalisation and deregulation of the civil-aviation sector, the Brazilian market has changed, with airlines merging and forming alliances. When assessing transactions between airlines, allocated slots were considered by CADE and in certain cases justified the designation of remedies.

Varig/Gol case, Proceeding No. 08012.003267/2007-14

In 2007, CADE cleared Gol's acquisition of Varig, imposing only the exclusion of a non-competition clause covering cargo transport, which was not part of the relevant market at stake. Once the largest Brazilian air carrier, Varig had at the time of the transaction been experiencing severe financial problems for several years. Its remaining profitable assets were purchased by Gol, then an emerging Brazilian low-cost airline. CADE paid special attention to analyse the situation at São Paulo Congonhas, at which Gol was set to acquire a large set of slots. In spite of the slot concentration at the airport, CADE's Tribunal decided that airfares charged by airlines operating at the airport indicated the existence of a competitive market. Besides, competing airlines had idle capacity and would be able to compete with Gol.

TAM/LAN case, Proceeding No. 08012.009497/2010-84

In 2010, Chilean airline LAN and Brazilian TAM merged to form LATAM, the largest carrier group in South America. The case raised competition concerns about the availability of airport slots to competing airlines at São Paulo Guarulhos airport. CADE and the Chilean competition court cleared the transaction subject to remedies, including the exchange of four pairs of daily slots with another airline allowing new flights between São Paulo and Santiago in Chile.

Gol/Webjet case, Proceeding No. 08012.008378/2011-95

In 2011, Gol acquired Webjet, another Brazilian low-cost carrier. At the time of the transaction, Gol had 37.5% of domestic market share and Webjet 5.5%. CADE assessed operations at congested airports, and competition concerns were detected at Rio de Janeiro Santos Dumont airport. The transaction was finally approved subject to a behavioural remedy involving commitments to operate the allocated slots efficiently at Rio de Janeiro Santos Dumont. Among the commitments, Gol had to use allocated slots at Santos Dumont at least 85% of the time every three months or the slots would be returned to ANAC.

Azul/Trip case, Proceeding No. 08700.004155/2012-81

In 2012, Azul and Trip merged. At that time, Azul had 10% of domestic market share and and Trip 4.5%. Most of the routes on which both airlines directly competed before the merger were at regional airports, without capacity constraints, the only exception being Rio de Janeiro Santos Dumont. CADE approved the transaction subject to a behavioural remedy similar to that imposed in the Gol-Webjet case to ensure the efficient operation of allocated slots at Santos Dumont, under penalty of returning the unused or underused slots to ANAC.

TAM/Iberia/British Airways case, Proceeding No. 08700.004211/2016-10

In 2017, LATAM through TAM and International Consolidated Airlines Group (IAG) through Iberia and British Airways signed a joint business agreement comprising air passenger and cargo transport between Europe and South America. In practice, the case represented a metal-neutrality joint venture, a comprehensive economic sharing agreement in which costs and revenue are shared between each partner airline regardless of which one actually carries the passenger. The transaction raised competition concerns related to the route between São Paulo and London, since it would have been

monopolised by the merging parties and there were severe slot restrictions in London, especially at Heathrow. Among the remedies imposed by CADE, the merging airlines were required to lease free of charge for ten years a pair of slots at London Heathrow or London Gatwick airports to another air carrier, allowing a new flight on the São Paulo-London route.

Source: (CADE, 2017[109]).

There is no minimum aircraft capacity – the number of seats on each flight – to operate at congested airports in Brazil. In fact, smaller airlines can obtain slots to operate low-capacity aircraft, which means that fewer people can be transported at the congested airport, potentially reducing overall consumer welfare. Also, it is unclear whether allowing small airlines to enter the market to operate such flights actually poses a competitive threat and substantially enhances competition. When reallocating slots at Congonhas in 2019, limiting slot allocation to a minimum aircraft capacity was expressly refuted by ANAC, which stated the need to ensure new entry in the market, regardless of the total number of passengers transported.

In light of the slot-allocation model implemented by ANAC, one study evaluated Congonhas from 2002 to 2013 using an econometric model (Miranda and Oliveira, 2018[99]). It found evidence that market concentration on a given route is likely to reduce flight disruptions such as delays and cancellations, as more intense competition tends to force airlines to improve their service quality to passengers. Moreover, airlines strategically manage flight disruptions and employ schedule padding, adding extra time to a flight's scheduled arrival time to reduce the risk that the flight is considered delayed by the authorities. It was also pointed out that flight-disruption costs appeared to be passed onto consumers.

The study also noted that airport slots may have a role in strengthening the internalisation of congestion costs by dominant airlines. Although slot concentration may induce "slot hoarding" behaviour by airlines, the assessed period showed that those practices were not effective. In fact, over the study's duration, the number of flight delays at Congonhas dropped by 50% and flight cancellations by 69%. Nevertheless, the study found evidence that the average aircraft size decreased over the period, which may indicate a potentially inefficient use of airport infrastructure.

In conclusion, the paper stated that a traditional model of slot allocation (grandfather clauses combined with the "use it or lose it" rule) would be sufficient to lead to the internalisation of congestion externalities (some of which are currently borne by consumers, such as flight cancellations or delays) by dominant airlines (Miranda and Oliveira, 2018[99]).

A more recent study by a consulting firm contracted by the Brazilian Ministry of the Economy, with support from the United Nations Development Programme (UNDP), to propose regulatory solutions for an optimisation of airport slot allocation in Brazil, seems to be in line with the earlier paper (LL Advogados and PEZCO, 2021[110]). The study developed an econometric model to assess whether Resolution ANAC No. 338/2014 had impacted consumers. The results showed that slot concentration at Congonhas (as already noted, the most restricted airport in Brazil) has relevant, but specific effects on fares in the São Paulo region. This suggests that not all cases of slot concentration are detrimental to price competitiveness. Although in some cases slot concentration produces market power, in others it may generate pro-competitive effects. Indeed, the current regulatory framework has allowed the market to increase consistently, including with lower prices for consumers. However, the study highlighted that market shares of incumbent airlines have now stabilised, which indicates a need to focus on market contestability.

Other studies have been carried out by the Brazilian Government in order to evaluate whether and how Resolution ANAC No. 338/2014 should be amended or replaced. For example, SEAE and the World Bank have carried out a study on slot allocation regulation in Brazil, concluding that the current regulation did not reduce market concentration at congested airports (Secretaria de Advocacia da Concorrência e Competitividade, 2021[104]).

Another issue that may limit competition in Brazil is the restriction on transferring slots. Until recently, only free transfer between airlines belonging to the same economic unit or free one-for-one swaps not involving new entrants, were allowed. Slots may have different economic values, and the restriction of swapping one slot for more than one may prevent transactions that would be mutually beneficial for the parties and that could improve efficiency.

The WASG do not prohibit slot transfers between airlines, whether or not for compensation or consideration, although they highlight that national law may prohibit such transactions (Airports Council International, International Air Transport Association and World Wide Airport Coordinators Group, 2020, p. 40[87]). At least in theory, the inclusion of a market mechanism could enhance competition and efficiency, even though it seems reasonable to keep some sort of regulatory control, especially to prevent abusive behaviour by dominant airlines (see Annex 2.A). As previously noted, in the recently approved Resolution ANAC No. 682/2022, ANAC has allowed airlines to trade slots, under certain circumstances.

In summary, competition concerns related to airport slot allocation in Brazil seem to be aligned with concerns already identified in the economic literature and verified in other jurisdictions. This is the case of increasing market concentration and market power, as well as the inefficient use of airport infrastructure. This is not surprising since Brazil follows the WASG, which is also used by most jurisdictions.

Recommendation

The OECD recommends that the Brazilian authorities review the current regulation on slot allocation, in order to increase competition at congested airports. For that purpose, they should consider the following changes:

- improvements to the current administrative mechanism, such as, for example, making the grandfather clause more flexible; establishing a percentage higher than 50% of slots from the pool that need to be allocated to new entrants;[113] adopting a maximum number of slots an airline can hold at a given airport; determining expiry dates on grandfather clauses, after which the slots are returned to the pool and then reallocated to other airlines; revising the rule for new entrants;[114] and improving the determination of airports' declared capacity.[115]
- adoption of market-based mechanisms, such as congestion pricing,[116] slot auctions and slot trading, to replace the WASG model or as an additional feature to the current system.

2.6. Civil-aviation personnel

The personnel working in civil aviation includes employees from the entire air-transport industry, with airlines, air-navigation service providers, airports, and the civil-aerospace sector (Air Transport Action Group, 2020, p. 19[111]). This includes pilots, cabin-crew members, flight dispatchers, air-traffic controllers and ground-handling and aircraft-maintenance staff, jobs that in many cases require specialised qualifications, such as a licence, and a significant amount of training.[117]

A licence, according to the International Civil Aviation Organisation (ICAO), is a way that a state can authorise its holder to perform specific activities that, unless performed correctly, could jeopardise aviation safety. Therefore, the licence provides evidence that the issuing state is satisfied that the holder has demonstrated an internationally acceptable degree of competency (International Civil Aviation Organization, 2012, p. 22[112]). In Annex 1 to the Convention on International Civil Aviation, ICAO also provides international standards and recommended practices for licensing flight crews[118] and other personnel.[119]

Accordingly, licensed aviation professions are subject to regulations that seek to promote aviation safety.[120] These requirements vary according to the specific profession, but usually comprise training, practical experience, examinations, and characteristics such as age, citizenship and language competence.

2.6.1. Licensed civil-aviation personnel in Brazil

Background

In Brazil, the following civil-aviation professions are regulated by ANAC:[121]

1. pilots[122]
2. flight mechanics[123]
3. flight attendants[124]
4. flight dispatchers[125]
5. aircraft-maintenance technicians.[126]

The first three professions compose the aircrew, which provides services on an aircraft during a flight, with pilots and flight mechanics comprising the flight crew and flight attendants the cabin crew.[127] The number of members of a flight and cabin crew varies according to the type of aircraft.

On the ground, flight dispatchers are responsible for the control and supervision of flight operations and aircraft-maintenance technicians ensure the continuing airworthiness of an aircraft (International Civil Aviation Organization, 2007[113]).

In line with Annex 1 to the Convention on International Civil Aviation, there are different kinds of pilot licences: 1) private; 2) commercial; 3) multi-crew; 4) airline transport; 5) glider; and 6) free balloon. The total number of civil-aviation licences issued by ANAC between 2010 and 2022 is presented in Table 2.11.

Table 2.11. Civil-aviation licences issued in Brazil, 2010-2022

Type of licence	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Airline transport pilot (aeroplane)	651	837	531	197	257	444	404	440	352	382	249	208	58
Airline transport pilot (helicopter)	185	180	201	167	153	79	41	25	52	33	12	36	22
Commercial pilot (aeroplane)	1 292	1 640	2 043	1 712	1 534	1 273	991	895	864	959	806	939	305
Commercial pilot (helicopter)	401	433	628	753	615	318	180	165	146	110	80	103	31
Private pilot (aeroplane)	2 310	2 680	3 754	2 885	2 439	2 308	1 753	1 442	1 369	1 615	1 448	1 517	422
Private pilot (helicopter)	680	639	1009	911	727	558	293	186	177	185	130	178	60
Other pilots*	416	625	639	406	413	352	324	242	354	775	362	369	88
Flight attendant	2 896	2 360	1 354	384	435	686	211	766	801	839	237	85	235
Flight mechanic	3	12	5	0	0	4	0	1	1	0	0	0	0
Aircraft-maintenance technician	NA	NA	NA	NA	NA	NA	NA	NA	NA	661	329	481	NA
Flight dispatcher	NA	NA	NA	NA	NA	NA	NA	NA	NA	13	4	2	NA
Others**	27	60	165	17	15	21	6	8	11	0	2	3	0
Total	**8 861**	**9 466**	**10 329**	**7 432**	**6 588**	**6 043**	**4 203**	**4 170**	**4 127**	**5 572**	**3 659**	**3 921**	**1 221**

Notes: * Glider pilots, free-balloon pilots and sport pilots. ** Others include specialised operators and designated examiners, for example.
Source: OECD calculations, based upon (ANAC, 2022[114]) and other data provided by ANAC, up to 1 May 2022.

Each type of licence has different requirements (Table 2.12).

Table 2.12. Requirements for civil-aviation personnel licensing

Licence/ requirement	Pilot*	Flight mechanic	Flight attendant	Flight dispatcher	Aircraft-maintenance technician
Minimum age	18 and 21 for airline-transport pilot	21	18	21	18
Educational level	Secondary school	Secondary school	Secondary school	Secondary school	Secondary school
Language proficiency	Portuguese + English to operate a Brazilian aircraft outside Brazilian airspace	Portuguese	Portuguese	Portuguese	Portuguese
Medical fitness	Class 1 medical certificate for commercial pilot, multi-crew pilot, and airline transport pilot or Class 2 medical certificate for private pilot	Class 2 medical certificate	Class 2 medical certificate	N/A	N/A
Theoretical knowledge	Course for commercial pilot + technical examination	Course + technical examination	Course + technical examination	Experience or course + technical examination	Course or specific degree + technical examination
Experience	Training course, including minimum flight hours: – private pilot: 40 hours – commercial pilot: 200 hours – multi-crew pilot: 240 hours – airline transport pilot: 1 500 hours	Training course, including at least 100 flight hours	Training course, including at least 14 flight hours	Minimum service experience	Minimum service experience
Practical skills	Test	Test	Test	Test	Test

Note: * Glider and free-balloon pilots excluded.
Source: RBAC No. 61, RBHA No. 63, RBAC No. 65, and RBAC No. 67.

Although many of the requirements for obtaining civil-aviation licences in Brazil are in line with Annex 1 to the Convention on International Civil Aviation, there is room for regulatory reforms that would be effective in promoting market entry and competition.

Civil-aviation instruction centres

Description of the obstacle and policy makers' objective

Applicants for a civil-aviation licence must undergo practical training at a civil-aviation instruction centre (CIAC). Additionally, they may also be required to receive theoretical instruction at a CIAC, depending on the requested licence. A CIAC must be certified by ANAC to provide courses for licences for pilots, flight mechanics, flight attendants, flight dispatchers, and aircraft-maintenance technicians. For that purpose, it must demonstrate compliance with requirements related to the training programmes, facilities, equipment, personnel and training material, according to the courses it intends to offer.[128] This aims to ensure that training courses meet instructional quality and safety criteria, and are in line with the standards set out in Annex 1 to the Convention on International Civil Aviation.

In addition, if the CIAC also gives flight instruction on board an aircraft, it requires an ANAC authorisation to operate, since flight training of aircrew is a specialised air service.[129] This rule intends to guarantee that the firm will follow all technical requirements when providing such a service, in order to protect aviation safety.

Since 2017, Law No. 13.475/2017 states that a flight instructor on board an aircraft must be hired by the training organisation on an employment contract.[130] This aims to enhance their employment protection.

Further, to be allowed to give skill tests, a CIAC must be authorised by ANAC and one or more of its instructors certified as an examiner. For that purpose, an instructor must meet different requirements, including: 1) minimum experience (for aeroplane examiners, at least 500 hours of aeroplane flight instruction); 2) a valid licence and ratings for the type of licence to be examined; 3) completed an examiner training course given by ANAC or an organisation authorised by it; and 5) passed a skill test as a certified examiner.[131] These rules aim to ensure that examiners have appropriate qualifications and experience to assess whether an applicant is able to hold a licence, based on objective, transparent and non-discriminatory criteria.

Currently, 333 training organisations are certified as a CIAC in Brazil, although 13 of them have their certification suspended (ANAC, 2022[115]).

Training organisations are free to offer their services in the market and to establish their own prices.

Harm to competition

Requiring a training organisation to be certified by ANAC seems reasonable to guarantee a minimum level of training programmes, and so aviation safety. Indeed, many jurisdictions also require such an approval by the civil-aviation authority, following Annex 1 to the Convention on International Civil Aviation. Nevertheless, this may be burdensome, and increase entry costs, especially for SMEs.

The European Union has introduced an alternative system for training general-aviation personnel that is more appropriate for and proportionate to the needs of these activities. The requirements applicable to approved training organisations (ATOs) were considered too demanding for small general-aviation training providers, mainly run by private flying clubs or private individuals (Euripean Aviation Safety Agency, 2016[116]). Since 2018, what are known as declared training organisations (DTOs) can provide training for non-commercial pilot licences (including private pilot licences) on the basis of a declaration submitted by the representative of the organisation, confirming that it has implemented a safety policy and will comply with the applicable requirements.[132]

This solution is believed to lessen the costs for obtaining a non-commercial pilot licence (Euripean Aviation Safety Agency, 2016[116]). In the long term, this outcome is also likely to reduce the costs of getting a commercial-pilot licence, since obtaining a private-pilot licence is mandatory for becoming a commercial pilot.

