Flexing the slot regime: airport slot coordination in light of evolving market realities: a regulatory perspective

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2 CHAPTER TWO

The connotation of airport slots in contemporary air transport

2.1 The concept and objectives of slot coordination

2.1.1 The definition of an airport slot in light of the arrangement of this dissertation

According to the Worldwide Airport Slot Guidelines [hereinafter: WASG], the international reference document for slot coordination, an airport slot inhabits

> ". . . the permission given by a coordinator 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".[84]

The definition used in European Union [hereinafter: EU] law is similar to the one in the WASG.[85] Airport slots are expressed in block time, which is the total amount of time a flight takes to use the range of airport infrastructure.[86] An airport slot is not to be confused with a runway slot or air traffic management slot, which both refer to an allocated period of time by the local air traffic control [hereinafter: ATC] authorities within which landing or take-off of the aircraft has to take place. Whilst airport slots are allocated at capacity-constrained airports, runway slots require an on-the-day permission to use a congested air route.[87] Slots can only be allocated to and held by airlines.[88] Further analysis on who holds the legal title to a slot will follow in Chapter 5, section 5.2 of this dissertation.

Section 2.1 reviews the concept and objectives of slot coordination, followed by an analysis of the basic notions and principles of the coordination process in section 2.2. A central question that this dissertation aims to answer is whether slot coordination as we know it is reflective of the needs of society that we witness to date. Although this dissertation will not provide a definitive answer to this question until Chapter 6, Chapter 2 sets out how times have changed for air transport, and by extension slot coordination, since the signing of the Chicago Convention on International Civil Aviation of 1944 [hereinafter: the Convention] nearly

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[84] ACI, IATA and WWACG, *Worldwide Airport Slot Guidelines (WASG) Edition 1* (2020), *supra* note 8, at 1.6.1.

[85] Article 2(a) of EU Regulation 95/93, as amended, *supra* note 47, provides the following definition: "[A] "slot" shall mean the permission given by a coordinator in accordance with this Regulation to use the full range of airport infrastructure necessary to operate an air service at a coordinated airport on a specific date and time for the purpose of landing or take-off as allocated by a coordinator in accordance with this Regulation." *See infra* Chapter 4, section 4.1 (analyzing EU Regulation 95/93, as amended, *supra* note 47).

[86] The 'clock' starts ticking from the arrival at the gate, that is 'on-block' time, to the moment the aircraft is ready for pushback from the stand, that is 'off-block' time.

[87] *See* Eurocontrol, What is a slot? (23 December 2016), *available at* https://www.eurocontrol.int/article/what-is-a-slot (last visited November 10, 2021).

[88] EU Regulation 95/93, as amended, *supra* note 47, Article 8(1); ACI, IATA and WWACG, *Worldwide Airport Slot Guidelines (WASG) Edition 1* (2020), *supra* note 8, at 1.7.2(b).

seventy years ago.[89] Key concerns include foreclosed airport access due to the rising slot scarcity levels at (super-)congested airports, and the growing public concerns related to the negative externalities of air transport, including aircraft noise exposure and atmospheric emissions. These concerns are analyzed in sections 2.3 and 2.4 respectively.

2.1.2 The inextricable link between airport slots and airport infrastructure

Airport slots have been compared with other commodities which are subject to quantitative restrictions such as spectrum rights, fishing and emissions quotas, *see* NERA (2004) and MottMacDonald (2006).[90] The main difference between airport slots and other commodities is that airport slots are considerably more heterogeneous, and their value to airlines varies greatly depending on the season, time of day and airport they are allocated for. Instead of simply conveying the right to catch a certain quantity of fish or produce a certain quantity of emissions within a given timeframe, an airport slot is inextricably linked to the capacity of a specific airport at a particular date and time.[91]

Slots at different times and at other airports may therefore be very imperfect substitutes. As described in section 2.2.3 below, the coordinator only accepts a slot request if there is sufficient airport capacity available at the date and time sought after. Slots at both ends – that is, airports – of a route are linked to one another, hence an airline cannot accept a slot at any available moment offered by the coordinator. Slots have substantial interdependencies. Besides the fact that there needs to be capacity available for a specific service, a change in one slot has knock-on effects at destination airports, and throughout the network.[92]

A report drawn up on behalf of the European Commission [hereinafter: the Commission] by PricewaterhouseCoopers in 2000 confirms that slots are linked to various types of airport infrastructure, and not to runway capacity only.[93] Stand, terminal and airspace capacities may well be the most constraining factors, as well as environmental limitations at an increasing number of airports.[94] Only if all airport resources are available, an airline can have access to a slot-controlled airport in order to operate an air service.[95] In this light, PricewaterhouseCoopers recommended to the Commission that the definition of a slot in EU Regulation 95/93, as amended [hereinafter: the Slot Regulation] should recognize that slots are linked to all resources necessary to operate air services at an airport, except traffic rights.[96]

The Commission followed this recommendation in its 2004 revision of the Slot Regulation by changing the definition of a slot to include the use of "the full range of airport infrastructure", instead of merely referring to an "aircraft movement" in the first version of the Slot Regulation, implying runway usage only.[97]

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[89] *See infra* Chapter 3, section 3.1 (analyzing the Convention on International Civil Aviation, *supra* note 4, and the legal instruments which are attached to or made under the Convention).
[90] *See* NERA Economic Consulting, *supra* note 5, at 234; Mott MacDonald, *supra* note 63, Chapter 6.
[91] *See* NERA Economic Consulting, *supra* note 5, at 72.
[92] *See id.,* at 174 and 177; Mott MacDonald, *supra* note 63, at 12-16. Moreover, and not without reason, John Balfour already described the coordination of slots as an "extremely complex business" nearly 20 years ago, particularly in light of the need for global coordination, as to which *see* John Balfour, *Air Transport – A Community Success Story*?, 31 Common Market Law Review 5 (1994), at 1030.
[93] *See* PricewaterhouseCoopers, *Study of certain aspects of Council Regulation 95/93 on common rules for the allocation of slots at Community airports* (2000), at 28.
[94] *See infra* sections 2.3 and 2.3 (addressing the diverse nature of the capacity constraints faced by airports).
[95] *See* PricewaterhouseCoopers, *supra* note 93, at 29.
[96] *See* NERA Economic Consulting, *supra* note 5, at 9; *infra* Chapter 3, section 3.3 (further analyzing the extent of the relationship between slots and traffic rights).
[97] EU Regulation 95/93, as amended, *supra* note 47, Article 2(a).

When allocated, however, slots are not route, aircraft or flight number specific. With narrow exceptions[98] and if the declared capacity allows for it,[99] slots may be changed from, *inter alia,* one route to the other after confirmation of the coordinator responsible for slot allocation at the airport concerned to meet changing demand patterns.[100] Airlines may also exchange slots with other airlines to improve schedules, again subject to the confirmation of the coordinator.[101]

2.1.3 General and specific objectives of slot coordination

At most airports where demand for air transport services exceeds supply, slot coordination is used to define a set of rules and priorities to be followed for the allocation of airport capacity.[102] Thus, airport slots are essentially planning tools for the rationing of capacity at airports where the available capacity falls short of air travel demand. Slot coordination is also portrayed by the drafters of the WASG as a process to "maximize the efficient use of airport infrastructure".[103]

The prime objective of slot coordination is reflected in paragraph 1.2.1 of the WASG:

> "The prime objective of airport slot coordination is to ensure the most efficient declaration, allocation and use of available airport capacity in order to optimize benefits to consumers, taking into account the interests of airports and airlines."[104]

The first edition of the WASG under joint supervision of airlines, airports and coordinators, has been in effect since 2020.[105] Since 2020, the specific objectives of slot coordination according to the WASG are as follows:

> "a) To facilitate consumer choice of air services, improve global connectivity and enhance competition at congested airports for passengers and cargo.
> b) To provide consumers with convenient schedules that meet demand, are consistent from one season to the next, and reliable in terms of their operability.
> c) To ensure that slots are allocated at congested airports in an open, fair, transparent and non-discriminatory manner by a slot coordinator acting independently.
> d) To realize the full capacity potential of the airport infrastructure and to promote regular reviews of such capacity and demand that enable effectual capacity declarations for slot allocation on a seasonal basis.
> e) To balance airport access opportunities for existing and new airlines.
> f) To provide flexibility for the industry to respond to regulatory and changing market conditions, as well as changing consumer demand.
> g) To minimize congestion and delays."[106]

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[98] Pursuant to Article 8a(3) of EU Regulation 95/93, as amended, *supra* note 47, slots allocated to new entrants ". . . may not be transferred to another route . . . for a period of two equivalent scheduling periods". They may also not be transferred or exchanged between airlines. *See infra* section 2.2.3 (mentioning the so-called 'new entrant rule' as part of the allocation priorities set forth by the slot allocation process) and Chapter 5, section 5.5 (providing further analysis on the new entrant rule and questioning if it is still fit for purpose).

[99] *See infra* section 2.2.2 (addressing the setting of declared capacities).

[100] ACI, IATA and WWACG, *Worldwide Airport Slot Guidelines (WASG) Edition 1* (2020), *supra* note 8, at 8.10.

[101] *See* Mott MacDonald, *supra* note 63, at 1-11 and 2-1; ACI, IATA and WWACG, *Worldwide Airport Slot Guidelines (WASG) Edition 1* (2020), *supra* note 8, at 8.10; EU Regulation 95/93, as amended, *supra* note 47, Article 8a(2).

[102] *See* European Commission, *supra* note 26, at 1.

[103] ACI, IATA and WWACG, *Worldwide Airport Slot Guidelines (WASG) Edition 1* (2020), *supra* note 8, at 1.1.1.

[104] ACI, IATA and WWACG, *Worldwide Airport Slot Guidelines (WASG) Edition 1* (2020), *supra* note 8, at 1.2.1.

[105] Before 2020, the document was under the supervision of airlines and coordinators and published by airlines alone. *See infra* Chapter 3, section 3.4 (further elaborating upon the history and governance of the WASG).

[106] ACI, IATA and WWACG, *Worldwide Airport Slot Guidelines (WASG) Edition 1* (2020), *supra* note 8, at 1.2.1.

Interestingly enough, the Worldwide Slot Guidelines [hereinafter: WSG] – the WASG predecessor which remained in force until 1 June 2020 – seemingly only pursued the following, more narrowly worded objective:

> "The prime objective of airport coordination is to ensure the most efficient use of airport infrastructure in order to maximize benefits to the greatest number of airport users."[107]

Instead of putting "benefits to consumers" at the center of the coordination process, previous editions of the document put "benefits to the greatest number of airport users" at the heart of the system. Although the document did not specify what should be understood by "airport users", the wording appears narrower than the current reference to "consumers".

