EUROCONTROL

CODA Digest

All-causes delay and cancellations to air transport in Europe

Q3 2019

SUPPORTING EUROPEAN AVIATION

FOUNDING MEMBER SESAR JOINT UNDERTAKING

NETWORK MANAGER

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Arrival Punctuality	Main Delay Causes mins/flight		Early Arrivals	Departure Delay
73.8%	Reactionary	7.2	**8.6%** +0.5 %pts	**15.9** mins/flight
+2.1 %pts vs. Q3 2018	Airline	3.8	Flights arriving >15 mins of STA	-2.0 mins vs. Q3 2018
Flights arriving within 15 mins of STA	ATFM En-Route	2.4		

1 Executive Summary

The core summer months of July to September 2019 (Q3 2019), illustrated an **improvement in the delay picture compared to Q3 2018**, in comparison to the severe levels both passengers and the airline industry suffered from in Q3 2018. Despite this improvement, in the context of long-term performance **the level of delay was the second worst in the last 10 years.**

Following the record high delays of 2018, airlines made considerable efforts and investments such as scheduling improvements and using hot spare aircraft to improve on-time performance, in-turn improving the passenger experience in reducing reactionary delay.

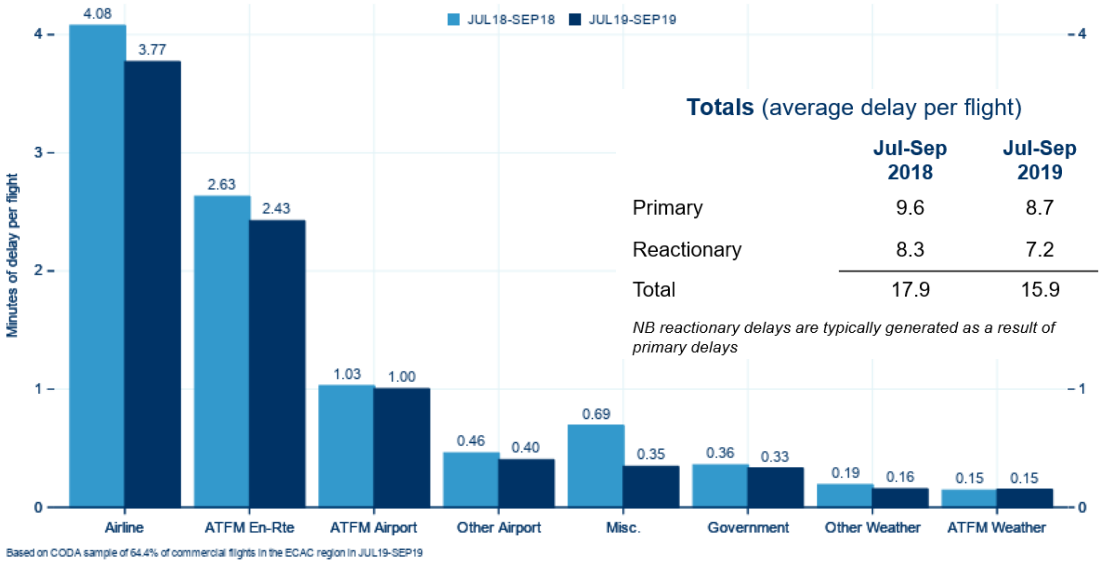
The benefits of this can be seen in the third quarter, with **punctuality improving to 73.8% (on arrival),** compared to 71.7% in Q3 2018. Underlying this gain were significant reductions in **reactionary (knock-on)** delays, down 1.1 minutes, contributing **7.2 minutes** to the average delay per flight. Primary delays from **airline operations** decreased by 0.3 minutes with a contribution of **3.8 minutes per flight**, although airline operations remained the main cause of primary delay.

ATFM en-route delay remained a significant cause of delay to airlines, here the work in the last 10 years. However, in comparison to the severe levels of Q3 2018 this **decreased** to **2.4 minutes per flight**. Again, airline investments helped, as did measures taken by the Network Manager and air navigation service providers for the summer, resulting in fewer ATC capacity, ATC staffing issues coupled with better weather.

Operational cancellations decreased to 1.6% (from 2.0% in Q3 2018) with fewer disruptions to airlines during the quarter.

In summary, together these factors resulted in an **average all-causes departure delay of 15.9 minutes**, down by 2.0 minutes per flight on Q3 2018 when the average delay was 17.9 minutes per flight.

All-causes, airline-reported delay: Main Primary delay categories



Totals (average delay per flight)

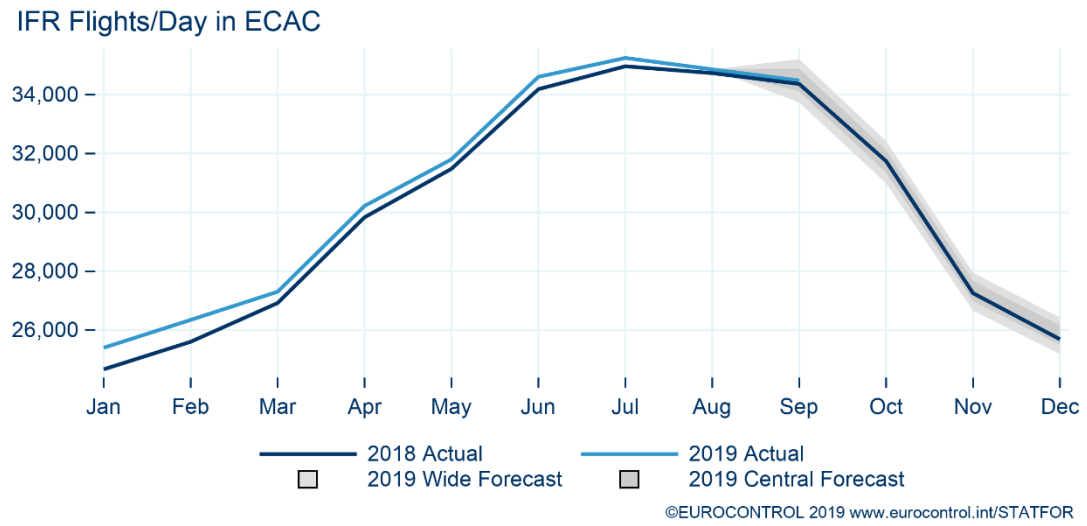
	Jul-Sep 2018	Jul-Sep 2019
Primary	9.6	8.7
Reactionary	8.3	7.2
Total	17.9	15.9

NB reactionary delays are typically generated as a result of primary delays

Based on CODA sample of 64.4% of commercial flights in the ECAC region in JUL19-SEP19

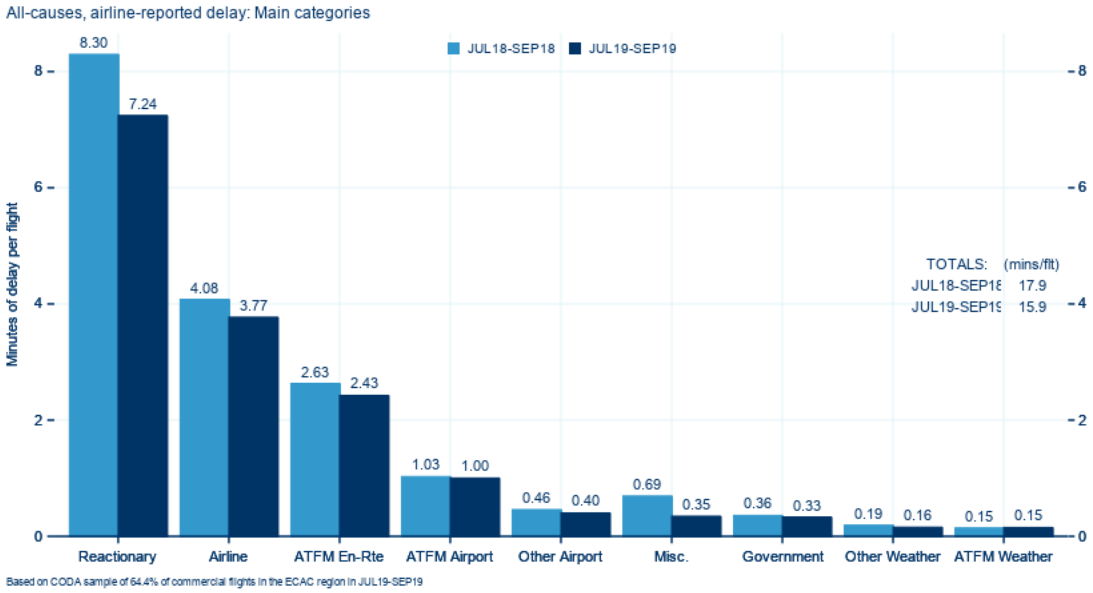
2 Traffic and Average Delay per Flight Overview

Figure 1. Total Flights per Day in ECAC



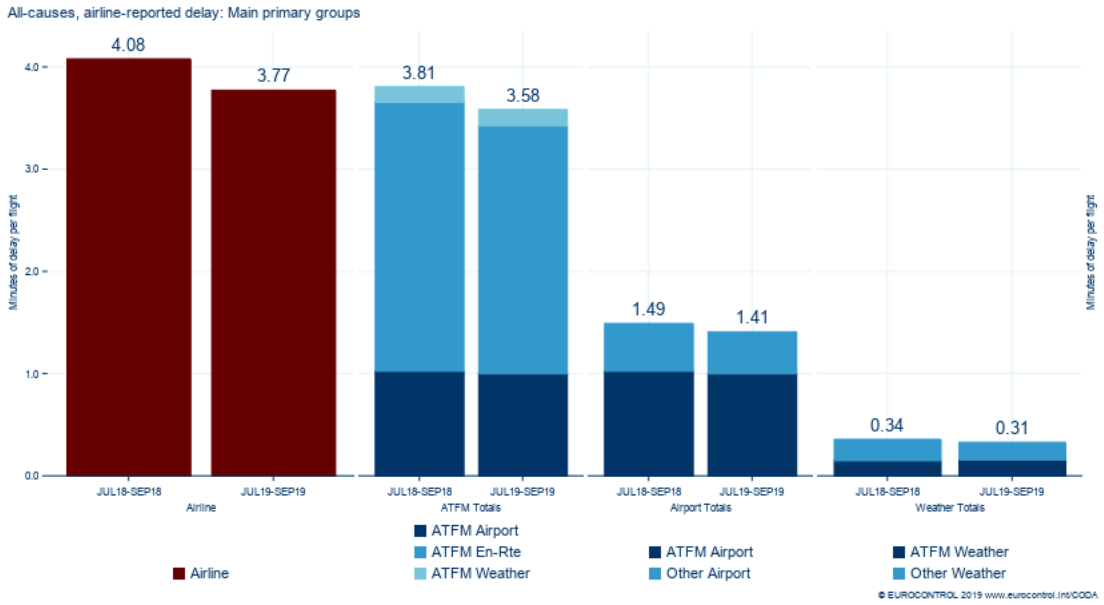
European flights (ECAC) in average daily terms (Figure 1) increased by 0.5% in Q3 2019 compared with Q3 2018. Further information regarding traffic and forecasts can be consulted at the STATFOR website and via the STATFOR Interactive Dashboard (SID).

Figure 2. Breakdown of the Average Delay per Flight Q3 2018 vs. Q3 2019



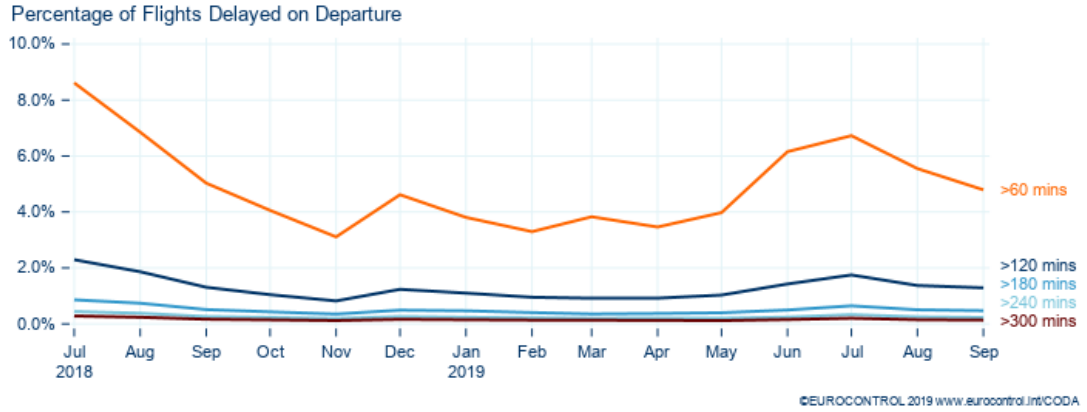
Q3 2019 saw an average departure delay per flight of 15.9 minutes for all-causes delay (Figure 2), a decrease of 11% in comparison to Q3 2018. Analysis of the delay reasons shows that reactionary delays contributed the most to the average delay with 7.2 minutes per flight. Airline-related delays decreased to 3.8 minutes per flight. En-route ATFM delay fell to 2.4 minutes from 2.6 minutes per flight in Q3 2018.

Figure 3. Primary Delay Causes Q3 2018 vs.Q3 2019



Total ATFM delays (Figure 3) (airport, en-route and weather delay) reported by airlines decreased to 3.6 minutes per flight, with en-route ATFM delay contributing 2.3 minutes per flight, predominantly caused by ATC capacity and ATC staffing issues. Weather delay remained at 0.3 minutes per flight.

