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## The Depot-Level Maintenance of DoD's Combat Aircraft: Insights for the F-35

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# The F-35: DoD's Most Costly Aircraft Program

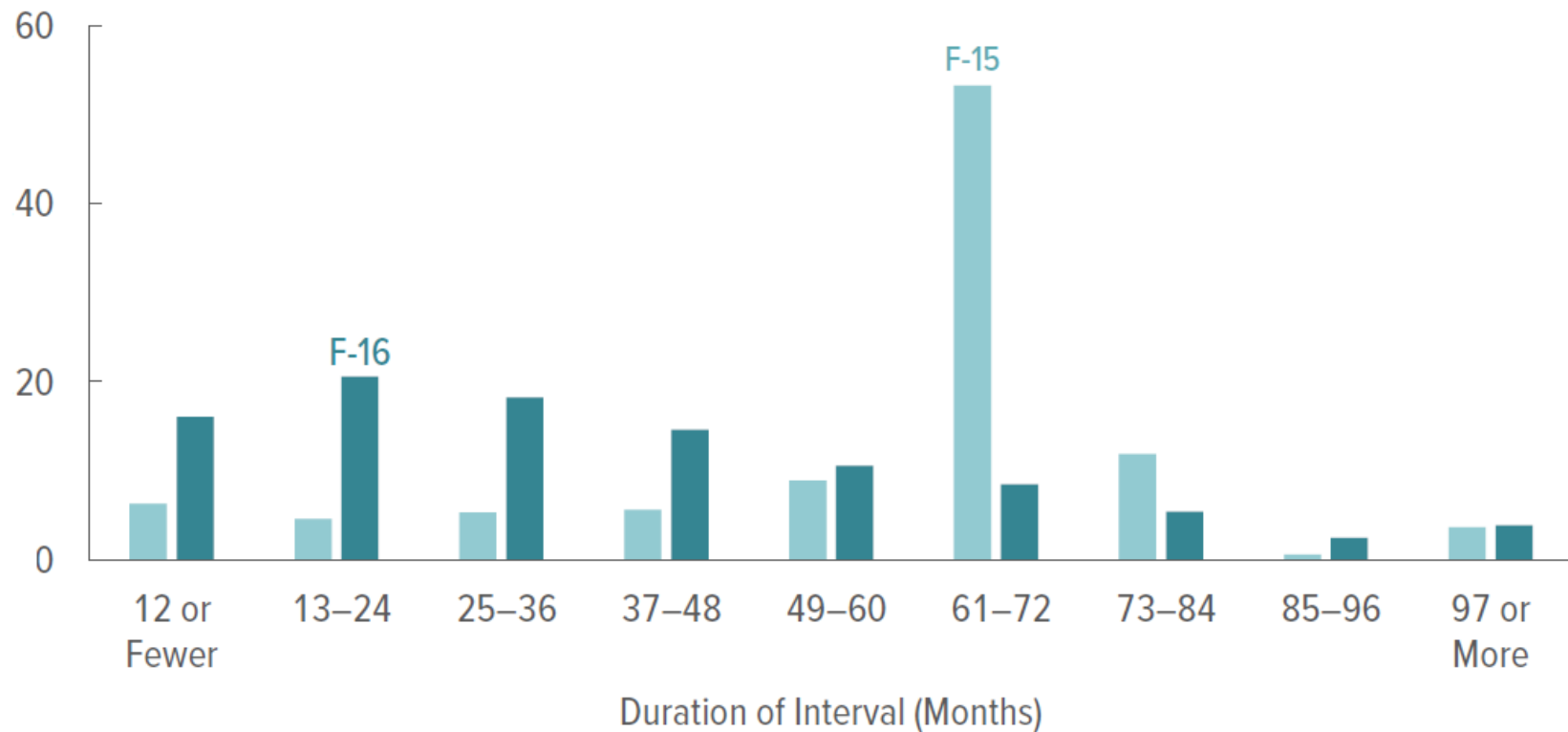
- The 2016 F-35 Selected Acquisition Report calls for DoD's eventual acquisition of 2,470 aircraft:
  - 1,768 F-35As by the Air Force
  - 366 F-35Bs by the Marine Corps
  - 269 F-35Cs by the Navy and 67 F-35Cs by the Marine Corps
  