2.1.4 Concluding remarks

With the coming into existence of the first edition of the WASG in 2020, the prime objective of slot coordination appears to have changed, whereas the key principles governing the slot coordination process have largely remained the same. Whilst it is, in the author's opinion, certainly important "to maximize benefits to the greatest number of airport users", it seems tenuous at best that a host of ambitious objectives has been added to the document when the WASG came into existence, without first performing a wholesale review of the key principles that need to meet said objectives, or an explanation as to why the current principles are receptive of the revised objectives.

Indeed, a 'Strategic Review' of the WSG has taken place between 2016 and 2019 by airlines, coordinators and for the first time also airports, but only brought marginal changes as to which *see* Chapter 3, section 3.4 of this dissertation. The absence of a wholesale review is noticeable, in particular since the key principles for slot coordination have received widespread criticism from leading academics, competition authorities and industry professionals. Criticism is directed mainly towards the principle of historic precedence and the resulting lack of effective entry posed by the slot regime anno 2021.[108]

The current rules are blamed for creating concentrated constituencies of 'winners', *id est* incumbent airlines holding a large proportion of grandfather rights, even when there are large numbers of 'losers', *id est* new entrant airlines and other airlines experiencing difficulty to operate according to the 80% threshold, for instance airlines with a business model built around non-scheduled services.[109] *See,* among others, DotEcon (2001 and 2006)[110], Boyfield et al (2003)[111], NERA (2004)[112], Mott MacDonald (2006 and 2019)[113], Gillen and Morrison (2008)[114], the European Parliamentary Research Service (2016)[115], Haylan and Butcher

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[107] International Air Transport Association (IATA), *Worldwide Slot Guidelines (WSG) Edition 10* (2019), *supra* note 8, at 1.2.1.

[108] Among others, the principle of historic precedence is criticized for preventing an optimal use of available airport capacity, and for foreclosing market access. The principle of historic precedence lies at the heart of the current slot regime and its role in the slot allocation process is addressed in section 2.2.3. *See infra* Chapter 5, section 5.5 (providing further analysis on the 'grandfather rights clause' from the perspective of optimal capacity utilization).

[109] *See* Guiomard, *supra* note 70, at 130.

[110] *See* DotEcon Ltd.(II), *Auctioning Airport Slots: A Report for HM Treasury and the Department of the Environment* (2001); DotEcon Ltd., *supra* note 64.

[111] *See* Boyfield et al., *supra* note 13.

[112] *See* NERA, *supra* note 5.

[113] *See* Mott MacDonald, *supra* note 63; Mott MacDonald(II), *ACI Slot Policy Brief: Interim Technical Report. Enhancing the efficiency of the allocation and use of airport slots* (2019).

[114] *See* David Gillen and William G. Morrison, 'Slots and Competition Policy: Theory and International Practice' in Achim I. Czerny, Peter Forsyth, Hans-Martin Niemeier et al. (eds), *Airport Slots: International Experiences and Options for Reform* (Routledge 2008).

[115] *See* European Parliamentary Research Service, *Airports in the EU: Challenges Ahead* (2016).

(2017)[116], the United Kingdom [hereinafter: UK] Competition and Markets Authority (2018)[117], Airport Coordination Limited (2019)[118], Finger et al. (2019)[119], ACI Europe (2020)[120] and Odoni (2020)[121].

The next section highlights the basic notions and principles of the slot coordination process, including the setting of declared capacities (the supply-side of slot coordination) and the allocation of slots by the coordinator (the demand-side of slot coordination).

2.2 Basic notions and principles of the coordination process

2.2.1 Airport levels and the designation of an airport as 'slot coordinated'

At the date of writing of this dissertation, three categories of airports can be distinguished according to their level of congestion. The WASG defines the following three categories of airports:

- Level 1 (non-facilitated and non-coordinated) airports are airports where the capacity of the available infrastructure is generally adequate to meet demand at all times;

- Level 2 (facilitated) airports have the potential for congestion during some periods of the day, week, or season which can be resolved by schedule adjustments mutually agreed between the airlines and a facilitator. The facilitator is appointed to facilitate the planned operations of airlines using or planning to use the airport;

- Level 3 (coordinated) airports are declared to be congested, as the available infrastructure at these airports is not sufficient to meet the demands of airport users. Alternatively, governments have imposed conditions that make it impossible for these airports to meet demand. At Level 3 airports, a coordinator is appointed by the responsible government authorities to allocate slots to airlines in an independent manner.[122]

Airports are designated following a thorough demand and capacity analysis by the airport managing body or "another competent body",[123] with the objective of improving the airport's ability to accommodate demand. The analysis should "determine any infrastructure, operational, or environmental constraints that prevent demand being satisfied" and the airport managing body "should evaluate options in consultation with responsible parties for overcoming such shortages through infrastructure, operational, or policy changes and improvements, in accordance with the respective legal framework".[124]

When the demand and capacity analyses demonstrate that there is potential for congestion during some periods of the day, week, or season, an airport is designated Level 2.

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[116] *See* Andrew Haylan and Louise Butcher, *Briefing Paper: Airport Slots, CBP488* (2017).
[117] *See* UK Competition and Markets Authority, *Advice for the Department for Transport on competition impacts of airport slot allocation* (2018).
[118] *See* Airport Coordination Limited (ACL), *ACL response to Sections 3.46 to 3.65 of the consultation document of Aviation 2050: The future of UK aviation* (2019).
[119] *See* Finger et al., *supra* note 18.
[120] *See* Airports Council International (ACI) Europe, *supra* note 11.
[121] *See* Odoni, *supra* note 61.
[122] ACI, IATA and WWACG, *Worldwide Airport Slot Guidelines (WASG) Edition 1* (2020), *supra* note 8, at 1.4.1.
[123] ACI, IATA and WWACG, *Worldwide Airport Slot Guidelines (WASG) Edition 1* (2020), *supra* note 8, at 1.5.1.
[124] ACI, IATA and WWACG, *Worldwide Airport Slot Guidelines (WASG) Edition 1* (2020), *supra* note 8, at 6.1.3.

When the demand and capacity analyses demonstrate that there is a mere risk that demand may significantly exceed the capacity of the airport, an airport is designated Level 3.[125]

The EU legislator follows a similar designation process, although the Slot Regulation is surprisingly more prescriptive on the matter of airport designation.[126] The significant shortfall in capacity must be of such serious nature that significant delays cannot be avoided at the airport and cannot be resolved in the short term.[127] Should all these criteria be fulfilled, the second step is for the Member State to appoint an independent airport coordinator.[128]

On the face of it, it appears that slot coordination should be seen as a measure of last resort. Alternatives to slot controls should be considered first, such as increasing the airport's (existing) capacity. If sufficient capacity becomes available at a later stage, slot controls could be lifted. In practice, however, airports rarely – if ever – had their coordinated status rescinded.[129]

2.2.2 The supply-side of slot coordination: capacity declaration

Following the designation of an airport as discussed in the previous section, the first step in the coordination process at any Level 3 airport is to determine the applicable coordination parameters by way of issuing a capacity declaration in consultation with the airport's coordination committee.[130] The capacity declaration is a bi-annual instruction to the slot coordinator in which the available capacity is expressed in terms of the total number of slots authorized for either the Summer or the Winter season, as well as the maximum peak-hour capacity.[131]

The formal determination of the capacity declaration by the airport or any other competent body[132] serves as a starting point for the slot coordinator to issue the declared capacity within the specified limits in terms of airport slots.[133] The underlying purpose is to reduce congestion delays to an acceptable level for both passengers and airlines, as well as to avoid short-term overloads and ensure that traffic loads in each of the individual capacity drivers are manageable, which in turn links to the prime objective of slot coordination as elucidated in section 2.1.3.[134]

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[125] ACI, IATA and WWACG, *Worldwide Airport Slot Guidelines (WASG) Edition 1* (2020), *supra* note 8, at 1.5.1 and 1.5.2.

[126] EU Regulation 95/93, as amended, *supra* note 47, Article 3(3). Across the board, the WASG are more prescriptive. *See infra* Chapter 4, section 4.2 (providing comparative analysis of similarities and differences between the WASG and the Slot Regulation).

[127] EU Regulation 95/93, supra note 47, Article 3(5).

[128] EU Regulation 95/93, supra note 47, Article 4(b).

[129] *See* Guiomard, *supra* note 70, at 128.

[130] ACI, IATA and WWACG, *Worldwide Airport Slot Guidelines (WASG) Edition 1* (2020), *supra* note 8, at 5.4.1. Furthermore, paragraph 5.6.3 of the WASG reads that the coordination committee is open to "all airlines using the airport regularly and their representative organizations, the airport managing body, air traffic control authorities, and representatives of general/business aviation".

[131] ACI, IATA and WWACG, *Worldwide Airport Slot Guidelines (WASG) Edition 1* (2020), *supra* note 8, at 5.4.1 and 6.2.1; EU Regulation 95/93, as amended, *supra* note 47, Article 6.

[132] According to paragraph 6.2.1 of the WASG, "the airport managing body or *other competent body*" [italics added] should consult the airlines and other relevant stakeholders on the results of the capacity analysis, after which the coordination parameters are declared. No reference as to what constitutes a "competent body" is provided.

[133] Typically, the capacity declaration places an upper limit on the number of slots that may be allocated at each time interval of the day, usually divided in so-called 'time brackets' in order to maintain applicable service levels. *See* Nuno Antunes Ribeiro, Alexandre Jacquillat, António Pais Antunes et al*., Improving slot allocation at Level 3 airports*, 127 Transportation Research Part A: Policy and Practice (2019), at 34.

[134] *See* Odoni, *supra* note 61, at 28; Peter Forsyth and Hans-Martin Niemeier, 'Setting the Slot Limits at Congested Airports' in Achim I. Czerny, Peter Forsyth, Hans-Martin Niemeier et al. (eds), *Airport Slots: International Experiences and Options for Reform* (Routledge 2008), at 64.

