Availability and Use of Aircraft in the Air Force and Navy

At a Glance

In this report, the Congressional Budget Office analyzes patterns in the availability and use of military aircraft by the Air Force and the Department of the Navy (DoN, which encompasses both the Navy and the Marine Corps). CBO looks at availability—a measure of the percentage of time aircraft can be flown on training or missions—and flying hours per aircraft per year.

CBO finds that from 2001 through 2019:

- Aircraft availability rates declined in both the Air Force and DoN, but the decline was more marked in DoN;

- Driven by a marked decline in the availability of F/A-18C/D legacy Hornets, the availability rates of DoN's fighters and attack aircraft fell considerably more than those of the Air Force's fighters and attack aircraft; and

- Flying hours per aircraft declined in both the Air Force and DoN.

CBO also finds that during the coronavirus pandemic:

- Fleetwide availability rates increased in both the Air Force and DoN during the early months of the pandemic; and

- Flying hours declined for both the Air Force and DoN, but the Air Force's decline was proportionally greater.

The measure of the availability rate that CBO used in this analysis is typically lower than the Department of Defense's (DoD's) rate. CBO's measure counts aircraft in depot-level maintenance or storage as being unavailable. In contrast, DoD measures only the availability of aircraft that are located with operating squadrons. DoD's measure could be boosted by moving unflyable aircraft in the squadrons to depot status.

Contents

Notes

All years referred to in this report are federal fiscal years, which run from October 1 to September 30 and are designated by the calendar year in which they end.

Numbers in the text, figures, and table may not add up to totals because of rounding.

On the cover: An F/A-18C legacy Hornet undergoes maintenance at Fleet Readiness Center Southwest in 2017. Photo courtesy of the Department of Defense.

Availability and Use of Aircraft in the Air Force and Navy

This report shows trends in the availability and use of the Air Force's and Department of the Navy's (DoN's) aircraft since 2001. (DoN includes the Navy and the Marine Corps, whose aircraft were not separated in the data the Congressional Budget Office analyzed.) The report also shows how the military services' aircraft have performed since the March 2020 onset of the coronavirus pandemic.

How CBO and the Department of Defense Measure Availability Rates

In this analysis, CBO uses a measure of a fleet's availability rate—the percentage of time its aircraft are fit to fly missions for operating squadrons—that differs from the measure used by the Department of Defense (DoD). Both CBO and DoD use data from the Air Force's Reliability and Maintainability Information System (REMIS) and DoN's Decision Knowledge Programming for Logistics Analysis and Technical Evaluation (DECKPLATE) to calculate average availability rates. The two databases track the monthly performance of individual aircraft, including flying hours and the number of hours aircraft are "mission capable" (the term REMIS and DECKPLATE use for "available").

CBO and DoD define aircraft as available if they are identified in the databases as both "mission capable" and "possessed by operators"—that is, not currently undergoing depot-level maintenance or in storage. (For discussion of other ways to measure availability, see the appendix.)

The availability rate of a fleet can be measured by dividing the number of hours that aircraft are available in a month by the total number of aircraft hours in that month. DoD and CBO use different measures of total hours. In defining total hours, DoD excludes the hours aircraft spend in depot-level maintenance or storage. DoD's availability-rate formula is:

$$\frac{\textit{Operator-Possessed, Mission-Capable Hours}}{\textit{Operator-Possessed Hours}}$$

DoD's measurement captures only the availability rate of aircraft in operational squadrons. For example, it would not account for an unusually large backlog of aircraft in a modification program at a depot.

CBO uses the same numerator as DoD (the number of hours that aircraft are both mission capable and in the possession of operational squadrons) and divides it by total possible hours of availability for the entire fleet, including aircraft receiving maintenance in a depot and aircraft in storage. CBO's availability rate formula is:

$$\frac{\textit{Operator-Possessed, Mission-Capable Hours}}{\textit{Entire Fleet Hours}}$$

CBO's measure of the availability rate would show, for example, when there is an increase in the percentage of a fleet that is in storage or in depot-level maintenance, and it cannot be tailored by recategorizing unflyable aircraft in the squadrons as being in depot status.

How CBO's Measure of Availability Rates Compares With the Department of Defense's Measure

To illustrate the differences between the methods CBO and DoD use to calculate the availability rate of military aircraft, CBO analyzed 2019 data on the Air Force's F-15C fighter jet.

Measuring the Status of the Air Force's Fleet of F-15Cs
Number of Aircraft

What the Air Force's Data Show
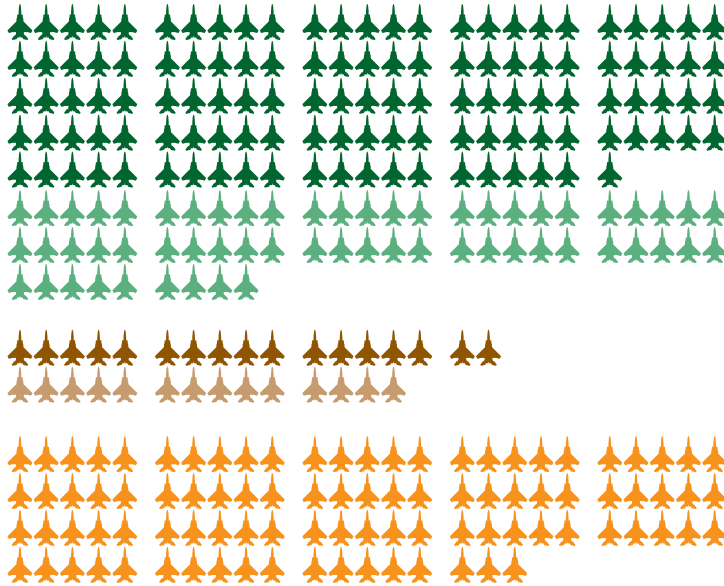
Operator-Possessed