Figure 4. Long Departure Delays >60 Minutes



In Q3 2019, longer delays (those greater than 60 mins in orange) decreased when compared to Q3 2018 with 5.7% of flights experiencing long delays compared to 6.8% in Q3 2019. Decreases were observed in all 3 months of the quarter, with July notably driving this decrease.

3 Q3 2019 Monthly Summary

Section 3 provides a month-by-month view for Q3 2019, highlighting the particular locations, causes of delay or disruptions in further detail.

July 2019. Traffic increased by 0.9% compared to July 2018. En-route ATFM delays, ATC capacity delays occurred in Vienna, Zagreb and Barcelona ACCs. ATC staffing delays were recorded in Marseille, Karlsruhe and Budapest ACCs, with weather mostly convective activity also affecting Marseille and Vienna ACCs. Athens airport suffered from ATC capacity, Lisbon saw capacity delays as a result of military activity in the vicinity of the airport and aerodrome capacity delays occurred in Amsterdam Schiphol.

August 2019. Traffic increased by 0.4% compared to August 2018. Concerning en-route ATFM delays, ATC capacity delays occurred in Karlsruhe, Budapest, Marseille, Zagreb, Barcelona ACCs as well as at Athens and Mikonos airports. There were ATC staffing issues in London, Vienna, Brussels and Marseille ACCs. Weather (mainly convective activity) also affected Vienna, Budapest, Zagreb, Karlsruhe and Bremen ACCs. Thunderstorms impacted operations at London Heathrow, London Gatwick and Frankfurt airports.

September 2019. Traffic increased by 0.3% compared to September 2018 A French central communications system failure on 01 September generated high delays in all French ACCs and neighbouring states such as London and Madrid ACCs. Weather (convective activity, strong winds and thunderstorms) affected operations in Vienna, Barcelona, Marseille, Zagreb, Budapest, Karlsruhe, Madrid and Prague ACCs as well as Palma de Mallorca and Barcelona airports. A ground handling staff industrial action disrupted operations at Schiphol airport.

4 Average Delay per Delayed Flight (Departure)

The average delay per flight (Figure 5) decreased to 15.9 minutes per flight, compared to 17.9 minutes per flight in Q3 2018. Delay decreased in all three months of the quarter, with notably stronger performance in July driving this decrease. The average delay per delayed departure (>=5 minutes) (Figure 6) decreased by 2.6 minutes to 30.2 minutes per flight. The percentage of flights delayed on departure (Figure 7) (>=5 minutes) also decreased, falling to 52.9% vs. 55.0% in Q3 2018.

Figure 5. Average Delay per Flight (All-Causes) for Departures

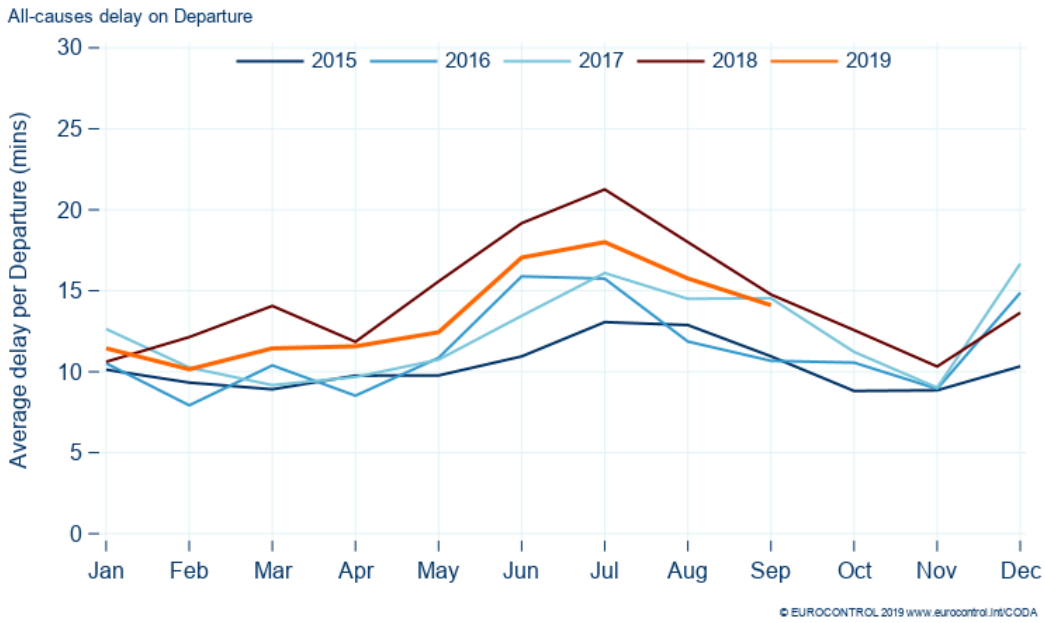


Figure 6. Average Delay per Delayed Flight (All-Causes) for Departures

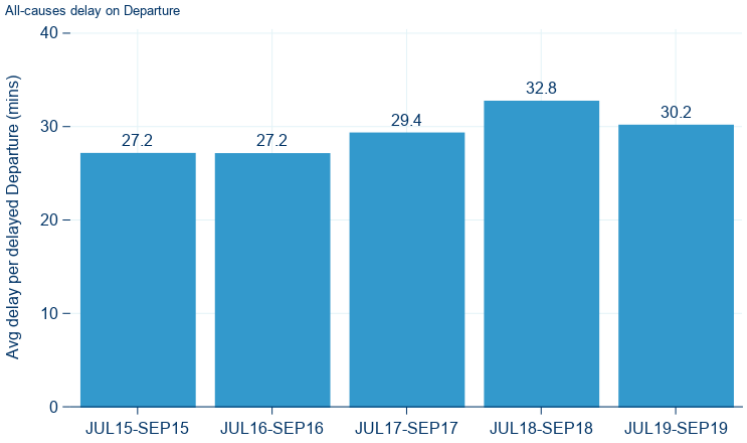
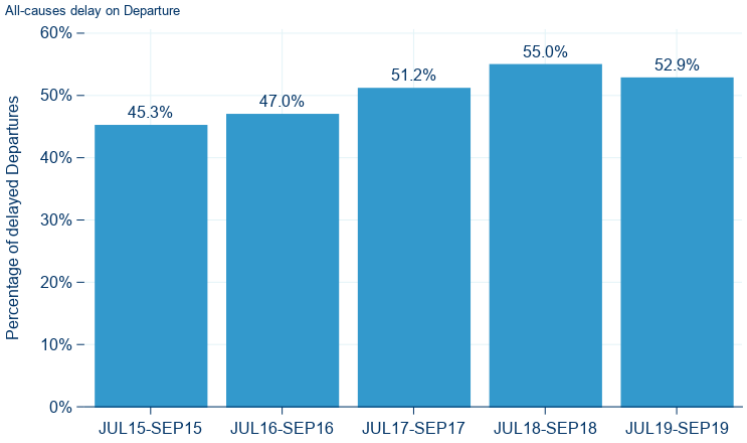


Figure 7. Percentage of Delayed Flights (All-Causes) for Departures



5 Average Delay per Delayed Flight (Arrival)

The average delay per flight on arrival (Figure 8) showed a similar trend to that of the departure, at 14.5 minutes per flight, a decrease of 1.8 minutes when compared to Q3 2018. The average delay per delayed flight was 32.1 minutes per flight, a decrease of 2.5 minutes when compared to Q3 2018. The percentage of delayed arrivals (Figure 10) decreased by 1.9 percentage points to 45.3%.

Figure 8. Average Delay per Flight (All-Causes) for Arrivals

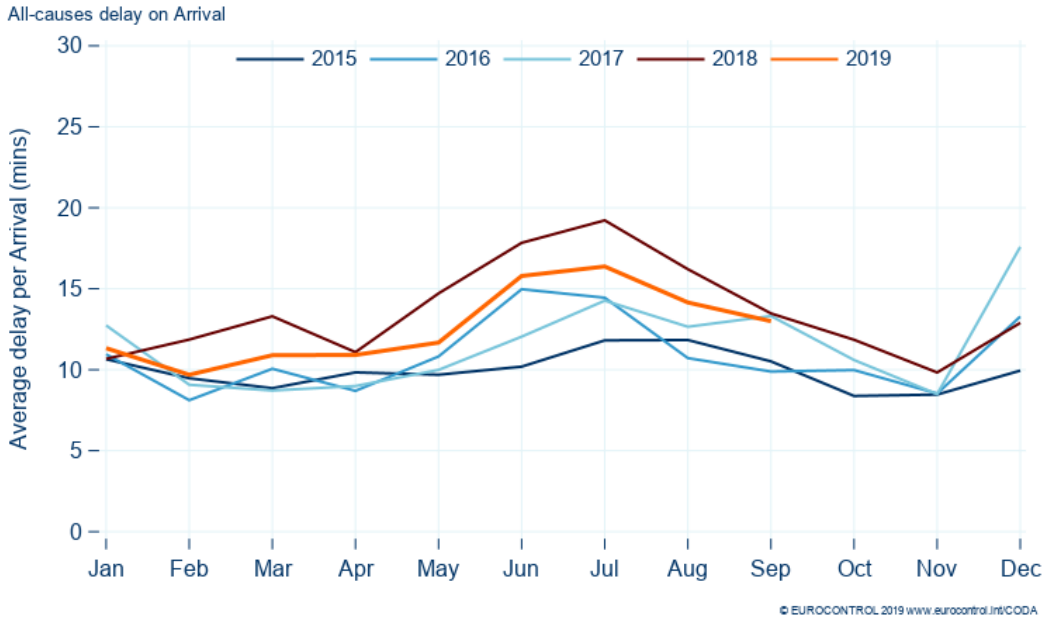


Figure 9. Average Delay per delayed Flight (All-Causes) for Arrivals

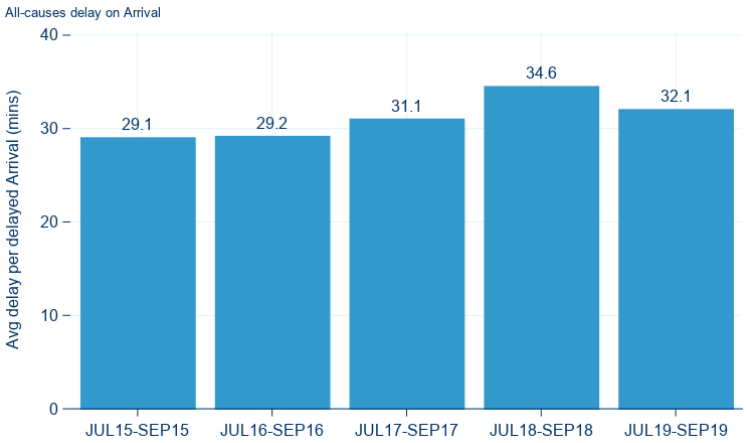
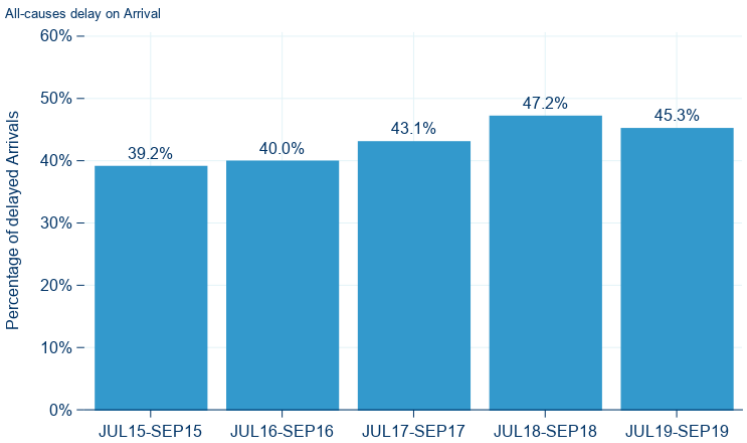
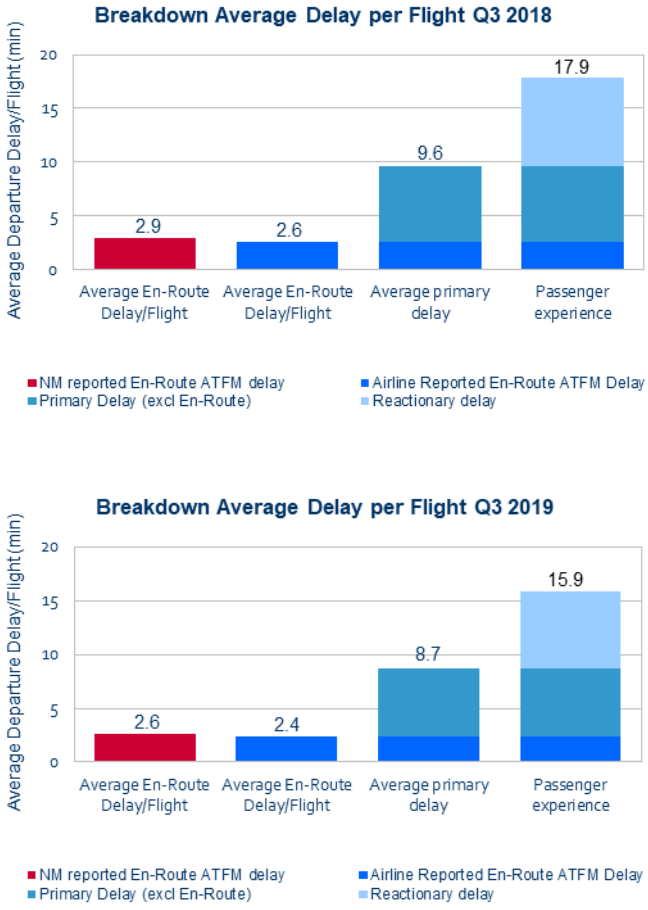