- \$64 billion in research, development, test, and evaluation (RDT&E), 1994–2022
  
- \$281 billion in procurement, 2006–2044
  
- \$669 billion in life-cycle operating and support costs—including depot-level maintenance costs, 2011–2070

# Other DoD Fighter/Attack Aircraft Experiences Offer Lessons for F-35 Depot-Level Maintenance

- The Air Force's F-15 has had calendar-based programmed depot maintenance.
  - F-15s return to a depot at regular six-year intervals.
- The Air Force's F-16 and A-10 have had modification-based depot maintenance.
  - F-16s and A-10s return to a depot when modifications are required.
  - Modification intervals have varied between two and six years.
- The Navy's F/A-18 has had calendar-based planned maintenance intervals.
  - Like F-15s, F/A-18s visit depots at regular intervals—every four years for carrier-based F/A-18s and every six years for shore-based F/A-18s.

# Intervals Between Depot Visits for Air Force F-15s and F-16s, 1990 to 2017

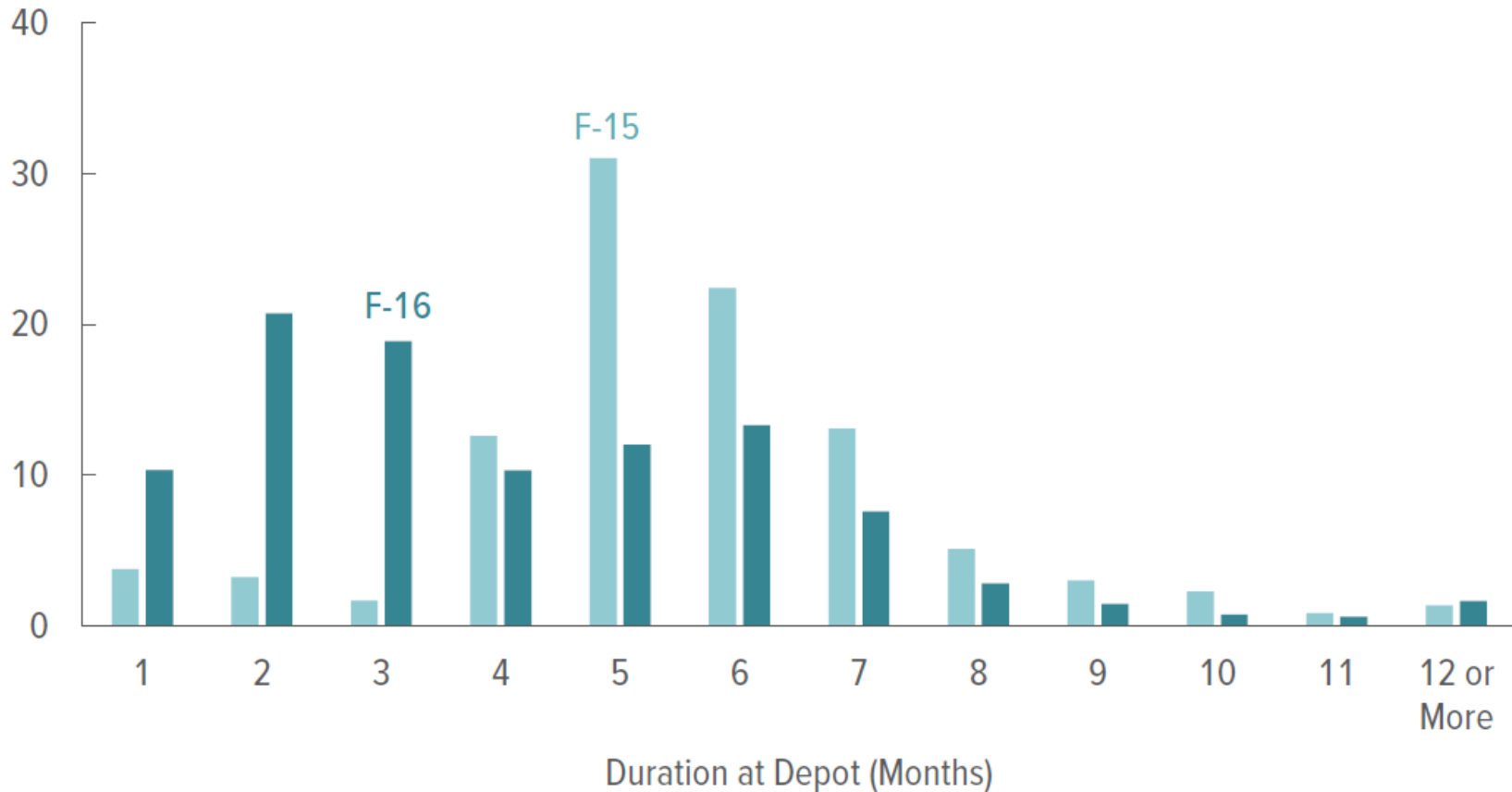
Percentage of Intervals



Intervals between F-16s' depot visits have varied widely; by contrast, the majority of F-15s have returned to depots after 61 to 72 months of operation.

# Durations of Completed Depot Visits for Air Force F-15s and F-16s, 1990 to 2017

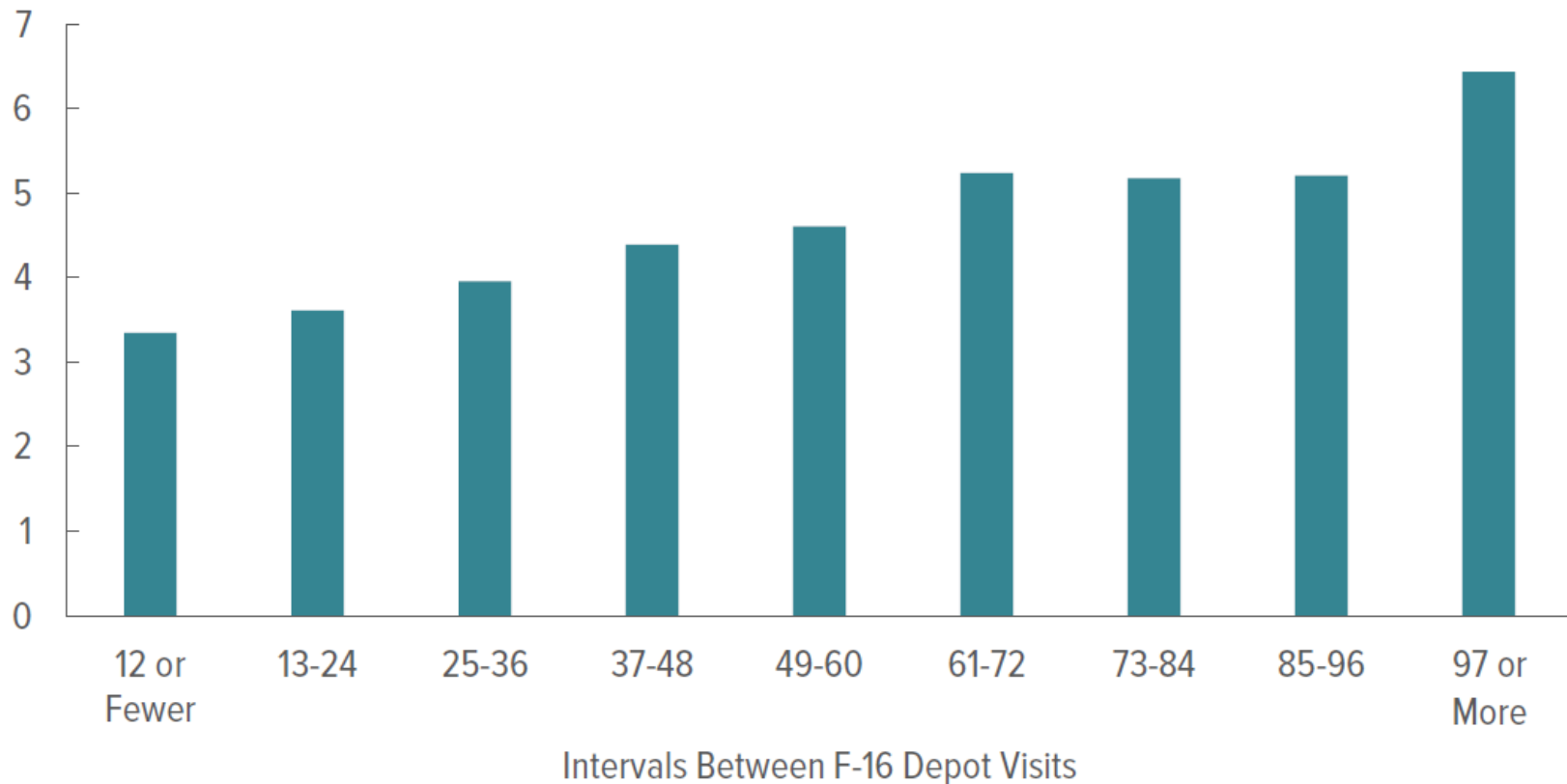
Percentage of Intervals



It has been most common for F-16s to spend two to three months in a depot visit, whereas F-15s' depot visits have typically been five to six months long.