121 Mission Capable

59 Not Mission Capable

Depot
17 Mission Capable
14 Not Mission Capable

Storage

93 Mission Capable

The Air Force had 304 F-15Cs in 2019. During that year, an average of 121 planes were mission capable and possessed by operators, according to military data. The data also indicate that 110 jets were coded as mission capable but could not be flown on combat or training missions because 17 were undergoing depot-level maintenance and 93 were in storage.

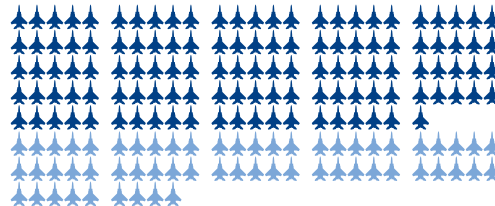**Different Ways to Calculate the Availability Rate**

DoD's Approach

67% Available
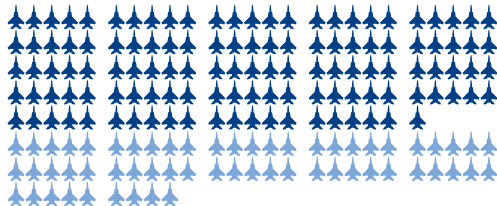
33% Unavailable

CBO's Approach

40% Available

60% Unavailable

DoD measures only the availability rate of aircraft in the possession of operating units. By its measure, 67 percent of F-15Cs were available in 2019 (121 out of 180).

CBO's measure counts all aircraft, including those in storage or receiving depot maintenance, as part of the fleet. By CBO's measure, 40 percent of F-15Cs were available (121 out of 304).
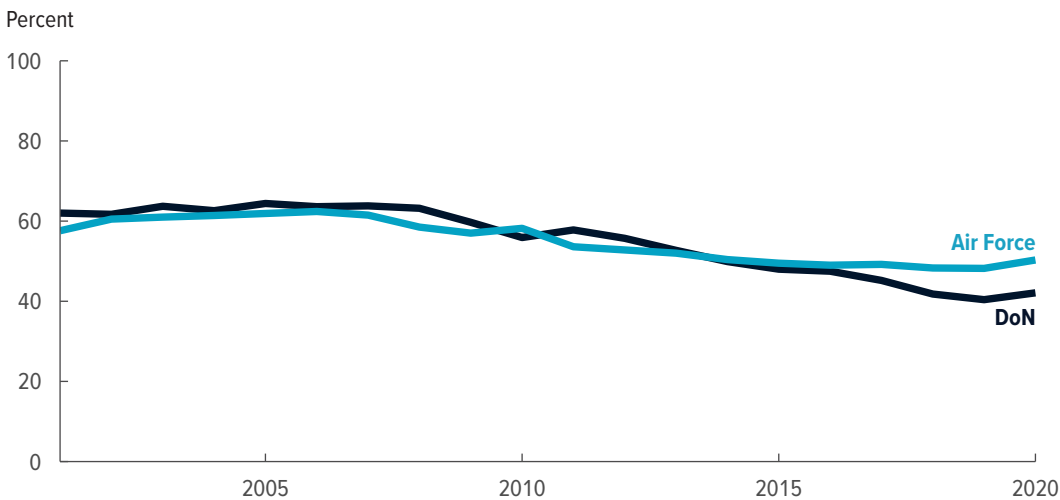
Trends in Aircraft Availability and Use

This section presents CBO's calculations of annual availability rates and flying hours per aircraft for the Air Force and DoN from 2001 to 2020 using CBO's measure of availability. CBO also tracked a complementary metric, flying hours per aircraft per year. The two metrics are slightly different: Availability rates show what share of the fleet could have been flown in a given period, whereas flying hours show the amount of flight that actually occurred. After presenting fleetwide trends for both services, CBO shows availability rates and annual flying hours per aircraft for fighters and attack aircraft, helicopters and tiltrotor aircraft, and fixed-wing training aircraft.
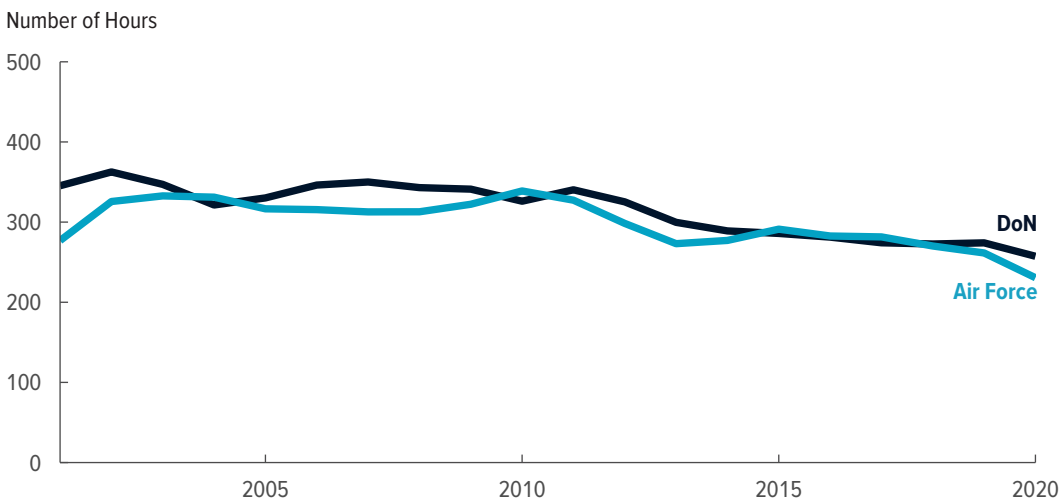
Fleetwide Trends