Figure 10. Percentage of Delayed Flight (All-Causes) for Arrivals



6 NM Versus Aircraft Operator Experience of Delay

Figure 11. Breakdown of Average Delay per Flight Q3 2018 vs. Q3 2019 (Network Manager vs. Aircraft Operator)



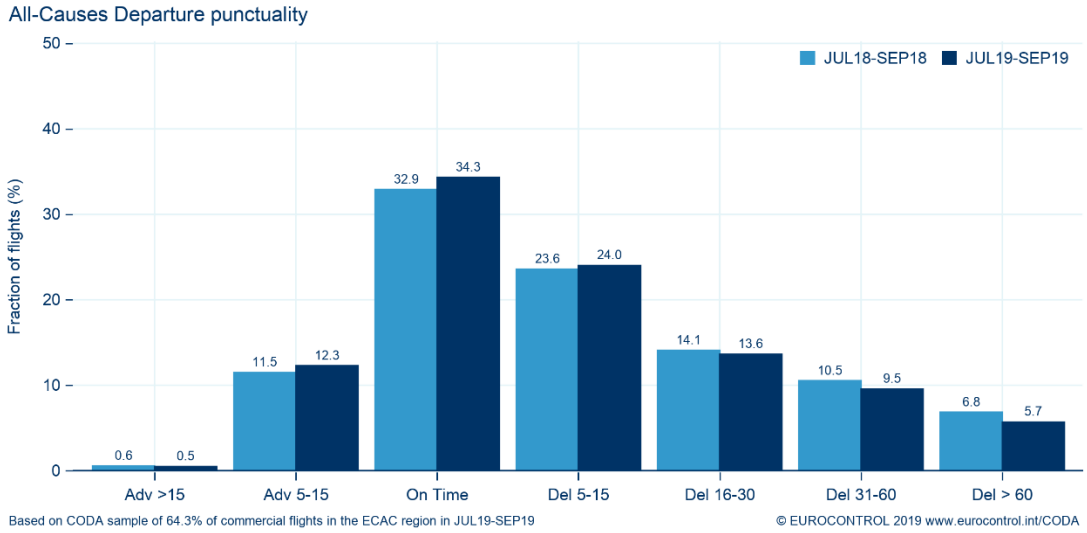
Airline data in (Figure 11) shows that the average en-route ATFM delay from all-causes was 2.4 minutes per flight. This was lower when compared to the NM recorded average en-route ATFM delay per flight for the quarter of 2.6 minutes per flight.

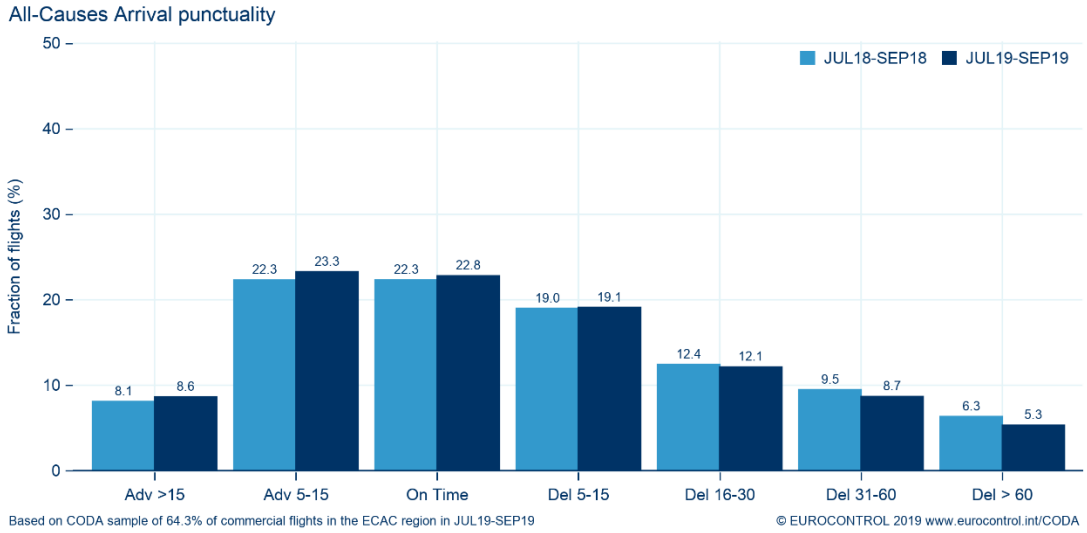
Primary delays (e.g. passenger and ramp handling delays) counted for 55% (8.7 min/flt), with reactionary delays representing the remaining share of 45% (or 7.2 min/flt). This resulted in a decreased average departure delay per flight, of 15.9 minutes per flight as reported in previous sections.

7 Punctuality

In Q3 2019, overall departure punctuality improved (Figure 12), with 34.3% of flights departing within the 5-minute threshold before or after the scheduled departure time (STD). Flights delayed >30 minutes from all causes decreased by 2.1 percentage points to 15.2% compared to Q3 2018.

Figure 12. All-Causes Departure and Arrival Punctuality Q3 2018 vs. Q3 2019

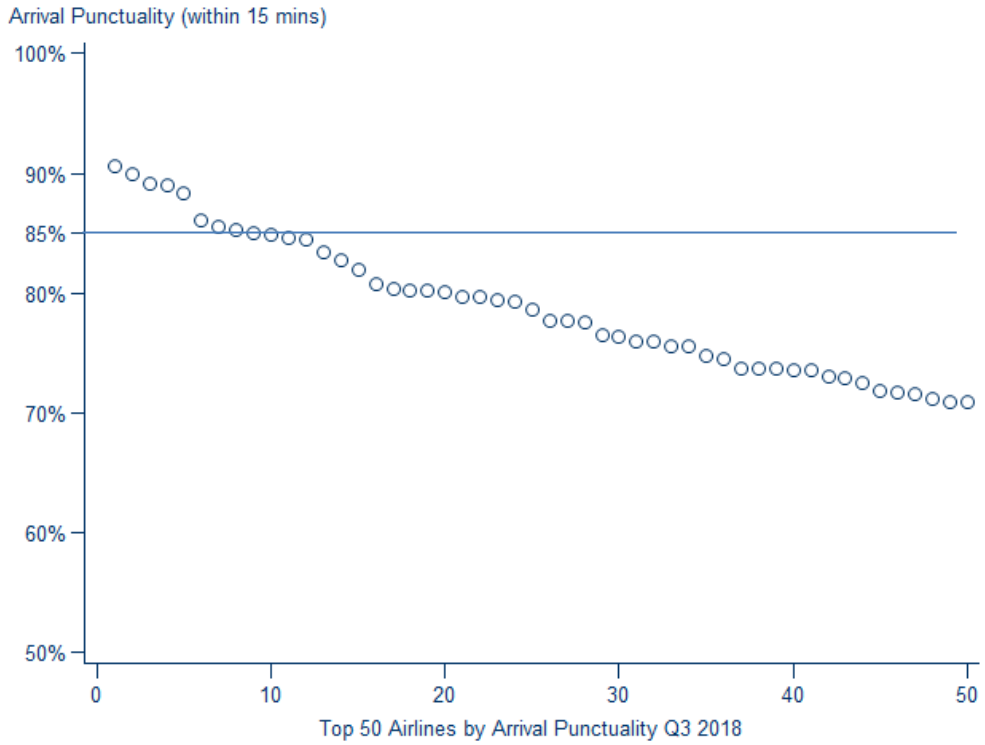




Airline arrival punctuality also improved, with 73.8% of flights arriving within 15 minutes or earlier than their scheduled arrival time (STA), compared to 71.7% in Q3 2018.

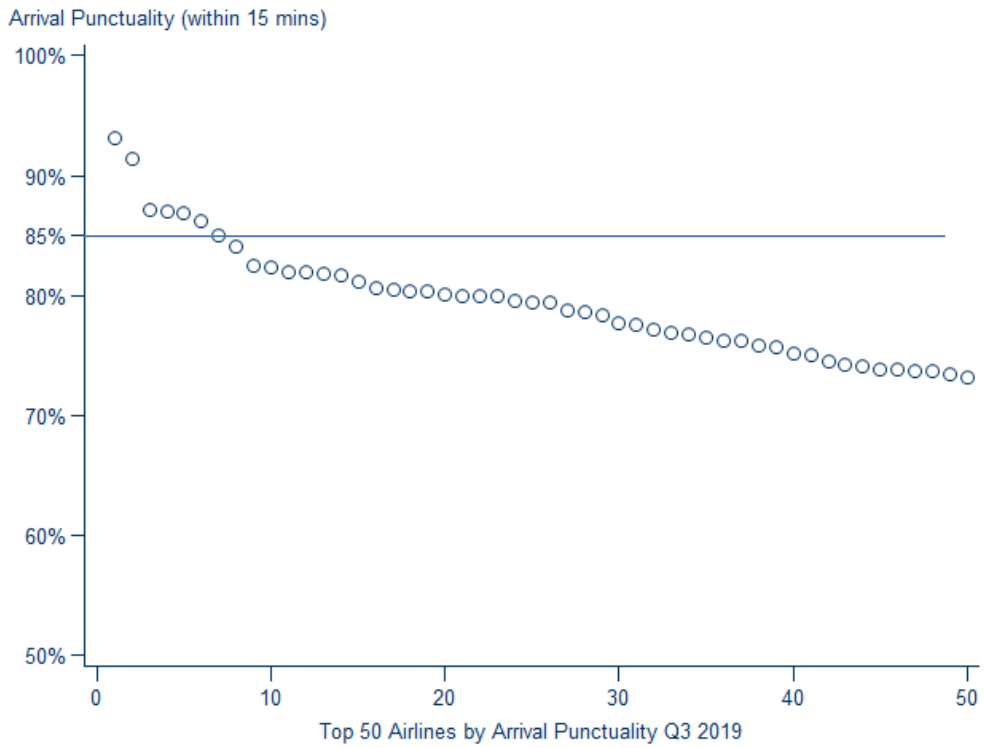
Flights arriving >15 minutes ahead of schedule saw an increase to 8.6%. Whilst being good for the passenger experience, this high share may affect operations. Effects being stand availability and air traffic flow management operations (implementation of ATFM regulations as a result of demand shifts) in the event of aircraft frequently arriving excessively ahead of their schedule.

Figure 13. Top 50* Airlines by Arrival On-Time Performance Q3 2018



*The top 50 airlines reporting to CODA by number of flights. Arrival punctuality is calculated as the share of flights arriving within 15 minutes of the scheduled time (time of arrival at gate)

Figure 14. Top 50* Airlines by Arrival On-Time Performance Q3 2019



During the quarter, fewer airlines were able to maintain 15-minute arrival punctuality (Figure 13) above 85%. 7 airlines saw more than 85% of their flights arrive within 15 minutes of the scheduled time of arrival vs. 12 airlines in Q3 2018. However more airlines did maintain arrival punctuality between 75% and 85% than in Q3 2018.