# The Relationship Between F-16s' Depot Visit Intervals and Depot Visit Durations, 1990 to 2017

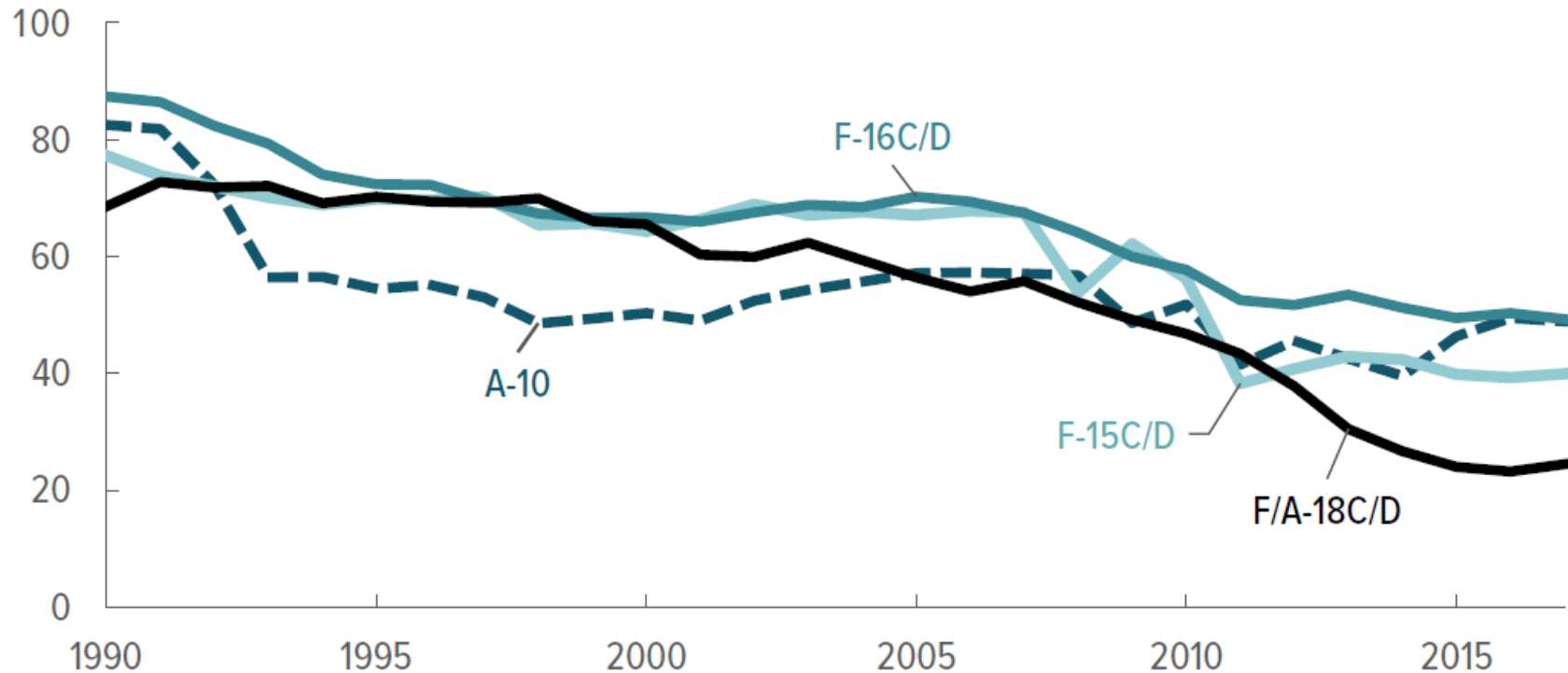
Average Duration of Completed Depot Visits (Months)



The longer F-16s have been away from depots, the lengthier their ensuing depot visits have been.