In general, fleetwide availability rates have declined for both services, but they have declined more for DoN. Average annual flight hours per aircraft have followed a similar trend.
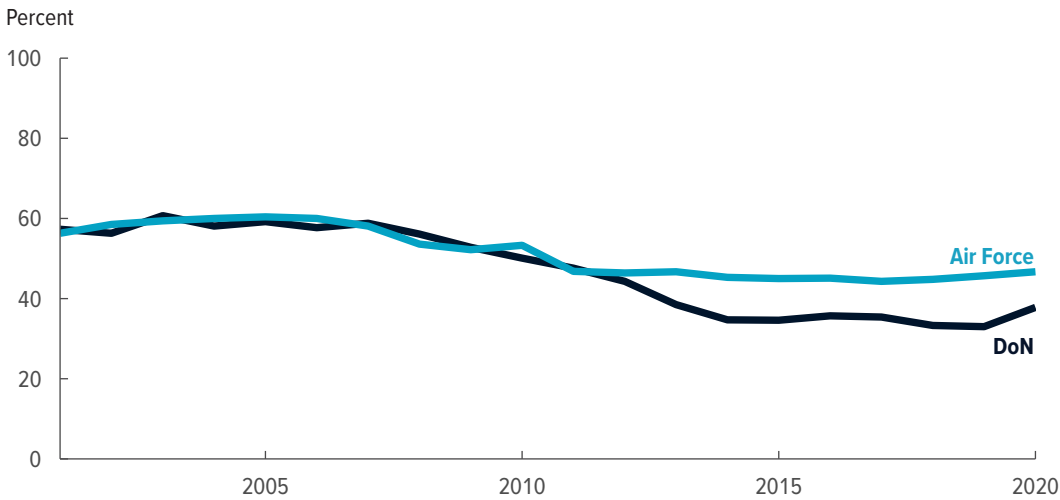
Availability Rates for All Aircraft

Percent

Availability rates for DoN's aircraft fell from 48 percent in 2015 and 2016 to 45 percent in 2017, 42 percent in 2018, and 40 percent in 2019.

Both the Air Force's and DoN's availability rates rose in 2020 (during the pandemic).

Flying Hours per Aircraft for All Aircraft

Number of Hours

Both the Air Force and DoN experienced declines in the number of flying hours per aircraft and a sharper decline during the pandemic.
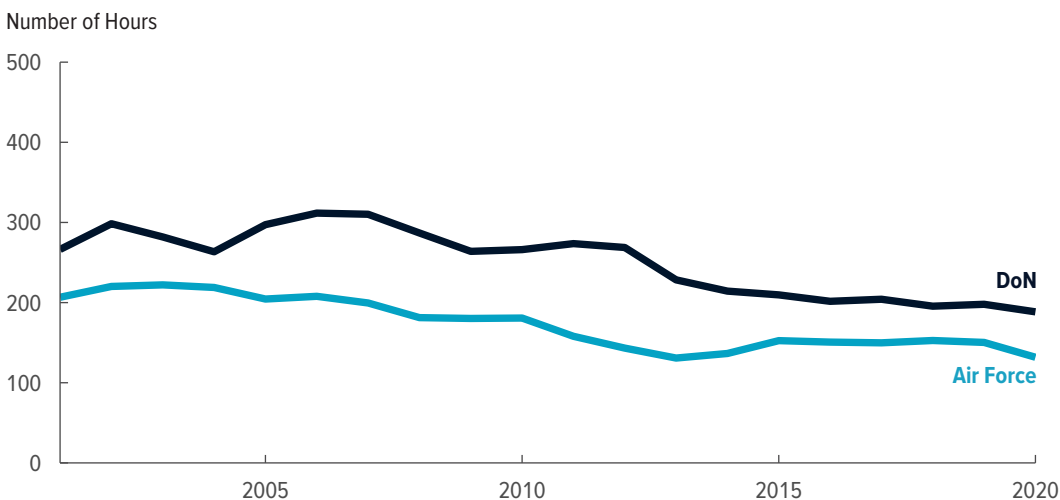
Fighters and Attack Aircraft

The trends for fighters and attack aircraft in each service mirror the trends observed for the services' fleets as a whole. Of particular note is the steep decline in the availability rate for DoN's fighters and attack aircraft, which drives the decline in the availability rate of the total fleet. For DoN, the aircraft CBO analyzed included the AV-8B, EA-6B, EA-18G, F-14, and F/A-18 aircraft; for the Air Force, the aircraft CBO analyzed included the A-10, F-15, F-16, and F-22 aircraft. REMIS does not accurately track availability or flying hours for the F-35A, and the data CBO received from DECKPLATE on the F-35B and F-35C did not match other reports of the availability of those aircraft, so F-35s are not analyzed here.