As for the need for an authorisation by ANAC to provide flight instruction on board an aircraft – in addition to the required certification – it is worth noting that recent regulation issued by ANAC[133] no longer requires an authorisation for a Brazilian firm to provide air transport services, including specialised air services such as on board training. Instead, a national airline must only be certified by ANAC and operate an aircraft in an airworthy condition and compatible with the intended service. Hence, provisions that demand an authorisation to provide flight training are obsolete. This can raise regulatory and compliance costs facing market players. Furthermore, it can lead to extra costs for operators willing to enter the market, and may discourage new entrants.

Additionally, obliging a CIAC only to hire flight instructors to provide flight training on board an aircraft through an employment contract increases their costs, and so the cost of obtaining a pilot licence. This also prevents commercial pilots holding a flight-instructor certificate from doing freelance work, which could increase their flight experience more flexibly. This may be crucial to becoming a more competitive pilot in the job market, as a higher number of flight hours is usually decisive for getting a job, as well as helping these commercial pilots to achieve the required hours to obtain an airline transport pilot licence. According to ANAC, this is not a technical requirement and does not enhance aviation safety. In fact, before Law No. 13.475/2017 was enacted in 2017 doing freelance work was a common practice.

Recommendations

The OECD has three recommendations.

1. Brazilian authorities should implement a more flexible and less burdensome system for civil-aviation instruction centres delivering training for non-commercial pilot licences, such as allowing them to self-declare their fitness as training organisations.
2. Brazilian authorities should update the legislation requiring an ANAC authorisation for a CIAC to provide flight instruction on board an aircraft. Training organisations should only need to obtain a certification from ANAC and operate an aircraft in an airworthy condition and compatible with the intended training.
3. Brazilian authorities should review the requirement of a training organisation to hire flight instructors only on an employment contract.

Theoretical courses

Description of the obstacle and policy makers' objective

To obtain certain licences, an applicant must take a theory course at a CIAC before taking the technical examination. This is the case for licences for commercial pilots, flight mechanics, flight attendants, flight dispatchers and aircraft-maintenance technicians. For a flight-dispatcher licence, the theoretical course may be substituted by two years of service as an airline-transport pilot or flight mechanic. Those holding a bachelor's degree in aeronautical, electrical, electronics, mechanical or aeronautical-mechanical engineering may be exempted from the technical course for obtaining an aircraft-maintenance technician licence. Applicants for pilot licences (except commercial-pilot licences) must only pass the technical examination.

Harm to competition

The need to take a theoretical course at a CIAC before taking the technical examination increases the costs of getting a licence, and might reduce the number of licensed professionals in Brazil. The examination aims to ensure that applicants have the necessary knowledge of the privileges granted to the holder of the requested licence. Yet requiring a theoretical course may prevent applicants from using self-study methods, which could be both more affordable and satisfactory. For instance, certain licences (such as private pilot and airline-transport pilot licences) do not require a theoretical course.

Annex 1 to the Convention on International Civil Aviation only establishes that the applicant must demonstrate a level of knowledge appropriate to the privileges granted to the licence holder. This gives each signatory state the right to decide how the required level of knowledge is assessed.

In Australia, for example, applicants to private, commercial and air-transport pilot licences, as well as to aircraft-engineer licences only require a theory exam, which can be self-taught.[134] New Zealand similarly only requires an examination for private, commercial and airline transport pilot licences and aircraft-maintenance engineer licences.[135]

Recommendation

The OECD recommends that ANAC considers testing the theoretical knowledge of a licence applicant only through a technical examination, abolishing the requirement of taking a theoretical course at a CIAC and allowing alternative ways of training, including self-study methods.

2.6.2. Nationality requirement

Description of the obstacle and policy makers' objective

According to Brazilian legislation, the aircrew of domestic flights must be composed only of native or naturalised Brazilian citizens.[136] For international flights provided by Brazilian airlines, up to a third of flight attendants on board can be foreigners.[137] In that case, the flight crew – including pilots and flight mechanics – must still be Brazilian citizens. There is no nationality requirement for flight dispatchers and aircraft-maintenance technicians.

Although there is no official recital on the objective of this requirement, it can be assumed that it is intended to support the national labour market and ensure that Brazilian workers acquire the necessary skills to perform as aircrew members. Furthermore, it also seeks to establish a Brazilian workforce to prevent dependence on foreign aircrews. According to ANAC, there are no technical reasons for the nationality requirement.

In case of a shortage of Brazilian workers, foreign instructors may be provisionally admitted, but an ANAC authorisation is required and only valid for the time required to qualify new Brazilian aircrew members and for a maximum of six months. The rationale is to ensure that Brazilian airlines can operate, even without sufficient domestic personnel, but only until enough qualified crew members have been employed.

Foreigners may also be admitted by Brazilian airlines as aircrew members in case of bilateral agreement between Brazil and the country of the workers' nationality, on the basis of reciprocity.[138] However, only a few specific examples of such agreements, with particular airlines and with limited impact, are currently in force.

Harm to competition

The Brazilian nationality requirement is discriminatory. Excluding nationals of other countries reduces the number of people able to offer services in the market. Moreover, the requirement may make the entry of potential market participants more difficult as a consequence of the difficulty and cost of finding suitable crew.

For international flights, even though one-third of cabin crew members may be foreigners, all pilots and flight mechanics must be Brazilian citizens. The nationality requirement only applies to Brazilian airlines, and therefore foreign air carriers providing international flights to and from Brazil and competing with Brazilian firms on the same routes can hire foreign workers. In case of shortage of Brazilian manpower, foreign companies will not be affected, and Brazilian firms will be put at a competitive disadvantage on the routes on which they face foreign competition. Furthermore, multinational crew members can be commercially attractive and constitute a competitive advantage, especially for international flights.

In addition, Brazilian legislation allows foreigners to be employed as a last resort (in case of shortage of Brazilian personnel), but this requires an authorisation from ANAC for which there are no established criteria for assessing such requests, especially how to determine when there is a shortage of workers. This may lead to discretionary decisions and legal uncertainty. Moreover, as the authorisation for hiring foreign workers is limited to the period necessary for instructing new Brazilian aircrew members (up to six months), if no interested national citizens are found to qualify, the shortage of personnel will remain in place.

There appears to be no current shortage of aircrew members in Brazil, and the flexibility on the nationality requirement does not seem to have been applied in practice. On the other hand, Brazilian airlines may not have access to a sufficient supply of aviation personnel in the future. ICAO estimates predict that Brazil will require 9 807 new pilots and 15 922 flight attendants by 2037 (International Civil Aviation Organization, 2018[117]). According to one 2021 study, despite the uncertainties about the recovery of the civil-aviation industry from the COVID-19 crisis, a global pilot shortage will emerge in some regions in the years ahead. Although Latin America is likely to remain closer to equilibrium for pilot supply and demand, Brazilian crew members may be recruited to supply demand in regions facing a pilot shortfall (Murray, 2021[118]).

In most jurisdictions, nationality is not a requirement for working as an aircrew member, but foreigners willing to work in a third country must have the right to work in that country (in addition to hold the appropriate licences or certifications). For example, this is the case in the United States, Canada, the European Union, Chile, China, United Arab Emirates, and Qatar. In Argentina, foreigners can also work as a pilot or flight attendant, but only foreigners with permanent residency can work as a flight mechanic.

Recommendation

The OECD recommends that Brazilian authorities consider relaxing the nationality requirement, especially for international flights. This should include ANAC issuing guidelines on the transparent, objective, and non-discriminatory assessment of requests for temporary admission of foreign crew members when national labour is short. It should also consider the possibility of extending the flexibility period for longer than six months if no sufficient qualified Brazilian workers can be found in that time frame.

2.6.3. Outsourcing aircrew

Description of the obstacle and policy makers' objective

Aircrew cannot be outsourced in Brazil: cabin and flight crew members must be directly hired by the aircraft operator, through an employment contract.[139] This restriction aims to protect workers, especially considering that these activities concern airlines' core business. Where it is allowed outsourcing has resulted in less advantageous working conditions marked by lower union penetration, lower wages, and reduced benefits (International Transport Forum, 2015, p. 20[119]).

Harm to competition

Outsourcing aircrew may be a competitive advantage for airlines, and may reduce their costs. Indeed, in order to increase cost efficiency, flexibility and access to resources, airlines have been increasingly outsourcing functions to third-party organisations (Steer Davies Gleave, 2015, p. 181[120]). Outsourcing aviation personnel is not unlawful in several other jurisdictions, such as the United States and the European Union.

Although in the past few airlines outsourced flight and cabin crew employment, this has been changing in recent years, for example, in the United States and in the European Union (Rutner and Brown, 1999[121]) (Callaci, 2020[122]) (European Parliament, 2016[123]). For instance, in Europe, certain low-cost carriers and even a network carrier were outsourcing flight and cabin crew in 2015 (Steer Davies Gleave, 2015, p. 188[120])

Outsourcing can be especially relevant for small regional air carriers and new entrants, since it allows greater flexibility (as the services are only paid when required) and reduces costs for hiring and training

specialised personnel. This might increase the number of players in the market and ultimately reduce air fares to consumers.

Recent changes in Brazilian labour law have allowed outsourcing even for firms' core business activities.

Recommendation

The OECD recommends that Brazilian authorities consider authorising airlines to outsource aircrew members, in line with national labour law and international practices. Safeguards can be introduced to ensure respect of work conditions, including minimum wages, or collective bargaining.

2.6.4. Flight- and duty-time limitations

Description of the obstacle and policy makers' objective

Part I of Annex 6 to the Convention on International Civil Aviation provides that member states shall establish regulations for the purpose of managing fatigue,[140] with the aim of ensuring that flight- and cabin-crew members can safely perform their duties at an adequate level of alertness.

Indeed, academic literature highlights that the absence of tight regulations can compromise safety standards. The number of fatigue-related safety incidents has grown, and crew fatigue and sleep loss are often the causes of operational errors (Efthymiou et al., 2021[124]).

Fatigue management may be implemented by: 1) prescriptive regulations for flight time, flight duty-period limitations, and rest-period requirements;[141] and 2) authorising operators to use a fatigue risk-management system (FRMS).[142]

The ICAO's "Guidance Material for Development of Prescriptive Fatigue Management Regulations" indicates that limitations for flight times and duty periods should be divided by time periods (International Civil Aviation Organization, 2011, p. 3[125]). For instance, many countries prescribe daily, monthly and yearly flight-time limitations, as well as cumulative duty limitations for specified periods. However, the time periods established by countries vary substantially, according to the perceptions as to what is acceptable. ICAO recommends member states consider the results of relevant scientific principles and knowledge, past experience, cultural issues, and the nature of operations, as well as to examining other states' practices.

Brazil has adopted a prescriptive fatigue-management system, establishing flight-time and duty-period limitations, as well as rest-period requirements.[143] Airlines may mitigate these limitations by introducing an FRMS, which comprises ongoing risk assessment and monitoring, and can develop FRMS that establish other maximum values for flight times and duty periods, based upon data, scientific principles and operational experience to ensure that crews operate at an adequate level of alertness. To be implemented, a FRMS must be approved by ANAC.[144] If an FRMS provides a duty period longer than 12 hours or a rest period of fewer than 12 hours for operations with the minimum required crew, it must be negotiated between airlines and unions thorough a collective labour agreement.[145]

Harm to competition

Although establishing flight-time and duty-period limitations is necessary to prevent fatigue impacting upon aircrew performance and so aviation safety, Brazilian regulation seems to be more restrictive than other jurisdictions, including neighbouring countries (Table 2.13).

Table 2.13. Flight-time, flight-duty period and duty-period limitations

Jurisdiction	Flight-time limitations	Flight-duty-period limitations	Duty-period limitations
Brazil	In the same duty period: – 8 to 10 hours, depending on time of the day and number of landings (with a 2-pilot flight crew) – 10.5 to 14.5 hours, depending on time of the day and rest facilities (with a 3-pilot flight crew) – 11.5 to 16.5 hours, depending on time of the day and rest facilities (with a 4-pilot flight crew) – 90 hours in 28 consecutive days (turbojets) – 900 hours over 365 consecutive days (turbojets)	N/A	–9 to 13 hours, depending on time of the day and number of landings (with a 2-pilot flight crew) – 12 to 16 hours, depending on time of the day and rest facilities (with a 3-pilot flight crew) – 13 to 18 hours, depending on time of the day and rest facilities (with a 4-pilot flight crew) – 60 hours in 7 consecutive days – 100 hours in 14 consecutive days – 176 hours a month – 176 hours in 28 consecutive days
European Union	– 100 hours over 28 consecutive days – 900 hours a calendar year – 1 000 hours over 12 consecutive calendar months	– 9 to 13 hours, depending on time of the day and number of sectors for operations with the minimum required flight crew, extendable up to 3 hours in case of augmented flight crew	– 60 duty hours in 7 consecutive days – 110 duty hours in 14 consecutive days – 190 duty hours in 28 consecutive days
United States	– 8 to 9 hours, depending on time of day (with the minimum required flight crew) – 13 hours (with a 3-pilot flight crew) – 17 hours (with a 4-pilot flight crew) – 100 hours over 672 consecutive hours – 1 000 hours over 365 consecutive days	– 9 to 14 hours, depending on time of day and number of sectors (operations with the minimum required flight crew) – 13 to 17 hours, depending on time of day and rest facilities (with a 3-pilot flight crew) – 13.5 to 19 hours, depending on time of day and rest facilities (with a 4-pilot flight crew)	N/A
Canada	– 8 hours in 24 consecutive hours (operations with a single pilot) – 112 hours in 28 consecutive days – 1 000 hours over 365 consecutive days	– 8 to 13 hours, depending on flight duration, time of day and number of sectors (with a 2-pilot flight crew) – 14 to 15 hours, depending on rest facilities (with a 3-pilot flight crew) – 15.25 to 18 hours, depending on rest facilities (with a 4-pilot flight crew)	– 60 or 70 hours in 7 consecutive days, depending on time off-duty – 192 hours in 28 consecutive days – 2 200 hours over 365 consecutive days
Argentina	– 8 hours in 24 consecutive hours (with a 2-pilot flight crew) – 13 hours in 24 consecutive hours (with a 3-pilot flight crew) – 17 hours in 24 consecutive hours (with a 4-pilot flight crew) – 90 hours a month and 860 hours a year (with a 2-pilot flight crew) – 100 hours a month and 1 000 hours a year (with a 3-pilot flight crew) – 100 hours a month and 1 000 hours a year (with a 4-pilot flight crew)	- 13 hours (operations with a 2-pilot flight crew) - 17 hours (operations with a 3-pilot flight crew) - 22 hours (operations with a 4-pilot flight crew)	N/A
Chile	– 8 hours in 24 consecutive hours (with minimum required flight crew) – 34 hours over 7 consecutive days – 100 hours a month – 1 000 hours a year	– 12 hours (with a 2-pilot flight crew) – 18 hours (with a 3-pilot flight crew) – 20 hours (with a 4-pilot flight crew)	N/A

Note: Longest periods provided in the Brazilian legislation (i.e. Appendix B of RBAC No. 117).
The segment of a flight duty period between an aircraft first moving for the purpose of taking off until it comes to rest after landing and taxiing to the designated parking position.
Source: Brazil (RBAC No. 117); EU (Commission Regulation (EU) No. 83/2014 of 29 January 2014); US (14 CFR Part 117); Canada (SOR/96-433, Part VII, Division III); Argentina (National Decree No. 877/2021); Chile (Resolution 889 EXENTA).

For example, while the maximum flight time for aircrew in Brazil is 16.5 hours (with a 4-pilot crew), in Argentina and the United States, it is 17. The Chilean regulation provides that the maximum flight duty period can be up to 20 hours with a 4-pilot crew, a period longer than the 18 hours in Brazilian legislation. Additionally, the annual flight-time limitation set out in Brazilian legislation is lower than comparable jurisdictions, such as Canada, Chile and the United States.

These limitations increase costs for Brazilian airlines on long-haul flights compared to foreign competitors. These limitations only apply to Brazilian airlines, which means that foreign air carriers providing international flights to and from Brazil are not subject to the Brazilian flight-time limitations. This reduces Brazilian competitiveness compared to neighbouring countries, and may discourage foreign investors from entering the Brazilian market.

According to stakeholders, these restrictions have already prevented Brazilian airlines from providing flights on some routes, because the flight could not be operated, even with four-pilot crews. Although ANAC has recently mitigated these outcomes through RBAC No. 117 (which provides longer flight-time and duty-period limitations under the scope of a fatigue risk management), these limits are still below other countries. Also, despite the fact that since 2020 Brazilian airlines may establish an FRMS with the aim of derogating flight-time limitations, stakeholders suggest that implementing such a system may be costly. In any case, many countries also provide for a FRMS, which does not mitigate the impact of the higher flight-time and duty-period limitations set by the Brazilian legislation.