8 Operational Flight Cancellations

Figure 15. Monthly Rate of Operational Cancellations Q3 2019

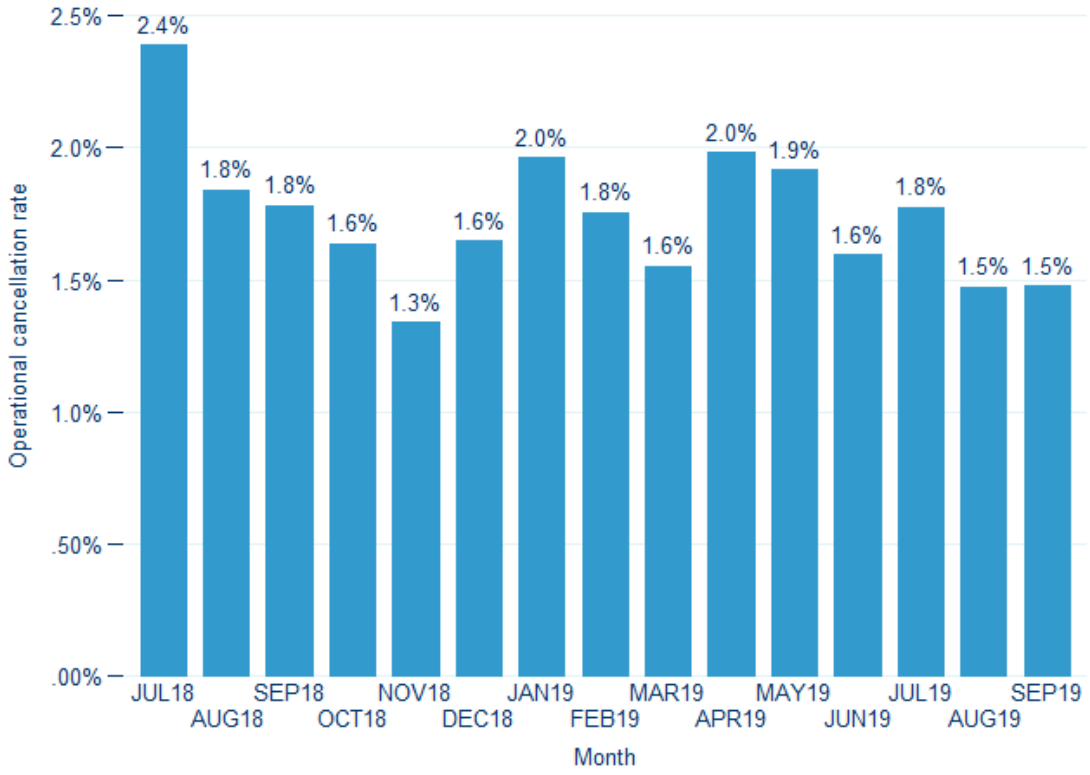


Figure 16. Average Daily Cancellation 2018 – Q3 2019

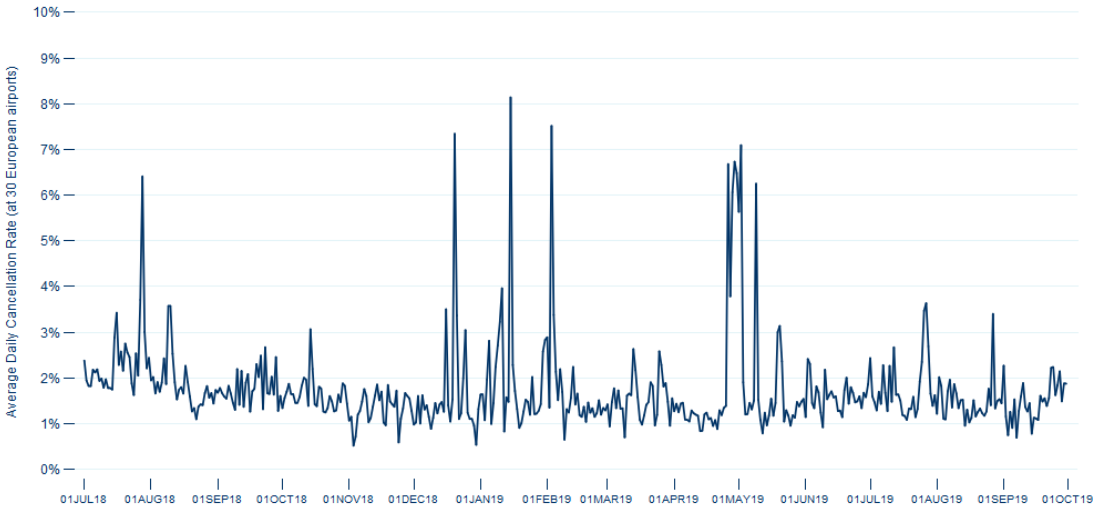


Figure 15 shows the monthly rate of operational cancellations providing details of cancellations by day from July 2018 to the end of September Q3 2019. It should be noted that initial cancellations count as 'operational cancellations' under the terms of the regulation EC Regulation N° 390 2013.

In Q3 2019, the operational cancellation rate was 1.6% compared to 2.0% in Q3 2018, in a quarter where less industrial action influenced cancellations. Radar instability affected London TC on 26 July with London Gatwick and London Heathrow seeing a peak in cancelled flights. The next day, the 27 July Gatwick suffered from gate and stand allocation system issues. On August 27 a security alert at Munich airport, as well as poor weather in the Balearic Islands resulted in increases in cancellations.

9 Scheduling Indicators

Two CODA scheduling indicators help airline schedulers determine the optimal schedule based on historical flight data:

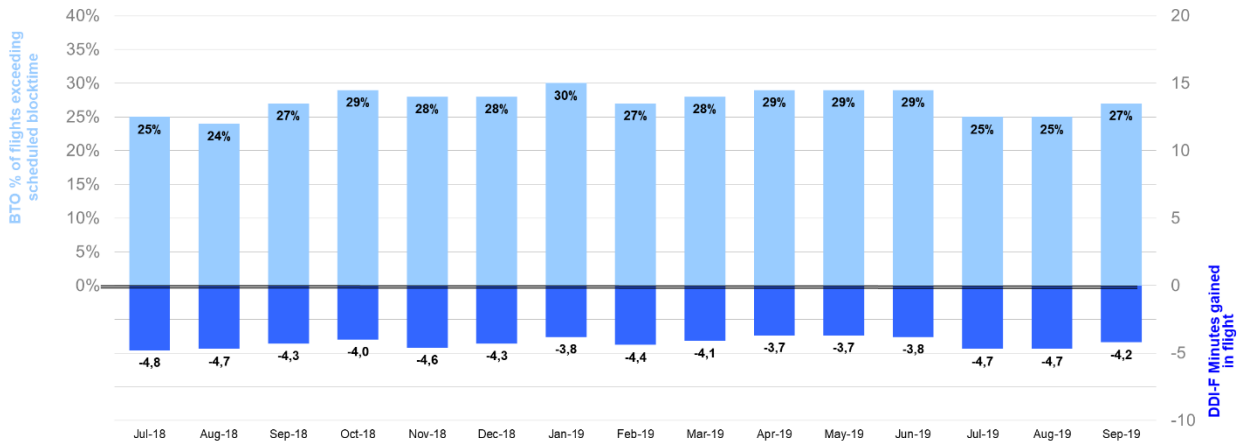
The **Delay Difference Indicator - Flight (DDI-F)** or the difference between departure and arrival punctuality expressed in minutes. This can be indicated as a positive or negative figure, for example, a flight departing with 20 minutes delay and arriving with 30 minutes arrival delay will have a DDI-F of +10 minutes.

The European DDI-F in Q3 2019 was -4.5 minutes, this was stable in comparison to Q3 2018 where the DDI-F was -4.6 minutes, indicating stability in airline schedule buffering.

The **Block Time Overshoot (BTO)** is the percentage of flights with an actual block time that exceeds the scheduled block time.

The European BTO in Q3 2019 increased slightly to 25.6% compared to 25.3% in Q3 2018.

Figure 17. Block Time Overshoot (BTO) and Delay Difference Indicator - Flight (DDI-F) Q3 2019



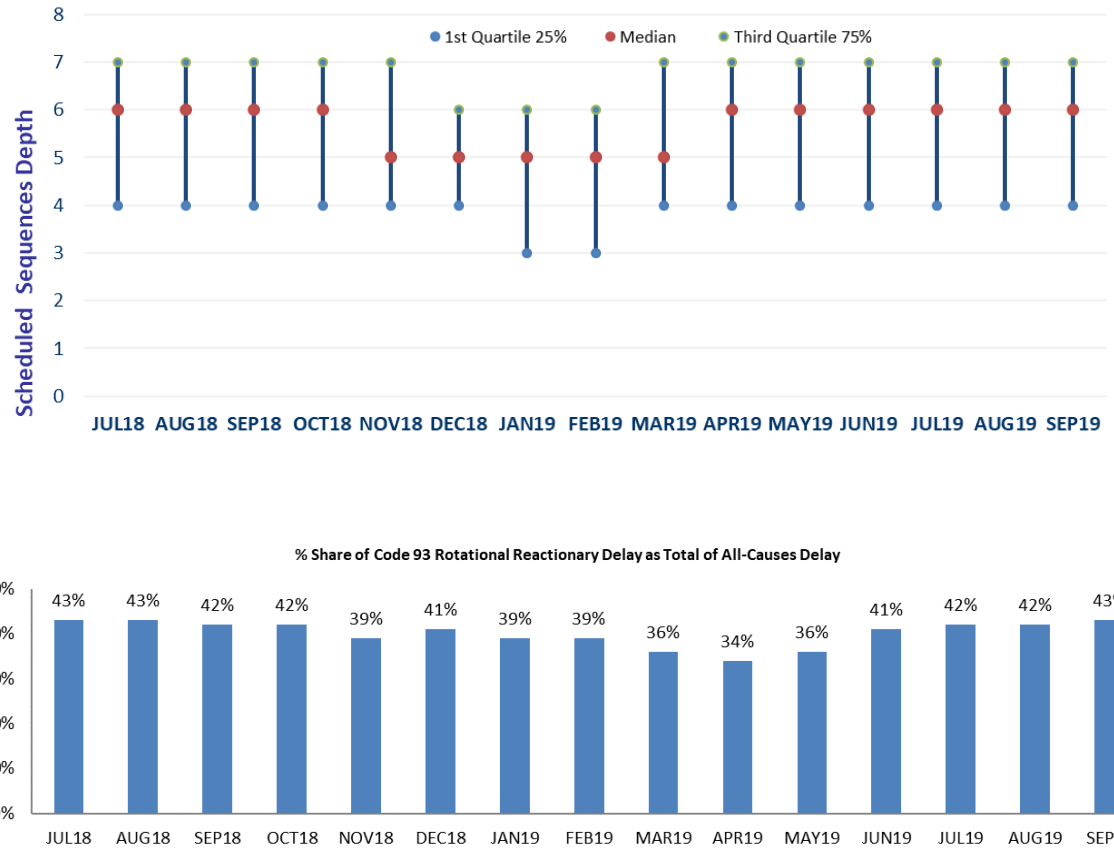
10 Reactionary Delay Analysis

In Q3 2019, the share of reactionary delay (IATA delay codes 91-96) was 45% of delay minutes contributing 7.2 minutes per flight.

This section concentrates on IATA delay code 93 rotational delays, as these have a significant share of overall reactionary delays (approximately 90%) and the largest effect on network performance and passenger experience. In Q3 2019, the share of IATA delay code 93 fell slightly to at 42% from 43% when compared to Q3 2018.

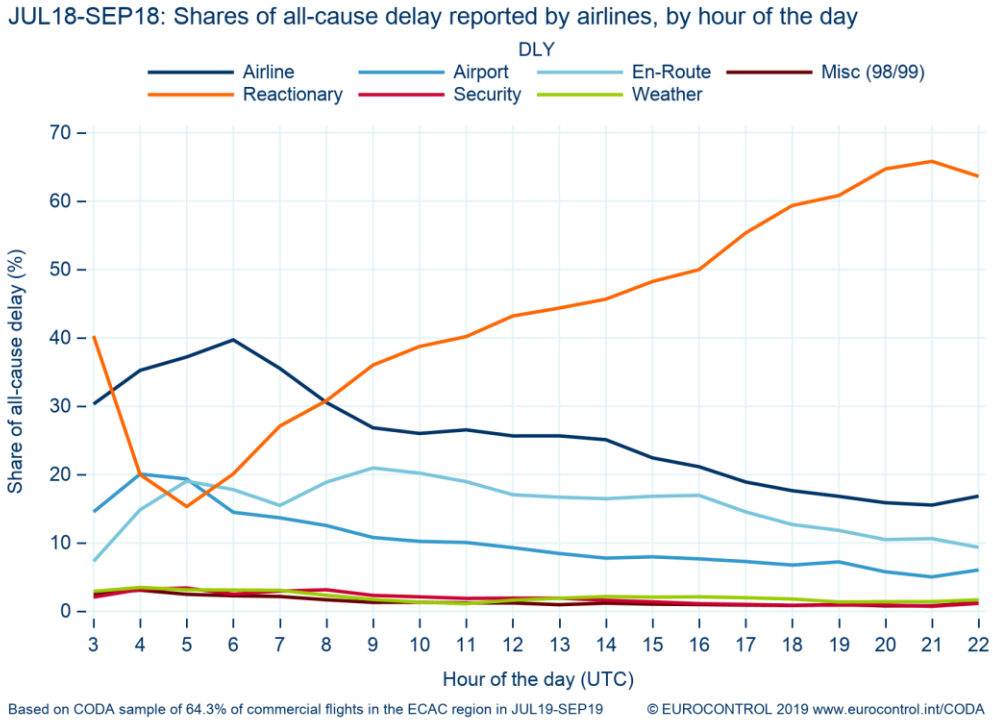
(Figure 18) analysis shows that the median number of scheduled flights per sequence for an aircraft in Q3 2019 was 6 and back to the normal summer season figure. A sequence combines flights operated by the same aircraft with a normal planned ground time between flights. A sequence will end when the aircraft remains on the ground for a longer time compared to a normal turn-around time, e.g. night stop, maintenance slots etc. An increase in the scheduled sequence depth may also drive an increase in reactionary delays.

Figure 18. Median Scheduled Flight Sequence Depth and Share of Reactionary Departure Delay on Intra European Flights: 2018 –Q3 2019.