Availability Rates for Fighters and Attack Aircraft

Percent

Since 2012, the availability rates of DoN's fighters and attack aircraft have fallen well below the Air Force's rates. The rates for both services have been lower than they were in the early 2000s.

Flying Hours per Aircraft for Fighters and Attack Aircraft

Number of Hours

DoN's fighters and attack aircraft have consistently flown more hours per aircraft than have the Air Force's fighters and attack aircraft. Both services have experienced declines in flying hours per aircraft.

Specific Types of Fighters

CBO looked at some of the most numerous types of fighters to illustrate the difference in the availability rates for the Air Force and DoN. Fighters' availability has declined for both services since about 2006. There has been an especially marked decline in the availability of DoN's F/A-18C/Ds, known as legacy Hornets, caused by considerable delays in the successful completion of "high flight hour inspections," which are not solely inspections but also a series of actions intended to extend the Hornets' operating life.

**Availability Rates for Specific Types of Fighters**

Percent
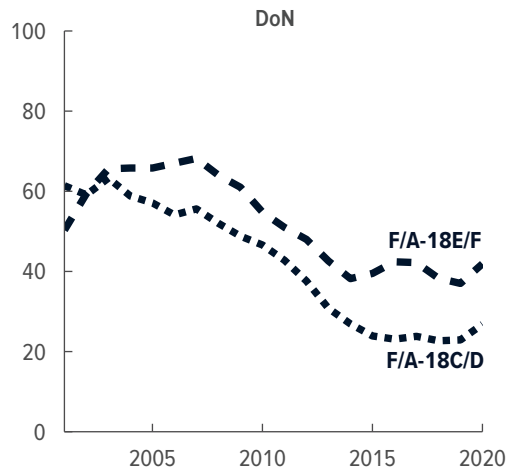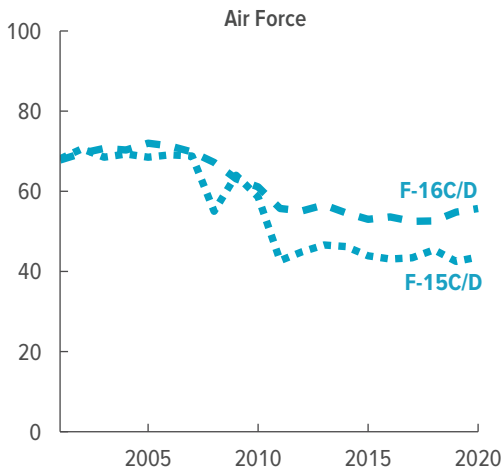
The availability rates for DoN's F/A-18C/Ds have been considerably lower than the rates for the Air Force's F-15C/Ds and F-16C/Ds. Availability rates for DoN's F/A-18E/Fs have been closer to the rates for the Air Force's F-15C/Ds. However, F-15C/Ds are roughly 20 years older, on average, than F/A-18E/Fs.

Flying Hours per Aircraft for Specific Types of Fighters

Number of Hours
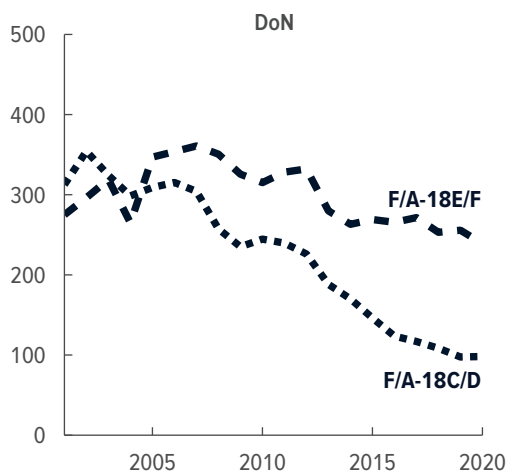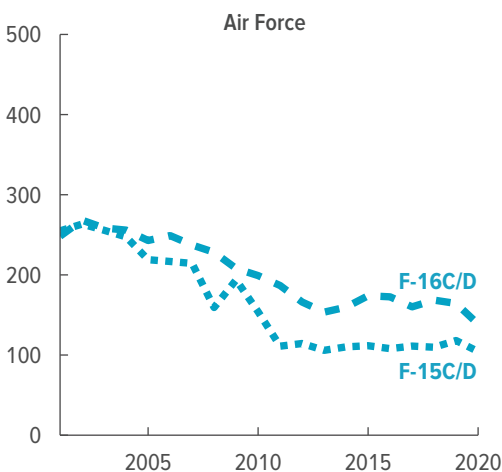
F/A-18E/F fighters have flown more hours per aircraft per year than the older F-15C/Ds, F-16C/Ds, and F/A-18C/Ds. Flying hours per fighter have declined for all four types of aircraft.