Recommendation

The OCED recommends that Brazilian authorities consider reviewing flight-time and duty-period limitations, taking into account the regulations established in other jurisdictions, but also relevant scientific principles and knowledge, past experience, cultural issues and operational nature, in line with ICAO recommendations (International Civil Aviation Organization, 2011, p. 3[125]).

Annex 2.A. Slot auctions and slot trading

This annex will further analyse slot auctions and slot trading, which are two of the most discussed solutions for increasing competition in the process of allocating slots. Both options have advantages and disadvantages.

Airport slot auctioning

Advantages

Slot auctioning may allow the allocation of scarce airport capacity to those airlines that value it most (or are most willing to pay) and so will provide more innovative and competitive services (Egeland and Smale, 2017, p. 27[86]) (Bichler et al., 2021[126]).

If the auction is appropriately designed and managed, it may allocate slots in a way that increases efficiency and encourages competition between airlines (Egeland and Smale, 2017, p. 27[86]). Indeed, auctioning slots may reduce barriers to entry, increase regulatory stringency, and prevent the possibility of windfall profits (Pertuiset and Santos, 2014, p. 67[127]).

Auctioning slots would improve overall system performance, as regards the available options between city-pair markets, the daily flight delays, as well as financial considerations for both passengers and airlines (Ball, Berardino and Hansen, 2018, p. 187[101]). Furthermore, auctioning slots could raise funds for the development of new infrastructure to help ease the problem of scarce airport capacity, where expansion is feasible (Egeland and Smale, 2017, p. 27[86]).

Slot auctions may completely or partially replace the current slot-allocation mechanism. Auctions may involve all slots (eliminating the grandfather clause) or only selected slots (such as slots from the pool, slots withdrawn from incumbents, or newly created slots).

Designing smart slot auctions is, nevertheless, a great challenge. They must be allocatively efficient to maximise the value of the allocation and incentive compatible, giving airlines and airports the necessary incentives to take part and bidders an interest in reporting their valuation honestly. They also need to be flexible, allowing airlines to develop a strategy to schedule take-offs and landings, as well as understandable, easily implementable and transparent (Pertuiset and Santos, 2014, p. 67[127]).

Academic literature suggests different approaches to designing slot auctions. One paper, for instance, proposes a Vickrey-Clarke-Groves auction mechanism, which would result in a division of the set of the auctioned slots across several bidders, maximising the seller's income (Pertuiset and Santos, 2014[127]).

Another paper notes that auction markets have been used around the world in similarly challenging environments with successful outcomes (Bichler et al., 2021[126]). Moreover, the authors emphasise the recent advances in economic modelling, computation and algorithms, which should improve the auction design, and consequently allocative efficiency.

Nevertheless, without a periodic reallocation of slots, the same outcomes produced by the present slot allocation model would be reproduced. In other words, an auction allocating unrestricted slot ownership would result in a new status quo, similar to the current one. Periodic slot reallocation through auctions would therefore achieve a vibrant, competitive environment, allowing a new or growing airline to obtain slots at congested airports (Bichler et al., 2021[126]) (Ball, Berardino and Hansen, 2018, p. 192[101]).

Another study used an economic model to investigate the effectiveness of airport slot auction and showed that a slot-auction mechanism is more effective than alternative allocations by a regulator when there is

substantial demand uncertainty (Sheng et al., 2015[128]). Furthermore, although auctioning some slots can improve social welfare, the marginal effect may decrease quickly. In conclusion, the paper indicated that regulators should carefully chose the number of slots to be auctioned, because the acquisition of slots from current users may cause operational disruption and generate transaction costs.

Disadvantages

Despite the advantages, studies have highlighted several limitations of slot auctions (Avenali et al., 2015, pp. 32-33[100]) (Sheng et al., 2015, p. 82[128]). The main criticism is that bids in a slot auction would not reflect slots' social value, but rather issues of market power. Usually, an auction is driven by bidders' profits, which do not take into account consumer welfare (and expected consumer surplus would hardly be measured beforehand). In addition, bidders' valuations rely upon the market structure (such as the degree of competitiveness in a given market) and how the auction was designed, including factors such as the number of available slots, how the bids can be made, and incentives to collude.

The strong complementarity between slots in origin and destination is also relevant, and airlines may manipulate the auction. In fact, the literature has described how when multiple complementary objects are sold that will subsequently be used by winning bidders to compete against each other in downstream markets (such as rights for electricity and gas transmission, mobile licences, and airport slots), auctions can behave in problematic ways, as they can be manipulated by bidders to build market power (Jehiel et al., 2003[129]). In those cases, valuations made by bidders for the multiple auction objects are interdependent, and allocations to one bidder create negative externalities for others. Severe conflicts may be produced between different goals of the auction, especially between revenue maximisation and efficient allocation. Therefore, auctioning slots could lead to rents to dominant air carriers to the detriment of passenger interests (Sheng et al., 2015, p. 82[128]).

The implementation of a slot-auction system may also be difficult from a political point of view. Incumbent slot holders have strong vested interests against change and it might be necessary to consider compensation for grandfather clauses (Ball, Berardino and Hansen, 2018, p. 201[101]). In addition, the withdrawal of slots from incumbents carries the risk of extreme disruption in the airline market, especially for airlines' route scheduling and for airports that rely on long-term airline partners for their business. This could also significantly affect airlines' business values (Egeland and Smale, 2017, p. 28[86]).

International experience

In 2008, the United States Federal Aviation Administration (FAA) endeavoured to auction off 10% of the slots at New York's three major airports: JFK, LaGuardia and Newark.[146] The proposition met with strong criticism, especially from IATA, incumbent airlines, and the airports' operators, who argued that the auction would produce an adverse effect on airport operation, airline services, and the quality of consumer services. The proposal was challenged before the US Court of Appeals for the District of Columbia Circuit and later completely dropped (Avenali et al., 2015, p. 28[100]) (Sheng et al., 2015, p. 81[128]).

In 2015, China announced it would, for the first time, use a market approach to allocate 50% of newly created slots for domestic flights at Guangzhou Baiyun and Shanghai Pudong airports.[147] At Guangzhou Baiyun, nine pairs of slots were auctioned for a three-year period. The winning bidders were the four largest, state-owned Chinese airlines and their subsidiaries, even though some privately owned carriers participated in the proceeding. A lottery ("lucky draw plus charge" model) was used at Shanghai Pudong airport for the allocation of the available slots, and six Chinese airlines obtained slots, including some small carriers. In both cases, winners were allowed to transfer, lease and sell the slots throughout the allocation period (Wen, 2015[130]) (Ballantyne, 2016[131]) (Civil Aviation Administration of China, 2016[132]) (Civil Aviation Administration of China, 2016[133]). This experience showed that auctioning slots does not necessarily lead to more competition in the market, albeit this can be a possible outcome.

Airport slot trading

Advantages

Secondary slot trading may be an alternative for improving the slot allocation at congested airports without changing the primary allocation (the traditional administrative scheme). Monetised slot trading could exert market pressure to alleviate inefficient slot utilisation and enhance economic efficiency, since airlines valuing slots the most would be able to purchase them, regardless of the initial allocation (Haylen and Butcher, 2017, p. 18[97]) (Egeland and Smale, 2017, p. 28[86]). The increased efficiency of this regime would incentivise long-haul over short-haul services and larger over smaller aircraft, and would enhance the average number of passengers per slot.[148] Indeed, the literature indicates that there are greater efficiencies in using slots for larger aircrafts over longer distances with higher payloads of passengers (de Wit and Burghouwt, 2008, p. 154[134]) (Mott MacDonald and European Commission, 2006, pp. 1-11[135]).

Slot trading would allow airlines to recognise the opportunity cost of slots, including the cost of keeping slots in low-value uses. This would establish a market for slots, and it would be easier for new airlines to enter the market and for smaller air carriers to expand their services, promoting more slot mobility (Guiomard, 2018, p. 132[136]).

Allowing slot trading may also prevent mergers aiming to incorporate slots from a third firm, without any further efficiency, which is common in jurisdictions where trading slots is unlawful.

In addition, the ability to participate in a secondary-slot market may lead to an uplift in equity values of airlines as they would be able to include slots valuations as assets on their balance sheets. Moreover, airlines may obtain greater access to debt markets if slots could be collateralised, which could be particularly relevant to air carriers facing financial difficulties (Mott MacDonald and European Commission, 2006[135]). However, this may end up favouring incumbent airlines controlling most slots and so simply further increase their market power.

Disadvantages

There are several concerns about slot trading's ability to achieve a more efficient and competitive distribution of slots. One is that a set of factors may restrict the contestability of the secondary slot market, for example, airlines may hoard slots and not cede prominent slots to rivals. Furthermore, dominant airlines could engage in predatory bidding for slots to keep entrants out of the market and reinforce their dominance at congested airports (Haylen and Butcher, 2017[97]) (Starkie, 2003, p. 59[137]) (Egeland and Smale, 2017, p. 28[86]). Yet, according to the UK's Office of Fair Trading (OFT) – now the Competition and Markets Authority (CMA) – this outcome is unlikely to be produced in cases where the airline does not already have a strong position prior to the secondary trading and would not be the result of secondary trading itself (Office of Fair Trading, 2005[138]).

A potential solution for this concern would be the establishment of a slot cap for each airline at a given congested airport. This restriction would prevent companies from buying slots if they already have a relevant market share at the airport (Secretaria Nacional de Aviação Civil, 2020[139]). Care should be taken on this measure, however, since it may undermine a more efficient distribution of slots, which is slot trading's main goal. Other possible conditions on slot trading in order to promote competition and efficiency are auctions, congestion or peak-load pricing, and trading through a clearing house (OECD, 2014, p. 17[92]). Introducing conditions allowing a new entrant to sell its slots to incumbent airlines may also contribute to the level playing field.

Other potential pitfalls of slot trading are indicated in the economic literature. For example, due to information asymmetry and lack of transparency, potential buyers and sellers may be unable to meet each other. Moreover, as slots give air carriers flexibility regarding future network developments, airlines may

be induced to keep their slots, even if they are not necessary at the moment. Further, airlines may not sell slots due to uncertainty on the stability of the slot-management regime (Avenali et al., 2015, p. 33[100]).

International experience

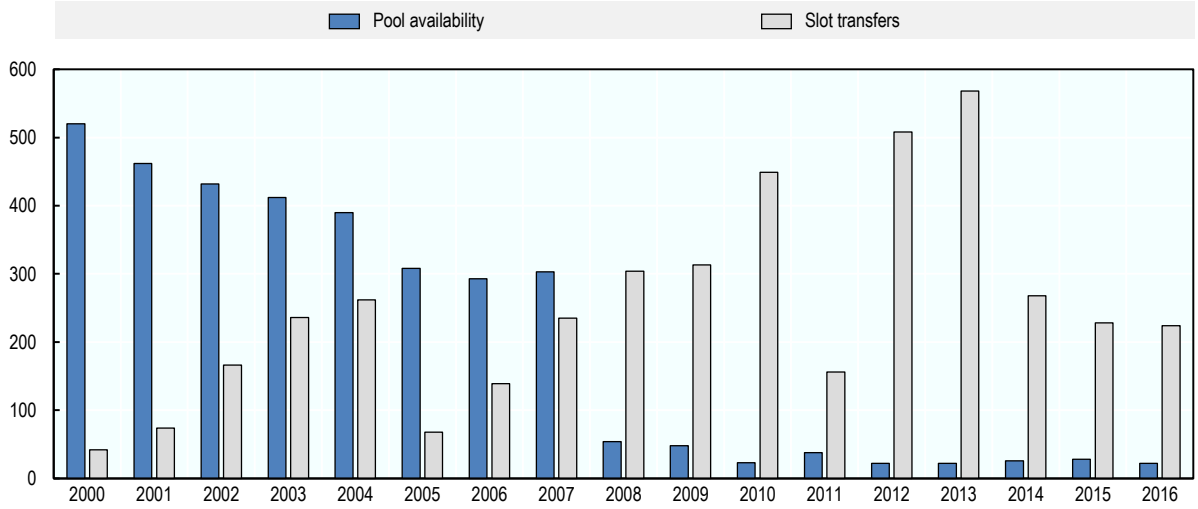
In the European Union, Council Regulation (EEC) No. 95/93, amended by Regulation (EC) No. 793/2004, does not expressly prohibit secondary slot trading. Although financial compensations for slot trading were mostly considered illegal, in the Guernsey case, heard in 1999, UK courts deemed the practice to be legal and in line with Regulation No. 95/93 (Guiomard, 2018, p. 130[136]). Since then, a grey market of secondary trading and monetary exchange has developed, especially at London Heathrow. In 2008, the European Commission issued a clarification of Regulation No. 95/93, in line with the UK model (Pertuiset and Santos, 2014, p. 67[127]).

A 2011 report indicated that it was unclear whether secondary trading was taking place in other EU airports, and that slot trading seemed to be mostly limited to London Heathrow and London Gatwick airports (then in the EU), even though this conclusion may be partly due to lack of transparency (Steer Davies Gleave, 2011, pp. 84-85[95]).

The UK Civil Aviation Authority (CAA) asserts that the secondary market helps airlines enhance their presence at congested airports, such as London Heathrow, since those airports are operating at full capacity, and only a very small number of pool slots are available for allocation (Civil Aviation Authority, 2014, pp. 84-85[140]).

For instance, at London Heathrow, in 2016, only 22 slots were made available by the pool, but 224 slots were traded in the secondary market (Haylen and Butcher, 2017, p. 6[97]). Annex Figure 2.A.1 indicates the number of traded slots, as well as slots available at the pool, from 2000 to 2016. It shows that slot trading has increased in recent years, while pool slots have significantly dropped.

Annex Figure 2.A.1. Annual slot transfers at London Heathrow, 2000-16



Source: (Haylen and Butcher, 2017, p. 7[97]) and Airport Co-ordination Limited (ACL, https://docplayer.net/45802381-Acl-slot-co-ordination.html.

Prices paid by airlines on the secondary market vary considerably by time and day. A 2017 study found reported slot prices at London Heathrow airport were around GBP 15 million for an early-morning slot pair; GBP 10 million at midday; and GBP 5 million in the evening. In past cases, airlines have already paid up

to USD 75 million for a pair of slots, although many transactions are not publicly reported (Haylen and Butcher, 2017, p. 7[97]).

Empirical evidence from London Heathrow airport shows that a secondary market has helped dominant airlines, such as British Airways, to increase market share at the airport, but has also aided strong second-tier airlines, including Virgin Atlantic, to emerge and compete effectively with them. Slot trading has also allowed a more efficient use of airport capacity, since traded slots were used for flights with higher average seat capacities and longer average stage lengths (Avenali et al., 2015, p. 33[100]) (de Wit and Burghouwt, 2007, pp. 51-52[141]).

Mixed results from slot trading have also been seen at US congested airports where secondary slot markets have been introduced. On the one hand, congested airport capacity was used in a more efficient fashion, and slot mobility grew, resulting in a relatively fluid and dynamic market. Slots have become a valuable asset, which may be particularly relevant during economic downturns. On the other hand, trading slots was associated with consolidation and market concentration, especially at Chicago O'Hare, the hub of American Airlines and the United Airlines. At that airport, some suggest that slots have not been used efficiently, since they have been employed for the operation of regional jets in the two airlines' hub-and-spoke systems rather than being limited to long-haul flights with larger aircrafts (de Wit and Burghouwt, 2007, pp. 52-53[141]).

This outcome at US airports in general is not straightforward. For example, a 2007 paper highlighted that an airport's characteristics may also play a role (de Wit and Burghouwt, 2007, pp. 48, 53[141]). For instance, at Chicago O'Hare, slots continued to accommodate small regional jets following the introduction of secondary trading. This would be in line with the airport's economic orientation which is to be a national hub for two US major airlines, allowing them to take advantage of network economies and resulting in a more efficient airport use. At New York LaGuardia, an increase in the aircraft size was seen after the implementation of slot trading, which is justified since it is a domestic airport, served by many US airlines. The authors also doubted whether secondary slot trading had had a causal relationship with concentration at constrained airports in the US. In their view, other factors are at stake, such as the consolidation in the US airline industry.

Over the years, the European Commission has conducted several studies into the effects of trading slots on the EU slot-allocation mechanism to inform a potential regulatory reform on the issue. In general, this research has indicated substantial gains from implementing market schemes for slot allocation. For example, a 2006 study, based on an assessment of eight heavily congested EU airports, estimated that secondary slot trading would improve consumer welfare by up to EUR 31 billion annually and producer welfare by up to EUR 1 billion annually, at 2006 rates (Mott MacDonald and European Commission, 2006[135]).[149] It also estimated an improvement in finances of major airports by around 7% and strong benefits for economies around such airports. However, the conclusions of the impact on airline competition are mixed. Existing dominant airlines are expected to increase the share of slots from an average 47% to around 49%. Consequently, competition between major European hubs is likely to be increased. Long-haul flights tend to be more competitive than intra-EU flights. A slight rise in diversity of users at airports on the different route types is also foreseen. Besides, impact on routes to peripheral points is predicted to be negative, unless they are protected, since they may be forced out of congested airports to secondary airports.