# Annual Operator-Possessed and Mission-Capable Rate for Selected Combat Aircraft, 1990 to 2017

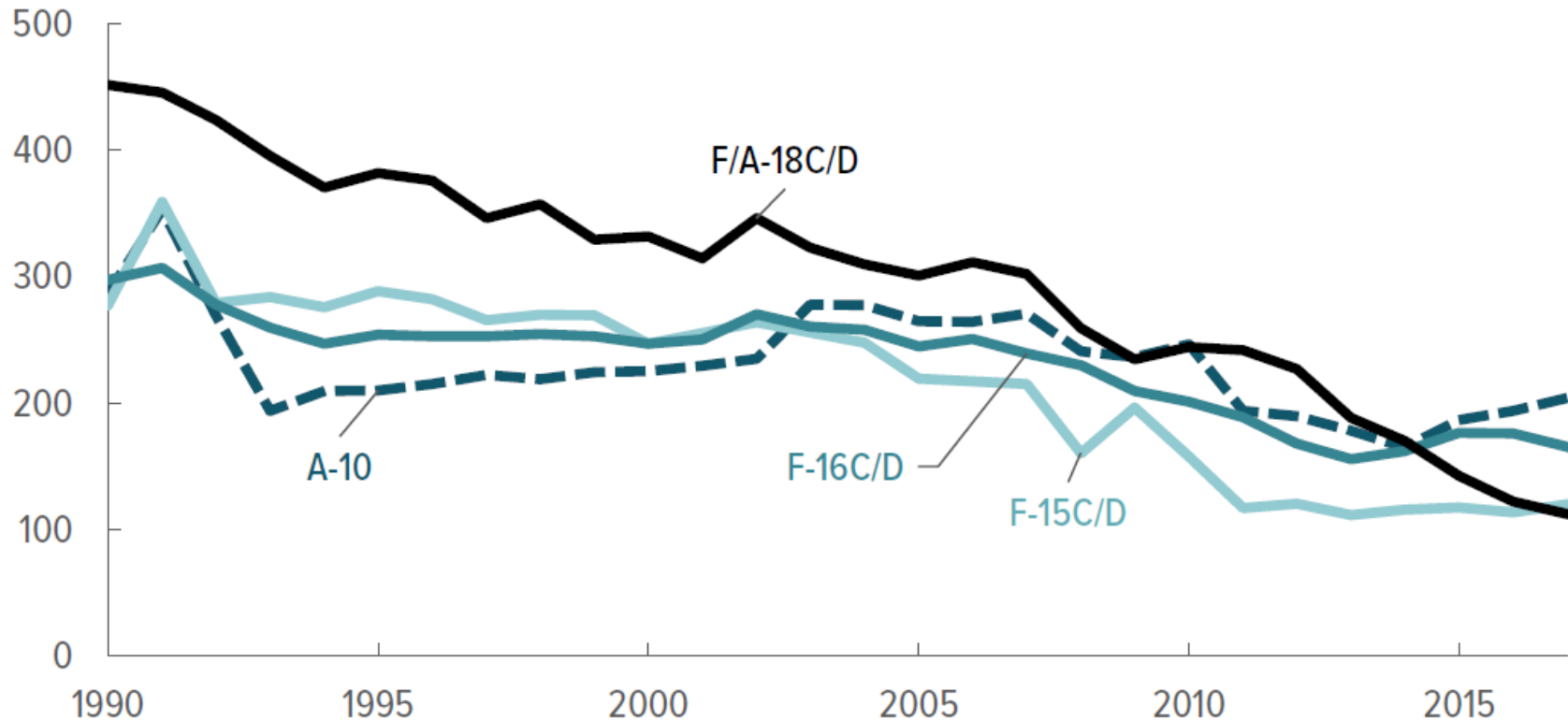
Percentage of Aircraft Available



The availability of aircraft in all four fleets has declined, but that decline has been most acute for F/A-18C/Ds in recent years.