Helicopters and Tiltrotor Aircraft

Both the Air Force and DoN operate helicopters and tiltrotor aircraft. However, helicopters and tiltrotor aircraft make up a much larger fraction of DoN's fleet, representing 34 percent of its total fleet compared with just 3 percent of the Air Force's fleet. The trends for those aircraft are consistent with fleetwide trends in both services.
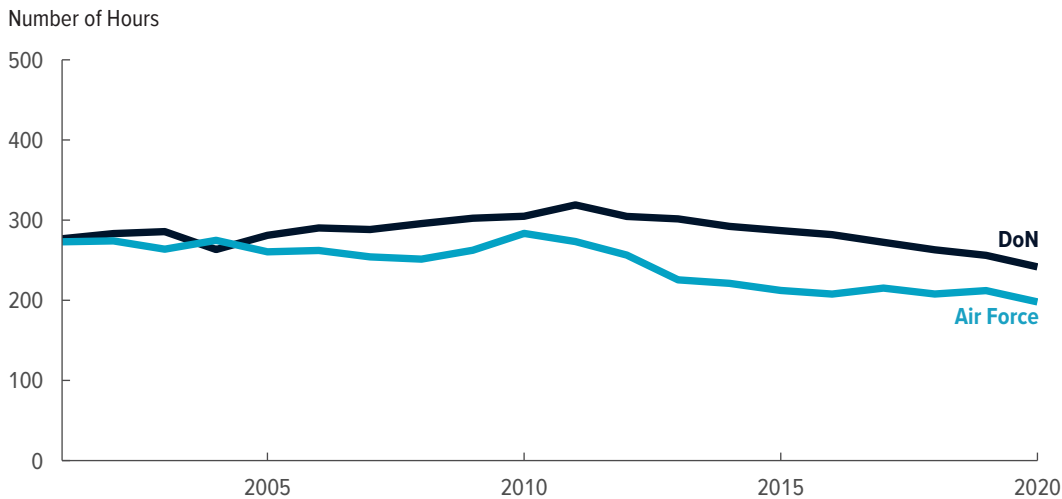
For the Air Force, the helicopters and tiltrotor aircraft CBO analyzed included the CV-22, HH-60, and UH-1 aircraft. For DoN, the helicopters and tiltrotor aircraft the agency analyzed included variants of the H-1, H-3, H-46, H-53, H-58, H-60, H-72, TH-6, TH-57, and V-22 aircraft.

Availability Rates for Helicopters and Tiltrotor Aircraft

Percent
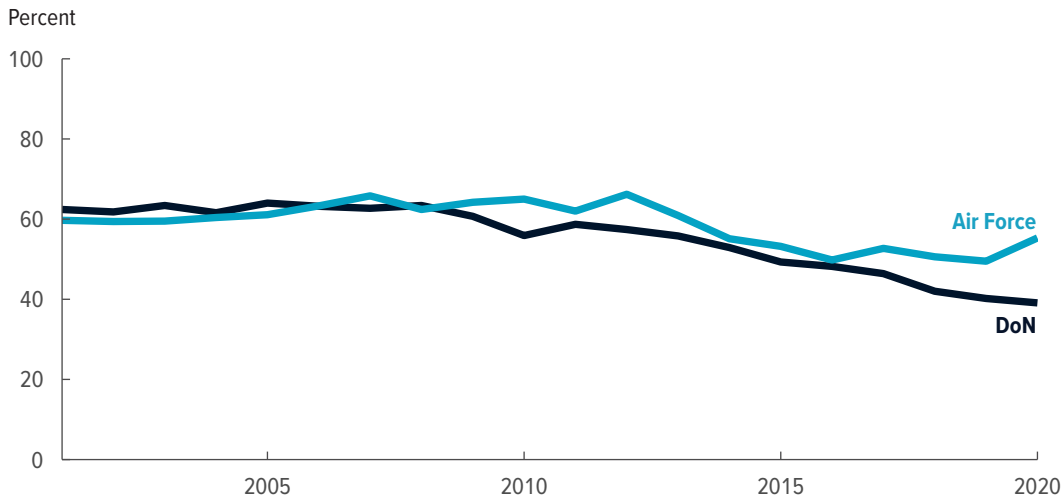
In recent years, the availability rates for DoN's helicopters and tiltrotor aircraft have fallen below the rates for the Air Force's helicopters and tiltrotors.