Until the early 2000s, the majority of capacity declarations took the relatively simple form of peak-hour capacity limits, indicating the total number of aircraft movements – landings and take-offs – that could be scheduled per hour.[135] Today's capacity declarations take into consideration the full spectrum of operating conditions observed at an individual airport.[136]

Numerous factors combine to determine an airport's capacity, many of which are not directly within the control of the airport operator. Pursuant to the WASG, the available capacity of the airport is declared on the basis of "coordination parameters", entailing the "maximum capacity available for allocation considering the functional limitations at the airport such as runway, apron, terminal, airspace, and environmental restrictions".[137] Accordingly, in addition to operational factors, other factors that can influence declared capacities include measures to address adverse environmental impacts, such as noise and emissions. Besides operational requirements, more and more airports add to the complexity of the parameter framework via the introduction of night flying restrictions or movement caps.[138]

Movement caps imposed for environmental reasons suppose that environmental impacts are linked to air transport movements. Environmentally-imposed slot constraints may be set well below the practical capacity of the airport so as to limit the noise associated with the airport, *exempli gratia* in Dusseldorf and Amsterdam.[139] In reality, matters are more complex, since different aircraft can impose different noise concerns and generate different greenhouse or toxic gas emissions, and "thus aircraft movement limits are a crude means of handling environmental costs".[140] When setting environmental constraints, there is the problem of determining at which level to set the constraint, and so the result may be more or less arbitrary, perhaps as a local political compromise.[141]

However set, declaring capacity is a complex task that requires careful analysis. The capacity declaration is an agreed benchmark for scheduling planning purposes, to be specified months in advance before the scheduled operations will actually take place. The true operating capacity of an airport may therefore be significantly different from declared capacity. For instance, variable external factors such as meteorological conditions are liable to affect the airport's actual throughput capabilities at a given date and time. Declared capacities must thus be set in the face of uncertainty, taking into consideration the full range of true operating capacities that may materialize in practice. They must also consider the trade-offs between capacity utilization and level of service, as reflected in delays and on-time performance.[142] Accordingly, coordination parameters are based on declared capacities, albeit they are not necessarily identical to them.[143]

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[135] *See* Odoni, *supra* note 61, at 27.
[136] *Id.,* at 147.
[137] ACI, IATA and WWACG, *Worldwide Airport Slot Guidelines (WASG) Edition 1* (2020), *supra* note 8, at 6.2.2. Equal to the WASG, the Slot Regulation requires the coordination parameters to reflect the total capacity available for slot allocation in a particular season, and incorporating all technical, operational and environmental factors pursuant to Article 6(1) of the Slot Regulation.
[138] *See* Claus Ulrich, How the Present (IATA) Slot Allocation Works' in Achim I. Czerny, Peter Forsyth, Hans-Martin Niemeier et al. (eds), *Airport Slots: International Experiences and Options for Reform* (Routledge 2008), at 11; Odoni, *supra* note 61, at 23-24; Ribeiro et al., *supra* note 133, at 50.
[139] *See* NERA Economic Consulting, *supra* note 5, at 16.
[140] *See* Forsyth and Niemeier, *supra* note 134, at 71.
[141] *See* Peter Forsyth, 'Airport Slots: Perspectives and Policies' in Achim I. Czerny, Peter Forsyth, Hans-Martin Niemeier et al. (eds), *Airport Slots: International Experiences and Options for Reform* (Routledge 2008), at 383.
[142] *See* Odoni, *supra* note 61, at 138-39.
[143] *See* Ribeiro et al., *supra* note 133, at 34; Ulrich, *supra* note 138, at 11.

The complexity of the declared capacity will furthermore vary with the size and geographic location of the airport, the geometric layout of the runways and the airfield, the number and configuration of terminals, aprons and gates, the combination of runways in use, the traffic mix operating at the airport, the percentage of arrivals and departures within a given period of time and how this percentage changes during the day, staffing, security control bottlenecks, the variability of weather conditions and so on. The complexity will also depend on demand characteristics, such as seasonality. Limitations on any of these capacity elements can have a significant impact on the overall capacity of the airport.[144]

Besides the requirement *that* coordination parameters need to be determined ahead of each scheduling season, the WASG and the Slot Regulation provide little guidance on *how* to set the coordination parameters. They both lack reference pertaining to norms, standards and methods for setting the declared capacity. Actual practices vary widely within the EU and on the international stage.[145] The WASG require a capacity analysis based on "commonly recognized methods" to validate declared capacity but do not identify which methods are "commonly recognized", nor do they prescribe the roles and responsibilities involved.[146] To the best of the author's knowledge, no concrete definition or guidance exists as to the definition of "commonly recognized methods". It follows that today's practices with regard to setting declared capacities vary greatly across Level 3 airports in Europe and worldwide.[147]

Also, since the WASG does not deal with long-term reductions of capacity anywhere in the document,[148] the declared capacity should presumably be at least equal to the declared capacity in the previous equivalent season, increased by the additional capacity resulting from the improvements in fleet characteristics and flight operations, as far as this is possible within both the legal boundaries as well as operational standards. It is questionable if this 'expansion-approach' is still realistic in light of today's market realities, including the increased environmental focus on airport capacity and the growing capacity crunch, as discussed in sections 2.3 and 2.4 respectively.

Chapter 6 of this dissertation provides suggestions for guidance on the setting of declared capacities, the point of departure being an optimal declaration of the coordination parameters depending on the specific functions of the airport.

2.2.3 The demand-side of slot coordination: allocation process

The subsequent step in the coordination of airport capacity is the responsibility of the functionally and financially independent slot coordinator.[149] There is no initial payment for slots. Slot allocations are made free of charge to airlines or other aircraft operators.[150] However,

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[144] *See* Odoni, *supra* note 61, at 141-42.
[145] *Id.* at 148.
[146] ACI, IATA and WWACG, *Worldwide Airport Slot Guidelines (WASG) Edition 1* (2020), *supra* note 8, at 6.1.1.
[147] *See* Odoni, *supra* note 61, at 142.
[148] Paragraph 6.10 of the WASG describes what steps need to be followed in situations where airport capacity has to be reduced. However, this paragraph also prescribes that airlines' historic slots must be honored in all cases. As concluded in section 2.1.2 of this chapter, slots are inextricably linked to airport capacity. Thus, it makes sense that the number of declared slots matches the number of actually allocated slots, whether these are historic or not. Section 2.2.3 of this chapter introduces the concept of historic precedence, which shows that – if operated in conformity with the applicable regulations – airlines retain the (historic) right to use congested infrastructure in the next, equivalent season. The WASG thus appear to keep historic rights in the clear where long-term capacity reductions are concerned.
[149] *See infra* Chapter 5, section 5.4 (analyzing the independent functions of the slot coordinator).
[150] *See* Burghouwt et al., *supra* note 16, at 56; UK Competition and Markets Authority, *supra* note 117, at 6; Levine, *supra* note 15, at 63; Condorelli, supra note 3, at 83; ACI, IATA and WWACG, *Worldwide Airport Slot Guidelines (WASG) Edition 1* (2020), *supra* note 8, at 1.7.2(b).

airlines do often pay for the process of slot allocation,[151] for example through the promulgation of a slot fee.[152] Airlines also pay charges for the use of airport facilities and services related to lighting, the landing, take-off and parking of aircraft and the processing of passengers and freight. However, in most cases where capacity is constrained and charges are regulated, this charge is less than the value of the slot.[153] The matter of airport charges is outside the scope of this dissertation and therefore I will not discuss it in greater detail.[154]

Airlines must submit slot requests for either the Winter or the Summer season to the slot coordinator about six months before the season starts, *exempli gratia* in early October for the next Summer season which begins in late March, and mid-May for the next Winter season which begins in late October.[155] Slot requests must be made in the form of slot series, consisting of at least five slots having been requested for the same time on the same day of the week regularly in the same scheduling period. Slot requests are only accepted if the airport capacity is sufficient for the date and time sought after. In other words: a slot request may only be accorded if it fits within the limits of the capacity declaration, as discussed in section 2.2.2. The coordinator strives for slot allocations to comply as closely as possible with the requested slot times, with low overall levels of displacement.[156]

Since 1947, airlines have met bi-annually at schedule coordination conferences under the auspices of the International Air Transport Association[157] [hereinafter: IATA], now known as slot conferences, about 4 months before the start of a new season to discuss schedules. Through bilateral discussions with other airlines, coordinators and airports, airlines voluntarily adjust schedules where it is in their mutual interest and/or to reduce anticipated delays to an acceptable level.[158] In essence, the slot allocation process with its bi-annual slot conferences is governed by a system of self-regulation by airlines themselves.[159]

At the root of the slot allocation process lies the primary principle of historic precedence or 'grandfather rights', which holds that an airline is entitled to retain a series of slots for the subsequent, equivalent season, if that series of slots has been operated according to the 80% threshold at a coordinated airport.[160] If the 80% threshold has not been met, slots are reallocated to other airlines. Airlines have been provided with relief from the use-it-or-lose-it rule on various occasions where sharp demand declines were observed, the most notable one

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[151] *See* Peter Haanappel, *Airport Slots and Market Access: Some Basic Notions and Solutions*, 19 Air and Space Law 4-5 (1994), at 200.

[152] *Inter alia,* the independent slot coordinator for Level 3 airports in The Netherlands, Airport Coordination Netherlands [hereinafter: ACNL] is financed by a slot fee paid by airlines and airports. Carriers using either one of the Level 3 airports have to pay €1,58 per aircraft movement (landing or take-off). In addition, airports have to pay their part of the slot fee resulting in 50% of ACNL's budget being paid by air carriers and 50% by airports. *See* Airport Coordination Netherlands (ACNL), New organizational structure ACNL and introduction slotfee (ACNL, 1 April 2020), *available at* https://slotcoordination.nl/new-organisational-structure-acnl-and-introduction-slotfee (last visited November 10, 2020).

[153] *See* UK Competition and Markets Authority, *supra* note 117, at 6.

[154] For more information on the matter of airport charges regulation, *see* Varsamos, *supra* note 16.

[155] *See* Odoni, *supra* note 61; ACI, IATA and WWACG, *Worldwide Airport Slot Guidelines (WASG) Edition 1* (2020), *supra* note 8, Calendar of Coordination Activities.

[156] *See* Odoni, *supra* note 61, at 31; Guiomard, *supra* note 70, at 129.

[157] *See infra* Chapter 3, section 3.4.3 (providing more information on the roles and functions of IATA to date).

[158] *See* Andrew Sentance, *Airport slot auctions: Desirable or feasible?*, 11 Utilities Policy 1 (2003), at 54; NERA Economic Consulting, *supra* note 5, at 19; Ulrich, *supra* note 138, at 15.

[159] *See* Haanappel, *supra* note 151, at 199.

[160] ACI, IATA and WWACG, *Worldwide Airport Slot Guidelines (WASG) Edition 1* (2020), *supra* note 8, at 8.6.1. *See infra* Chapter 5, section 5.5 (further analyzing the concept of historic precedence from the perspective of optimal capacity utilization).

resulting from the outbreak of COVID-19 in 2020-2021.[161] As previously indicated in section 2.1.4, the principle of grandfather rights has accrued widespread criticism from academics, competition authorities and industry professionals, particularly for airport access-related concerns. At the same time, nonetheless, the principle of grandfather rights is generally and understandably welcomed by incumbent airlines for its acknowledgement of the investments made by airlines in the long-standing development of, among others, their fleet and networks.