11 Average Departure Delay per Flight by Hour

Figure 19. Breakdown of the Average Departure Delay per Flight by Hour of the Day Q3 2018 (top) vs. Q3 2019 (bottom)



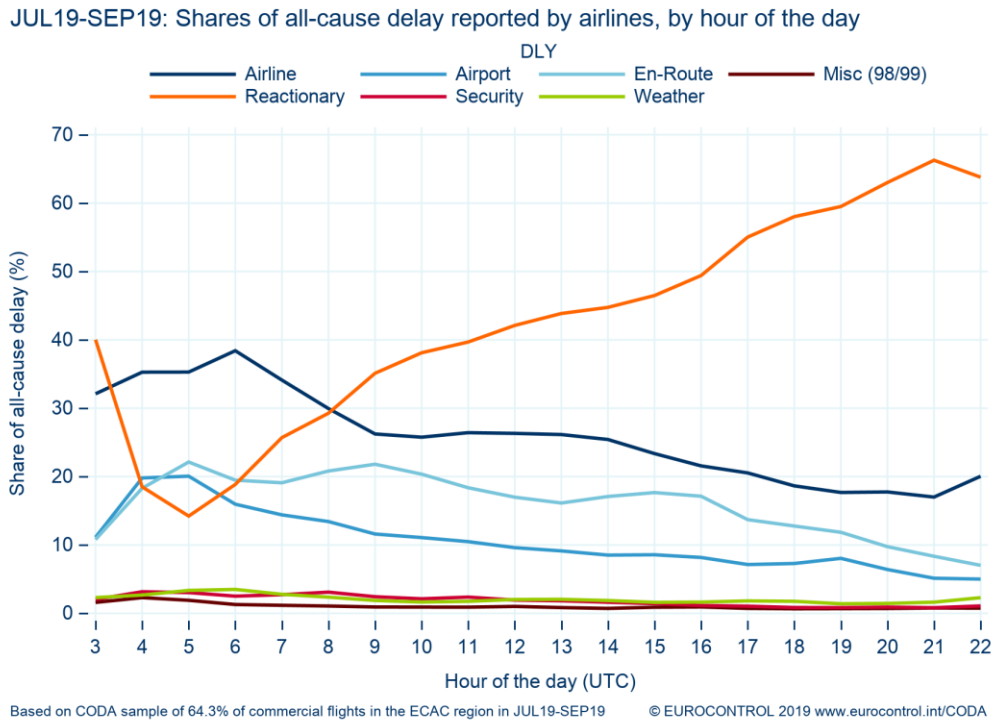
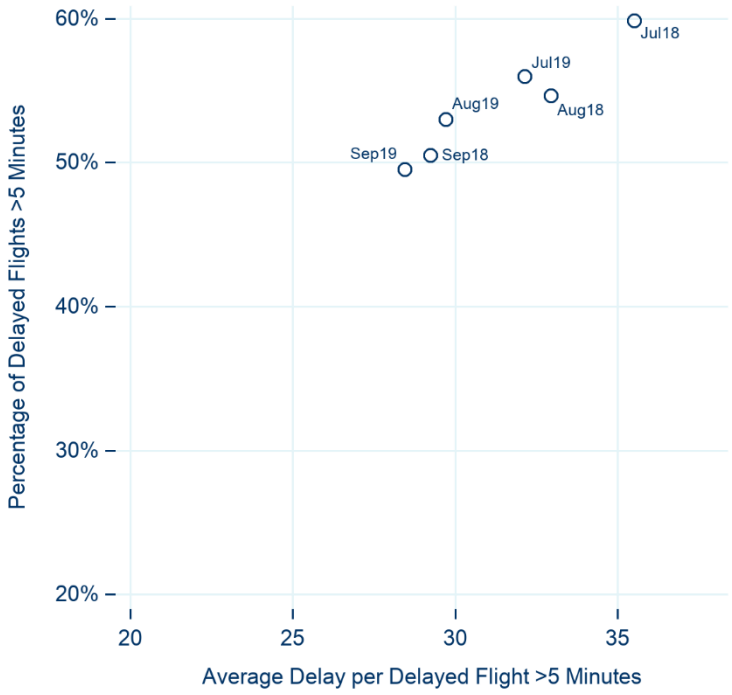


Figure 19 highlights the slight decrease in the delay situation for the quarter. Lower shares of airline delay can be observed in the first rotation hours.

12 Average Delay per Delayed Flight vs Percentage of Delayed Flights

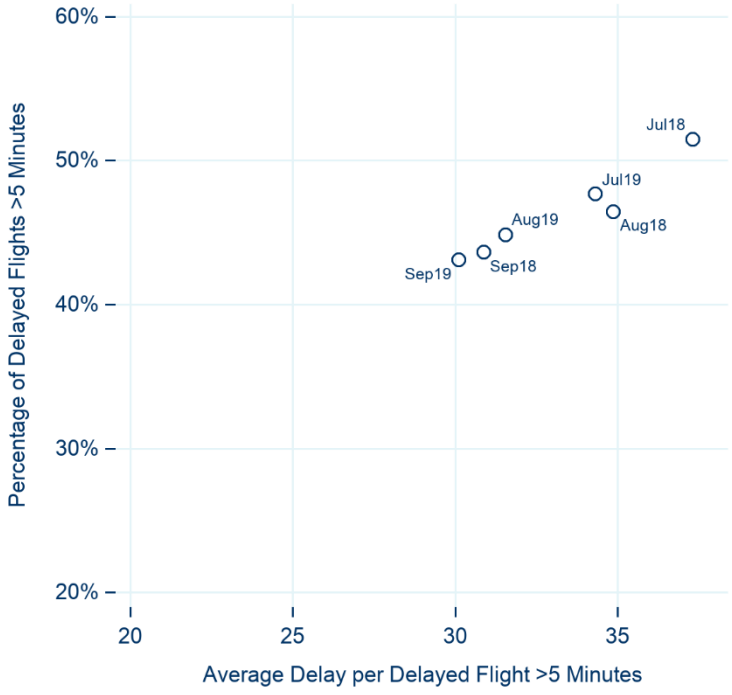
Figure 20. ADD vs. PDF on Departure



The better performance in Q3 2019 can be observed in Figure 20 and Figure 21.

When grouped together in Q3 2019 the percentage of flights delayed on departure (>=5 minutes) decreased to 52.9%. The average delay per delayed (ADD) flight was 30.2 minutes, a decrease of 2.6 minutes.

Figure 21. ADD vs. PDF on Arrival



The average delay per delayed flight (>=5 minutes) on arrival from all-causes was 32.1 minutes per flight in Q3 2019 a decrease of 2.5 minutes per flight. The percentage of delayed arrivals also decreased, this by 1.9 percentage points to 45.3% in comparison to Q3 2018.

Use of schedule buffering can be observed as the percentage of delayed arrivals decreases, by comparing Figures 20 and 21, as the difference between the percentage of delayed arrivals and delayed departures in percentage points. This has increased compared to Q3 2015 from 6.1% points to 7.6 % points in Q3 2019.

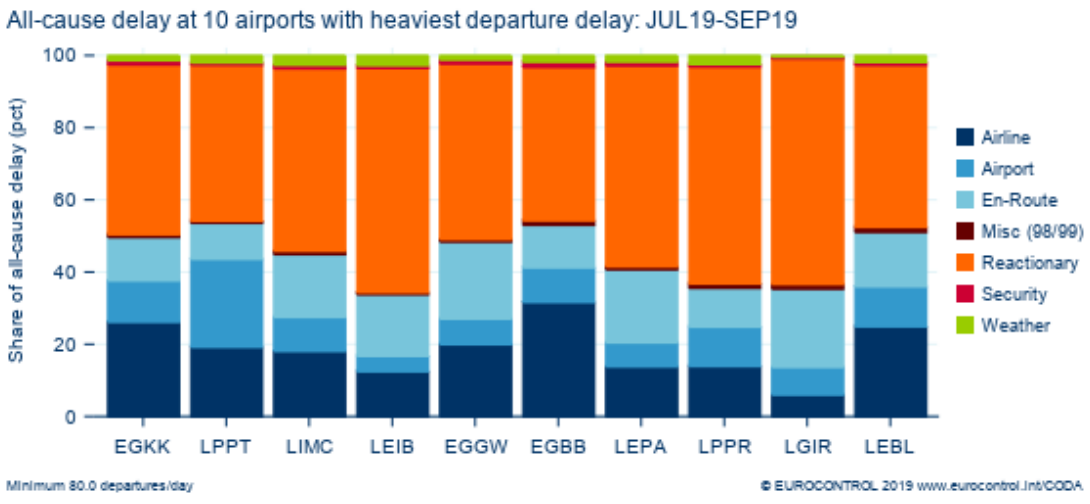
13 Top 20 Delay Affected Departure Airports

Figure 22. All-Causes Delay. Top 20 Affected Departure Airports Q3 2019 (flights delayed >5 mins)

Rank	Departure airport	ICAO Code	Average delay per departure (mins)	Delay Change	Average delay per delayed departure	Percentage delayed departures	Average Reactionary Delay Per Departure (Mins)
1	LONDON GATWICK	EGKK	26.1	20%	36.3	72.0%	11.8
2	LISBON	LPPT	23.8	-16%	32.1	74.0%	10.3
3	MILAN MALPENSA	LIMC	21.9	-0%	34.1	64.4%	11.1
4	IBIZA	LEIB	21.9	-14%	40.2	54.3%	13.2
5	LONDON/LUTON	EGGW	21.7	-10%	33.0	65.7%	10.6
6	BIRMINGHAM	EGBB	21.6	6%	34.5	62.6%	9.0
7	PALMA DE MALLORCA	LEPA	21.2	-17%	37.5	56.5%	11.3
8	PORTO	LPPR	21.0	-9%	36.4	57.6%	12.7
9	HERAKLION	LGIR	20.8	-18%	34.6	60.2%	12.5
10	BARCELONA	LEBL	20.7	-22%	35.5	58.3%	9.2
11	CATANIA	LICC	20.6	-6%	33.4	61.7%	10.6
12	BRUSSELS NATIONAL	EBBR	20.4	1%	29.7	68.5%	7.5
13	NAPOLI	LIRN	20.0	-5%	32.5	61.5%	9.0
14	TEL AVIV BEN GURION	LLBG	20.0	-18%	31.7	62.9%	7.4
15	PRAGUE	LKPR	19.7	-14%	33.2	59.4%	9.6
16	MANCHESTER	EGCC	19.6	-1%	32.3	60.7%	8.0
17	ATHENS	LGAV	19.1	6%	28.3	67.6%	9.3
18	NICE	LFMN	19.0	-18%	32.3	58.9%	9.1
19	VENICE TESSERA	LIPZ	18.9	-8%	32.8	57.6%	9.4
20	ALICANTE	LEAL	18.6	-5%	35.6	52.4%	9.3

London Gatwick ranked 1st in the top 20 affected airports (Figure 22) with an average delay per departure of 26.1 minutes, flights departing from the airport suffered from reactionary and local start-up delays. Lisbon ranked 2nd with an average delay per flight of 23.8 minutes, with flights receiving delays due to local ATC as well as reactionary, however the average delay did fall by 16% at this airport. Flights departing from Milan Malpensa suffered from en-route delays and weather, although remaining stable compared to Q3 2019.

Figure 23. Main Departure Delay Causes at the Top 10 Affected Departure Airports



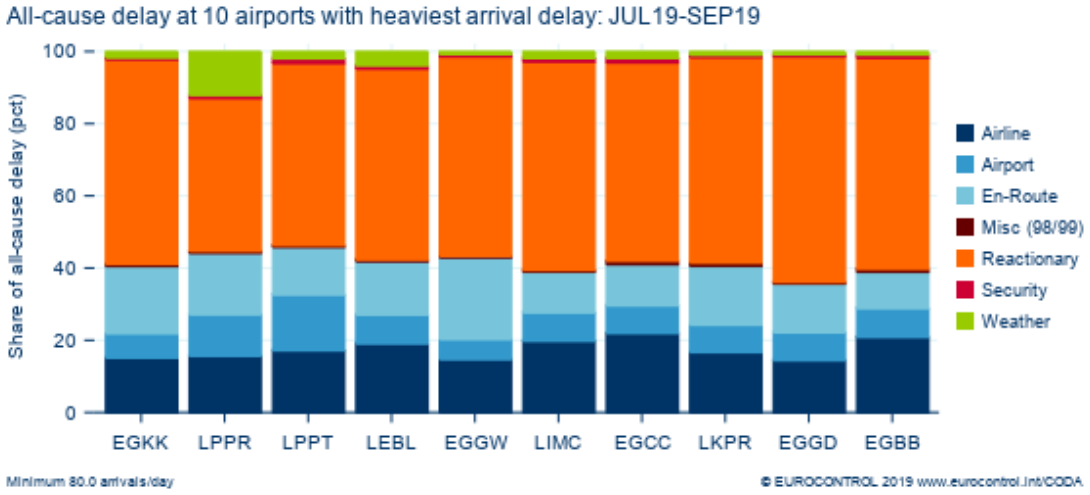
14 Top 20 Delay Affected Arrival Airports

Figure 24. All-Causes Delay. Top 20 Affected Arrival Airports Q3 2019 (flights delayed >5 mins)

Rank	Arrival airport	ICAO Code	Average delay per arrival (mins)	Delay Change	Average delay per delayed arrival	Percentage delayed arrivals	Average Reactionary Delay Per Arrival (Mins)
1	LONDON GATWICK	EGKK	28.8	17%	44.0	65.5%	15.8
2	PORTO	LPPR	23.2	-6%	40.9	56.8%	10.2
3	LISBON	LPPT	22.4	-9%	35.2	63.7%	11.4
4	BARCELONA	LEBL	21.7	-22%	42.4	51.2%	12.5
5	LONDON LUTON	EGGW	21.7	2%	37.7	57.4%	13.4
6	MILAN MALPENSA	LIMC	20.2	-2%	34.4	58.7%	11.6
7	MANCHESTER	EGCC	20.1	6%	38.2	52.6%	11.2
8	PRAGUE	LKPR	19.2	-9%	35.6	53.9%	12.0
9	BRISTOL	EGGD	18.9	-14%	37.0	51.3%	13.1
10	BIRMINGHAM	EGBB	18.6	4%	35.4	52.4%	11.0
11	ATHENS	LGAV	17.7	11%	30.0	59.1%	10.2
12	DUBLIN	EIDW	17.7	-1%	32.3	54.8%	9.3
13	TEL AVIV BEN GURION	LLBG	17.5	-26%	32.1	54.5%	6.2
14	BUCHAREST OTP	LROP	17.5	-7%	30.1	57.9%	10.1
15	HERAKLION	LGIR	17.3	-21%	34.4	50.4%	6.7
16	LONDON STANSTED	EGSS	17.2	-45%	36.3	47.5%	9.0
17	IBIZA	LEIB	17.2	-16%	37.0	46.3%	7.9
18	BUDAPEST	LHBP	17.1	-15%	33.0	51.9%	9.6
19	PALMA DE MALLORCA	LEPA	16.9	-20%	37.9	44.6%	6.9
20	EDINBURGH	EGPH	16.4	-11%	32.1	50.9%	9.7

London Gatwick ranked first for arrival delays in Q3 2019 (Figure 24), with an average delay per flight on arrival of 28.8 minutes, with reactionary delay and ATFM en-route delays affecting arrival performance of flights. Flights arriving at Porto suffered from weather delays (Figure 22). Barcelona saw better arrival performance with airlines suffering from less en-route and reactionary delays. (Figure 25).