To mitigate some anti-competitive effects, the study proposes measures such as banning of restrictive covenants in slot-exchange contracts that prohibit using slots in competition with the seller; active policing by competition authorities in the slot market; and operating "blind" slot trading, preventing participants from knowing from whom they are buying available slots (Mott MacDonald and European Commission, 2006, pp. 10-18[135]).

Annex 2.B. Quantification of the impact on airfare of facilitating entry into jet-fuel distribution markets

The OECD recommends changes to jet-fuel distribution regulation in Brazil in order to reverse restrictions on new entry. One recommendation is that airport operators must ensure open access for new fuel suppliers. It is expected that this access policy should address safety, security and environmental protection. The policy would guarantee that incumbents should provide access to competitors at the same time that the investments are recoupable. These regulatory changes, if implemented, are expected to affect jet-fuel markets by promoting entry and lowering prices through more competition.

Lower jet-fuel costs would lead to likely reductions in airfare prices, the ultimate goal of the regulatory changes. Their estimated impact on the benefits or surplus of airfare passengers can be calculated by:

$$CB = (\rho + \frac{1}{2}|\epsilon|\rho^2)R_i$$

Equation 1

CB is the measure of consumer (passenger) benefit or surplus in Brazilian reals (BRL); ρ the percentage change in airfare prices related to entry in the fuel-distribution market; *R* the airfare revenue at location *i*; and $|\epsilon|$ the absolute value of price elasticity of demand for air travel (OECD, 2019[61]) (OECD, 2019[142]).

The simulation assumes that there will be a pass-through from the fuel-cost reduction to the airfares. Pass-through from costs to prices has been studied in detail in the literature for airlines and jet fuel. A recent and best estimate suggests a pass-through elasticity of 0.66 (Gayle and Lin, 2021[143]).[150]

Passenger benefits from a change in the regulations were calculated for selected international airports: Guarulhos (GRU) in São Paulo State; Galeão (GIG) in Rio de Janeiro State; and Brasília (BSB) in Federal District. These airports were selected because they are or will soon be directly connected to jet-fuel pipelines[151] and together are responsible for about a third of regular journeys with a Brazilian airport as their origin (28% of national take-offs and 34% of passenger volume in 2019), according to National Civil Aviation Agency (ANAC) Database.[152]

Annex Table 2.B.1 shows the results of ANAC's data aggregation for airfare revenues. The data present the value of aggregated revenues for 2019 for routes in which the respective airport was the origin for both domestic and international destinations. The seat and fare data released by ANAC used to calculate annual ticket revenues are monthly for each company, airport of origin, and destination.[153] Data from 2019 was used as the baseline for the simulations, as the air-travel sector has been particularly affected by the COVID-19 pandemic since 2020.

Annex Table 2.B.1. Airfare revenues, in million BRL, by origin airport, 2019

Airport	2019
São PauloGuarulhos (GRU)	2 423
Brasília (BSB)	1 069
Rio de Janeiro Galeão (GIG)	902

Source: OECD, based upon ANAC data.

Market estimates of the price change after entry into an airport market for jet-fuel distribution were obtained from a market test conducted by the Brazilian Competition Defense System (SBDC) in a Brazilian merger case (Annex Table 2.B.2).[154] The information obtained reflects the perception of the market player after entry in selected geographical relevant markets, Galeão (GIG) in Rio de Janeiro and Brasília (BSB). Annex Table 2.B.2 shows that after entry the players obtained a reasonable market share and were able to affect market conditions. The OECD estimates the jet-fuel price decrease in these markets to be 2 to 3% in real terms.

Annex Table 2.B.2. Air BP's estimates of changes in jet fuel price occurred after entry

Airport	Entry date	Fuel distributor	Share obtained	Jet-fuel price change
Galeão (GIG)	May 2008	Air BP	5-10%	**~ -2%**
Brasília (BSB)	October 2005	Esso/Cosan	10-15%	**~ -3%**
Brasília (BSB)	October 2006	Air BP	5-10%	**~ -3%**

Source: AIR BP – Doc no. 10,840/2009/GOGCE/SEAE/MF – AC 08012.004341/2009-73. Disclosed by Commissioner César Mattos in his vote. AC 08012.004341/2009-73, vol. 3, doc no. 0047153, p. 671.

These price-reduction estimates are relevant since, as an example, the average gross-margin percentage of final price in jet-fuel distribution was 10% between January 2017 and 2018, ranging from around 8% to 12% (ANP/ANAC, 2019, p. 13[76]).

The value of ρ for airfares is calculated by taking the product between the 2 to 3% jet-fuel price decrease and the 0.66 pass-through rate from jet fuel to airfare prices. Therefore, after successful implementation of the regulatory changes, the estimated airfare price decreases would be in the range of 1.3% to 2.0%. Both estimates are shown in Annex Table 2.B.3.

The absolute value of price elasticity of demand for airfares used in the analysis range from 1.15 to 0.99, which follows literature estimates for the Brazilian industry that are in line with international estimates, as seen in Annex Table 2.B.3. Both alternative values are also included in our consumer benefits estimates in the Annex Table 2.B.4.

Annex Table 2.B.3. Air travel demand price elasticity estimates, literature review

Paper	Demand elasticity
Pompermeyer et al. (2019), "Elasticidade-Preço e Elasticidade-Renda de Passageiros por Modo de Transporte para Projeção de Matrizes Origem-Destino Nacional", *RADAR*, no. 61, 29-31 December, http://repositorio.ipea.gov.br/bitstream/11058/10128/1/Radar_61_elasticidade-prepercentageC3%A7o.pdf.	-1.151
Frazão, J. and A. Oliveira (2020), "Distribuição de renda e demanda por transporte aéreo: uma especificação de modelo econométrico para o mercado doméstico brasileiro", *Transportes* 28:3, pp. 1-13.	-0.99
European Commission, Directorate-General for Mobility and Transport (2019), *Taxes in the field of aviation and their impact: final report*, Publications Office, p. 55.	-1.12 to -0.80

Annex Table 2.B.4. Consumer (passengers) Benefit quantification, by airport, considering 2019 data

Airport	Jet-fuel price change	Airfare price change	Revenue (in millions, BRL)	Airfare demand elasticity (absolute value)	Consumer benefit (in millions, BRL)
São Paulo Guarulhos	3%	2.0%	2 423.62	1.15	**48.53**
	2%	1.3%	2 423.62	1.15	**32.23**
	2%	1.3%	2 423.62	0.99	**32.20**
	3%	2.0%	2 423.62	0.99	**48.46**
Rio de Janeiro Galeão	3%	2.0%	902.33	1.15	**18.07**
	2%	1.3%	902.33	1.15	**12.00**
	2%	1.3%	902.33	0.99	**11.99**
	3%	2.0%	902.33	0.99	**18.07**
Brasília	3%	2.0%	1 069.82	1.15	**21.42**
	2%	1.3%	1 069.82	1.15	**14.23**
	2%	1.3%	1 069.82	0.99	**14.21**
	3%	2.0%	1 069.82	0.99	**21.39**

Source: OECD estimates based upon ANAC data and literature parameters.

Annex Table 2.B.5. Total consumer benefit, considering 2019 data

Jet-fuel price change	Airfare price change	Airfare demand elasticity	Total consumer benefit (in millions, BRL)
3%	2.0%	1.15	**88.03**
2%	1.3%	1.15	**58.46**
2%	1.3%	0.99	**58.40**
3%	2.0%	0.99	**87.89**

Source: Annex Table 2.B.4 estimates.

The annual benefit to passengers of a potential entry into the jet-fuel distribution market resulting from the increase in competition in the three most relevant airports in Brazil is estimated between BRL 58.40 million and BRL 88.03 million a year.

This benefit may increase over the years with economic growth and the increase in passenger demand for air travel. The Ministry of Transportation of Brazil has estimates on the growth of passenger travel by airport, ranging from 3.9% to 5.4% depending on the year and airport (Ministério dos Transportes, 2018[144]). The OECD has used these annual airport growth rates to calculate the benefits up to 2032 (Annex Table 2.B.6).

Annex Table 2.B.6. Consumer benefit, 2022-32

3% fuel price decrease and 1.15 price elasticity				2% fuel price decrease and -0.99 price elasticity			
Year	BSB	GIG	GRU	Year	BSB	GIG	GRU
2022	24.44	19.93	53.26	2022	16.22	13.22	35.33
2023	25.45	20.83	55.62	2023	16.88	13.82	36.90
2024	26.47	21.75	58.03	2024	17.56	14.43	38.50
2025	27.52	22.69	60.51	2025	18.26	15.06	40.14
2026	28.59	23.66	63.05	2026	18.97	15.70	41.83
2027	29.69	24.65	65.65	2027	19.70	16.36	43.56
2028	31.06	25.88	68.86	2028	20.60	17.17	45.69
2029	32.63	27.27	72.53	2029	21.65	18.09	48.12
2030	34.29	28.75	76.42	2030	22.75	19.07	50.70
2031	36.05	30.31	80.52	2031	23.92	20.11	53.42
2032	37.89	31.96	84.85	2032	25.14	21.20	56.29
Total 2022-2031	334.07	277.68	739.28	Total 2022-2031	221.64	184.24	490.49
Total: BRL 1 351 million				**Total: BRL 896 million**			

Source: OECD estimates based upon ANAC data and literature parameters.

> *The estimated aggregated consumer benefit over the next 10 years (from 2022 to 2032) varies from BRL 896 million to BRL 1 351 million.*

References

ABEAR (2021), *"Voos Programados para 2021"*, http://www.jota.info/wp-content/uploads/2021/02/abear-brochura-bsb2021-digital-a-partir-da-pagina-10-1.pdf. [18]

ABEAR (2021), *Panorama 2020: o setor aéreo em dados e análises*, http://www.abear.com.br/wp-content/uploads/2021/08/Panorama2020-vf.pdf. [2]

ABESATA (2022), *"Certificação de Regularidade em Serviços Auxiliares ao Transporte Aéreo – CRES"*, https://cres.abesata.org/sobre. [147]

ABESATA (2016), *Panorama dos serviços auxiliares do transporte aéreo no Brasil*, http://www.abesata.org/br/panorama-2016. [64]

ACIL Allen Consulting (2018), *Competition in the Jet Fuel Supply Market: Submission to the Productivity Commission Inquiry into Airport Competition*, https://acilallen.com.au/uploads/projects/181/ACILAllen_JetFuel_2018-1593412678.pdf. [78]

Air Transport Action Group (2020), *Aviation - Benefits beyond borders*, ATAG, https://aviationbenefits.org/. [111]

Air Transport Research Society (2019), *Airport Benchmarking Report 2019: Global Standards for Airport Excellence*, Embry-Riddle Aeronautical University, http://www.atrsworld.org/airport-benchmarking. [60]

Air Transport Research Society (2019), *Airport Benchmarking Report 2019: Global Standards for Airport Excellence*, Embry-Riddle Aeronautical University. [93]

Airport Cooperative Research Program (2015), *ACRP Synthesis 63: Overview of Airport Fueling System Operations – A Synthesis of Airport Practice*, National Academies Press, https://doi.org/10.17226/22141. [73]

Airport Cooperative Research Program (2011), *ACRP Report 47: Guidebook for Developing and Leasing Airport Property*, National Academies Press, https://doi.org/10.17226/14468. [62]

Airport Cooperative Research Program (2010), *ACRP Report 25: Airport Passenger Terminal Planning and Design, Volume 1 – Guidebook*, National Academies Press, https://doi.org/10.17226/22964. [72]

Airports Council International (2018), *Policy Brief: Creating fertile grounds for private investment in airports*, ACI, https://store.aci.aero/product/policy-brief-creating-fertile-grounds-for-private-investment-in-airports. [24]

Airports Council International, International Air Transport Association and World Wide Airport Coordinators Group (2020), *Worldwide Airport Slot Guidelines (WASG)*, http://www.iata.org/en/policy/slots/slot-guidelines. [87]

ANAC (2022), *"Escolas de Aviação Civil"*, https://sistemas.anac.gov.br/educator/Index2.aspx. [115]

ANAC (2022), *"Licenças Emitidas"*, https://www.anac.gov.br/acesso-a-informacao/dados-abertos/areas-de-atuacao/pessoal-da-aviacao-civil/licencas-emitidas. [114]

ANAC (2022), *Consulta Interativa – Indicadores do Mercado de Transporte Aéreo*, https://www.gov.br/anac/pt-br/assuntos/dados-e-estatisticas/mercado-de-transporte-aereo/consulta-interativa. [105]

ANAC (2021), *"Brazilian Civil Aviation Sector"*, http://www.anac.gov.br/en/about-anac/brazilian-civil-aviation-sector. [9]

ANAC (2021), *Agenda Regulatória 2021-2022*, https://www.gov.br/anac/pt-br/acesso-a-informacao/participacao-social/agenda-regulatoria/agenda-regulatoria-2021-2022. [108]

ANAC (2021), *Características do mercado de transporte aéreo público: uma visão do mercado no Brasil e comparação dos níveis de concentração com outros países. Texto para Discussão, 01*, http://www.gov.br/anac/pt-br/centrais-de-conteudo/publicacoes/textos-para-discussao/textos/td-01-caracteristicas-do-mercado-de-transporte-aereo-publico-v201911.pdf. [7]

ANAC (2021), *Cartilha de orientações para empresas aéreas*, http://www.gov.br/anac/pt-br/centrais-de-conteudo/publicacoes/publicacoes-arquivos/cartilha-orientacao-para-empresas-aereas_v3.pdf/view. [19]

ANAC (2018), *"Metodologia de Acompanhamento das Tarifas Aéreas Domésticas"*, http://www.gov.br/anac/pt-br/assuntos/regulados/empresas-aereas/envio-de-informacoes/tarifas-aereas-domesticas-1/metodologia-de-acompanhamento-das-tarifas-aereas-domesticas. [146]

ANP (2021), *Anuário estatístico brasileiro do petróleo, gás natural e biocombustíveis: 2021*, http://www.gov.br/anp/pt-br/centrais-de-conteudo/publicacoes/anuario-estatistico/arquivos-anuario-estatistico-2021/anuario-2021.pdf. [67]

ANP/ANAC (2019), *Nota Técnica Conjunta nº 001/2019/ANP-ANAC*, http://www.gov.br/mme/pt-br/assuntos/secretarias/petroleo-gas-natural-e-biocombustiveis/abastece-brasil/subcomites/Nota_Tecnica_Conjunta_001_2019_ANP_ANACcompactado.pdf. [76]

Araújo, S. and D. Sutherland (2010), "Public-Private Partnerships and Investment in Infrastructure", *OECD Economics Department Working Papers*, No. 803, OECD Publishing, Paris, https://doi.org/10.1787/5km7jf6q8f0t-en. [27]

Australian Competition and Consumer Commission (2020), *Airport monitoring report 2018-19, ACCC*, ACCC, http://www.accc.gov.au/system/files/1655_Airport%20monitoring%20report_D09.pdf. [43]

Australian Productivity Commission (2019), *Economic Regulation of Airports: Inquiry Report: Overview & Recommendations, No. 92. 21 June 2019*, Productivity Commission, http://www.pc.gov.au/inquiries/completed/airports-2019/report/airports-2019-overview.pdf. [80]

Australian Productivity Commission (2011), *Economic Regulation of Airport Services: Inquiry Report*, Productivity Commission, http://www.pc.gov.au/inquiries/completed/airport-regulation/report/airport-regulation.pdf. [42]

Avenali, A. et al. (2015), "An incentive pricing mechanism for efficient airport slot allocation in Europe", *Journal of Air Transport Management*, Vol. 42, pp. 27-36, https://doi.org/10.1016/j.jairtraman.2014.07.009. [100]

Ávila, H. (2020), *Análise econômica do Direito e ativismo judicial: impacto da judicialização no transporte aéreo*, http://www.jota.info/opiniao-e-analise/colunas/coluna-da-abde/analise-economica-do-direito-e-ativismo-judicial-impacto-da-judicializacao-no-transporte-aereo-21032020. [14]

Ballantyne, T. (2016), *"China ignores IATA's reservations about its new slot auctions"*, http://www.orientaviation.com/articles/1703/china-ignores-iata%E2%80%99s-reservations-about-its-new-slot-auctions. [131]

Ball, M., F. Berardino and M. Hansen (2018), "The use of auctions for allocating airport access rights", *Transportation Research*, Vol. 114/A, pp. 186-202, https://doi.org/10.1016/j.tra.2017.09.026. [101]