When all historic slots have been allocated, there are remaining priority rules to be followed in a situation where not all slots can be accommodated to the satisfaction of the airlines concerned. After all historic slots and requests for changes to historic slots are allocated to incumbent airlines, a slot pool of newly created slots, slots returned voluntarily, and slots otherwise unclaimed is established.[162] Such a slot pool can only be set up when there are still slots remaining after the initial allocation of historic slots.[163] A maximum of 50% of the slot pool is set aside for priority allocation to new entrants, unless there are insufficient applications.[164] The Commission has clarified that the so-called 'new entrant rule' should be applied "permanently and continuously" throughout the scheduling season.[165] Despite its pro-competitive objectives, it is doubtful whether the new entrant rule has been successful at increasing competition and mitigating barriers to entry.[166]

After any new entrant requests have been satisfied, any remaining slots can be used to grant slot requests made by incumbent or other airlines, taking into account secondary criteria for competing requests, as well as local rules and guidelines at a specific airport, if applicable.[167] Practical examples of such criteria, rules and guidelines tailored to the local situation at airports are given further attention in Chapter 4, section 4.3 of this dissertation. Slot requests that cannot be satisfied will either be rejected or be placed on a waiting list for potential future in-season allocation, either after some allocated series or individual slots have been returned to the slot pool.[168]

Within each category of services, including new entrant requests, the coordinator accords priority to requests for an extension of existing flight schedules to operate on a year-round basis. We speak of year-round operations when an airline has started a new service during the Winter season and wants to continue this service throughout the coming Summer.[169] In the interest of schedule stability, such flights would have a higher priority over other requests.[170]

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[161] The use-it-or-lose-it rule has also been suspended at other times of sharp demand declines, such as after 9/11, during the Iraq war, the SARS epidemic and in the severe post-2008 economic downturn. *See* European Commission, *supra* note 51, at 13.
[162] *See* International Transport Forum, *Expanding Airport Capacity: Competition, Connectivity and Welfare* (2015), at 56; NERA Economic Consulting, *supra* note 5, at 7; Odoni, *supra* note 61, at 31.
[163] At the world's most congested airports, the total number of available slots may be taken up by historic rights, as to which *see infra* section 2.4.
[164] *See* International Transport Forum, *supra* note 162, at 56.
[165] European Commission, *Communication from the Commission on the application of Regulation (EEC) No 95/93 on common rules for the allocation of slots at Community airports*, as amended, COM(2008) 0227 final, at 4.
[166] *See infra* Chapter 5, section 5.5 (providing further analysis on the new entrant rule).
[167] ACI, IATA and WWACG, *Worldwide Airport Slot Guidelines (WASG) Edition 1* (2020), *supra* note 8, at 8.3 and 8.4; Ulrich, *supra* note 138, at 13.
[168] *See* Odoni, *supra* note 61, at 32.
[169] *See* Ulrich, *supra* note 138, at 12.
[170] *Id.*

2.2.4 Slot monitoring and slot enforcement

Airlines must ensure that their operations are conducted in accordance with the slots allocated to them.[171] Nevertheless, various instances of slot misuse can be identified. The recently added Chapter 9 of the WASG on slot monitoring seeks to address the different forms of slot misuse, *inter alia,* operating without a slot, operating a flight at a significantly different time or in a significantly different way from the allocated slot, holding slots that the airline does not intend to operate and requesting slots that the airline does not intend to operate.[172]

For instance, if an airline does not intend to use a slot, it should return said slot to the coordinator for allocation to another airline.[173] Holding slots that the airline does not intend to use is deemed slot misuse,[174] which may result in enforcement actions by the coordinator or other enforcement body if the misuse is proven to be intentional and/or where the misuse happens repeatedly. Nonetheless, airlines are generally not charged for not using the slots they hold. The slot rules require that slots are returned in advance of the relevant season, but failure to meet this deadline has no associated penalty under the WASG nor the Slot Regulation.[175]

The coordinator shall perform slot monitoring activities to identify and record instances of slot misuse and pursue corrective actions.[176] Slot monitoring has multiple objectives. It intends to reconcile airline operations to the slots allocated, it ensures that slots are used to the 80% threshold, it helps ensure that scarce airport capacity is not wasted, it helps ensure smooth airport operations for all stakeholders, and it prevents slot misuse.[177]

Enforcement actions shall be considered by the coordinator for intentional and/or repeated slot misuse. Airlines may, for example, lose historic rights, receive lower priority for future slot requests, and/or have slots withdrawn. Depending on applicable national or regional laws, (financial) sanctions may also be imposed.[178]

Article 14, recitals 4 and 5 of the Slot Regulation provide that EU Member States should establish an effective enforcement and sanctioning scheme to combat slot misuse. However, the Article restricts itself to sanctions for air services that have not been operated in conformity with the initial slot request made. The Slot Regulation does not refer to instances where airlines do not return slots they do not intend to use, or where airlines operate without having been allocated a slot.

Given the increasing risk of judicial review of allocation decisions,[179] it is questionable whether coordinators feel comfortable enough to impose sanctions for slot misuse, since the Slot Regulation only explicitly provides for the possibility of slot withdrawal in Article 14(4). The Slot Regulation does not include a range of sanctions, including fines, for slot misuse appropriate to the circumstances, nor does it impose the coordinator with the legal authority to impose such sanctions. The introduction of Article 14 presumably aimed to lift potential concerns in this area by requiring Member States to set up adequate sanctioning and

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[171] ACI, IATA and WWACG, *Worldwide Airport Slot Guidelines (WASG) Edition 1* (2020), *supra* note 8, at 9.1.3.
[172] ACI, IATA and WWACG, *Worldwide Airport Slot Guidelines (WASG) Edition 1* (2020), *supra* note 8, at 9.2.2.
[173] ACI, IATA and WWACG, *Worldwide Airport Slot Guidelines (WASG) Edition 1* (2020), *supra* note 8, at 8.5.1 and 8.5.2.
[174] ACI, IATA and WWACG, *Worldwide Airport Slot Guidelines (WASG) Edition 1* (2020), *supra* note 8, at 9.2.2.
[175] *See* NERA Economic Consulting, *supra* note 5, at 53.
[176] ACI, IATA and WWACG, *Worldwide Airport Slot Guidelines (WASG) Edition 1* (2020), *supra* note 8, at 9.1.5.
[177] ACI, IATA and WWACG, *Worldwide Airport Slot Guidelines (WASG) Edition 1* (2020), *supra* note 8, at 9.2.1(a).
[178] ACI, IATA and WWACG, *Worldwide Airport Slot Guidelines (WASG) Edition 1* (2020), *supra* note 8, at 9.4.4.2.
[179] *See infra* Chapter 4, section 4.3.3.2 and Chapter 5, section 5.4 (providing further analysis on the increased risk of judicial review faced by coordinators).

enforcement schemes to combat instances of slot misuse at the national level in its fifth recital.[180]

Following the introduction of Article 14(5) of the Slot Regulation, several Member States, including Ireland and Spain, have developed infringement procedures which ultimately may lead to the imposition of high fines onto airlines for non-compliance with applicable slot rules.[181]

2.2.5 Concluding remarks

Both the issuing of the capacity declaration and the allocation of slots are essentially advance planning processes. The capacity declaration determines the supply-side of the coordination process, *id est* how many slots will be made available to airlines and is therefore critical for the coordination process to commence. All subsequent steps involve demand-side questions, *id est* whom the available slots will be allocated to. In the words of Prof. Amedeo Odoni of the Massachusetts Institute of Technology, the capacity declaration addresses "50% of the equation",[182] whereas the allocation of slots constitutes the remaining 50%. Day-to-day practice may vary depending on operational circumstances, with the final day-to-day landing and take-off slot clearances in the hands of ATC authorities.[183] Besides the *ex ante* declaration of capacity and allocation of slots, *ex post* slot monitoring and slot enforcement may be imposed.

The recent (2020) addition of Chapter 9 on slot monitoring to the WAGS shows that by and large, the air transport industry considers slot monitoring an integral tool to improve the usage of available resources.[184]

2.3 Renewed importance of airport slots in contemporary society

2.3.1 The impact of deregulation and liberalization on slot availability

As global demand for air services considerably outpaces available airport capacity, the air transport industry worldwide is operating in an increasingly capacity-constrained environment.[185] There is no or limited outlook for sufficient capacity increases in order to meet demand at many coordinated airports around the world, either because of infrastructural and/or environmental limitations.[186]

The freedom to enter and exit airports triggered by deregulation and liberalization,[187] combined with a growing world population, is also the explanation for congestion and slot

[180] EU Regulation 95/93, as amended, *supra* note 47, Article 14(5).
[181] Ireland has introduced sanctions through the Irish European Communities (Airport Slots) Regulations 2013, S.I. No. 460/2013, accompanied by the Commission for Aviation Regulation, Decision on Updating the Slot Sanctions Scheme Implementation Guidelines, Commission Paper 12/2017 (3 October 2017). In Spain, slot monitoring is governed by Spanish Law 21/2003 of 7 July 2003, Aviation Safety, supplementing Royal Decree 15/2001, Articles 49 and 55. Although no longer a Member State, the UK also has an extensive sanctioning and enforcement scheme in place for slot misuse, *see* United Kingdom Airports Slot Allocation Regulations 2006, UK S.I. 2006/2665, which requires the coordinator to adopt and publish an enforcement code in Regulation 18(1). The Netherlands appears to be working towards improved slot compliance, *see* PA Consulting, *Improving slot compliance: addressing slot scarcity at Schiphol Airport* (August 2019).
[182] *See* Odoni, *supra* note 61, at 148.
[183] *See* Haanappel, *supra* note 151, at 199.
[184] *See* Ulrich, *supra* note 138, at 18.
[185] *See* Airports Council International (ACI) Europe, *supra* note 11, at 2.
[186] *See* Odoni, *supra* note 61, at 17 and 23.
[187] *See* Chapter 1, n.10, for an explanation of both terms, including differences as between them.

concentration at hub airports.[188] Incumbent airlines were quick to consolidate into increased joint ventures and large global alliances in order to remain competitive and reach almost global network coverage.[189] Moreover, incumbent airlines swiftly adapted to the liberalized environment by developing 'hub and spoke'[190] route structures in order to accommodate larger volumes of traffic from an increased number of city-pairs.

Critical factors in establishing a hub network are a high degree of coordination of connecting times and frequencies between arriving and departing aircraft. The hub airline thus accumulates most of the slots during these arrival and departure banks, which may in turn lead to slot concentration at peak times. Although hub-and-spoke networks produce powerful network externalities and are thus valuable to consumers in connectivity terms, they also increase movements, particularly by smaller aircraft, and inevitably exacerbate airport capacity problems.[191]

When hub-and-spoke networks were developed, airports generally still had ample slot capacity available, which allowed incumbent airlines to build large historical legacies in terms of grandfather rights over airport slots. As a consequence, slots at large hub airports remain concentrated with their respective hub carriers.[192]

Despite hub airlines holding the lion's share of slots at their respective hub airports, traffic in the EU is not only concentrated around hub airlines. Owing to the extensive liberalization process of the EU air transport market, Ryanair and easyJet managed to gain competitive foothold at EU airports, including secondary airports. Nonetheless, traffic in the EU remains concentrated around a small number of legacy carriers and LCCs, or groups of operators. In 2018, 71% of passenger traffic was operated by only five operators, to wit Ryanair, Lufthansa, IAG, Air France-KLM and easyJet.[193]

Slot scarcity at airports represents the inability of an airline to obtain the slot they want in order to operate a specific route.[194] The lack of slots at congested airports, especially at the ones where all available slots are covered by incumbents' historic rights,[195] may act as a barrier to market access. Airlines wishing to start or expand their services at a coordinated airport may

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[188] *See* Andrew R. Goetz and Paul Stephen Dempsey, *Airline Deregulation Ten Years After: Something Foul in the Air,* 54 Journal of Air Law and Commerce 4 (1989), at 941-960.