Figure 25. Main Arrival Delay Causes at the Top 10 Affected Arrival Airports



15 Top 20 Delay Affected Airport Pairs

Figure 26. All-Causes Delay Situation for the 20 Most Delayed Airport Pairs Q3 2019

Rank	Departure Airport	Arrival Airport	Average Delay Per Departure	Change since Previous Period	Average Delay Per Delayed Departure	Percentage Delayed Departures
1	LONDON GATWICK	BARCELONA	41.1	12%	47.9	85.7%
2	PALMA DE MALLORCA	LONDON GATWICK	33.9	17%	44.4	76.3%
3	BARCELONA	LONDON GATWICK	32.2	2%	44.1	73.1%
4	LONDON/GATWICK	DUBLIN	31.1	27%	41.0	76.0%
5	PARIS ORLY	BARCELONA	30.7	-6%	44.1	69.6%
6	LISBON	MADEIRA	30.4	7%	37.1	81.9%
7	ALICANTE	LONDON GATWICK	29.5	25%	43.9	67.2%
8	LISBON	BARCELONA	28.5	-11%	37.3	76.6%
9	LONDON GATWICK	PALMA DE MALLORCA	28.5	17%	37.6	75.9%
10	IBIZA	BARCELONA	28.1	-24%	43.4	64.7%
11	LISBON	PORTO	27.8	-32%	39.4	70.6%
12	MALAGA	LONDON GATWICK	27.4	31%	41.9	65.4%
13	ROME FIUMICINO	BARCELONA	26.9	-23%	37.3	72.3%
14	PARIS ORLY	LISBON	26.1	14%	32.0	81.5%
15	LISBON	PARIS ORLY	25.9	15%	33.2	77.9%
16	BARCELONA	LISBON	25.8	-14%	35.3	73.0%
17	CATANIA	MILANO MALPENSA	25.5	22%	40.6	62.7%
18	LONDON GATWICK	ALICANTE	25.5	29%	37.7	67.5%
19	MADEIRA	LISBON	23.4	11%	38.2	61.4%
20	PALMA DE MALLORCA	COLOGNE-BONN	23.1	-39%	35.2	65.6%

The delay situation affecting London Gatwick is highlighted in Figure 26 with airport appearing in 8 of the top 20 affected pairs. In Q3 2019, flights between London Gatwick and Barcelona ranked first in the most delayed airport pairs (Figure 26). Many flights operating on this city pair suffered from local start up delays in Gatwick as well as reactionary delays. Lisbon airport city pairs also feature in the above table, the main cause of delay here is airport capacity, in turn, creating reactionary delay on the returning flights. However, overall delay at Lisbon did decrease during the quarter.

16 Year on Year Trends in All-Causes Indicators

This section summarises the year-on-year trends in the main indicators of delay from all-causes. A flight is considered delayed from 5 minutes.

The improved performance in Q3 2019 can be observed in (Figures 27, 28 and 29). Further references to these graphs can be found in sections 4 and 5.

Figure 27 Average all-causes delay per delayed flight (departures top, arrivals bottom)

Figure 28. Percentage of flights delayed for all-causes delay (departures top, arrivals bottom)

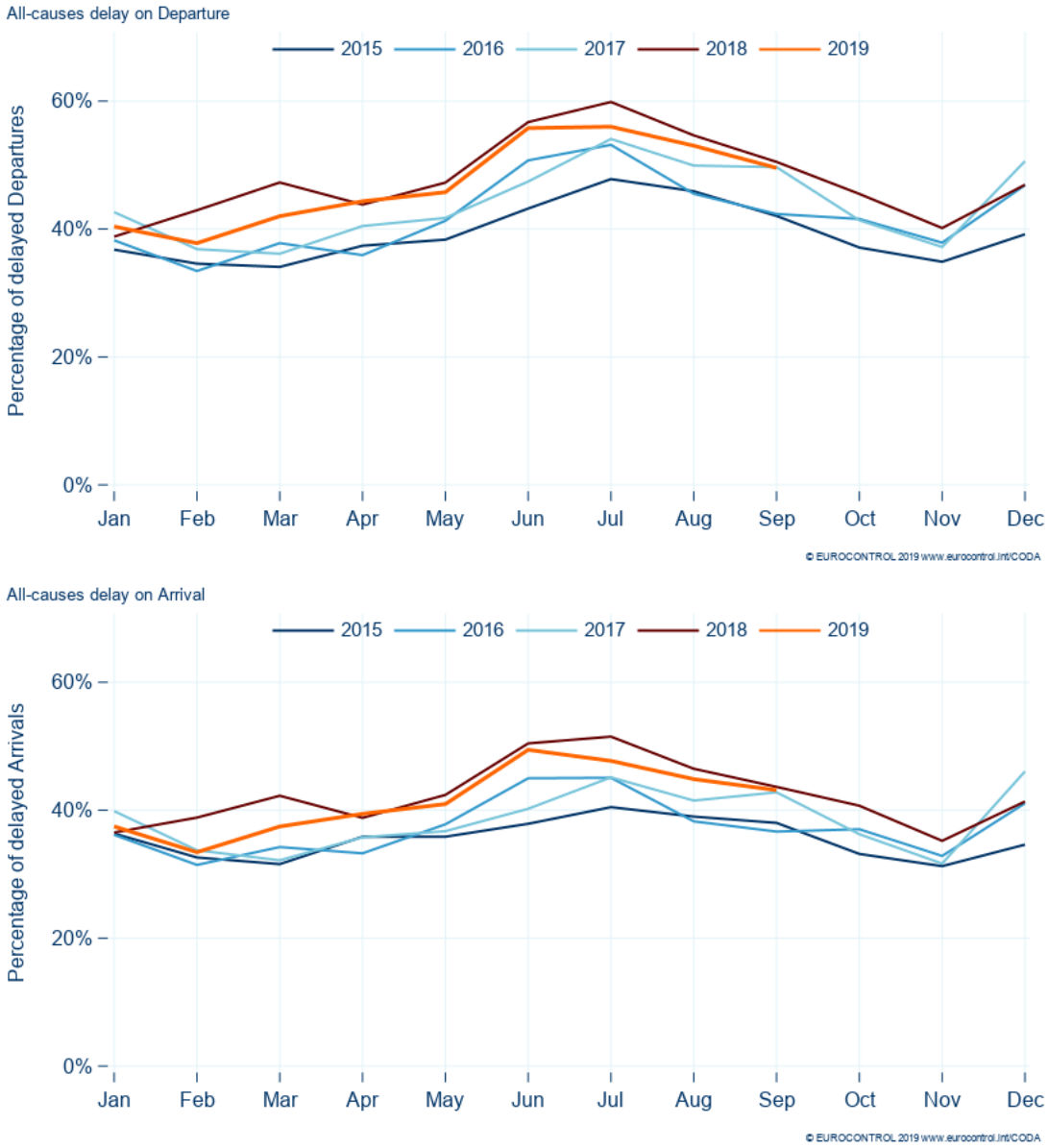
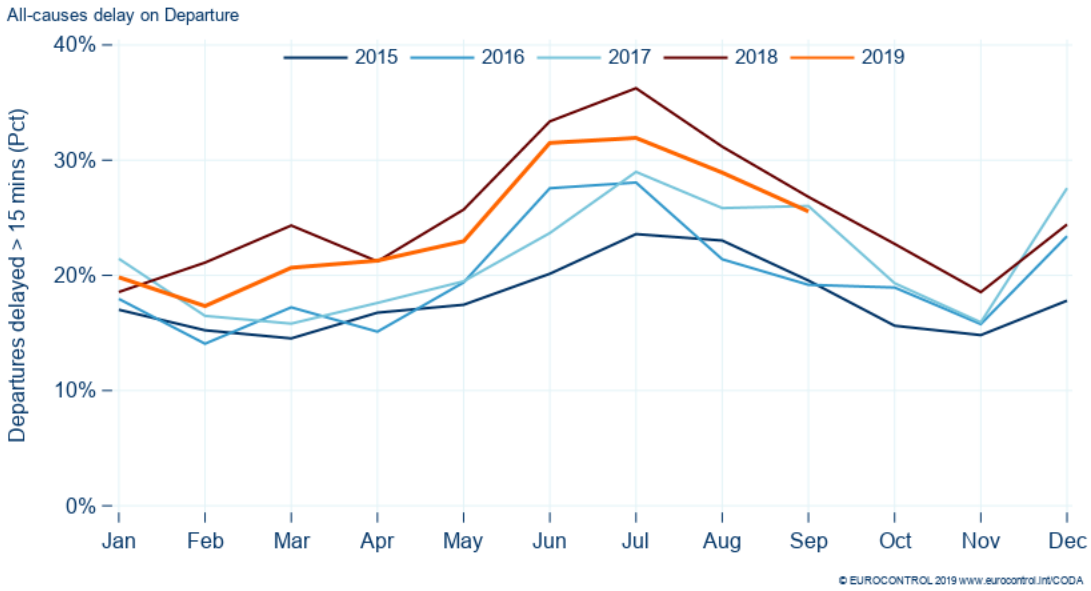
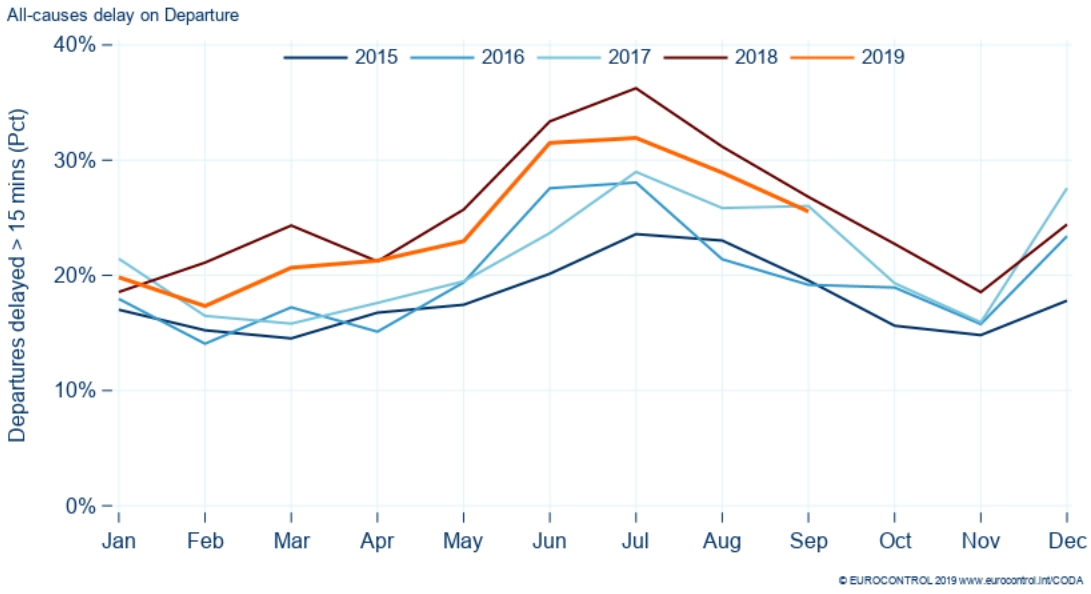


Figure 29. Percentage of flights delayed >15mins for all-causes (departures top, arrivals bottom)





17 CODA Definitions and References

NM Versus Aircraft Operator Experience of Delay

ATFM delays calculated by NM are the (flight) planned “delays” based on restrictions applied; the airlines report the “actual” experienced ATFM delay on departure. For instance, a flight with an ATFM restriction may also have a handling delay. For the airline, a part of this delay is the ATFM delay and the rest is the handling delay; for NM it is all ATFM delay.

In the event of a longer duration delay, an example being during ATC industrial action, a flight may keep its original schedule however when its flight plan is submitted for example a day later any ATFM delay allocated may be lower or zero, in this case airline reported delay will exceed NM reported ATFM delay.

Operational Flight Cancellations

These results are based on operational cancellation data supplied by 30 European coordinated airports reporting to CODA under EC Regulation N° 390 2013. Albeit based on data supplied by a restricted list (see the conditions below) of major European airports, these results already give a good indication of trends and effects of Network events like industrial actions or extreme weather.