Flying Hours per Aircraft for Helicopters and Tiltrotor Aircraft

Number of Hours

DoN's helicopters and tiltrotor aircraft have consistently flown more hours per year than the Air Force's. Flying hours per aircraft have declined for both services in recent years.
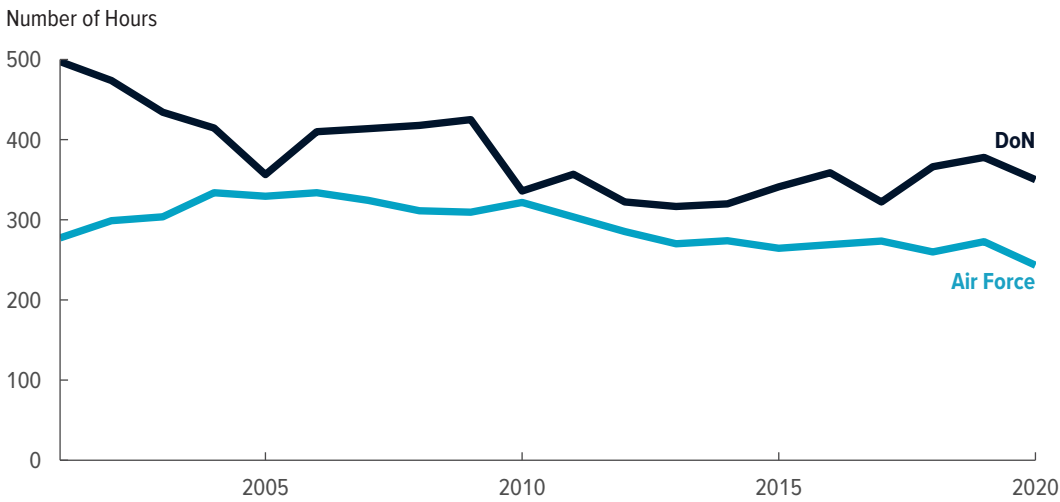
Fixed-Wing Training Aircraft

Both the Air Force and DoN operate fixed-wing aircraft for pilots to train in before they fly operational aircraft. The fixed-wing training aircraft CBO analyzed included the Air Force's T-1, T-6, and T-38 aircraft and DoN's T-2, T-6, T-34, T-38, T-39, T-44, T-45, U-1, and X-26 aircraft.

Availability Rates for Fixed-Wing Training Aircraft

Percent
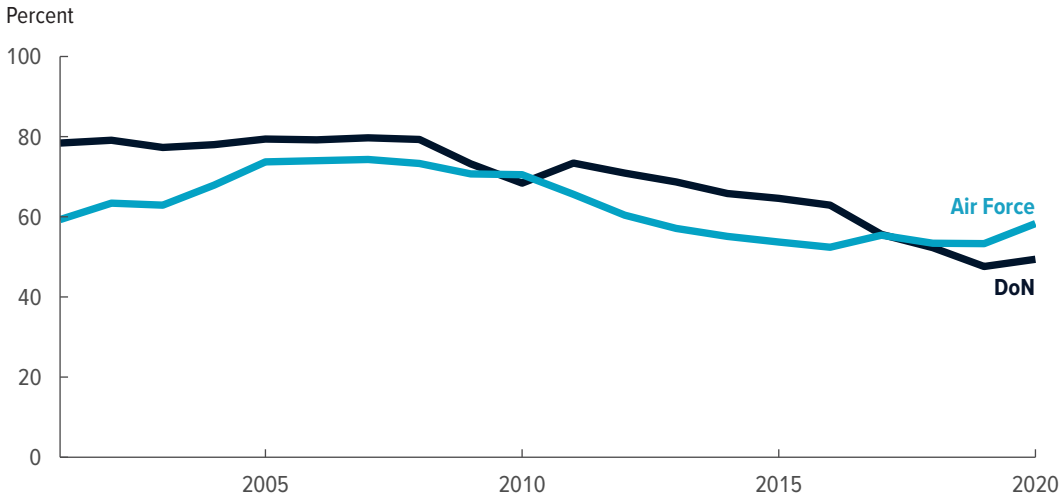
Availability rates for DoN's fixed-wing training aircraft have generally been higher than the Air Force's availability rates but have recently fallen below them.

Flying Hours per Aircraft for Fixed-Wing Training Aircraft

Number of Hours

DoN's fixed-wing training aircraft have flown more hours per year than the Air Force's.

Effects of the Pandemic

In the early months of the pandemic, fleetwide availability increased and flying hours per air-craft declined in both the Air Force and DoN. CBO analyzed Air Force data through March 2021 and DoN data through September 2020.

Effect on Availability Rates

Availability peaked in April 2020 for the Air Force and in May 2020 for DoN. With the services flying fewer hours, more spare parts may have been available to complete mainte-nance, increasing the number of aircraft that were available. Or fewer flying hours may have reduced the chances that available aircraft would experience problems and need repairs.

**Monthly Availability Rates in 2020 and 2021**
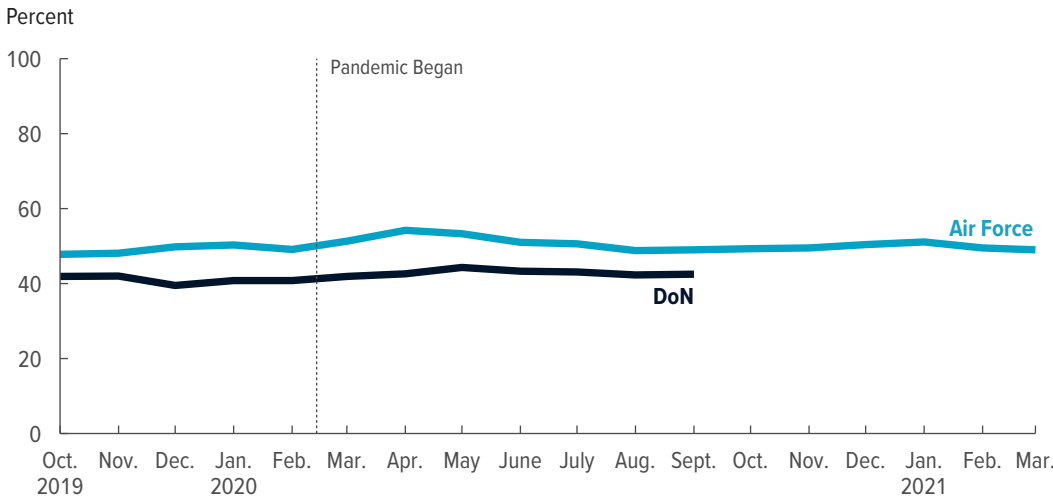
Percent

The availability rate for the Air Force rose from 49 percent in February 2020 to a peak of 54 percent in April 2020, falling to 49 percent in September 2020 and in March 2021. For DoN, the availability rate rose from 41 percent in February 2020 to a peak of 44 percent in May 2020 before falling to 43 percent in September 2020.