[189] *See* Varsamos, *supra* note 16, at 108.

[190] In a 'hub and spoke' network, a hub airline operates from a selected 'hub' to or from which traffic would be concentrated for air services to or from another airport, be it other hubs or secondary airports (spokes). Most of the spoke-to-hub flights land during 'arrival banks', whereas hub-to-spoke flights take-off in 'departure banks'. Examples of airlines and airports hosting hub operations are British Airways at London Heathrow, Lufthansa at Fraport, KLM at Amsterdam Airport Schiphol and Air France at Paris Charles de Gaulle. For an explanation of the economics and the demand and supply-side gains of a hub-and-spoke network, *see* NERA Economic Consulting, *supra* note 5, at 36; Gillen and Starkie, supra note 59; Robert Hardaway and Paul Stephen Dempsey, *Airlines, Airports and Antitrust: A Proposed Strategy for Enhanced Competition*, 58 Journal of Air Law and Commerce 2 (1993); David Starkie, 'The economics of secondary markets for airport slots' in Keith Boyfield, David Starkie, Tom Bass et al. (eds), *A market in airport slots* (The Institute of Economic Affairs 2003).

[191] *See* Brian Graham and Claire Guyer, *Environmental sustainability, airport capacity and European air transport liberalization: Irreconcilable goals?,* 7 Journal of Transport Geography 3 (1999), at 178; Varsamos, *supra* note 16, at 33; International Transport Forum, *supra* note 162, at 14; Goetz and Dempsey, *supra* note 188, at 941-960; Hardaway and Dempsey, *supra* note 190.

[192] *See* Gillen and Morrison, *supra* note 114, at 173; Goetz and Dempsey, *supra* note 188, at 941-960.

[193] *See* EGIS and SEO Amsterdam Economics, *supra* note 16, at 116.

[194] *See* Batool Menaz and Bryan Matthews, 'Economic Perspectives on the Problem of Slot Allocation' in Achim I. Czerny, Peter Forsyth, Hans-Martin Niemeier et al. (eds), *Airport Slots: International Experiences and Options for Reform* (Routledge 2008), at 24.

[195] Examples of these airports include London Heathrow and Amsterdam Airport Schiphol. *See infra* section 2.4.2 on super-congested airports.

be hindered or prevented from doing so, as slots are an essential input for airlines wanting to compete.[196] The enormous growth of LCCs such as Ryanair and easyJet took place, both by choice but also by necessity, at secondary airports.[197] At congested airports where pool slots are still available, they tend to only be available at unattractive times, or they are not available as a series.[198]

Understandably, the grandfather rights-based slot system is popular with incumbent airlines, which hold large slot portfolios at their preferred airports. Unsurprisingly, it is less popular with newer, less established airlines for whom it is difficult if not impossible to start or expand services from a coordinated airport. This is especially a concern in continental Europe and parts of the Asia Pacific.[199] Although expanding airport capacity appears to be the most logical solution to solve market access-related issues, adding slot capacity is a difficult task at the best of times.[200] It is expensive, and expansion plans often encounter environmental problems, as section 2.3.3 will illustrate below.

In 2021, roughly 204 out of 4000 airports offering commercial air services are operating at congestion levels that require slot coordination.[201] Despite this relatively small number, slot coordinated airports, also known as 'Level 3 airports', are of major importance to the global air transport system. Altogether, they served 4,2 billion arriving and departing passengers in 2018, which equals about half of the total number of the world's airport passengers.[202]

Eurocontrol forecasts that 16 European airports will be operating at 'Heathrow-like' conditions in 2040 (up from 6 in 2018).[203] At the global stage, the Economic Commission of the International Civil Aviation Organization [hereinafter: ICAO] noted during ICAO's 39th Assembly in Fall 2016 "the need to optimize the use of scarce capacity, particularly at capacity constrained airports".[204]

2.3.2 The apparent mismatch between the functions of slot coordination and market conditions anno 2021

Despite momentous developments at a global stage as explained in Chapter 1 and section 2.3.1 above, the industry 'standards' recognized by many regulatory authorities for the coordination of airport capacity as embodied in the WASG have remained largely unchanged since their inception in the 1970's. The guidelines of the WASG, although not legally binding, have been implemented in the Slot Regulation, and may also have been implemented in national law.[205]

Despite annual revision, the changes that have been made to the WASG are predominantly of a practical or clarifying nature.[206] In the author's opinion, substantive changes to key provisions are few, save for the introduction of the new entrant rule in 1993 following concerns of the Commission that the grandfather rights-system could be deemed anti-

[196] *See* Milligan, *supra* note 14, at 137; Balfour, *supra* note 92, at 1037.
[197] *See* Guiomard, *supra* note 70, at 132. There are, however, more factors of relevance when an airline decides to move to a secondary airport other than a lack of slots. Such airports may have lower charges and/or incentive schemes in place to attract LCCs.
[198] *See* NERA Economic Consulting, *supra* note 5, at 51.
[199] *See* Forsyth, *supra* note 141, at 379.
[200] *See* Gillen and Starkie, *supra* note 59, at 152.
[201] *See* Airports Council International (ACI) Europe, *supra* note 11, at 2.
[202] *See* Odoni, *supra* note 61, at 7.
[203] *See* Eurocontrol, *European Aviation in 2014 – Challenges of Growth* (2018), at 5.
[204] *See* ICAO, *Report of the Economic Commission on Agenda Item 39* (2016), paragraph 39.30.
[205] International Air Transport Association (IATA), *Worldwide Slot Guidelines (WSG) Edition 10* (2019), *supra* note 8, Preface. *See infra* Chapter 3, section 3.4.1 (discussing, *inter alia,* the legal status of the WASG).
[206] *See* Odoni, *supra* note 61, at 19.

competitive.[207] Likewise, the Slot Regulation continues to largely reflect the principles of the WASG. Accordingly, the essential principles for slot coordination that still apply to the air transport industry today have broadly remained the same since the introduction of the Slot Regulation in 1993.

A 2007 consultation exercise by the Commission shows that airlines pinpoint the lack of airport capacity as the main problem that lies at the heart of the slot scarcity experienced at congested airports. Instead of addressing the symptoms of slot scarcity, airlines have primarily advocated physical expansion.[208] Likewise, Haanappel (1994) opinionated that the "sole purpose of slot allocation should be to alleviate congestion".[209] This line of reasoning does not come as a surprise, given that the current rules were never written to provide a solution to the fundamental problem of a lack of airport capacity. Capacity-wise, the WASG continue to underline that

> "Coordination is not a solution to the fundamental problem of a lack of airport capacity. In all instances, coordination should be seen as an interim solution to manage congested infrastructure until the longer-term solution of expanding airport capacity is implemented."[210]

In 2016, ICAO acknowledged the WASG approach by confirming that "[t]he air transport industry and States should concentrate efforts on providing sufficient capacity, so that less slot coordination is needed than we currently have today. . .".[211] In 2018, ICAO moderated its capacity growth-oriented stance by clarifying that environmental and physical constraints may make "substantial expansion of the existing facilities impractical or prohibitively expensive", although reiterating that incremental capacity increases are possible at these airports.[212]

The above function of slot coordination set forth by the WASG and as confirmed by ICAO appears somewhat archaic to say the least. *First,* although it would be more evident to treat the problem instead of the symptoms in most situations, the question is whether the problem at hand *can* actually be treated. Whereas supply in most sectors strives to grow against excess demand, and airport capacity expansion would indeed reduce congestion and increase airport access opportunities for some time,[213] adding slot capacity and matching supply with demand in air transport is a difficult task at the best of times, which will take me to another notable development in air transport relevant to this dissertation in section 2.3.3 below: the promotion of environmental protection.[214]

Second, it implies that at airports with no outlook for moderate or significant capacity increases, slot coordination as we know it may not constitute the right means to manage scarce infrastructure and evokes questions as to the qualifications of the WASG, and by extension the Slot Regulation, to govern the declaration, allocation and use of slots at airports where slot scarcity is of a long-term or permanent nature, and where persistent impediments to airport

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[207] *See infra* Chapter 4, section 4.1.2 (explaining the Commission's concerns and considerations paired with the adoption of the Slot Regulation).
[208] *See* European Commission, *Communication from the Commission on the application of Regulation (EC) 793/2004 on common rules for the allocation of slots at Community airports*, COM(2007) 704 final, at 2.
[209] *See* Haanappel, *supra* note 151, at 202.
[210] ACI, IATA and WWACG, *Worldwide Airport Slot Guidelines (WASG) Edition 1* (2020), *supra* note 8, at 1.1.2.
[211] *See* ICAO, *Agenda Item 39: Economic Regulation of International Air Transport – Policy,* A39-WP/340 (2016), paragraph 1.5.
[212] *See* ICAO, *Doc 9626: Manual on the Regulation of International Air Transport*, Third Edition (2018).
[213] *See* Gillen and Starkie, *supra* note 59, at 152.
[214] *See* Colangelo, *supra* note 10, at 35; Gillen and Starkie, *supra* note 59, at 152; Graham and Guyer, *supra* note 191, at 165.

access are experienced as a result, the so-called 'super-congested airports'. This special category of airports is analyzed in section 2.4.2 below.

2.3.3 Airport planning and the promotion of environmental protection

Although insufficient airport capacity has a negative impact on air carriers' ability to acquire slots at congested airports, the lack of airport capacity is oftentimes a physical impediment that cannot be resolved with short-term solutions.[215] In fact, the notion that the demand for air transport can be entirely met by physical capacity expansion is now seen as unrealistic.[216]

Since the implementation of policies designed to liberalize air transport in the EU in the 1980's, a lot has changed regarding society's perspective on air transport. It is evident that air transport is intricately linked with the well-being of a nation's whole economy.[217] Yet, air transport is also widely perceived as generating significant negative externalities, notably in the form of emissions of pollutants affecting local air quality, in particular nitrogen oxides and volatile organic compounds, as well as emissions of carbon dioxide and other greenhouse gases, which have global impacts.[218] In the words of the Intergovernmental Panel on Climate Change, an international scientific body established jointly by the UN and the World Meteorological Organization, the impact of aviation on the global environment has become one of the most politically contentious issues in international aviation law and policy.[219]

In particular younger generations are becoming increasingly sensitive to the climate impact of air transport.[220] The phenomenon of 'flight shaming' has encouraged individuals to take the train over a plane and has seemingly gained popularity.[221] A negative shift in public attitude towards air transport has already put into question aviation's societal license to continue to grow its activities and unlock more slots to enhance market access for new or expanded services.[222] For instance, environmental impacts were the main reason for delays in capacity investment at the airports of Dusseldorf, Vienna and Munich.[223] The construction of a new airport in Karlstad, Sweden in the 1990's was also motivated primarily by environmental

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[215] *See* ICAO, *supra* note 78, paragraph 4.3.