The IFR flight coverage at the individual airports included in this analysis is 100%. Those airports currently unable to report operational cancellations in the required data format or those not meeting all of the criteria for operational cancellations were excluded from the analysis.

According to Annex V of EC Regulation N°390 2013 an ‘Operational Cancellation’ means an arrival or departing scheduled flight to which the following conditions apply:

- The flight received an airport slot, and
- The flight was confirmed by the air carrier the day before operations and or it was contained in the daily list of flight schedules produced by the airport operator the day before of operations, but
- The actual landing or take-off never occurred.

Therefore this section of the CODA Digest reports on monthly and daily shares of operational cancellations of the total planned flights at day -1. Like delays, operational cancellations provide an insight into the impact of network events and associated disruption; e.g. industrial action or extreme weather events.

CODA Scheduling Indicators

Two CODA scheduling indicators help airline schedulers determine the optimal schedule based on historical flight data.

Scheduling correctly is a difficult art: if too long a time is blocked for a flight, the airline will not be able to make best use of resources - staff, airframes, infrastructure. Too short a time can arguably be worse as late flights generate rotational delay with late incoming aircraft and passengers from previous flights having to be accommodated. When flights leave on time but arrive after the scheduled time of arrival they cause reactionary delays. Schedule padding is essential for air carriers in order to find schedules which work with the typical patterns of delay, so that they can deliver passengers on time, and get maximum use out of their aircraft. Consequently, when delays decrease it takes one or two (IATA) seasons for the airline to adapt its schedule accordingly.

The **Delay Difference Indicator - Flight (DDI-F)** or the difference between departure and arrival punctuality expressed in minutes. This can be indicated as a positive or negative figure, for example, a flight departing with 20 minutes delay and arriving with 30 minutes arrival delay will have a DDI-F of +10 minutes.

The **Block Time Overshoot (BTO)** is the percentage of flights with an actual block time that exceeds the scheduled block time.

Reactionary Delay Analysis

Reactionary delays are generated as a result of an aircraft's late arrival from a previous flight, which in turn affects the punctuality of its next flight with the same aircraft, as well as potentially delaying connecting passengers. See the IATA Standard Delay Codes section for an overview of the IATA reactionary delay codes. Subsequently there are two types of reactionary delays: firstly as a result of the same aircraft being delayed on its next flight (rotational delay) and secondly when another aircraft is delayed as a result of another aircraft typically through passengers, crew and load connection (non-rotational delays).

A sequence combines flights operated by the same aircraft with a normal planned ground time between flights. A sequence will end when the aircraft remains on the ground for a longer time compared to a normal turn-around time, e.g. night stop, maintenance slots etc. An increase in the scheduled sequence depth may also drive an increase in reactionary delays.

18 CODA Delay Groupings

	CODA CAUSE	Description	IATA Code
Primary Delay Causes	**Airline**	Passenger and Baggage	11-19
		Cargo and Mail	21-29
		Aircraft and Ramp Handling	31-39
		Technical and Aircraft Equipment	41-48
		Damage to Aircraft & EDP Automated Equipment Failure	51-58
		Flight Operations and Crewing	61-69
		Other Airline Related Causes	Others
	Airport	ATFM due to Restriction at Destination Airport	83
		Airport Facilities	87
		Restrictions at Airport of Destination	88
		Restrictions at Airport of Departure	89
	En-Route	ATFM due to ATC En-Route Demand Capacity	81
		ATFM due to ATC Staff Equipment En-Route	82
	Governmental	Security and Immigration	85-86
	Weather	Weather (other than ATFM)	71-77
		ATFM due to Weather at Destination	84
	Miscellaneous	Miscellaneous	97-99
	Reactionary	Late Arrival of Aircraft, Crew, Passengers or Load	91-96

19 Correlation between IATA Delay Codes and the NM Regulation Codes

Note: updated version published in the ATFCM Users Manual 20.1.1[1]

Correlation Between IATA Delay Codes and NM Regulation Reasons (Edition 20.1.1)

NM				IATA	
Regulation Cause	Code	Regulation Location	Guidelines	Code	Delay Cause
ATC Capacity	C	D	En Route: Demand exceeds or complexity reduces declared or expected ATC capacity. Airport: Demand exceeds declared or expected ATC capacity	89	RESTRICTIONS AT AIRPORT OF DEPARTURE
		E		81	ATFM due to ATC ENROUTE DEMAND/CAPACITY
		A		83	ATFM due to RESTRICTION AT DESTINATION AIRPORT
ATC Industrial Action	I	D	Reduction in any capacity due to industrial action by ATC staff	89	RESTRICTIONS AT AIRPORT OF DEPARTURE
		E		82	ATFM due to ATC STAFF/EQUIPMENT ENROUTE
		A		83	ATFM due to RESTRICTION AT DESTINATION AIRPORT
ATC Routeings	R	E	Network Solutions / Scenarios used to balance demand and capacity	81	ATFM due to ATC ENROUTE DEMAND/CAPACITY
ATC Staffing	S	D	Unplanned staff shortage reducing expected capacity	89	RESTRICTIONS AT AIRPORT OF DEPARTURE
		E		82	ATFM due to ATC STAFF/EQUIPMENT ENROUTE
		A		83	ATFM due to RESTRICTION AT DESTINATION AIRPORT
ATC Equipment	T	D	Reduction of expected of declared capacitydue to the non-availability or degredation of equipment used to provide an ATC service	89	RESTRICTIONS AT AIRPORT OF DEPARTURE
		E		82	ATFM due to ATC STAFF/EQUIPMENT ENROUTE
		A		83	ATFM due to RESTRICTION AT DESTINATION AIRPORT
Accident/Incident	A	D	Reduction of expected ATC capacity due to an aircraft accident/incident	89	RESTRICTIONS AT AIRPORT OF DEPARTURE
		A		83	ATFM due to RESTRICTION AT DESTINATION AIRPORT
Aerodrome Capacity	G	D	Reduction in declared or expected capacity due to the degradation or non-availability of infrastructure at an airport e.g. work in progress, shortage of aircraft stands etc. Or when demand exeeds expected aerodrome capacity.	89	RESTRICTIONS AT AIRPORT OF DEPARTURE
		A		83	ATFM due to RESTRICTION AT DESTINATION AIRPORT
Aerodrome Services	E	D	Reduced capacity due to the degradation or non-availability of support equipment at an airport e.g. Fire Service, De-Icing / Snow Removal equipment or toher ground handling equipment	99	OTHER
		A		99	OTHER
Industrial Action NON-ATC	N	D	A reduction in expected / planned capacity due to industrial action by non-ATC personnel	98	INDUSTRIAL ACTION OUTSIDE OWN AIRLINE
		A		98	INDUSTRIAL ACTION OUTSIDE OWN AIRLINE
Airspace Management	M	D	Reduction in delared or expected capacity following changes in airspace / route availability due to small scale military activity	89	RESTRICTIONS AT AIRPORT OF DEPARTURE
		E		82	ATFM due to ATC STAFF/EQUIPMENT ENROUTE
		A		83	ATFM due to RESTRICTION AT DESTINATION AIRPORT
Special Event	P	D	Reduction in planned, declared or expected capacity or when demand exceeds the above capacities as a result of a major sporting, governmental or social event. It may also be sued for ATM system upgrades and transitions. Large multinational excercises may also use this reason. This category should only be used with prior approval during the planning process	89	RESTRICTIONS AT AIRPORT OF DEPARTURE
		E		82	ATFM due to ATC STAFF/EQUIPMENT ENROUTE
		A		83	ATFM due to RESTRICTION AT DESTINATION AIRPORT
Weather	W	D	Reduction in ecpected capacity due to any weather phenomena. This includes were weather impacts airport infrastructure capacity, but where aerodrome services are operating as planned / expected	89	RESTRICTIONS AT AIRPORT OF DEPARTURE
		E		81	ATFM due to ATC ENROUTE DEMAND/CAPACITY
		A		84	ATFM due to WEATHER AT DESTINATION
Environmental issue	V	D	Reduction in any capacity or when demand exceeds capacity due to agreed local noise, runway or similar procedures. This category should only be used with prior agreement in the planning process.	89	RESTRICTIONS AT AIRPORT OF DEPARTURE
		E		81	ATFM due to ATC ENROUTE DEMAND/CAPACITY
		A		83	ATFM due to RESTRICTION AT DESTINATION AIRPORT
Other	O	D	This category should be used in exceptional circumstances when no other category is sufficient. An explanatory ANM remark MUST be given to allow post ops analysis	89	RESTRICTIONS AT AIRPORT OF DEPARTURE
		E		81	ATFM due to ATC ENROUTE DEMAND/CAPACITY
		A		83	ATFM due to RESTRICTION AT DESTINATION AIRPORT

[1] http://www.eurocontrol.int/sites/default/files/content/documents/nm/network-operations/HANDBOOK/atfcm-users-manual-current.pdf

20 Standard IATA Delay Codes (AHM 730)

Others

00-05 AIRLINE INTERNAL CODES
06 (OA) NO GATE STAND AVAILABILITY DUE TO OWN AIRLINE ACTIVITY Including Early Arrivals
09 (SG) SCHEDULED GROUND TIME LESS THAN DECLARED MINIMUM GROUND TIME

Passenger and Baggage

11 (PD) LATE CHECK-IN, acceptance after deadline
12 (PL) LATE CHECK-IN, congestions in check-in area
13 (PE) CHECK-IN ERROR, passenger and baggage
14 (PO) OVERSALES, booking errors
15 (PH) BOARDING, discrepancies and paging, missing checked-in passenger
16 (PS) COMMERCIAL PUBLICITY PASSENGER CONVENIENCE, VIP, press, ground meals and missing personal items
17 (PC) CATERING ORDER, late or incorrect order given to supplier
18 (PB) BAGGAGE PROCESSING, sorting etc.
19 (PW) REDUCED MOBILITY, boarding deboarding of passengers with reduced mobility.

Cargo and Mail

21 (CD) DOCUMENTATION, errors etc.
22 (CP) LATE POSITIONING
23 (CC) LATE ACCEPTANCE
24 (CI) INADEQUATE PACKING
25 (CO) OVERSALES, booking errors
26 (CU) LATE PREPARATION IN WAREHOUSE
27 (CE) DOCUMENTATION, PACKING etc *(Mail Only)*
28 (CL) LATE POSITIONING *(Mail Only)*
29 (CA) LATE ACCEPTANCE *(Mail Only)*

Aircraft and Ramp Handling

31 (GD) AIRCRAFT DOCUMENTATION LATE INACCURATE, weight and balance, general declaration, pax manifest, etc.
32 (GL) LOADING UNLOADING, bulky, special load, cabin load, lack of loading staff
33 (GE) LOADING EQUIPMENT, lack of or breakdown, e.g. container pallet loader, lack of staff
34 (GS) SERVICING EQUIPMENT, lack of or breakdown, lack of staff, e.g. steps
35 (GC) AIRCRAFT CLEANING
36 (GF) FUELLING DEFUELLING, fuel supplier
37 (GB) CATERING, late delivery or loading
38 (GU) ULD, lack of or serviceability
39 (GT) TECHNICAL EQUIPMENT, lack of or breakdown, lack of staff, e.g. pushback

Technical and Aircraft Equipment

41 (TD) AIRCRAFT DEFECTS.
42 (TM) SCHEDULED MAINTENANCE, late release.
43 (TN) NON-SCHEDULED MAINTENANCE, special checks and or additional works beyond normal maintenance schedule.
44 (TS) SPARES AND MAINTENANCE EQUIPMENT, lack of or breakdown.
45 (TA) AOG SPARES, to be carried to another station.
46 (TC) AIRCRAFT CHANGE, for technical reasons.
47 (TL) STAND-BY AIRCRAFT, lack of planned stand-by aircraft for technical reasons.
48 (TV) SCHEDULED CABIN CONFIGURATION VERSION ADJUSTMENTS.