Bichler, M. et al. (2021), *It is time to auction slots at congested airports, VoxEU, 10 January 2021*, https://voxeu.org/article/it-time-auction-slots-congested-airports. [126]

Board of Airline Representatives of Australia (2018), *Submission to the Productivity Commission – the competitive supply of jet fuel*, http://www.pc.gov.au/__data/assets/pdf_file/0011/231320/sub037-airports.pdf. [82]

Bronchi, C. (2003), "The Effectiveness of Public Expenditure in Portugal", *OECD Economics Department Working Papers*, No. 349, OECD Publishing, Paris, https://doi.org/10.1787/636037755640. [47]

CADE (2022), *"Cade prorroga cronograma para venda de refinarias pela Petrobras"*, http://www.gov.br/cade/pt-br/assuntos/noticias/cade-prorroga-cronograma-para-venda-de-refinarias-pela-petrobras. [71]

CADE (2020), *"Nota Técnica Nº 31/2020/CGAA4/SGA1/SG/CADE"*, https://sei.cade.gov.br/sei/modulos/pesquisa/md_pesq_documento_consulta_externa.php?DZ2uWeaYicbuRZEFhBt-n3BfPLlu9u7akQAh8mpB9yN578muWdmGhityNwioM5b0A4zG-hF51XDIDOqKjY2UcCI6UalbowZU4F_Ixv1-P_LA6cWlpILhBo1271GGDlw5. [75]

CADE (2020), *CADE Yearbook 2019*, https://cdn.cade.gov.br/portal-ingles/topics/publications/cade-yearbook/CADE%20Yearbook%202019_final.pdf. [70]

CADE (2017), *Cadernos do Cade: Mercado de Transporte Aéreo de Passageiros e Cargas*, https://cdn.cade.gov.br/Portal/centrais-de-conteudo/publicacoes/estudos-economicos/cadernos-do-cade/mercado-de-transporte-aereo-de-passageiros-e-cargas-2017.pdf. [6]

CADE (2017), *Mercado de Transporte Aéreo de Passageiros e Cargas*, https://cdn.cade.gov.br/Portal/centrais-de-conteudo/publicacoes/estudos-economicos/cadernos-do-cade/mercado-de-transporte-aereo-de-passageiros-e-cargas-2017.pdf. [109]

CADE (2016), *Guide for Horizontal Merger Review*, https://cdn.cade.gov.br/Portal/centrais-de-conteudo/publicacoes/guias-do-cade/GUIDE%20FOR%20HORIZONTAL%20MERGER%20REVIEW.pdf. [145]

Callaci, B. (2020), *Fissuring in Flight: Consolidation and Outsourcing in the US Domestic Airline Industry, 1997-2018*, Communications Workers of America, https://cwa-union.org/sites/default/files/20200108-fissuring-in-flight.pdf. [122]

Castro, M. et al. (2019), *"A Efetividade das Concessões de Aeroportos no Brasil"*, Universidade de Brasília, https://conferencias.unb.br/index.php/ICTS/1ICTS/paper/viewFile/15990/2509. [30]

Chevron (2007), *Aviation Fuels: Technical Review*, Chevron, http://www.chevron.com/-/media/chevron/operations/documents/aviation-tech-review.pdf. [74]

Civil Aviation Administration of China (2016), *"Pilot Auctioning of Time Slots of Guangzhou Baiyun International Airport"*, http://www.caac.gov.cn/en/XWZX/201601/t20160115_26630.html. [132]

Civil Aviation Administration of China (2016), *Results of Pilot Lottery for Market-based Allocation of Time Slots at Pudong Airport Come Out*, http://www.caac.gov.cn/en/XWZX/201602/t20160218_28439.html. [133]

Civil Aviation Authority (2014), *Discussion paper on the regulatory treatment of issues associated with airport capacity expansion, CAP 1195*, https://publicapps.caa.co.uk/docs/33/CAP%201195%20regulatory%20paper.pdf. [140]

Civil Aviation Safety Authority (2022), *"Licences and Certificates"*, http://www.casa.gov.au/licences-and-certificates. [154]

Comision Federal de Competencia (2007), *"Oficio PRES-10-096-2007-182"*, https://www.cofece.mx/cfcresoluciones/Docs/Mercados%20Regulados/V2/7/1382537.pdf. [44]

Comisión Federal de Competencia Económica (2022), *"Dictamen Preliminar de la Cofece identifica barreras a la competencia a lo largo de la cadena de valor de la turbosina en México"*, http://www.cofece.mx/dictamen-preliminar-identifica-barreras-en-cadena-de-valor-de-la-turbosina/. [83]

Commonwealth of Australia (2009), *National Aviation Policy White Paper: Flight Path to the Future*, Department of Infrastructure, Transport, Regional Development and Local Government, http://www.infrastructure.gov.au/sites/default/files/migrated/aviation/publications/files/Aviation_White_Paper_final.pdf. [41]

Competition and Markets Authority (2016), *BAA airports: Evaluation of the Competition Commission's 2009 market investigation remedies*, CMA, https://assets.publishing.service.gov.uk/media/57399d43ed915d152d00000b/evaluation_of_baa__market_investigation_remedies.pdf. [40]

Competition Commission (2009), *BAA airports market investigation: A report on the supply of airport services by BAA in the UK*, Competition Commission, https://webarchive.nationalarchives.gov.uk/ukgwa/20140402170726mp_/http://www.competition-commission.org.uk/assets/competitioncommission/docs/pdf/non-inquiry/rep_pub/reports/2009/fulltext/545.pdf. [39]

Copenhagen Economics (2012), *Airport Competition in Europe*, Copenhagen Economics, http://www.copenhageneconomics.com/dyn/resources/Publication/publicationPDF/5/195/0/Copenhagen%20Economics%20Study%20-%20Airport%20Competition%20in%20Europe.pdf. [36]

Czerny, A. (2009), *"Airport Pricing and Concession Revenues"*, WHU – Working Paper Series in Economics, https://opus4.kobv.de/opus4-whu/frontdoor/index/index/docId/522. [52]

Davidson, C. et al. (2014), *An Overview of Aviation Fuel Markets for Biofuels Stakeholders*, National Renewable Energy Laboratory, http://www.nrel.gov/docs/fy14osti/60254.pdf. [66]

de Wit, J. and G. Burghouwt (2008), "Slot allocation and use at hub airports, perspectives for secondary trading", *European Journal of Transport and Infrastructure Research*, Vol. 8/2, pp. 147-164, https://dare.uva.nl/search?identifier=68121533-2ad5-42d5-bfd8-166f23c3a255. [134]

de Wit, J. and G. Burghouwt (2007), "The impact of secondary slot trading at Amsterdam Airport Schiphol", *SEO Economic Research. Report 957*, http://www.researchgate.net/publication/254896479_The_impact_of_secondary_slot_trading_at_Amsterdam_Airport_Schiphol. [141]

DEE/CADE (2019), *"Nota Técnica No. 23/2019/DEE/CADE"*, https://sei.cade.gov.br/sei/modulos/pesquisa/md_pesq_documento_consulta_externa.php?mYbVb954ULaAV-MRKzMwwbd5g_PuAKStTlNgP-jtcH5MdmPeznqYAOxKmGO9r4mCfJlTXxQMN01pTgFwPLudAzHj83et0PiynnWapON2j-0ZojIj0dtdY35Ck-FCK3Xd. [106]

DEE/CADE (2019), *"Nota Técnica No. 11/2019/DEE/CADE"*, https://cdn.cade.gov.br/Portal/centrais-de-conteudo/publicacoes/estudos-economicos/notas-tecnicas/2019/nota-tecnica-n11-advocacy-08700002226201988.pdf. [10]

ECMT (2006), *Transport Services: The Limits of (De)regulation*, ECMT Round Tables, No. 129, OECD Publishing, Paris, https://doi.org/10.1787/9789282123461-en. [156]

Efthymiou, M. et al. (2021), "Flight crew evaluation of the flight time limitations regulation", *Case Studies on Transport Policy*, Vol. 9/1, pp. 280-290, https://doi.org/10.1016/j.cstp.2021.01.002. [124]

Egeland, J. and P. Smale (2017), "Capacity Building through Efficient Use of Existing Airport Infrastructure: Roundtable Summary and Conclusions", *International Transport Forum Discussion Papers*, No. 2017/27, OECD Publishing, Paris, https://doi.org/10.1787/98237320-en. [86]

El Economista (2020), *"El GACM tomará el control de nuevo sistema aeroportuario"*, http://www.eleconomista.com.mx/empresas/El-GACM-tomara-el-control-de-nuevo-sistema-aeroportuario-20201026-0012.html. [45]

Euripean Aviation Safety Agency (2016), *"Training outside approved training organisations, Opinion No 11/2016*, http://www.easa.europa.eu/downloads/21334/en. [116]

Eurocontrol and DECEA (2021), *Comparison of Operational ANS Performance in Brazil and Europe*, https://ansperformance.eu/global/brazil/bra-eur. [149]

European Commission (2011), *"Proposal for a Regulation of the European Parliament and of the Council on common rules for the allocation of slots at European Union airports (Recast)"*, https://ec.europa.eu/transparency/documents-register/detail?ref=COM(2011)827&lang=en. [151]

European Commission (2011), *Commission Staff Working Paper: Impact Assessment Accompanying the document Proposal for a Regulation of the European Parliament and of the Council on groundhandling services at Union airports and repealing Council Directive 96/67/EC, SEC(2011) 1439 final*, https://eur-lex.europa.eu/resource.html?uri=cellar:6c4173b0-0728-4df9-a463-c84f975df568.0001.02/DOC_1&format=PDF. [79]

European Parliament (2016), *Briefing: Employment and working conditions in EU civil aviation*, European Parliamentary Research Service, http://www.europarl.europa.eu/RegData/etudes/BRIE/2016/580915/EPRS_BRI(2016)580915_EN.pdf. [123]

Expansión (2011), *"La CFC frena a Asur para la Riviera Maya"*, https://expansion.mx/negocios/2011/01/30/la-cfc-frena-a-asur-para-la-riviera-maya. [46]

Fairbrother, J., K. Zografos and K. Glazebrooka (2020), "A Slot-Scheduling Mechanism at Congested Airports that Incorporates Efficiency, Fairness, and Airline Preferences", *Transportation Science*, Vol. 54/1, pp. 115-138, https://doi.org/10.1287/trsc.2019.0926. [90]

Federal Aviation Administration/Office of the Secretary of Transportation Task Force (1999), *Airport Business Practices and Their Impact on Airline Competition*, FAA, http://www.faa.gov/airports/aip/media/airport-business-practices-and-their-impact-on-airline-competition.pdf. [33]

Forsyth, P., D. Gillen and H. Niemeier (2010), *Airport Competition: The European Experience*, Ashgate Publishing. [38]

Gayle, P. and Y. Lin (2021), *Cost pass-through in commercial aviation: theory and evidence*, pp. 803-828, https://doi.org/10.1111/ecin.12949. [143]

Gillen, D. and D. Starkie (2015), "Congested Hubs, the EU Slot Regulation and Incentives to Invest", https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2592449. [98]

Gomes, S. and P. Fonseca (2014), ""Análise econômico-operacional do setor de transporte aéreo: indicadores básicos"", *BNDES Setorial*, Vol. 40, pp. 131-162, https://web.bndes.gov.br/bib/jspui/handle/1408/2861. [5]

Graham, A. (2020), ""Airport privatisation: A successful journey?"", *Journal of Air Transport Management*, Vol. 89/C, https://doi.org/10.1016/j.jairtraman.2020.101930. [25]

Guiomard, C. (2018), "Airport slots: Can regulation be coordinated with competition? Evidence from Dublin airport", *Transportation Research*, Vol. 114/Part A: Policy and Practice, pp. 127-138, https://doi.org/10.1016/j.tra.2017.09.028. [136]

Haylen, A. and L. Butcher (2017), *"Airport slots", House of Commons Library Briefing Paper No. CBP 488*, https://researchbriefings.files.parliament.uk/documents/SN00488/SN00488.pdf. [97]

Hromádka, M. and A. Cíger (2015), "Hydrant refueling system as an optimisation of aircraft refuelling", *Transport Problems*, Vol. 10/3, pp. 61-71, https://doi.org/10.21307/tp-2015-035. [77]

ICAO (2012), *Manual of Procedures for Establishment and Management of a State's Personnel Licensing System*, ICAO, https://store.icao.int/en/manual-of-procedures-for-establishment-and-management-of-a-state-s-personnel-licensing-system-doc-9379. [153]

International Air Transport Association (2022), *"Worldwide Airport Slots"*, http://www.iata.org/en/policy/slots/#tab-8. [88]

International Air Transport Association (2021), *"Valor da Aviação – Judicialização"*, https://valordaaviacao.org.br/judicializacao/. [17]

International Air Transport Association (2020), *"Demand Triggers for Airport Investments – Best Practice"*, IATA, http://www.gov.br/anac/pt-br/assuntos/concessoes/sexta-rodada/consulta-publica-no-03-2020/05-anexos-das-contribuicoes/11915-iata.pdf. [51]

International Air Transport Association (2020), *Annual Review 2020*, IATA, http://www.iata.org/contentassets/c81222d96c9a4e0bb4ff6ced0126f0bb/iata-annual-review-2020.pdf. [4]

International Air Transport Association and Deloitte (2018), *Airport Ownership and Regulation, IATA Guidance Booklet*, IATA, http://www.iata.org/contentassets/4eae6e82b7b948b58370eb6413bd8d88/airport-ownership-regulation-booklet.pdf. [22]

International Civil Aviation Organization (2022), *"About ICAO"*, http://www.icao.int/about-icao/Pages/default.aspx. [8]

International Civil Aviation Organization (2020), *Airport Economics Manual, fourth edition, Doc 9562,*, ICAO, http://www.icao.int/publications/Documents/9562_cons_en.pdf. [58]

International Civil Aviation Organization (2019), *Manual on Ground Handling, Doc 10121*, ICAO, https://store.icao.int/en/manual-on-ground-handling-doc-10121. [63]

International Civil Aviation Organization (2018), *"Aviation Personnel Forecasts"*, http://www.icao.int/Meetings/ngap2018/Presentations/2.1%20Ananthanarayan%20Sai%20.pdf. [117]

International Civil Aviation Organization (2016), *"Agenda Item 39: Economic Regulation of International Air Transport – Policy. Opening of Cabotage in Chile", A39-WP/440*, http://www.icao.int/Meetings/a39/Documents/WP/wp_440_rev1_en.pdf. [13]

International Civil Aviation Organization (2012), *ICAO's Policies on Charges for Airports and Air Navigation Services, Doc 9082*, ICAO, http://www.icao.int/publications/Documents/9082_9ed_en.pdf. [57]

International Civil Aviation Organization (2012), *Manual of Procedures for Establishment and Management of a State's Personnel Licensing System, second edition, Doc 9379*, ICAO, https://store.icao.int/en/manual-of-procedures-for-establishment-and-management-of-a-state-s-personnel-licensing-system-doc-9379. [112]

International Civil Aviation Organization (2011), *"Attachment A. Guidance Material for Development of Prescriptive Fatigue Management Regulations"*, ICAO, https://www.icao.int/safety/fatiguemanagement/FRMS%20Tools/Amendment%2037%20for%20FRMS%20SARPS%20-AttA%20(en).pdf. [125]

International Civil Aviation Organization (2007), *International Civil Aviation Vocabulary*, ICAO, https://www.spilve.lv/library/various/Doc%209713.pdf. [113]

International Transport Forum (2015), *"Liberalisation of Air Transport Summary: Policy Insights and Recommendations"*, OECD Publishing, http://www.itf-oecd.org/sites/default/files/docs/liberalisation-air-transport-summary-policy-insights-recommendations.pdf. [119]

ITF (2019), *Liberalisation of Air Transport*, ITF Research Reports, OECD Publishing, Paris, https://doi.org/10.1787/1170876b-en. [12]

Jehiel, P. et al. (2003), "An economic perspective on auctions", *Economic Policy*, Vol. 18/36, pp. 269-308, http://www.jstor.org/stable/1344658. [129]

Jiang, Y. and K. Zografos (2021), "A decision making framework for incorporating fairness in allocating slots at capacity-constrained airports", *Transportation Research*, Vol. 126/Part C: Emerging Technologies, pp. 1-19, https://doi.org/10.1016/j.trc.2021.103039. [89]

Kappes, J. and R. Merkert (2013), "Barriers to entry into European aviation markets revisited: A review and analysis of managerial perceptions", *Transportation Research*, Vol. 57/Part E: Logistics and Transportation Review, pp. 58-69, https://doi.org/10.1016/j.tre.2013.01.006. [94]

Kociubiński, J. (2013), "Regulatory Challenges of Airport Slot Allocation in the European Union", *Wroclaw Review of Law, Administration & Economics*, Vol. 3/1, pp. 28-47, https://doi.org/10.2478/wrlae-2013-0003. [157]