[216] *See* Michael A. Madas and Konstantinos G. Zografos, *Airport slot allocation: From instruments to strategies*, 12 Journal of Air Transport Management 2 (2006), at 53.

[217] *See* European Commission, *supra* note 20, at 71; Peter McManners, *Fly and Be Damned: What Now for Aviation and Climate Change?* (Zed Books 2012), at 1-10; David L. Greene and Michael Wegener, *Sustainable Transport,* 5 Journal of Transport Geography 3 (1997), at 177; Kenneth Button, *Studying the empirical implications of the liberalization of airport markets,* 21 Competition and Regulation in Network Industries 3 (2020), at 13; Mike Feintuck, 'Regulatory Rationales Beyond the Economic: In Search of the Public Interest' in Robert Baldwin, Martin Cave and Martin Lodge (eds), *The Oxford Handbook of Regulation* (Oxford University Press 2010), at 39.

[218] *See* NERA Economic Consulting, *supra* note 5, at 121-22; Graham and Guyer, *supra* note 191, at 179; McManners, *supra* note 217; Paul Stephen Dempsey, *Market failure and regulatory failure as catalysts for political change: The choice between imperfect regulation and imperfect competition*, 46 Washington and Lee Law Review 1 (1989), at 17; Truxal, *supra* note 16, at 78; European Commission, *supra* note 20, at 100.

[219] The Intergovernmental Panel on Climate Change has provided substantial scientific evidence that global temperatures are on the rise due to rapid increases in greenhouse gas emissions caused by human activity. *See* Intergovernmental Panel on Climate Change (IPCC), Climate Change 2021: The Physical Science Basis. Summary for Policymakers, *available at* https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM.pdf (last visited November 10, 2021).

[220] *See* EGIS and SEO Amsterdam Economics, *supra* note 16, at 75.

[221] *See* Forbes, *The Spread Of Flight Shame In Europe – Is Greta Thunberg The Reason Why?* (13 January 2020), *available at* https://www.forbes.com/sites/jamesasquith/2020/01/13/the-spread-of-flight-shame-in-europe-is-greta-thunberg-the-reason-why/#45a47d0e69bd (last visited November 10, 2021). *See* James Asquith, The Spread Of Flight Shame In Europe – Is Greta Thunberg The Reason Why? (Forbes, 13 January 2020), *available at* https://www.forbes.com/sites/jamesasquith/2020/01/13/the-spread-of-flight-shame-in-europe-is-greta-thunberg-the-reason-why/#45a47d0e69bd (last visited November 10, 2021).

[222] *See* EGIS and SEO Amsterdam Economics, *supra* note 16, at 75.

[223] *See* NERA Economic Consulting, *supra* note 5, at 16; Van Houten and Burghouwt, *supra* note 22.

considerations, because of the old airport's proximity to the city center.[224] Amsterdam Airport Schiphol equally has a long history of strong environmental opposition to airport expansion and flight volume growth.[225]

In addition to aviation emissions, aircraft noise exposure is increasingly being seen as an important public health issue.[226] Noise around airports and in airport hinterlands in particular is a principal source of complaints.[227] The right to a quiet life has been recognized by the European Court of Human Rights in 2001 in the *Hatton*-case[228], which was brought before the court by residents who suffered from noise around London Heathrow.[229] The court ruled that the government must strike a fair balance between the competing interests of the individual and the community as a whole. In doing so, the government enjoys a certain margin of appreciation in determining the steps to be taken. A "mere reference to the economic well-being of the country" was deemed "not sufficient to outweigh the rights of others".[230]

Even where expansion plans are authorized, projects take many years to complete. For example, the London airport system – the world's largest for the combined number of destinations served – is suffering from congestion and severe capacity shortfalls, particularly at London Heathrow and London Gatwick. There is a long history of strong environmental opposition to the expansion plans of both of these sites.[231] London Heathrow's third runway is on a lengthy timescale, if the runway will see the light of day at all. In early 2020, the UK Court of Appeal ruled that the government's decision to give the go-ahead for London Heathrow expansion did not adequately consider the government's commitments to tackle the climate crisis in line with the Paris Agreement.[232] Alternatively, moving the largest UK airport to an island in the Thames would take twenty years to complete.[233]

Comparing airports to other businesses – perhaps with the exception of harbors – is like comparing apples to oranges. Airports have limited flexibility with regard to where they are located and the demands placed on them owing to their public functions.[234] In 2004, the Commission expressly highlighted that an airport always fulfils a public function.[235] Many of the world's busiest airports are located in densely populated urban areas where geographic conditions, environmental and public health concerns are liable to make expansion plans

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[224] *See* European Commission, Commission Decision of 22 July 1998 on a procedure relating to the application of Council Regulation (EEC) No 2408/92 (*Access to Karlstad Airport*), L 233/25, recital 9.
[225] *See* EGIS and SEO Amsterdam Economics, *supra* note 16, at 104-06; Van Houten and Burghouwt, *supra* note 22.
[226] *See* European Commission, *supra* note 20, at 104.
[227] *See* NERA Economic Consulting, *supra* note 5, at 49; Graham and Guyer, *supra* note 191, at 169-174.
[228] *See Hatton and others v. The United Kingdom* 36022/97 [2003] ECLI:CE:ECHR:2003:0708JUD003602297.
[229] *See* Mendes de Leon, *supra* note 48, at 566.
[230] *See Hatton and others v. The United Kingdom, supra* note 228, at 86.
[231] Both airports are large contributors to the international air transport system: London Heathrow is the world's second largest international airport, having been superseded by Dubai in 2014, whereas London Gatwick is the world's busiest single runway airport. *See* Gillen and Starkie, *supra* note 59, at 159-60.
[232] Court of Appeal (Civil Division) on Appeal from the Queen's Bench Division, *R (Friends of the Earth) v. Secretary of State for Transport and Ors* [2020] EWCA Civ 214; Laura Hughes-Gerber, *A Third Runway for Heathrow? To Build or Not to Build?: A Brief Review of the Supreme Court's Recent Judgment*, 46 Air and Space Law 2 (2021).
[233] *See* Brian F. Havel and Gabriel S. Sanchez, *The Principles and Practice of International Aviation Law* (Cambridge University Press 2014), at 116.
[234] For instance, the Dutch Aviation Act of 1992, Article 8.24(a) required Dutch airports to accommodate all traffic which has acquired traffic rights pursuant to ASAs or EU Regulation 1008/2008, *supra* note 39. *See infra* Chapter 3, section 3.2 (explaining the concept of traffic rights) and Chapter 4, section 4.3 (addressing the key principles of EU Regulation 1008/2008).
[235] *See* European Commission, *Commission Decision of 12 February 2004 concerning advantages granted by the Walloon Region and Brussels South Charleroi Airport to the airline Ryanair*, OJ L 137, paragraph 156.

problematic.[236] The location of many of the world's major airports close to urban centers, and hence dense residential areas, is logical, because airports and urban areas are complementary forces. They feed each other business, industry, trade, commerce, transport and communications.[237]

Yet, the closer an airport is located to a densely populated area, the more geographical and environmental planning restrictions it will likely face affecting its use and growth. Invariably, airports cannot be built or expanded without the permission of public authorities. The lack of political will to authorize airport expansion projects or develop new airports owes much to the environmental opposition that such plans encounter, which is illustrated by the airports facing environmental restrictions mentioned above.[238] The application of environmental restrictions at these airports are no isolated cases, for they are more likely to be exemplars that will be followed elsewhere in the future.[239]

The above paragraphs illustrate the mounting recognition that present and projected trends in mobility cannot be sustained,[240] that is to say at least until alternative means are found to eliminate the negative externalities of air transport, *exempli gratia* large scale electric flying. The 2015 Paris Agreement[241], adopted by 196 States parties, includes a pledge to limit carbon emissions in order to hold the global average temperature rise to well below 2 degrees Celsius, compared to pre-industrial levels.[242]

Initiatives to assess the responsibility of the air transport industry with regard to climate change or 'global warming' are already ongoing.[243] Under the umbrella of ICAO, many States around the world are working to achieve targets of carbon neutral growth from 2020 onwards and to reduce air transport industry emissions by 50% by 2050 compared to 2005 levels.[244] Moreover, ICAO is pursuing a "basket of measures" including improvements in aircraft technology and operations, sustainable aviation fuels, and market-based measures, for example through its Carbon Offsetting and Reduction Scheme for International Aviation.[245] The 2021 Work Programme of the Commission lists the European Green Deal as the Commission's first priority.[246]

Despite the above efforts undertaken by States and air transport industry stakeholders, it appears that a completely 'de-carbonized' and 'de-noised' aviation industry seems out of reach for some decades. Technology for electric engines in aviation is taking its first steps nowadays, however, the industrialization of this technology will require years.[247] It thus appears that only

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[236] *See* European Commission, *Commission Staff Working Document – Evaluation of the Directive 2009/12/EC of 11 March 2009 on airport charges*, SWD(2019) 291 final, at 7.
[237] *See* Truxal, *supra* note 10, at 90; Haanappel, *supra* note 151, at 198.
[238] *See* Haanappel, *supra* note 151, at 198; Graham and Guyer, *supra* note 191, at 170.
[239] *See* Graham and Guyer, *supra* note 191, at 179.
[240] *See* Greene and Wegener, *supra* note 217, at 177.
[241] Paris Agreement to the United Nations Framework Convention on Climate Change (Paris, 12 Dec. 2015), T.I.A.S. No. 16-1104, *entered into force* 4 Nov. 2016.
[242] *Id.*, Article 2(1)a.
[243] *See* Havel and Sanchez, *supra* note 233, at 217.
[244] *See* ICAO, *Resolution A40-18: Consolidated statement of continuing ICAO policies and practices related to environmental protection – Climate change* (2019).
[245] *See* ICAO, Climate Change, *available at* https://www.icao.int/environmental-protection/pages/climate-change.aspx (last visited November 10, 2021).
[246] *See* European Commission, Communication from the Commission – Commission Work Programme 2021: A Union of vitality in a world of fragility, COM(2020) 690 final.
[247] *See* Munari, *supra* note 21, at 542.

enhancements of existing capacity can bring solutions at many congested airports, perhaps partially through the coordination of slots.[248]

The debate on climate change and the reduction of carbon emissions at the worldwide level – with Europe at the forefront – puts pressure on the governmental and societal support for the development of the air transport sector, and by extension the number of newly available slots. A growing socio-political focus on limiting the negative externalities of air transport may culminate into discussions as to how a flight's environmental footprint could be reflected in the declaration, allocation and use of airport capacity. Hence, airport capacity presumably is, or is soon to become, environmental capacity, with environmental constraints increasingly determining the magnitude of air transport movements.[249]

Exemplary to initiatives in tackling air transport's environmental externalities is that an increasing number of airports add to the complexity of their capacity parameter framework via the introduction of night flying restrictions or air traffic movement caps as illustrated above, further exacerbating the capacity crunch.[250] Hence, in addition to operational factors, other factors that can influence declared capacities include measures to address environmental impacts, such as noise and emissions.