Damage to Aircraft & EDP Automated Equipment Failure

51 (DF) DAMAGE DURING FLIGHT OPERATIONS, bird or lightning strike, turbulence, heavy or overweight landing, collision during taxiing
52 (DG) DAMAGE DURING GROUND OPERATIONS, collisions (other than during taxiing), loading off-loading damage, contamination, towing, extreme weather conditions
55 (ED) DEPARTURE CONTROL
56 (EC) CARGO PREPARATION DOCUMENTATION
57 (EF) FLIGHT PLANS
58 (EO) OTHER AUTOMATED SYSTEM

Flight Operations and Crewing

61 (FP) FLIGHT PLAN, late completion or change of, flight documentation
62 (FF) OPERATIONAL REQUIREMENTS, fuel, load alteration
63 (FT) LATE CREW BOARDING OR DEPARTURE PROCEDURES, other than connection and standby (flight deck or entire crew)
64 (FS) FLIGHT DECK CREW SHORTAGE, sickness, awaiting standby, flight time limitations, crew meals, valid visa, health documents, etc.
65 (FR) FLIGHT DECK CREW SPECIAL REQUEST, not within operational requirements
66 (FL) LATE CABIN CREW BOARDING OR DEPARTURE PROCEDURES, other than connection and standby

67 (FC) CABIN CREW SHORTAGE, sickness, awaiting standby, flight time limitations, crew meals, valid visa, health documents, etc.
68 (FA) CABIN CREW ERROR OR SPECIAL REQUEST, not within operational requirements
69 (FB) CAPTAIN REQUEST FOR SECURITY CHECK, extraordinary

Weather

71 (WO) DEPARTURE STATION
72 (WT) DESTINATION STATION
73 (WR) EN ROUTE OR ALTERNATE
75 (WI) DE-ICING OF AIRCRAFT, removal of ice and or snow, frost prevention excluding unserviceability of equipment
76 (WS) REMOVAL OF SNOW, ICE, WATER AND SAND FROM AIRPORT
77 (WG) GROUND HANDLING IMPAIRED BY ADVERSE WEATHER CONDITIONS

Air Traffic Flow Management Restrictions

81 (AT) ATFM due to ATC EN-ROUTE DEMAND CAPACITY, standard demand capacity problems
82 (AX) ATFM due to ATC STAFF EQUIPMENT EN-ROUTE, reduced capacity caused by industrial action or staff shortage, equipment failure, military exercise or extraordinary demand due to capacity reduction in neighbouring area
83 (AE) ATFM due to RESTRICTION AT DESTINATION AIRPORT, airport and or runway closed due to obstruction, industrial action, staff shortage, political unrest, noise abatement, night curfew, special flights
84 (AW) ATFM due to WEATHER AT DESTINATION

Airport and Government Authorities

85 (AS) MANDATORY SECURITY
86 (AG) IMMIGRATION, CUSTOMS, HEALTH
87 (AF) AIRPORT FACILITIES, parking stands, ramp congestion, lighting, buildings, gate limitations, etc.
88 (AD) RESTRICTIONS AT AIRPORT OF DESTINATION, airport and or runway closed due to obstruction, industrial action, staff shortage, political unrest, noise abatement, night curfew, special flights

89 (AM) RESTRICTIONS AT AIRPORT OF DEPARTURE WITH OR WITHOUT ATFM RESTRICTIONS, including Air Traffic Services, start-up and pushback, airport and or runway closed due to obstruction or weather[2], industrial action, staff shortage, political unrest, noise abatement, night curfew, special flights

Reactionary

91 (RL) LOAD CONNECTION, awaiting load from another flight
92 (RT) THROUGH CHECK-IN ERROR, passenger and baggage
93 (RA) AIRCRAFT ROTATION, late arrival of aircraft from another flight or previous sector
94 (RS) CABIN CREW ROTATION, awaiting cabin crew from another flight
95 (RC) CREW ROTATION, awaiting crew from another flight (flight deck or entire crew)
96 (RO) OPERATIONS CONTROL, re-routing, diversion, consolidation, aircraft change for reasons other than technical

Miscellaneous

97 (MI) INDUSTRIAL ACTION WITH OWN AIRLINE
98 (MO) INDUSTRIAL ACTION OUTSIDE OWN AIRLINE, excluding ATS
99 (MX) OTHER REASON, not matching any code above

SOURCE: IATA – Airport Handling Manual (730 & 731)

[2] Restriction due to weather in case of ATFM regulation only, else refer to code 71 (WO)

21 Standard IATA Delay Code Sub-Codes (AHM 731)

73 (WR) **WEATHER: EN ROUTE OR ALTERNATE**
- **Z** OUTSIDE AIRCRAFT LIMITS
- **Y** OUTSIDE CREW LIMITS
- **X** ETOPS

81 (AT) **ATFM DUE TO ATC EN-ROUTE DEMAND CAPACITY, standard demand capacity problems**
- **Z** ATC ROUTEING
- **Y** HIGH DEMAND OR CAPACITY
- **X** ENVIRONMENTAL
- **W** WEATHER
- **G** OTHER

82 (AX) **ATFM DUE TO ATC STAFF EQUIPMENT EN-ROUTE, reduced capacity caused by industrial action or shortage or equipment failure, extraordinary demand due to capacity reduction in neighbouring area**
- **Z** INDUSTRIAL ACTION
- **Y** EQUIPMENT FAILURE
- **X** STAFF SHORTAGE
- **W** MILITARY ACTIVITY
- **V** SPECIAL EVENT

83 (AE) **ATFM DUE TO RESTRICTION AT DESTINATION AIRPORT, airport and or runway closed due to obstruction, industrial action, staff shortage, political unrest, noise abatement, night curfew, special flights**
- **Z** HIGH DEMAND ATC CAPACITY
- **Y** INDUSTRIAL ACTION
- **X** EQUIPMENT FAILURE
- **W** STAFF SHORTAGE
- **V** ACCIDENT INCIDENT
- **U** MILITARY ACTIVITY
- **T** SPECIAL EVENT
- **S** NOISE ABATEMENT NIGHT CURFEW
- **P** HIGH DEMAND AIRPORT FACILTIES

85 (AS) **MANDATORY SECURITY**
- **Z** MANDATORY SECURITY CHECK
- **Y** SECURITY CONTROL CHECKPOINTS
- **X** BAGGAGE AVI SECURITY
- **W** BAGGAGE IDENTIFICATION UNLOADING INTENDED
- **V** AIRPORT TERMINAL SECURITY
- **U** AIRLINE AIRCRAFT SECURITY CHECK
- **T** EXTRAORDINARY SECURITY EVENTS
- **G** OTHER

86 (AG) **IMMIGRATION, CUSTOMS, HEALTH**
- **Z** IMMIGRATION EMMIGRATION
- **Y** CUSTOMS
- **X** HEALTH
- **G** OTHER

87 (AF) **AIRPORT FACILITIES, parking stands, ramp congestion, lighting, buildings, gate limitations, etc.**
- **Z** PARKING STANDS LIMITATION NO PARKING STANDS AVAILABLE, EXCLUDING EARLY ARRIVALS
- **Y** RAMP CONGESTION, ABNORMAL STAND ACCESS LIMITATION (NON-ATC)
- **X** BUILDINGS
- **W** GATE LIMITATION NO GATE AVAILABLE EXCLUDING EARLY ARRIVALS
- **V** BAGGAGE SORTING SYSTEM DOWN SLOW
- **U** NO PUSH BACK CLEARANCE DUE TO INFRASTRUCTURE (NON-ATC)
- **T** JET BRIDGE INOPERATIVE
- **S** LACK OF CHECK IN COUNTERS
- **R** AIRFIELD ELECTRICAL SYSTEM FAILURE
- **P** PASSENGER TRANSPORT SYSTEM FAILURE
- **N** PUBLIC ADDRESS FLIGHT INFORMATION DISPLAY SYSTEM FAILURE
- **M** INSUFFICIENT FIRE COVER
- **J** LATE POSITIONING OF AIRCRAFT (WHEN RESPONSIBILITY OF AIRPORT)
- **I** SERVICE ROAD RESTRICTION
- **H** LATE ARRIVAL OR LACK OF FOLLOW ME VEHICLE
- **G** ANY OF THE ABOVE AT THE DESTINATION AIRPORT

89 (AM) **RESTRICTIONS AT AIRPORT OF DEPARTURE WITH OR WITHOUT ATFM RESTRICTIONS, including Air Traffic Services, start-up and pushback, airport and or runway closed due to obstruction or weather.**

Z ATC CAPACITY
Y ATC INDUSTRIAL ACTION
X ATC STAFFING
W ATC EQUIPMENT
V ATC ACCIDENT INCIDENT
U MILITARY ACTIVITY SPECIAL FLIGHTS VIP
T ATC SPECIAL EVENT
S ATC WEATHER
O ENVIRONMENTAL BENEFIT, DELAYED START-UP PUSHBACK DUE TO USE OF REDUCED STANDARD TAXI TIMES
R ATC RESTRICTIONS DUE TO CURFEW
P ATC POLITICAL UNREST
N ATC ENVIRONMENTAL
M AIRPORT CLOSURE
L RUNWAY CLOSURE
K MISCELLANEOUS START-UP DELAY (LOCAL ATC)
J LOST FLIGHT PLAN BY ATC
I LATE PUSHBACK GIVEN DUE TO OTHER REASONS THAN INFRASTRUCTURE
H CONSTRUCTION WORK MAINTENANCE
G OTHER

93 (RA) **AIRCRAFT ROTATION, late arrival of aircraft from another flight**

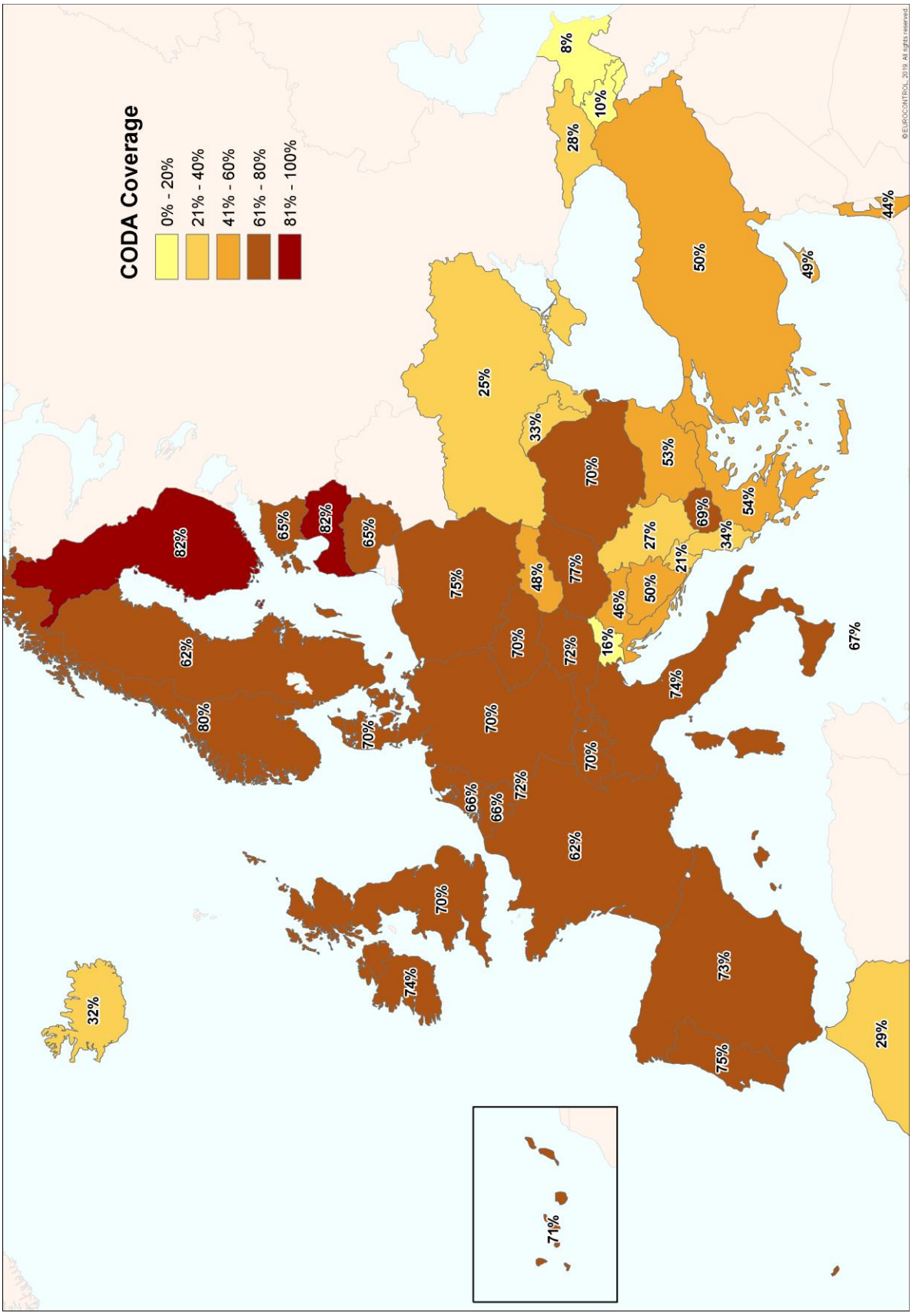
Z LATE ARRIVAL DUE DEPARTURE DELAY AT PREVIOUS STATION
Y LATE ARRIVAL DUE ENROUTE DELAY
X LATE ARRIVAL DUE DELAY AFTER LANDING
W LATE ARRIVAL DUE TO HIGH DEMAND FOR DESTINATION STATION
V LATE ARRIVAL DUE TO WEATHER AT DESTINATION
U LATE ARRIVAL DUE TO TECHNICAL REASONS

22 Glossary of Terms and Abbreviations

ACC	Area Control Centre
ADD	Average Delay per Delayed Flight
AHM	Airport Handling Manual
AIBT	Actual In Block Time
AOBT	Actual Off Block Time
ATFCM	Air Traffic Flow and Capacity Management
ATFM	Air Traffic Flow Management (used by IATA in the Standard IATA Delay Codes)
ATS	Air Traffic Services
BTO	Block Time Overshoot
CODA	Central Office for Delay Analysis
DDI-F	Delay Difference Indicator – Flight
ECAC	European Civil Aviation Conference
FIR	Flight Information Region
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
NM	Network Manager
NMOC	Network Manager Operations Centre
PDF	Percentage of Delayed Flights
STA	Scheduled Time of Arrival
STD	Scheduled Time of Departure
TDF	Total Delayed Flights
TDM	Total Delay in Minutes
TTF	Total Flights

23 CODA Coverage of IFR Flights in Q3 2019

EUROCONTROL Member States and Partner Countries



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