Effect on Flying Hours per Aircraft

To evaluate the effect of the pandemic on flying hours, CBO computed five-year monthly averages for the years preceding the pandemic. (CBO averaged the data over the past five years because monthly flying hours may vary considerably from year to year.) The agency compared those averages with the corresponding months in fiscal years 2020 and 2021 (in months for which CBO had REMIS data).

Monthly Flying Hours in 2020 and 2021 as a Share of Prepandemic Averages
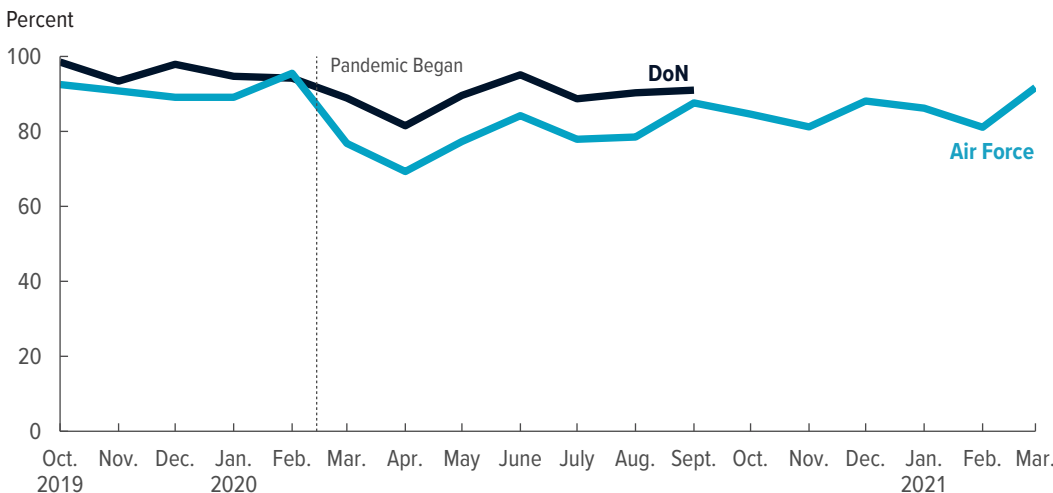
Percent

The Air Force's decline in flying hours during the pandemic was proportionally greater than DoN's.

In April 2020, the Air Force flew 69 percent as many hours as it typically did before the pandemic. DoN's fleetwide flying hours in April 2020 were 81 percent of its typical prepandemic flying hours for April.

Appendix: Alternative Measures of Availability

The availability rate for military aircraft can be measured in many ways. This appendix explores two alternatives that differ from the measures used by the Congressional Budget Office and the Department of Defense (DoD). One alternative would modify CBO's measure by imposing a stricter standard for availability, resulting in lower availability rates than CBO or DoD found. The other would modify DoD's approach by treating aircraft that are receiving depot-level maintenance as part of the total fleet. That would result in an availability rate that was lower than DoD's measure but higher than CBO's.

A Stricter Modification of CBO's Availability Rate

Under CBO's and DoD's measures, it is possible that some aircraft that could not be flown might be counted as available. That is because those measures count as available all of the aircraft that are shown by the military's databases to be "operator possessed"—that is, not currently undergoing depot-level maintenance or in storage—and "mission capable," or able to perform at least some of the missions that might be assigned. However, those same databases, the Air Force's Reliability and Maintainability Information System and the Department of the Navy's (DoN's) Decision Knowledge Programming for Logistics Analysis and Technical Evaluation, also show months when some aircraft did not fly even though they met CBO's definition of availability. Given the demands associated with overseas operations for much of the period CBO analyzed as well as the demands for pilot training proficiency during that period, it is striking that some available aircraft apparently did not fly at all during a month.

CBO therefore explored a stricter measure of availability in which specific aircraft were counted as available in a particular month only if they flew in that month. That definition would be more accurate than CBO's measure if the reason aircraft did not fly was because they could not. But the alternative measure would be less accurate if the reason aircraft did not fly was because they were not needed or because pilots or funding were not available. The data

CBO had access to did not allow the agency to determine why specific aircraft did not fly in a given month.

CBO calculated availability rates in 2019 using its method and the stricter method (see Table A-1). The differences between the availability rates calculated by the two methods were larger for the Air Force than for DoN. Under the stricter measure, the availability rate for the Air Force's entire fleet was 4.6 percentage points lower than it was under CBO's measure, and the availability rate for DoN was 2.1 percentage points lower. Looking across multiple years, CBO found that the difference between the rates would have been consistently larger for the Air Force than for DoN: That is, it has been more common for the Air Force's mission-capable-coded aircraft not to fly. The differences between the two methods varied by type of aircraft; Table A-1 shows the differences associated with the two services' largest fleets in 2019.