In sum, a paradigm shift may be required in order for the slot regime to shy away from its seemingly growth-oriented focus to bring it more in line with market conditions anno 2021. The positive externalities of air transport[251] may be better served by extending the functions of slot coordination to achieving a better balance between the legitimate interests of all stakeholders involved, *inter alia,* regulators, airports, incumbent airlines and new entrants, local residents and citizens, for the benefit of society as a whole. In other words: the time may have come for socio-economic considerations[252] or an airport's function to society as a whole to play a role in the regulatory regime in place for slot coordination at congested airports.[253]

2.3.4 Concluding remarks

Despite the fact that the first enactment of the WASG principles in 1974 and the Slot Regulation in 1993 made a significant contribution in terms of a slot coordination process offering global synergies,[254] the slot regime provided for by both the WASG and the Slot Regulation still reflect the pre-liberalization situation into a more liberalized and congested world.[255]

Hence, the coordination of slots increasingly involves broader policy questions as to how capacity is used to its most optimal level, taking into account both operational and environmental concerns, as well as the compatibility of liberal airport access provisions with high slot scarcity levels, imposing insuperable entry barriers.[256]

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[248] *See* Haanappel, *supra* note 151, at 198.
[249] *See* Graham and Guyer, *supra* note 191, at 169.
[250] *See* Odoni, *supra* note 61, at 23-24; Ribeiro et al., *supra* note 133, at 50; Ulrich, *supra* note 138, at 11.
[251] Air transport contributes significantly to economic growth. Increased (inter)national connectivity has a positive impact on a nation's productivity, the business climate and general socio-economic welfare. *See*, among others, Air Transport Action Group, *The economic & social benefits of air transport* (2005).
[252] Socio-economic considerations are, for the purposes of this dissertation, understood to mean the balancing of the positive and negative externalities of air transport, which includes topics as sustainability in a broad sense, including aircraft noise exposure, air quality, employment levels, the business climate and competitive relations.
[253] *See* Odoni, *supra* note 61, at 21; DotEcon Ltd., *supra* note 64, at 4.
[254] *See* European Commission, *supra* note 26, at 6; Gillen and Starkie, *supra* note 59, at 154.
[255] *See* Finger et al., *supra* note 18, at 3.
[256] *See* ICAO, *Circular 283-AT/119: Regulatory Implications of the Allocation of Flight Departure and Arrival Slots at International Airports* (2001)*;* Varsamos, *supra* note 16, at 115-16.

As airport congestion is expected to only worsen over time – with Europe at the forefront – and more airports will become congested in the future, as to which *see* section 2.4 below, the issues experienced with the current slot rules will become more widespread and have a greater impact should they not be addressed adequately.[257] The capacity issues encountered by numerous slot coordinated airports have become highly diverse as well, potentially requiring tailor-made solutions reflective of the nature of the issues experienced as argued in this dissertation.[258]

2.4 The deepening of the 'Airport Capacity Crunch'

2.4.1 Growth trends exacerbating slot scarcity: facts and figures

The World Bank reports that the number of passengers carried by air transport at a global level have increased from 310 million in 1970, to 1,025 billion in 1990, to 2,628 billion in 2010 and to 4,233 billion in 2018.[259] Between 2010 and 2018, the number of passengers carried by air transport in the EU has increased by 43% from 776 to 1106 million, this increase being substantially higher than that experienced in other transport modes.[260]

Similarly, the number of Level 3 slot coordinated airports worldwide continues to increase: 136 in 2000, 155 in 2010 and 197 in 2021.[261] In 2019, Level 3 airports accounted for 46% of global seat capacity offered and 38% of the number of scheduled passenger flights.[262] At an aggregate level, the world's airports thus lack sufficient capacity to accommodate projected growth trends in air transport.[263]

The congestion problem is especially prevalent in Europe, which is home to about half of all Level 3 airports worldwide.[264] This number is deemed to reflect the chronic difficulty that many European States face when it comes to increasing the physical capacity of their airports and/or environmental concerns.[265] Nonetheless, excess demand for airport infrastructure is a global phenomenon. As shown by the specific regimes for slot coordination analyzed in Chapter 4, congested airports are also found in, among others, Australia, the US, Mexico, and China.

The COVID-19 outbreak in 2020-2021 has had a profound negative impact on air transport. Health measures and travel restrictions designed to contain the outbreak have resulted in a dramatic reduction in air transport activity, especially so for passenger operations.[266] This dissertation does not analyze in detail the impacts of the COVID-19 crisis. What is relevant for this dissertation, however, is that many predict global air transport to continue to grow in the decades ahead, despite the COVID-19 pandemic in 2020-2021, the pandemic's potentially longer-term impacts on the industry and ongoing investment in airport infrastructure where possible.[267]

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[257] *See* Steer Davies Gleave, *supra* note 69, at 3.
[258] *See* Odoni, *supra* note 61, at 21.
[259] *See* Finger et al., *supra* note 18, at 3. *See* also data.worldbank.org (input: air transport, passengers carried).
[260] *See* Eurostat, Air passenger transport in the EU of 6 December 2019, *available at* https://ec.europa.eu/eurostat/documents/2995521/10265946/7-06122019-AP-EN.PDF/8f2c9d16-c1c4-0e1f-7a66-47ce411faef7 (last visited November 10, 2021).
[261] *See* International Air Transport Association (IATA), Annex 12.7 – Contact list for Level 2 and Level 3 Airports (21 October 2021), *available at* https://www.iata.org/contentassets/4ede2aabfcc14a55919e468054d714fe/wasg-annex-12.7.xlsx (last visited November 12, 2021).
[262] *See* Van Houten and Burghouwt, *supra* note 22.
[263] *See* Graham and Guyer, *supra* note 191, at 165.
[264] *See* Odoni, *supra* note 61, at 8, as cited in Van Houten and Burghouwt, *supra* note 22.
[265] *Id.,* at 8; Gillen and Starkie, *supra* note 59, at 152.
[266] *See* EGIS and SEO Amsterdam Economics, *supra* note 16, at 34; European Commission, *supra* note 51, at 2.
[267] *See* Sun et al., *supra* note 23; Czerny et al., *supra* note 23; Suau-Sanchez et al., *supra* note 23.

ICAO still expects global passenger demand to grow by 4,2% per annum towards 2038 with slightly lower growth rates in the maturing European market. Rising disposable incomes, urbanization, liberalization, competition, globalization and more efficient aircraft drive long-term growth.[268] Hence, the number of Level 3 airports around the world is also expected to increase.

The fact that passenger demand is expected to continue to grow only exacerbates the problems experienced at existing congested airports and introduces delays at other airports that currently still have spare capacity.[269] If traffic volumes continue to increase and capacity keeps falling short of demand, it is inevitable that many of the airports that are currently eligible for Level 2 designation will become Level 3 airports in the (near) future.[270]

2.4.2 The emergence of super-congested airports

Besides the fact that capacity in the entire aviation system will become increasingly scarce, what is more important is that half of global air traffic is concentrated at just 4% of the largest 100 airports.[271] These are the airports that are or will be confronted with severe capacity problems, because increasing demand has outpaced or will outpace increases in declared capacity. At this newly emerged category of 'super-congested' Level 3 airports, a deepening of slot scarcity levels is observed, to such an extent that these airports have little to no slots available for coordination.[272]

Accordingly, besides the fact that more airports are declared Level 3 as discussed in section 2.4.1 above, the level of congestion experienced by different congested airports has become diversified as well. At super-congested Level 3 airports, slot limits are effective more or less all of the day. Others are likely to still have spare (peak) slot capacity left for coordination.[273] At the latter category of airports, market entry is not foreclosed. Most of the slot requests can be dealt with, potentially after rescheduling them to another date and time than initially requested. Nonetheless, not only the complete absence of slots represents an entry barrier. The lack of slots during peak hours experienced at many coordinated airports may also be a serious entry barrier to potential entrants, particularly those targeting time-sensitive business customers.[274]

The airports in the super-congested category have in common that they have little to no slots available to accommodate new requests, since the slots are covered by incumbents' historic rights. No-slot waitlists are expanding, as coordinators are confronted with having to reject slot requests season after season. The competitive pressure exerted by other airlines in the same market is minimal, and much latent demand exists at these airports. Should the capacity of these airports increase, numerous additional slot requests are likely to be submitted immediately to claim any newly available slots.[275]

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[268] *See* ICAO, Forecast of Scheduled Passenger and Freight Traffic, *supra* note 24.
[269] *See* Gillen and Starkie, *supra* note 59, at 152.
[270] *See* ICAO, *supra* note 78, paragraph 2.1.
[271] *See* Marc C. Gelhausen, Peter Berster and Dieter Wilken, *Do airport capacity constraints have a serious impact on the future development of air traffic?*, 28 Journal of Air Transport Management (2013), at 6; Graham and Guyer, *supra* note 191, at 178.
[272] *See* European Commission, *supra* note 20, at 193.
[273] *See* Peter Forsyth and Hans-Martin Niemeier, *Prices and Regulation in Slot Constrained Airports*, in Achim I. Czerny, Peter Forsyth, Hans-Martin Niemeier et al. (eds), *Airport Slots: International Experiences and Options for Reform* (Routledge 2008), at 128.
[274] *See* Case No COMP/M.3770 – Lufthansa/Swiss. Regulation (EC) No 139/2004 Merger Procedure, Article 6(2) NON-OPPOSITION, 4 July 2005, paragraph 33.
[275] *See* Odoni, *supra* note 61, at 23-24.