Kuchinke, B. and J. Sickmann (2007), *Vertical Integration of Airlines and Airports: Impacts on Competition*, pp. 283-301, https://doi.org/10.1177/178359170700800302. [32]

LL Advogados and PEZCO (2021), *Estudos sobre exploração de slots aeroportuários, PNUD - PROJETO BRA/19/015 | RFP NO. JOF-1933/2020*, http://www.gov.br/economia/pt-br/assuntos/noticias/2021/agosto/arquivo/copy8_of_Relatorio_Completo_Slots_Aeroportuarias.pdf. [110]

Machado, B. et al. (2019), ""A evolução recente do modelo de concessão aeroportuária sob a ótica da financiabilidade"", *BNDES Setorial*, Vol. 25/50, pp. 7-65, https://web.bndes.gov.br/bib/jspui/handle/1408/19101. [50]

Marques, R. and A. Brochado (2008), "Airport regulation in Europe: Is there need for a European Observatory?", *Transport Policy*, Vol. 15/3, pp. 163-172, https://doi.org/10.1016/j.tranpol.2008.01.001. [53]

McKinsey & Company (2010), *Estudo do Setor de Transporte Aéreo do Brasil: Relatório Consolidado*, McKinsey & Company, https://web.bndes.gov.br/bib/jspui/handle/1408/7666. [26]

Meersman, H. et al. (2011), "Ground handling in a changing market. The case of Brussels Airport", *Research in Transportation Business & Management*, Vol. 1/1, pp. 128-135, https://doi.org/10.1016/j.rtbm.2011.06.003. [65]

Militão, L. et al. (2020), ""Consumer Claims, on-line Dispute Resolution and Innovation in the Public Administration: A Case Study of the Consumidor.gov Platform in Brazil During 2014-2019"", *Teoria e Prática em Administração*, Vol. 10/2, pp. 81-91, https://doi.org/10.21714/2238-104X2020v10i2-51147. [21]

Ministério da Infraestrutura (2021), *"Brasil avança para reduzir custos do combustível de aviação"*, http://www.gov.br/infraestrutura/pt-br/assuntos/noticias/2021/1/brasil-avanca-para-reduzir-custos-do-combustivel-de-aviacao. [68]

Ministério da Justiça e Segurança Pública (2022), *"Consumidor em Números 2021: 3,3 milhões de reclamações foram registradas em todo o país"*, http://www.gov.br/pt-br/noticias/justica-e-seguranca/2022/03/consumidor-em-numeros-2021-3-3-milhoes-de-reclamacoes-foram-registradas-em-todo-o-pais#:~:text=DIA%20DO%20CONSUMIDOR-,Consumidor%20em%20N%C3%BAmeros%202021%3A%203%2C3%20milh%C3%B5es%20de%20recl. [20]

Ministério dos Transportes (2018), *Plano Aeroviário Nacional*, http://www.gov.br/infraestrutura/pt-br/assuntos/transporte-aereo/plano-aeroviario-nacional. [144]

Miranda, V. and A. Oliveira (2018), "Airport slots and the internalization of congestion by airlines: An empirical model of integrated flight disruption management in Brazil", *Transportation Research*, Vol. 116/Part A: Policy and Practices, pp. 201-219, https://doi.org/10.1016/j.tra.2018.06.008. [99]

Mott MacDonald and European Commission (2006), *Study on the Impact of the Introduction of Secondary Trading at Community Airports: Volume I*, http://www.euaca.org/up/files/DocsEUROPE/EU_REGULATION_95_93_AS_AMENDED_Slot_Regulation/2006_slots_final_report.pdf_211108_054651.pdf. [135]

Murray, G. (2021), *"After Covid-19, aviation faces a pilot shortage"*, http://www.oliverwyman.com/our-expertise/insights/2021/mar/after-covid-19-aviation-faces-a-pilot-shortage.html. [118]

National Economic Research Associates (2004), *Study to Assess the Effects of Different Slot Allocation Schemes*, http://www.nera.com/content/dam/nera/publications/archive1/PUB_SlotAllocationSchemes_NPL.pdf. [152]

New Zealand Government (2019), *Government Inquiry into the Auckland Fuel Supply Disruption: Final Report*, http://www.dia.govt.nz/diawebsite.nsf/Files/Inquiry-into-the-Auckland-Fuel-Supply-Disruption/$file/AFSD-Inquiry-Report-August-2019.pdf. [81]

OECD (2021), *Methodologies to Measure Market Competition, OECD Competition Policy Roundtable Background Note*, OECD Paris, http://www.oecd.org/daf/competition/methodologies-to-measure-market-competition-2021.pdf. [155]

OECD (2020), *OECD Economic Surveys: Brazil 2020*, OECD Publishing, Paris, https://doi.org/10.1787/250240ad-en. [3]

OECD (2020), *The OECD Services Trade Restrictiveness Index: Policy Trends up to 2020*, OECD Publishing, http://www.oecd.org/trade/topics/services-trade/documents/oecd-stri-policy-trends-up-to-2020.pdf. [11]

OECD (2019), *Competition Assessment Toolkit: Volume 3. Operational Manual*, OECD Paris, https://www.oecd.org/daf/competition/assessment-toolkit.htm. [61]

OECD (2019), *Competition for-the-market, OECD Competition Policy Roundtable Background Note*, OECD Publishing, https://one.oecd.org/document/DAF/COMP/GF(2019)7/en/pdf. [48]

OECD (2019), *OECD Competition Assessment Reviews: Tunisia*, OECD Paris, http://www.oecd.org/daf/competition/oecd-competition-assessment-reviews-tunisia.htm. [142]

OECD (2014), *Airline Competition, OECD Competition Policy Roundtable Background Note*, OECD Paris, https://one.oecd.org/document/DAF/COMP(2014)14/en/pdf. [92]

OECD (2006), *Global Formum on Competition: Concessions, DAF/COMP/GE(2006)6*, OECD Paris, http://www.oecd.org/daf/competition/39531515.pdf. [28]

OECD (1999), *Roundtable on Airline Mergers and Alliances, Roundtables on Competition Policy*, OECD Paris, http://www.oecd.org/daf/competition/mergers/2379233.pdf. [91]

Office of Fair Trading (2005), *Competition issues associated with the trading of airport slots*, https://docplayer.net/1440660-Competition-issues-associated-with-the-trading-of-airport-slots.html. [138]

Oliveira, A. (2016), "Avaliação empírica dos impactos competitivos de regras regulatórias de redistribuição de slots em aeroportos", *Journal of Transport Literature*, Vol. 10/4, pp. 40-44, https://doi.org/10.1590/2238-1031.jtl.v10n4a8. [102]

Oum, T. and X. Fu (2008), "Impacts of Airports on Airline Competition: Focus on Airport Performance and Airport-Airline Vertical Relations"*, OECD/ITF Joint Transport Research Centre Discussion Papers*, No. 2008/17, OECD Publishing, Paris, https://doi.org/10.1787/235140743836. [34]

Oxera (2017), *The continuing development of airport competition in Europe*, Oxera, http://www.oxera.com/wp-content/uploads/2018/07/The-continuing-development-of-airport-competition-in-Europe-report-for-ACI-Europe-1.pdf-1.pdf. [37]

Oxera (2007), *"Airport Regulation: keeping up with an industry at full throttle?"*, Oxera, http://www.oxera.com/wp-content/uploads/2018/03/Airport-regulation-1.pdf. [59]

Pellegrini, P., L. Castelli and R. Pesenti (2012), "Secondary trading of airport slots as a combinatorial exchange", *Transportation Research*, Vol. Vol. 48/Part E: Logistics and Transportation Review, pp. 1009-1022, https://doi.org/10.1016/j.tre.2012.03.004. [84]

Pereira Neto, C. et al. (2016), "Pro-competition rules in airport privatization: International experience and the Brazilian case", *Journal of Air Transport Management*, Vol. 54, pp. 9-16, https://doi.org/10.1016/j.jairtraman.2016.03.011. [31]

Pertuiset, T. and G. Santos (2014), "Primary auction of slots at European airports", *Research in Transportation Economics*, Vol. 45, pp. 66-71, https://doi.org/10.1016/j.retrec.2014.07.009. [127]

Pompeu, A. (2021), *Judicialização exacerbada da aviação obriga a repensar cultura da litigância, dizem especialistas*, http://www.jota.info/casa-jota/judicializacao-aviacao-obriga-pensar-acesso-justica-25022021. [15]

Resende, C. and T. Caldeira (2020), "Privatization of Brazilian airports: a synthetic control approach", *Economics Bulletin*, Vol. 40/1, pp. 743-757, https://ideas.repec.org/a/ebl/ecbull/eb-19-00443.html. [56]

Reynolds, P. et al. (2018), *Effective regulation of airport market power: A report for Airlines for Europe and IATA*, http://www.iata.org/contentassets/4eae6e82b7b948b58370eb6413bd8d88/ceg-airport-charges-report.pdf. [54]

Rutner, S. and J. Brown (1999), "Outsourcing as an Airline Strategy", *Journal of Air Transportation World Wide*, Vol. 4/2, pp. 22-31, https://ntrs.nasa.gov/api/citations/19990111542/downloads/19990111542.pdf. [121]

Secretaria de Advocacia da Concorrência e Competitividade (2021), *"Parecer SEI No. 20496/2021/ME"*, http://www.gov.br/economia/pt-br/acesso-a-informacao/reg/advocacia-da-concorrencia/2020-2021/agencia-nacional-de-aviacao-civil-anac/parecer-20496.pdf/view. [104]

Secretaria de Advocacia da Concorrência e Competitividade (2021), *PARECER SEI Nº 16475/2021/ME*, https://www.gov.br/economia/pt-br/acesso-a-informacao/reg/advocacia-da-concorrencia/2020-2021/agencia-nacional-de-aviacao-civil-anac/parecer-16475.pdf/view. [150]

Secretaria de Aviação Civil/Presidência da República (2015), *"Nota Técnica No. 21/DERC/SPR/SAC-PR"*. [49]

Secretaria Nacional de Aviação Civil (2020), *"Nota Técnica No. 8/2020/DPR/SAC"*, https://sei.anac.gov.br/sei/modulos/pesquisa/md_pesq_documento_consulta_externa.php?9LibXMqGnN7gSpLFOOgUQFziRouBJ5VnVL5b7-UrE5SVJYgA6aZWrbYZEdJOsnutq61Q48ADIYo0U00jgrePMl7JSiDfrCN2qP1e8nZnrZaTq5tRogLfSDtVzrypvWcD. [139]

Secretaria Nacional do Consumidor (2019), *"Nota Técnica No. 6/2019/GAB-SENACON/SENACON/MJ"*, https://consumidor.mppr.mp.br/arquivos/File/NotaTecnica_06_2019_Senacon.pdf. [107]

Sheng, D. et al. (2015), "Slot auction in an airport network with demand uncertainty", *Transportation Research*, Vol. 82/Part E: Logistics and Transportation Review, pp. 79-100, https://doi.org/10.1016/j.tre.2015.07.010. [128]

Silveira, P. (2018), ""Hybrid governance structure between public company and private partners: the case of Infraero in the Brazilian airline sector"", *Revista Direito GV*, Vol. 14/2, pp. 537-556, https://doi.org/10.1590/2317-6172201822. [29]

Starkie, D. (2003), *"The economics of secondary markets for airport slots" in A Market in Airport Slots, K. Boyfield (ed.),*, The Institute of Economic Affairs, https://iea.org.uk/wp-content/uploads/2016/07/upldbook256pdf.pdf. [137]

Starling, V. and N. Villa (2022), *A origem da judicialização desproporcional no mercado do transporte aéreo no Brasil*, http://www.jota.info/coberturas-especiais/aviacao-desafios-da-retomada/a-origem-da-judicializacao-desproporcional-no-mercado-do-transporte-aereo-no-brasil-20062022#_ftn1. [16]

Steer Davies Gleave (2016), *Study on airport ownership and management and the ground handling market in selected non EU countries*, Steer Davies Gleave, https://ec.europa.eu/transport/sites/transport/files/modes/air/studies/doc/2016-06-airports-and-gh.pdf. [23]

Steer Davies Gleave (2015), *Study on employment and working conditions in air transport and airports*, Steer Davies Gleave, https://transport.ec.europa.eu/system/files/2016-09/2015-10-employment-and-working-conditions-in-air-transport-and-airports.pdf. [120]

Steer Davies Gleave (2011), *European Commission Impact assessment of revisions to Regulation 95/93, Final report (sections 1-12)*, Steer Davies Gleave, https://transport.ec.europa.eu/system/files/2016-09/2011-03-impact-assessment-revisions-regulation-95-93.pdf. [95]

Steer Davies Gleave (2011), *European Commission: Impact assessment of revisions to Regulation 95/93, Final report (sections 1-12)*, Steer Davies Gleave, https://transport.ec.europa.eu/system/files/2016-09/2011-03-impact-assessment-revisions-regulation-95-93.pdf. [96]

Subcomitê de Abastecimento de Combustíveis de Aviação (2021), *Relatório de Atividades: Abastecimento de Combustíveis de Aviação ao Conselho Nacional de Política Energética*, https://oeco.org.br/wp-content/uploads/2022/01/20210119RelatrioSubcomitdeAviao_final.pdf. [69]

Tretheway, M. and I. Kincaid (2005), *"Competition between airports in the new Millennium: what works, what doesn't work and why"*, https://issuu.com/intervistasconsulting/docs/competition_between_airports/15. [35]

United Nations Department of Economic and Social Affairs (2008), *International Standard Industrial Classification of All Economic Activities, Revision 4*, United Nations Publications, https://unstats.un.org/unsd/publication/seriesm/seriesm_4rev4e.pdf. [1]

Valdes, V. and D. Gillen (2018), "The consumer welfare effects of slot concentration and reallocation: A study of Mexico City International Airport", *Transportation Research*, Vol. 114/Part A: Policy and Practice, pp. 256-269, https://doi.org/10.1016/j.tra.2018.05.013. [158]

Varsamos, S. (2016), *Airport Competition Regulation in Europe*, Kluwer Law International, Alphen aan den Rijn. [55]

Vaze, V. and C. Barnhart (2012), "Modeling Airline Frequency Competition for Airport Congestion Mitigation", *Transportation Science*, Vol. 46/4, pp. 439-546, https://doi.org/10.1287/trsc.1120.0412. [85]

Vojvodić, K. (2008), ""Airport concessions"", *Ekonomska misao i praksa*, Vol. XVII/1, pp. 95-104, https://hrcak.srce.hr/26362. [148]

Wen, W. (2015), *"Big airlines dominate first airport slot auction", 31 December 2015*, http://www.chinadaily.com.cn/business/2015-12/31/content_22877753.htm. [130]

Zou, B. and M. Hansen (2014), "Flight delay impact on airfare and flight frequency: A comprehensive assessment", *Transportation Research*, Vol. 69/Part E: Logistics and Transportation Review, pp. 54-74, https://doi.org/10.1016/j.tre.2014.05.016. [103]

Notes

[1] The Brazilian territory covers an area of 8 547 403 km².

[2] Accounting for direct, indirect, induced and catalysed jobs (ABEAR, 2021[2]).

[3] According to IATA, Brazil was the sixth largest domestic market in the world in 2019 considering the single origin-destination (O-D) air-travel market (74 million passengers). The US domestic passenger market continued to be the world's largest (614 million passengers), followed by China (550 million passengers), India (125 million passengers), Japan (87 million passengers) and Indonesia (83 million passengers) (International Air Transport Association, 2020[4]). 2020).

[4] Comprising only paying passengers, i.e. excluding passengers traveling free of charge such as persons traveling on tickets purchased at rates or discounts available to airline employees or children who do not occupy a seat, for example.

[5] The decrease in passenger numbers in 2016 and 2017 was driven by the Brazilian recession that began in the second trimester of 2014 and lasted until the fourth trimester of 2016; see, http://portalibre.fgv.br/codace.

[6] RPK corresponds to the number of revenue passengers multiplied by the distance flown of each flight.

[7] ASK is the number of seats multiplied by the distance flown by each flight.

[8] The effect of spare capacity on firms' pricing behaviour is not straightforward: "on the one hand, where firms hold spare capacity they will have strong unilateral incentives to reduce prices to fill that capacity. On the other hand, the existence of spare capacity, particularly when distributed systematically, may promote co-ordinated behaviour. There is also a relationship between spare capacity and entry deterrence. The existence of spare capacity enables incumbent firms to threaten to increase supply and lower price in the event of entry, which may deter potential entrants if they are aware of the existence of the spare capacity" (OECD, 2021, p. 47[155]).