# Annual Flying Hours per Individual Aircraft for Selected Combat Aircraft, 1990 to 2017

Number of Hours

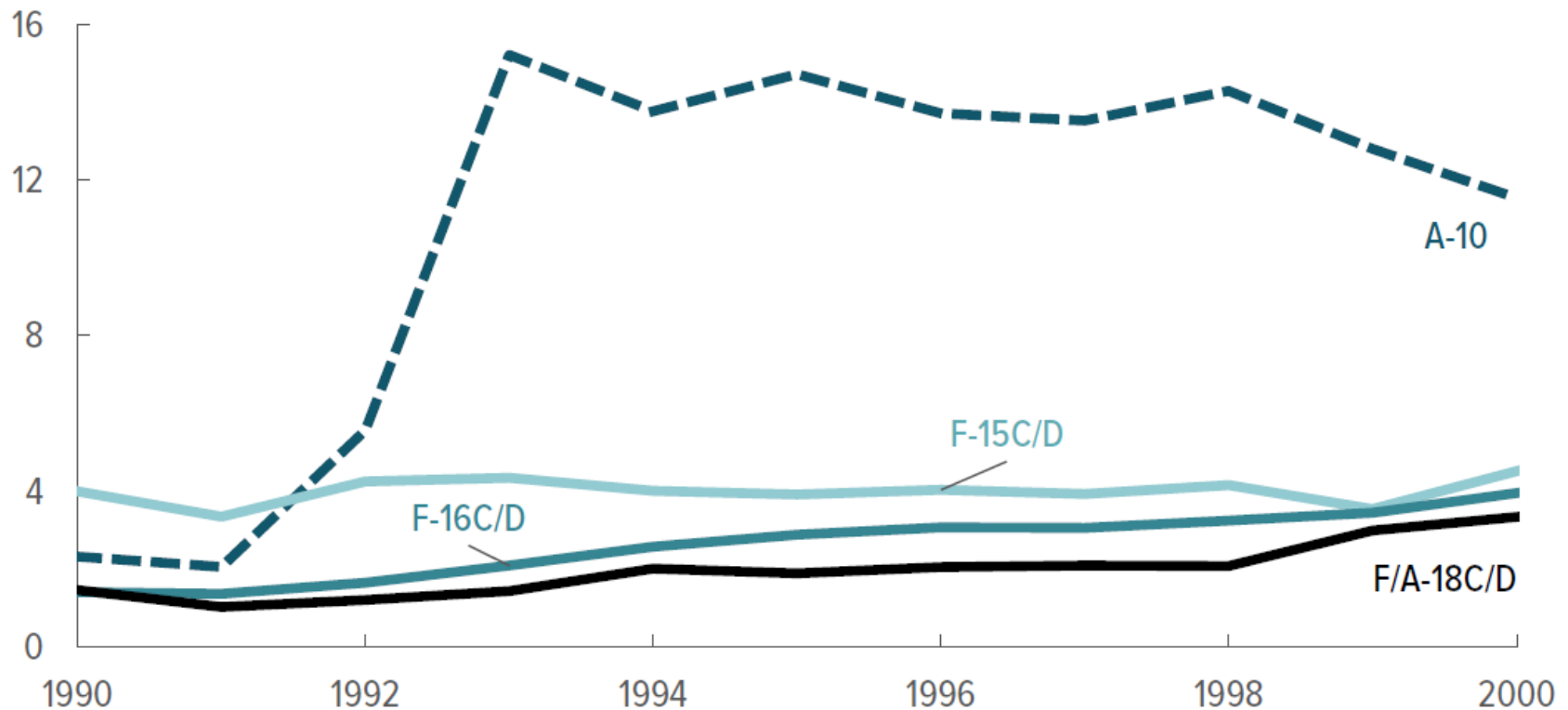


F/A-18C/Ds had the most flying hours per individual aircraft in the 1990s and early 2000s, but their annual flying hours have declined precipitously.