Amongst this super-congested category are the world's busiest airports, oftentimes providing their countries with the majority of available long-haul destinations.[276] Airports operating at saturation levels with excess demand all year round include London Heathrow, Amsterdam Airport Schiphol, Paris Orly and Hong Kong International.[277] At these airports, slots are extremely valuable.[278] At airports such as Fraport, Munich, Dusseldorf and Vienna, slots are still available, although all or most of the slots may be fully used during peak times, particularly in the Summer season.[279] Eurocontrol already forecasted that 16 European airports will experience 'Heathrow-like' congestion in 2040.[280]

Where few or no slots are available at super-congested airports, the coordinator continuously has to make trade-offs between competing slot requests. By nature, this comes down to making decisions which airlines can operate to and from an airport and which airlines cannot. With the number of slot requests rising, these decisions will be increasingly difficult to make.[281]

Besides varying levels of congestion, the nature of the capacity constraints and the particular issues encountered by different (super-)congested Level 3 airports differ considerably.[282] Specific airport characteristics stem from, *inter alia,* public functions, markets served, the availability of regional alternatives, business strategies, geographical constraints, the nature and origin of capacity constraints, et cetera.[283] Moreover, facilitating hub-and-spoke networks requires a different level of airport infrastructure and service than facilitating mainly origin and destination traffic, which cannot be provided by all airport operators.[284]

The heterogeneity of airport infrastructure discussed in section 2.2.2 reduces the likelihood of finding general capacity declaration or slot allocation principles matching the particular situation of each and every airport.[285] The growing demand in terms of both aircraft movements and passengers has forced many airport operators to increase the number and complexity of coordination parameters appropriate to their specific situation.[286] Extensive sets of coordination parameters have by now become the rule, rather than the exception, at the busiest Level 3 airports.[287] At an increasing number of airports, today's declared capacities are also reflective of environmental objectives, as to which *see* section 2.3.3 above.

2.4.3 Impacts of growing excess demand at super-congested airports on competition, connectivity and airport operations

A study undertaken by NERA (2004) shows that where excess demand is greatest, there exists greater potential for an inefficient coordination of slots.[288] Growing excess demand has

[276] *See* Jagoda Egeland and Paul Smale, *Capacity building through Efficient Use of Existing Airport Infrastructure* (2017), at 12.
[277] *See* Ribeiro et al., *supra* note 133, at 50.
[278] *See* Boyfield, *supra* note 46, at 22-23; Odoni, *supra* note 61, at 44; EGIS and SEO Amsterdam Economics, *supra* note 16, at 106; Ribeiro et al., *supra* note 133, at 50; European Commission, *Commission Implementing Decision (EU) 2019/1585 of 24 September 2019 on the establishment of traffic distribution rules pursuant to Article 19 of Regulation (EC) No 1008/2008 for the airports Amsterdam Schiphol and Amsterdam Lelystad*, OJ L 246, paragraph 23.
[279] *See* SA.57153 – Germany – COVID-19 – Aid to Lufthansa, *supra* note 38, paragraphs 187-209.
[280] *See* Eurocontrol, *supra* note 203, at 5.
[281] *See* ICAO, *supra* note 256, at (v).
[282] *See* Odoni, *supra* note 61, at 101.
[283] *See* Varsamos, *supra* note 16, at 217; Madas and Zografos, *supra* note 216.
[284] *See* Varsamos, *supra* note 16, at 217.
[285] *See* Button, *supra* note 217, at 14.
[286] *See* Odoni, *supra* note 61, at 27.
[287] *Id.*, at 27-29.
[288] *See* NERA Economic Consulting, *supra* note 5, at 31 and 47.

substantial implications for super-congested airports, relating not only to increasing average aircraft size and load factors, but also to the crowding out of certain traffic segments such as full freighter flights, traffic spill to other airports, higher ticket prices, and foreclosed route entry, making the markets served to and from the hub less contestable. Other issues that may arise include increased legal pressure on the coordinator and a suboptimal use of capacity because uncertainty with regard to future development opportunities will lead airlines to hold onto slots.[289]

Capacity constraints are also liable to affect the number of available direct connections and therefore the development of a diverse route network, which is especially detrimental to hub-and-spoke operations discussed in section 2.3.1. When capacity constraints start to bite, *id est* at super-congested airports, the route network may become suppressed and scarcity rents are accrued along the air transport value chain, including to airlines and airports and eventually to passengers.[290]

When faced with a limited number of slots and virtually no room to expand, airlines may abandon their weaker routes in the interest of redeploying their aircraft to denser, higher yielding routes where they might get a better contribution over variable costs, the result being wholesale deterioration of service on thinner, lower yielding routes and concentration on the stronger routes. For example, owing to the introduction of the 480,000 air transport movement limit at London Heathrow in 2008, many regional routes were crowded out at Heathrow while the long-haul traffic spill to other airports inside and outside London has been substantial.[291] Thus, slot scarcity may negatively impact an airport's connectivity.

The difference between growth rates of passenger numbers and air transport movements, the latter of which increases more slowly compared to passenger numbers, is consistent with a global pattern of concurrent trends: new aircraft models tend to have a larger seating capacity compared to the models they are replacing, tighter cabin seating arrangements and increasing load factors.[292] As excess demand for slots increases, higher average loads are observed, which indicates that there is greater demand from passengers to travel to and from congested airports.[293] Average load factors and seat capacities at London Heathrow are amid the highest in the world, reflecting among other things the severe constraints.[294] From an airport operations perspective, these developments bear the need to manage airport capacity more efficiently and invest in capacity enhancements where possible in order to meet demand for larger aircraft with higher load factors.

2.4.4 Concluding remarks

Although they share their Level 3 designation, the increasing number of Level 3 airports around the world are very non-homogeneous in terms of the level of congestion and the particular issues experienced. Super-congested airports are both qualitatively and quantitatively different from other Level 3 airports. Despite their differences, both 'regular' and 'super-congested' categories of airports are currently governed through the same set of rules and policies, that is to say through the WASG and regional legislation on slot coordination such as the Slot Regulation, with the principle of grandfather rights at the center.

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[289] *See* Van Houten and Burghouwt, *supra* note 22; Odoni, *supra* note 61.
[290] *See* Egeland and Smale, *supra* note 276, at 14.
[291] *See* Melvin A. Brenner, *Need for Continued Economic Regulation of Air Transport*, 41 Journal of Air Law and Commerce (1975), at 807; Gudmundsson et al., *supra* note 22 as cited in Van Houten and Burghouwt, *supra* note 22.
[292] *See* Odoni, *supra* note 61, at 15.
[293] *See* NERA Economic Consulting, *supra* note 5, at 32.
[294] *See* Van Houten and Burghouwt, *supra* note 22.

The shortcomings of this one-size-fits-all approach to airport coordination at all Level 3 airports appears to be unworkable should regulators want to ensure that scarce slots are declared, allocated and used in the most optimal way appropriate to specific airport characteristics, and ultimately to the benefit of society. Evidently, the expected enlargement of the capacity crunch in the coming years prompts the need to manage the coordination of slots effectively and appropriate to the particular issues faced at the local level.[295]

2.5 Concluding remarks

As the availability of slots is directly connected to the capacity of an airport at a particular date and time, a slot is a scarce resource by definition.[296] The coordination of slots cannot generate additional capacity – slots are merely a tool for managing scarce capacity.[297] As Sanchez (2009) put it: "They [slots] are a secondary concept which overlay the primary concept of congestion."[298] Since slots are distributed at Level 3, or slot coordinated, airports with significant capacity shortfalls, a system for slot coordination has to be put into place at airports where constraints cannot be solved by a voluntary cooperation between airlines.

The inability to provide capacity in keeping up with demand conflicts with the increasing demand levels created by, among others, liberalization efforts and a growing world population. Combined with the severity of political, geographic and institutional constraints in matching airport capacity supply with demand, a purely supply-side solution seems rather impossible.[299] Hence, according to the Commission, "airport congestion is an enduring challenge to the orderly development of a competitive international air transport market."[300] Coupled with growing public concerns regarding noise exposure, carbon emissions and land use planning, it is expected that the issue of slot coordination will continue to place constraints on the development of the air transport industry worldwide and will become more prevalent.[301]

On top of a deepening of the 'Airport Capacity Crunch' and the emergence of super-congested airports, especially in the EU, a lot has changed with regard to society's perspective on air transport. Quality-of-life factors increasingly influence the economic development of air transport, including slot coordination. Moreover, each capacity-constrained airport is constrained for a different reason and will have different needs and coordination parameters which are liable to affect the allocation of slots. To add to that complexity, each airport fulfills different functions to society and therefore serves different markets, passenger needs and traffic mixes.[302] It is clear that the societal focus has changed since the 20th century, which has its impact on the aviation industry as we know it. As Lykotrafiti (2015) put it, "the industry's *modus operandi* points to a different reality".[303]

It is questionable, however, whether the current slot rules are reflective of the needs of contemporary society and thus of the public value of slots. With the coming into existence of the first edition of the WASG in 2020, the prime objective of slot coordination is the efficient

[295] *See* Abeyratne, *supra* note 55.
[296] *See* Colangelo, *supra* note 10, at 35.
[297] *See* European Commission, *supra* note 26, at 9.
[298] *See* Gabriel S. Sanchez, *An overview of the airport slot challenge in the US and EU,* Panel Paper for the 2009 Annual Meeting of the American Bar Association Forum on Air & Space Law – Chicago, Illinois' (DePaul University College of Law 2009).
[299] *See* Michael A. Madas and Konstantinos Zografos, *Airport slot allocation: A time for change?,* 17 Transport Policy (2010), at 274.
[300] *See* Havel and Sanchez, *supra* note 233, at 116.
[301] *See* ICAO, *supra* note 78, paragraph 2.3; Van Houten and Burghouwt, *supra* note 22.
[302] *See* ACL, *supra* note 118, at 2.
[303] *See* Lykotrafiti, *supra* note 10, at 85.

declaration, allocation and use of scarce airport capacity to *consumers* by establishing an unequivocal coordination process, subject to international, regional and national regulations, which will be discussed in detail in Chapters 3 and 4. Interestingly, previous editions of the WASG – up until 2019 – put "benefits to the greatest number of airport users" instead of the wider term "consumers" at the heart of the system. It seems tenuous at best that the prime objective of slot coordination appears to have changed, without subjecting the key principles governing the process that need to meet the system's objectives to a wholesale review.

Chapter 2 has illustrated that the role of slots has changed from a purely productive instrument used to cope with congestion to a multi-faceted concept. The declaration, allocation and use of slots carries many aspects and considerations, *exempli gratia* of an operational, commercial or environmental nature, which need recognition. Since the key principles guiding the WASG and the Slot Regulation go back decades, it is questionable whether they are equipped for reconciliation with the multi-faceted role of slots in contemporary society.

Chapter 3 and Chapter 4 respectively provide an analysis of the question whether the general and specific legal regimes for airport access can alleviate the particular coordination issues encountered to date. Chapter 5 analyzes the slot regime through various related concepts, including but not limited to slot ownership, the functioning of the new entrant rule, the tenability of the role of the functionally and financially independent coordinator, and market-based mechanisms for slot coordination. Chapter 6 of this dissertation provides general conclusions as well as suggestions for measures to flex the slot regime which take into account the key criticisms of the current slot regime and allow for a reflection of the public value of slots in coordination decisions.