A Modification of DoD's Availability Rate

Another way to measure availability would be to exclude storage-coded aircraft from the calculation (as DoD's measure does) but to include depot-coded aircraft (which DoD's metric does not). Calculating availability that way would account for the active portion of a fleet (those aircraft in operational squadrons or in depot-level maintenance) and exclude aircraft that have entered long-term storage, a status from which only a few aircraft have ever returned to operational use. In effect, this measure finds the share of the fleet receiving operational funding that is capable of flying missions. By contrast, the measure CBO used in this report indicates the share of all aircraft purchased—excluding those destroyed in accidents, scrapped, or otherwise disposed of—that are capable of flying missions.

Not surprisingly, omitting aircraft in storage results in availability rates that are higher than the rates found under CBO's measure and the first alternative measure but lower than the rates found using DoD's measure (see Figure A-1).

Table A-1.

How a Stricter Measure of Availability Would Affect Aircraft Availability Rates

Aircraft	CBO's Measure of Availability Rate (Percent)	Stricter Measure of Availability Rate (Percent)	Difference (Percentage points)
C-130 Cargo Aircraft	41.8	34.9	-6.8
F-15C/D Fighter	42.5	36.8	-5.7
F-16C/D Fighter	54.8	51.9	-2.9
KC-135 Tanker Aircraft	48.5	45.8	-2.7
T-38 Fixed-Wing Training Aircraft	47.5	45.0	-2.5
All Air Force Aircraft[a]	48.2	43.7	-4.6
F/A-18C/D Fighter	22.9	21.9	-1.0
F/A-18E/F Fighter	37.0	35.3	-1.7
MH-60R Helicopter	37.5	37.2	-0.3
MH-60S Helicopter	32.4	31.5	-0.9
MV-22B Tiltrotor	40.3	38.5	-1.8
All DoN Aircraft[a]	40.4	38.3	-2.1

Data sources: Congressional Budget Office; Air Force; Department of the Navy. See www.cbo.gov/publication/57433#data.

CBO used data from 2019 to calculate the difference between two measures of availability. CBO's measure defined aircraft as available if they were possessed by operators—that is, not in depot-level maintenance or storage—and coded in military databases as mission capable. A stricter measure of availability would define such aircraft as available only in months that they actually were flown.

DoN = Department of the Navy.

a. Includes other aircraft in addition to those that are listed.

Figure A-1.

Four Measures of Availability Rates for Air Force Aircraft

Percent
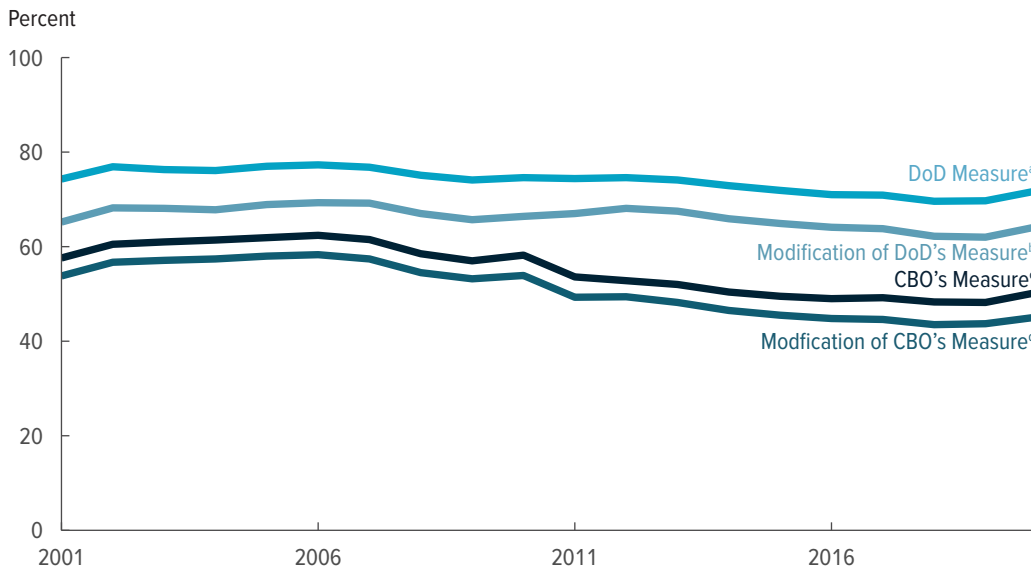
DoD's measure of availability rates results in the highest rates because it excludes some of the fleet from its calculations. The stricter version of CBO's measure would include all of the aircraft in the fleet and require that aircraft fly at least once a month to be considered available.

Data source: Congressional Budget Office. See www.cbo.gov/publication/57433#data.

DoD = Department of Defense.

a. DoD's measure of the fleet does not include aircraft receiving depot-level maintenance or in storage.

b. A modified version of DoD's method includes aircraft receiving depot-level maintenance in the fleet but not aircraft in storage.

c. CBO's measure of the fleet includes aircraft receiving depot-level maintenance and those in storage.

d. The modification uses CBO's measure of the fleet with the additional criterion that aircraft are considered available only in months when they are actually flown.

About This Document

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