# Annual Depot-Coded Hours per Flying Hour for Selected Combat Aircraft, 1990 to 2000

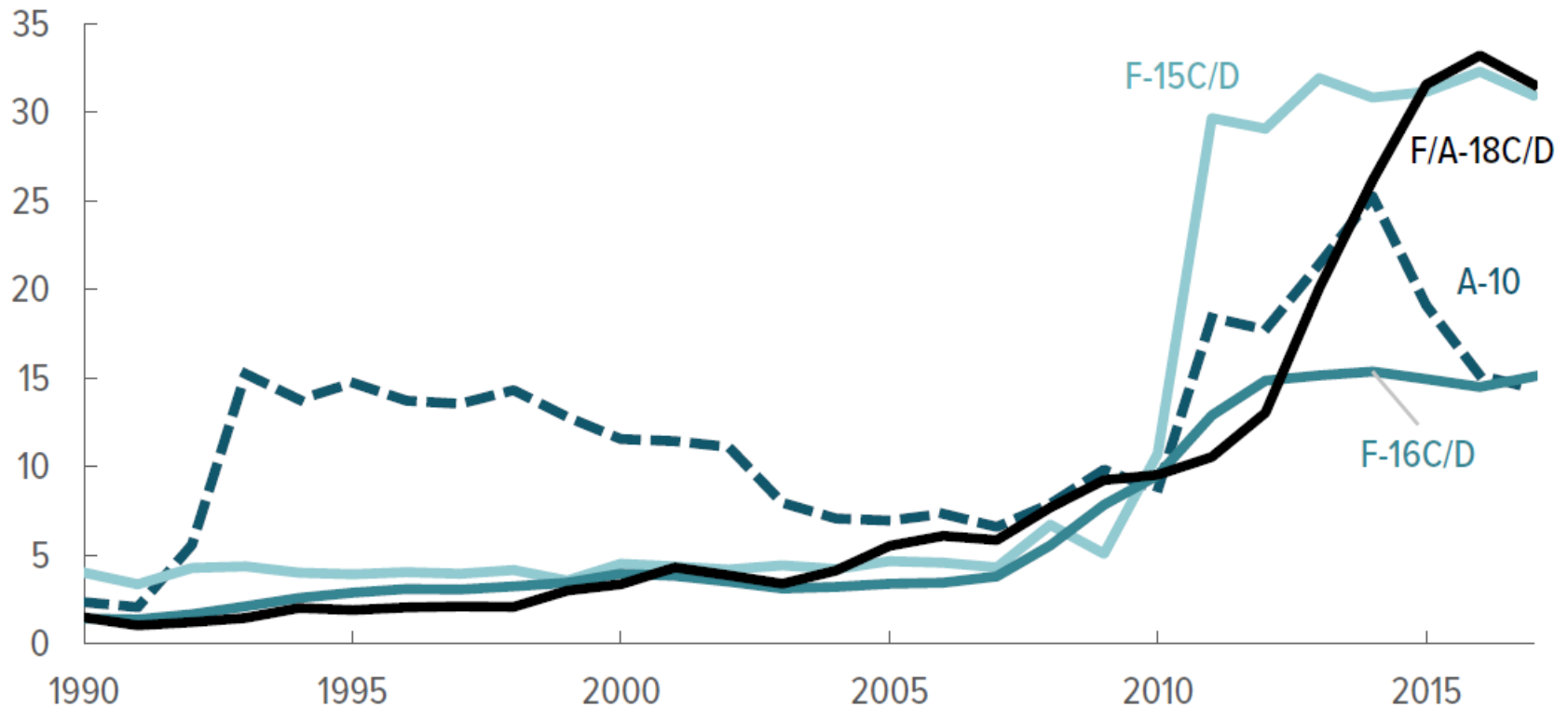
Number of Hours



In the 1990s, F/A-18C/Ds spent less time undergoing depot-level maintenance per flying hour than the other selected aircraft.

# Annual Depot-Coded Hours per Flying Hour for Selected Combat Aircraft, 1990 to 2017

Number of Hours



F/A-18C/Ds and F-15C/Ds had the largest increases in depot-coded hours per flying hour since 2010.

# Upcoming Decisions About the F-35's Depot-Level Maintenance

- What approach to scheduling depot-level maintenance should the F-35 program follow?
- How frequent and intensive should the F-35's depot-level maintenance be?
  - Should different variants be handled differently?
- Who will participate in the F-35's depot-level maintenance, and how?

# Insights From This Research

- The choice between modification-based and calendar-based maintenance may be less important than the level of effort invested in depot-level maintenance.
- Depot-level maintenance entails a trade-off between short-term costs and long-term benefits.
- History suggests that DoD will want to operate the F-35 past its stipulated 30-year life limit, but successfully doing so may require more and better depot-level maintenance than F/A-18C/Ds have received.

## Further Information

- For more information, see Congressional Budget Office, *The Depot-Level Maintenance of DoD's Combat Aircraft: Insights for the F-35* (February 2018), [www.cbo.gov/publication/53543](https://www.cbo.gov/publication/53543).