[9] HHI ranks markets below 1 500 as unconcentrated; between 1 500 and 2 500 as moderately concentrated; and above 2 500 as highly concentrated (CADE, 2016[145]). The European Commission, for example, generally considers no horizontal competition concerns in a "merger with a post-merger HHI between 1000 and 2000 and a delta below 250, or a merger with a post-merger HHI above 2 000 and a delta below 150, except where special circumstances". See, https://eur-lex.europa.eu/legal-content/EN/LSU/?uri=celex:52004XC0205(02).

[10] The average ticket price represents the average cost paid by passengers for a one-way flight calculated from the weighted average of commercialised domestic air tickets and the corresponding number of commercialised seats. The yield ticket price represents the average cost paid by passengers per flown kilometres and is calculated by dividing the average ticket price by the average direct distance between the passenger's origin and destination. For that reason, it is commonly used to compare prices between flights with different distances (ANAC, 2018[146]).

[11] ANAC Data and Statistics, www.gov.br/anac/pt-br/assuntos/dados-e-estatisticas.

[12] Although the sixth airport concession round took place in 2021, private operators only assumed control of the airports in 2022. For that reason, data on investments do not include airports from that round.

[13] First round: Natal São Gonçalo do Amaranto (NAT). Second round: Brasília (BSB), São Paulo Guarulhos (GRU), Campinas Viracopos (VCP). Third round: Belo Horizonte Confins (CNF), Rio de Janeiro Galeão (GIG). Fourth round: Florianópolis (FLN), Fortaleza (FOR), Salvador (SSA), Porto Alegre (POA).

[14] Northeast cluster: Recife (REC), Maceió (MCZ), João Pessoa (JPA), Aracaju (AJU), Campina Grande (CPV), and Juazeiro do Norte (JDO). Midwest cluster: Cuiabá (CGB), Sinop (OPS), Rondonópolis (ROO), Alta Floresta (AFL). Southeast cluster: Vitória (VIX), Macaé (MEA).

[15] Southern cluster: Curitiba (CWB), Foz do Iguaçu (IGU), Navegantes (NVT), Londrina (LDB), Joinville (JOI), Bacacheri (BFH), Pelotas (PET), Uruguaiana (URG), Bagé (BGX). Central cluster: Goiânia (GYN), São Luís (SLZ), Teresina (THE), Palmas (PMW), Petrolina (PNZ), Imperatriz (IMP). Northern cluster I: Manaus (MAO), Porto Velho (PVH), Rio Branco (RBR), Cruzeiro do Sul (CZS), Tabatinga (TBT), Tefé (TFF) and Boa Vista (BVB).

[16] General aviation cluster: Rio de Janeiro Jacarepaguá (RRJ) and São Paulo Campo de Marte (RTE). Northern cluster II: Belém (BEL), Macapá (MCP). SP-MS-PA-MG cluster: São Paulo Congonhas (CGH), Campo Grande (CGR), Corumbá (CMG), Ponta Porã (PMG), Santarém (STM), Marabá (MAB), Carajás Parauapebas (CKS), Altamira (ATM), Uberlândia (UDI); Montes Claros (MOC), Uberaba (UBA).

[17] Rio de Janeiro Santos Dumont (SDU) and Rio de Janeiro Geleão (GIG).

[18] According to Article 3 of Decree No. 3.564/2000, CONAC is composed of the Ministry of Defence; Ministry of Foreign Affairs; Ministry of the Economy; Ministry of Development, Industry and Foreign Trade; Ministry of Tourism; Chief of Staff of the Presidency; Ministry of Planning, Budget and Management; Ministry of Justice and Public Security; Ministry of Infrastructure; and Commander of the Brazilian Air Force. The Decree is partially outdated as certain of these ministries no longer exist.

[19] According to Article 3 of Decree No. 10.703/2021, CONAERO is composed of the following bodies: Ministry of Infrastructure (Executive Secretariat); Executive Office of the President of Brazil; Ministry of Justice and Public Security; Ministry of Defence (Department of Airspace Control of Aeronautics Command); Ministry of Economy (Federal Revenue); Ministry of Agriculture, Livestock and Food Supply; Brazilian Health Regulatory Agency (ANVISA); and National Civil Aviation Agency (ANAC).

[20] According to ICAO, general aviation operations refer to all civil-aircraft operations other than a commercial air-transport operation and aerial-work operation. This includes, for example, operations involving air taxis and private aircraft (International Civil Aviation Organization, 2007[113]).

[21] Besides concessions, moral persons may also operate private aerodromes – those without commercial purpose – or public aerodromes providing private air services, specialised air services, and air taxis under an authorisation system.

[22] Law No. 5 862/1972.

[23] The remainder were operated by states and municipalities, by the air force, and by private firms.

[24] According to the ACI, "the build-operate-transfer (BOT) model and its variations are used when a specific investment in the airport is needed, but the government is unwilling or unable to invest in or construct the capital asset required, such as a new terminal" (Airports Council International, 2018, p. 8[24]).

[25] Brazil launched the first concession tender as a pilot project in 2011 with Natal São Gonçalo do Amaranto (NAT), a mid-sized airport in the northeast of Brazil.

[26] Second round: Brasília (BSB), São Paulo Guarulhos (GRU), and Campinas Viracopos (VCP). Third round: Belo Horizonte Confins (CNF) and Rio de Janeiro Galeão (GIG).

[27] Florianópolis (FLN), Fortaleza (FOR), Salvador (SSA), and Porto Alegre (POA).

[28] Decree No. 9 972/2019.

[29] Northeast cluster: Recife (REC), Maceió (MCZ), João Pessoa (JPA), Aracaju (AJU), Campina Grande (CPV), and Juazeiro do Norte (JDO). Midwest cluster: Cuiabá (CGB), Sinop (OPS), Rondonópolis (ROO), and Alta Floresta (AFL); Southeast cluster: Vitória (VIX), and Macaé (MEA).

[30] Southern cluster: Curitiba (CWB), Foz do Iguaçu (IGU), Navegantes (NVT), Londrina (LDB), Joinville (JOI), Bacacheri (BFH), Pelotas (PET), Uruguaiana (URG), and Bagé (BGX). Central cluster: Goiânia (GYN), São Luís (SLZ), Teresina (THE), Palmas (PMW), Petrolina (PNZ), and Imperatriz (IMP). Northern cluster I: Manaus (MAO), Porto Velho (PVH), Rio Branco (RBR), Cruzeiro do Sul (CZS), Tabatinga (TBT), Tefé (TFF) and Boa Vista (BVB).

[31] General aviation cluster: Rio de Janeiro Jacarepaguá (RRJ) and São Paulo Campo de Marte (RTE). Northern cluster II: Belém (BEL) and Macapá (MCP). SP-MS-PA-MG cluster: São Paulo Congonhas (CGH), Campo Grande (CGR), Corumbá (CMG), Ponta Porã (PMG), Santarém (STM), Marabá (MAB), Carajás Parauapebas (CKS), Altamira (ATM), Uberlândia (UDI); Montes Claros (MOC) and Uberaba (UBA). An eighth round is planned for 2023, aiming at awarding together Rio de Janeiro Santos Dumont (SDU) and Rio de Janeiro Geleão (GIG), both profitable airports.

[32] According to ACI, from a sample of 127 airports worldwide, the average number of bidders at the final bid stage for concession contracts was 4 (Airports Council International, 2018[24]).

[33] According to Law No. 11.079/2004, these are concessions in which the government pays a complementary revenue to the concessionaire, in addition to the ordinary revenue sources obtained from the exploitation of the service (i.e. tariffs charged to users).

[34] The economic crises that hit Brazil from 2014 affected the sector; its slow recovery was halted by the COVID-19 pandemic.

[35] In April 2020, the Attorney General's Office (AGU) concluded that the COVID-19 pandemic was a force majeure or an act of God event, allowing the amendment of transport infrastructure concession contracts in order to maintain their initial economic and financial balance (AGU Advisory Opinion No. 261/2020/CONJUR-MINFRA/CGU/AGU).

[36] Article 175 of the Federal Constitution and Article 14 of Law No. 8.987/1995.

[37] These can include bid bonds, performance guarantees, insurance policies, minimum capital, and specific requirements for foreign bidders, such as sworn translations, a representative in Brazil, and authorisations to operate in the country.

[38] Another example is the requirement for bidders to submit a statement issued by a financial institution on an offer's economic viability, which aims to allow ANAC to verify the economic feasibility of an offered project. This even though the tender notice already required other documents to prove bidders' economic qualification. The need of an additional document raised unnecessarily entry costs and was removed in the sixth round.

[39] The first round required bidders to prove they employed professionals with a college degree and experience in specific activities: 1) at least 1 professional with at least 5 years' experience in administrative management; 2) at least 1 professional with a year's experience of risk management in transport operations; 3) at least 1 professional with at least 5 years' experience in management of airport handling at least 1 million passengers a year; 4) at least 1 professional with 5 years' experience in airport, aircraft and/or industrial-maintenance management; 5) at least 1 professional with 5 years' experience in aviation-security management; and 6) at least 1 professional with 5 years' experience in execution or inspection of works on airport passenger terminals.

[40] In practice, in the first airport-concession rounds the technical-experience requirements prevented Brazilian companies to bid independently as Infraero (as the historical incumbent) was the only firm with necessary years of experience. Only in 2019 an entirely Brazilian consortium managed to win a cluster, in the fifth concession round.

[41] The obligation of the technical operator to hold a minimum stake in the consortium seems reasonable, otherwise the technical experience requirement could be bypassed by an insignificant stake in the consortium. However, it should be noted that the required minimum share of the technical operator in the consortium has varied across concession rounds: 10% in the second round; 25% in the third round; and 15% since the fourth round (Table 2.6).

[42] Other companies in the consortium financially would support the experienced operator while also gaining experience that would allow them to bid in future concession rounds.

[43] Division 4 of Part 3 of the Australian Airports Act 1996 establishes a 5% limit on ownership by airlines of airport-operator companies, while Article 29 of the Mexican Airports Law limits vertical integration between airlines and airport operators to a 5% stake.

[44] This includes their parent companies, subsidiaries and related companies, as well as the subsidiaries and related companies of their parent companies and subsidiaries.

[45] A parent company, subsidiary or related company to an airline or subsidiary or related company to its parent companies and subsidiaries.

[46] A prior authorisation from CADE may also be required if the Brazilian merger control threshold is fulfilled.

[47] Including parent companies, subsidiaries and related companies.

[48] Including their parent companies, subsidiaries and related companies, as well as the subsidiaries and related companies of their parent companies and subsidiaries.

[49] "There is no precise definition of what is called yardstick competition, given that the associated theory has led to various ways of implementation, as described in chapter 3. However, we can distinguish two main senses given to the term 'yardstick competition'. On the one hand, this expression refers to a regulatory framework, based on comparisons. It is a virtual form of competition between similar regulated firms, like Shleifer's proposal (see next page). It consists in estimating what should be the best prices and subsidies, by comparing the performances of various regulated firms. The regulator, by setting the correct prices and subsidies, can lead the firms to produce an effort that increases the welfare. On the other hand, yardstick competition refers to the basic and relatively informal use of comparisons by a regulator who wants to improve its expertise and reduce the informational asymmetry he [sic] faces. In that sense, yardstick competition is an additional expertise tool used by the regulator to improve the efficiency of another regulatory framework (franchising, for example)" (ECMT, 2006, p. 75[156]).

[50] Of airports from the second round.

[51] Including parent companies, subsidiaries and related companies.

[52] Of airports from the second or third rounds (in case of the second round) or from the other airport at the same region (in case of the fourth round).

[53] Including parent companies, subsidiaries and related companies.

[54] A prior authorisation from CADE may also be required, if the Brazilian merger control threshold is fulfilled.

[55] Resolution CONAC No. 01/2017. For a definition of general aviation, see endnote 20.

[56] This was also highlighted by SEAE on its opinion on this airport concession round (Secretaria de Advocacia da Concorrência e Competitividade, 2021[150]).

[57] Certain stakeholders have suggested that this was at least partially due to "winner's curse" when bidders overestimate an object's value at auction.

[58] São Paulo also has a third airport, Viracopos (VCP), located in the nearby city of Campinas.

[59] Although ground-handling services are related to aviation activities at an airport, they are generally not considered to be a core business activity, and are often not directly provided by airport operators. For that reason, revenue from ground-handling services can be considered as non-aeronautical (although technically part of aeronautical revenue). Furthermore, the rental of hangars and other operational areas is considered as part of aeronautical services, but charges vary substantially across airports and tend to represent a small fraction of an airport's aeronautical revenue (Air Transport Research Society, 2019[60]). In Brazil, these services are not charged through airport tariffs and so their prices fall under airports' non-aeronautical revenue, as discussed in more detail in Section 2.3.2.

[60] The only exception is Natal São Gonçalo do Amaranto (NAT), the first airport offered for concession, for which the contract establishes that if the ratio between non-tariff revenues and the total revenue exceeds 35%, part of the non-tariff revenue will be used to reduce airport tariffs.

[61] Resolutions ANAC No. 350/2014, No. 392/2016, No. 432/2017 and No. 508/2019, as well as Ordinance Aeronautics Command No. 219/GC-5/2021.

[62] In addition to airport tariffs, there are tariffs covering air-navigation services (including air-traffic control, meteorological services and aeronautical telecommunications). In Brazil, air-navigation services are not provided by airport operators, but two main service providers. The first is the Department of Airspace Control (DECEA), subordinated to the Aeronautics Command (COMAER), which is linked to the Ministry of Defence, which is responsible for regulating these activities (including setting air navigation tariffs), as well as providing services related to national defence and sovereignty. The second provider for the remaining air navigation services is an SOE, NAV Brasil Serviços de Navegação Aérea.

[63] This mechanism has been included in concession contracts since the fourth round, as well as in Resolution ANAC No. 508/2019, which establishes the airport-tariff regulation for airports managed by Infraero.

[64] Considering only concessions with available and detailed data. The Midwestern cluster, Central cluster, Northern cluster and Southern cluster are not included in the analysis.

[65] According to Airports Council International (ACI) data for financial year 2019; see, www.wsp.com/en-GL/insights/fuelling-airport-recovery-via-non-aeronautical-revenue.

[66] "Concession in its original context means the payment that the airport authority charges the owner or manager of an operation to conduct commercial activities in the airport, whereas rent or lease refers to the right to occupy certain defined premises or a specific area of realty. In general, however, concessions confer all commercial activities to sell goods and services in the airport, and sometimes the meaning of concession, rent and lease is used indiscriminately" (Vojvodić, 2008[148]).

[67] Article 1 of Resolution ANAC No. 302/2014.

[68] Article 49 of Infraero's Internal Bidding and Contract Regulation.

[69] Articles 25 to 29 of Infraero's Internal Rules No. 13.13/2020.

[70] Article 4 of Ordinance SAC No. 93/2020.

[71] Articles 5 and 6 of Ordinance SAC No. 93/2020.

[72] Annex 2 to the concession contracts (Airport Exploration Plan or PEA).

[73] According to airport-concession contracts, tariffs are annually updated by ANAC following a formula that takes into account an inflation index, as well as a productivity factor (X factor) and a quality factor (Q factor). The productivity factor refers to efficiency savings, which is subtracted from the final cap, in order to share productivity gains with users. The quality factor comprises service quality indicators, such as how the services have been performed, the availability of equipment and facilities, as well as a passenger satisfaction survey.

[74] Article 40 of Law No. 7.565/1986 (Brazilian Aeronautical Code).

[75] Article 2, paragraph 2 of Resolution ANAC No. 302/2014.

[76] Article 6, item I, of Resolution ANAC No. 302/2014.

[77] Article 6, item II, of Resolution ANAC No. 302/2014.

[78] Article 6, item IV, of Resolution ANAC No. 302/2014.

[79] Article 8 and Article 9, paragraphs 1 and 2 of Resolution ANAC No. 302/2014.

[80] According to stakeholders, ANAC has recently engaged in this activity, which has led to many disputes being resolved out of courts.

[81] Article 11 of Resolution ANAC No. 302/2014.

[82] Annex to Resolution ANAC No. 116/2009.

[83] For instance, in the United States the ground-handling market is dominated by the major airlines' own operations, which provide the services either directly or through subsidiary companies (Steer Davies Gleave, 2016, p. 157[23]). In Europe, many airports still provide extensive ground-handling services (Air Transport Research Society, 2019[60]).

[84] Article 2 of Resolution ANAC No. 116/2009.

[85] Resolution ANAC No. 116/2009.

[86] Holding space at an airport seems to be paramount for the provision of more competitive services. Indeed, in practice, the majority of ground-handling service providers sign a leasing agreement with the airport operator.

[87] For example, the Brazilian ground-handling association (ABESATA) has recently developed a certification programme, aimed at ensuring compliance of ground-handling service providers with the legislation (comprising regulatory, financial, operational, labour and environmental, social and corporate-governance dimensions). The certificate is issued by an independent organisation and can be obtained by any firm which demonstrates that it meets the minimum requirements (ABESATA, 2022[147]).

[88] Article 2, item II of Resolution ANAC No. 116/2009.

[89] Article 2 of Resolution ANAC No. 116/2009.

[90] According to ANP, Brazil currently has more than 250 jet fuel resellers.

[91] The requirements to be qualified as an aviation-fuel distributor and/or reseller are established, respectively, by Resolution ANP No. 17/2006 and Resolution ANP No. 18/2006. Furthermore, as aviation-fuel supply is a type of ground-handling service, and since suppliers need access to airport operating areas to provide the service, it is also covered by Resolutions ANAC No. 116/2009 and No. 302/2014, as well as the airport-concession contracts.

[92] Article 1, paragraph 1 of Resolution ANAC No. 302/2014. Although the regulation does not indicate any examples of what could constitute an abusive or discriminatory practice, they could include, for example, refusing access to the airport, imposition of unreasonable requirements, and price discrimination between competitors.

[93] Article 9, paragraph 2 of Resolution ANAC No. 302/2014.

[94] The WASG classifies airports in three categories. Besides co-ordinated or Level 3 airports, these are: 1) non-co-ordinated or Level 1 airports, where the infrastructure capacity is adequate to meet the demands of airport users at all times; 2) schedule-facilitated or Level 2 airports with the potential for congestion during some periods of the day, week, or season that requires schedule adjustments mutually agreed between the airlines and the facilitator (Airports Council International, International Air Transport Association and World Wide Airport Coordinators Group, 2020, p. 20[87]).

[95] Only three airports in the United States follow the WASG; these are New York JFK, New York LaGuardia and Washington Ronald Reagan. At all other airports, airlines can generally schedule flights as they wish, in co-ordination with airport operators. On the one hand, the absence of an interventionist approach is likely to lead to delays created by airlines over-subscribing airport slots during the busiest periods of the day. On the other hand, some argue that the marginal costs of delays at airports dominated by an air carrier or an alliance are often overstated, since these costs would be internalised by that airline or alliance. In practice, though, it is unlikely that all flights at Level 2 airports such as Chicago O'Hare, Los Angeles, San Francisco, and Newark Liberty are completely freely scheduled by airlines, as they are expected to seek and obtain schedule approval from the Federal Aviation Administration (FAA). Otherwise, if the airport becomes Level 3, the airline will not receive priority for any of the non-approved flights (Egeland and Smale, 2017, p. 25[86]).

[96] According to WASG, equivalent seasons are "consecutive summer seasons (two summers) or consecutive winter seasons (two winters) as opposed to two consecutive seasons (a summer and a winter season)" (Airports Council International, International Air Transport Association and World Wide Airport Coordinators Group, 2020, p. 62[87]).

[97] Article 8, paragraph 3 of Resolution ANAC No. 338/2014. The criterion on maximum delay is not contained in the WASG.

[98] ANAC has developed a system to monitor slots that feeds a database allowing any interested party to follow slots usage; see, https://sas.anac.gov.br/sas/samu/(S(bwv0mwd0lgb5c5fs222425vd))/view/frmConsultaBases.

[99] Article 38 of Resolution ANAC No. 338/2014.

[100] Article 2, item XVI-A of Resolution ANAC No. 338/2014.

[101] Article 43, item II of Resolution ANAC No. 338/2014. It is worth noting that misuse of slots constitutes an administrative infringement, as long as an airline's intent can be proven. This aims to prevent airlines from losing slots for circumstances beyond their control, such as weather conditions. In case of misuse of slots, besides the loss of historical precedence, ANAC may inflict a fine from BRL 7 000 to BRL 90 000 for each flight, although this has not been common practice. In theory, misuse of slots could also be considered an anticompetitive practice, and CADE could investigate and impose sanctions basing on Law No. 12 529/2012 (Brazilian Competition Act). According to the OECD, however, only rarely can a slot-trading tactic amount to a restrictive agreement or an abuse of dominance (OECD, 2014, p. 17[92]). In Brazil, no such case has ever been prosecuted.

[102] Article 22 of Resolution ANAC No. 338/2014.

[103] Article 8, paragraph 2 of Resolution ANAC No. 338/2014.

[104] Article 2, item XIII, and article 8, paragraph 4 of Resolution ANAC No. 338/2014.

[105] Article 22 of Resolution ANAC No. 338/2014.

[106] Article 22, paragraph 3 of Resolution ANAC No. 338/2014.

[107] Article 31 of Resolution No. 338/2014. According to ANAC, this rests on the premise that slots are permission given by the regulator to an airline, free of charge, for a planned operation, and comprise no property rights; i.e. airlines do not own slots. This makes slots public assets, from which airlines can take no financial advantage. Only the co-ordinator can allocate a slot, according to the established criteria. The only exception is slot lease between companies belonging to the same economic group, as they already function as a single economic entity (Article 31, paragraph 1 of Resolution ANAC No. 338/2014).

[108] Article 32 of Resolution ANAC No. 338/2014.

[109] Resolution ANAC No. 338/2014 will continue to apply until the winter season 2022.

[110] The fact that many slots allocated to new entrants are returned to the pool after only one season might illustrate this. In addition, at the most congested airports in the European Union (at the time of the study), such as London Gatwick, Düsseldorf and Frankfurt, less than 50% of slots were allocated according to the new entry rule, partly because there were no requests that met the criteria (Steer Davies Gleave, 2011, p. 5[96]).

[111] However, one study signalled that the main goal of allocating slots is not to reduce average fares, but to ensure that airport infrastructure is used efficiently and that downstream airline markets operate at the highest level of economic efficiency (Valdes and Gillen, 2018, p. 257[158]). It also suggested that reallocating slots to smaller airlines does not necessarily lead to higher consumer welfare. Indeed, outcomes depend on the current distribution of slots, which routes lose services, which routes gain services from which airline, as well as how market power is exercised at the route level.

[112] It should be noted that Belo Horizonte Pampulha airport (PLU) is currently restricted to general aviation and regional scheduled air services.

[113] SEAE, for example, proposes that 100% of slots from the pool should be firstly allocated to new entrants in all co-ordinated Brazilian airports (Secretaria de Advocacia da Concorrência e Competitividade, 2021[104]).

[114] For example, the current new-entry rule could be replaced to consider an airline holding less than 10% of slots at the airport, across the airline's entire ownership group and even any joint-venture partners, as a new entrant. This would allow some airline-ownerships groups to build up a major slot holding, and be more able to compete with large dominant airlines (Steer Davies Gleave, 2011, p. 11[96]).

[115] In Brazil, the declared capacity is determined by the airport operator, in line with DECEA, which is responsible for managing Brazilian airspace. Since 2019, DECEA has been reviewing the capacity declaration for most Brazilian airports to refine the methodology for the determination of runway capacity. This has resulted in increased capacity for many airports, including some co-ordinated ones (Eurocontrol and DECEA, 2021, pp. 19-20[149]).

[116] Through congestion pricing, rather than slots, fees would be set on flight operations, which would vary throughout the day. By charging higher prices during congested periods, airlines would be encouraged to operate flights in less congested periods or to reduce their overall number of flights (Ball, Berardino and Hansen, 2018, p. 186[101]). This mechanism would ensure that air fares reflect the commercial value of the slots they are associated with and therefore represent an efficient use of slots. However, the competitive equilibrium of prices only exists when slots are (perfect) substitutes for all airlines, which is not always the case (Kociubiński, 2013, p. 45[157]). Incentivising flights to spread across the day may also dampen hub connectivity. Further, implementing congestion pricing may be difficult, since the difference between peak and off-peaks pricing needs to be extremely large for airlines to accept the operational inconvenience of using the airport at off-peak times (Egeland and Smale, 2017, p. 29[86]). See Annex 2.A. Slot auctions and slot trading for a further analysis of slot auctions and slot trading, including their advantages, disadvantages and corresponding international experiences.

[117] It is worth mentioning that although no specific licensing requirement for cabin-crew members exist in ICAO's provisions, Annex 6 to the Convention on International Civil Aviation does provide training and competency requirements for the profession. In certain jurisdictions, flight attendants are required to hold a qualification other than a licence to prove their qualifications to perform duties related to the safety of passengers and flight during operations. For instance, in the United States, flight attendants must hold a certificate of demonstrated proficiency issued by the Federal Aviation Administration (49 USC 44728); in the European Union, they are required to hold an attestation, issued upon application, with which the applicant has demonstrated that he or she complies with the essential requirements (Articles 22 and 23 of Regulation EU No. 2018/1139 of 4 July 2018); Argentina requires a certificate of competency issued by the aeronautical authority (RAAC 64). In other jurisdictions, such as Chile (DAR 01), Colombia (RAC 63), Mexico (Reglamento para la expedición de permisos, licencias y certificados de capacidad del personal técnico aeronáutico), and Brazil (Law No. 13 475/2017), a licence issued by the civil-aviation authority is required to perform cabin-crew duties.

[118] Pilot, flight navigator, and flight engineer (known in Brazil as flight mechanic).

[119] Aircraft maintenance, including technicians, engineer, and mechanics; air-traffic controller; flight-operations officer and flight dispatcher, and aeronautical-station operator.

[120] Besides holding a licence, operating certain types of aircraft may also require holding a type rating to ensure that the holder has knowledge and skills to operate that specific aircraft type.

[121] In addition, the Department of Airspace Control (DECEA) regulates the professions related to air-navigation services, and a licence is required to be an air-traffic controller; aeronautical information professional; aeronautical meteorology professional; aeronautical station operator; offshore radio operator; and air-traffic manager (ICA 63-31, approved by Ordinance DECEA No. 137/DGCEA, of 27 September 2021). However, considering that air-navigation services are provided either directly by DECEA or through NAV Brasil, an SOE, only civil servants from these organisations are allowed to perform these activities. This report will not assess the requirements for these professions.

[122] RBAC No. 61.

[123] RBHA No. 63. This activity is likely to disappear in the near future. Today, according to ANAC, only one type of aircraft (for the provision of air cargo transport) requires a flight mechanic.

[124] RBHA No. 63.

[125] RBAC No. 65.

[126] RBAC No. 65.

[127] Articles 2 and 3 of Law No. 13.475/2017.

[128] RBAC No. 141.

[129] Articles 180 and 201 of Law No. 7.565/1986 (Brazilian Aeronautical Code), both recently revoked by Provisional Measure No. 1.089/2021, converted into Law No. 14.368/2022.

[130] Article 5, paragraph 1, and Article 20 of Law No. 13.475/2017.

[131] Item 141.91 of RBAC No. 141.

[132] Commission Regulation (EU) No. 2018/1119 of 31 July 2018 amended Commission Regulation (EU) No. 1178/2011 of 3 November 2011, laying down technical requirements and administrative procedures related to civil-aviation aircrew pursuant to Regulation (EC) No. 216/2008 of the European Parliament and of the Council.

[133] Resolution ANAC No. 659/2022.

[134] Part 61 and Part 66 of the Australian Civil Aviation Safety Regulations 1998, and (Civil Aviation Safety Authority, 2022[154]).

[135] Part 61 and Part 66 of the New Zealand Civil Aviation Rules.

[136] Article 156, paragraph 1 of Law No. 7 565/1986 and Article 6 of Law No. 13.475/2017.

[137] Article 156, paragraph 3 of Law No. 7 565/1986 and Article 6, paragraph 1 of Law No. 13.475/2017.

[138] Article 157 of Law No. 7 565/1986 (Brazilian Aeronautical Code).

[139] Article 20 of Law No. 13 475/2017.

[140] According to Annex 6 to the Convention on International Civil Aviation, fatigue is "a physiological state of reduced mental or physical performance capability resulting from sleep loss, extended wakefulness, circadian phase, and/or workload (mental and/or physical activity) that can impair a person's alertness and ability to perform safety-related operational duties".

[141] Flight time is the total time from the moment an aeroplane first moves for the purpose of taking off until the moment it finally comes to rest at the end of the flight (Annex 6 to the Convention on International Civil Aviation). Flight duty period is a period that commences when a flight or cabin crew member is required to report for duty that includes a flight or a series of flights and that finishes when the aircraft finally comes to rest and the engines are shut down at the end of the last flight on which he or she is a crew member (Annex 6 to the Convention on International Civil Aviation). Duty period is a period which starts when a flight or cabin crew member is required by an operator to report for or to commence a duty and ends when that person is free from all duties (Annex 6 to the Convention on International Civil Aviation). Rest period is a continuous and defined period of time, subsequent to and/or prior to duty, during which flight or cabin crew members are free of all duties (Annex 6 to the Convention on International Civil Aviation).

[142] Fatigue Risk Management System (FRMS) is a data-driven means of continuously monitoring and managing fatigue-related safety risks, based upon scientific principles and knowledge, as well as operational experience that aims to ensure relevant personnel are performing at adequate levels of alertness (Annex 6 to the Convention on International Civil Aviation).

[143] Law No. 13 475/2017 establishes the main flight-time, duty-period and rest period-limitations. However, section 117.61 and Appendixes B and C of RBAC No. 117 also set limits for flight-time, duty-period and rest-period limitations, the so-called fatigue risk-management rules. These rules are also prescriptive, but they are more detailed than those provided in Law No. 13 475/2017, since they take into account different variables, such as the start time of the duty period and on board rest facilities provided to the crew. This allows longer periods than those stated in Law No. 13 475/2017.

[144] Section 117.63 of RBAC No. 117.

[145] Article 19, paragraph 4 of Law No. 13 475/2017.

[146] According to the US Federal Aviation Administration (FAA), Newark Liberty is today a Level 2 airport and no longer a Level 3 airport; www.faa.gov/about/office_org/headquarters_offices/ato/service_units/systemops/perf_analysis/slot_administration/slot_administration_schedule_facilitation/level-2-airports. As explained in endnote 103, this means that today the airport has potential for congestion during some periods of the day, week, or season that requires schedule adjustments mutually agreed between the airlines and the facilitator.

[147] Newly created slots for international flights continued to be allocated through an administrative scheme; www.gdjv.cn/article/8626852.

[148] This outcome has been seen at London Heathrow airport, where commercial slot transfers seem to have increased the average aircraft size by around 80%, from 139 to 250 seats for each slot. Furthermore, there is evidence at the same airport to indicate that airlines operating short-haul routes have tended to

sell slots either to the dominant airline or to other airlines operating long-haul routes (Mott MacDonald and European Commission, 2006, pp. 3-35-8-4[135]).

[149] Other studies suggest greater benefits from market-based mechanism in general. One indicated that secondary slot trading, higher runway charges, slot auctions or combinations of these would ensure a more efficient use of slots, leading to an increase in passenger numbers at congested airports of about 7%, equivalent to around 52 million additional passengers per year at those airports (National Economic Research Associates, 2004[152]). In the Impact Assessment accompanying the Proposal for a Regulation of the European Parliament and of the Council on common rules for the allocation of slots at European Union airports (Recast), the European Commission estimated that adopting a market-based mechanism expressly allowing slot trading across the EU would result in an average annual increase of 1.6% (or 23.8 million) in the number of passengers carried, a net economic benefit of EUR 5.3 billion, and an increase in employment of up to 62 000 full-time jobs (European Commission, 2011[151]). The legislative proposal to review Regulation No. 95/93 was published in December 2011, the Council adopted its general approach in October 2012 and the European Parliament adopted its first reading position in December 2012. At present, the proposal is waiting for the Council's first reading position and remains blocked; www.europarl.europa.eu/legislative-train/theme-transport-and-tourism-tran/file-allocation-of-slots-at-eu-airports-common-rules-recast.

[150] Estimating pass-though elasticity is notoriously difficult as 1) data limitations do not match flight dates with airfare dates; and 2) airlines have a variety of financial tools to hedge fuel and oil price uncertainty. Gayle and Lin's recent paper takes these factors into account and is able to rationalise the unexpectedly lower estimates previously obtained in the literature (Gayle and Lin, 2021[143]).

[151] Brasília International Airport will soon be directly connected through fuel pipelines. The test phase has started and the project is expected to be operational in October 2022; https://tnpetroleo.com.br/noticia/petrobras-leva-querosene-de-aviacao-por-duto-para-brasilia.

[152] ANAC, www.anac.gov.br/acesso-a-informacao/dados-abertos/areas-de-atuacao/voos-e-operacoes-aereas/dados-estatisticos-do-transporte-aereo.

[153] ANAC, www.anac.gov.br/acesso-a-informacao/dados-abertos/areas-de-atuacao/voos-e-operacoes-aereas/tarifas-aereas-domesticas. The annual airfare revenue by airport was calculated by placing ANAC's national and international fare data into a single base; revenue from airline tickets was calculated by multiplying the value of the fare charged and the number of seats sold for the respective value for each company, month and departing airport, aggregated to the year and airport level.

[154] AC 08012.004341/2009-73 – Cosan/Shell.