This chapter examines two issues. First, does AMC have more CPs and ACs than are authorized? If this is consistently the case, AMC should provide a justification for the excess or be prepared to make adjustments in pilots’ duties and workloads in the event that a cut comes. Second, how does the actual CP/AC ratio deviate from that authorized? If the deviation persists but is justified, DoD should try to convince Congress not to authorize specific numbers of CPs and ACs. Instead, Congress should focus on the overall budget, leaving AMC to optimize the mix of CPs and ACs.

NUMBERS OF COPILOTS AND AIRCRAFT COMMANDERS

Each year, Congress authorizes specific numbers of full-time CPs and ACs to man AMC’s air mobility operations. A key determinant of an authorized number is the crew ratio, which, for a given aircraft type, is the average number of pilots required to man an aircraft. The authorized numbers often contrast with the actual numbers of CPs and ACs at AMC.

Figure 3.1 shows three ratios of actual to authorized personnel. The CP ratio is the actual number of CPs in relation to those authorized for all airlifters and tankers (C-5s, C-141s, C-17s, C-130s, KC-135s, and KC-10s). The AC ratio is the actual number of ACs in relation to authorized ones. The CP + AC ratio is the actual number of CPs and ACs in relation to the authorized number. During 1982–2001, the average CP ratio increased 1 percent per year. In the 1980s, the CP ratio was less than one, but in the 1990s it fluctuated widely both above and below one.1 In theory, the more the ratio exceeds one, the more difficult it can be for AMC to hire more CPs if existing CPs are found to be overworked, as

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1We will discuss the wide fluctuation in the number of CPs during the 1990s later in this chapter.
Congress can argue that the current number of CPs already well exceeds what has been authorized. In this sense, an upward trend is unfavorable. In practice, however, the actual numbers of CPs and ACs did deviate for years from those authorized. Apparently, Congress recognized the difficulties AMC would have in matching the authorized numbers as well as the negative implications of enforcing this match.\textsuperscript{2} On the other hand, the actual number of CPs dropped to only 0.1 percent above that authorized by FY 2000 and was only 5 percent above that authorized in FY 2001.

The AC data show that even in the 1980s, the ratio of actual to authorized ACs exceeded one. Indeed, from 1982 to 2001, there was an uptrend of 1.0 percent per year to the point at which the actual number of ACs was 22 percent above that authorized by FY 2000. During FY 2001, however, this number dropped abruptly to only 3 percent above that authorized.

\textsuperscript{2}For example, increasing the number of CPs and reducing the number of ACs to match those authorized would increase the flying hours for pilot training. Additional flying hours would be very costly whenever AMC faced flying-hour shortages.
The CP + AC data show that the ratio of actual to authorized CPs and ACs had been above one since 1986, having trended upward at a rate of 1 percent per year from 1982 to 2001. By FY 2000, the actual number of CPs and ACs was 11 percent above that authorized. During FY 2001, it was only 4 percent above.

In sum, during the past two decades, the actual numbers of CPs and ACs increased. During FY 2001, however, those numbers were only 3 percent to 5 percent above what Congress had authorized.

**COPILOT-TO-AIRCRAFT COMMANDER RATIOS**

Even if the actual total number of CPs and ACs is equal to that authorized, the mix of CPs and ACs—or the actual CP/AC ratio—may still differ from that authorized.

Each airlifter or tanker flight requires at least two pilots. The salary cost of a flight would be lowest if there were precisely two pilots: one CP and one AC. The ratio of full-time CPs to ACs serving at AMC airlift and air refueling wings would then be one, as CPs and ACs would fly similar number of hours per year. A higher ratio (more CPs than ACs) could lead to an insufficient number of ACs for commanding flights. On the other hand, a relative surplus of ACs over CPs would result in a higher salary cost, as ACs are paid annually an average of $15,000 more than CPs. In the face of a flying-hour shortage, however, there is a much higher cost associated with generating additional flying hours. For example, the monthly flying-hour requirement for a C-17 CP is 35, whereas that for an AC is only in the teens. If AMC replaced a C-17 AC with a CP, each additional flying hour per month (or 12 hours per year) for a CP would have a marginal (or variable) flying cost of $30,000. Because it is likely that the replacement would require much more than one hour per month, the flying cost would be much higher than the salary savings. In sum, when AMC is short of

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3Because this study focuses on AMC pilots who perform full-time flying duties, we exclude pilots at AMC headquarters or wing units who perform mostly administrative duties.

4This is based on the annual regular military compensation for ACs and CPs. See Chapter Seven for more detail.

5See Table 2.3 for a C-17 CP’s aging requirement as well as those for other aircraft types.

6We used the variable cost per aircraft flying hour listed in the Command Data Book, November 1999, p. 77. As shown in Chapter Four, the average number of pilots on each flight of a strategic airlifter is about three, while that of a tactical airlifter is two. For each of the extra C-17 flights here, we assume the aircrew to be composed of two CPs and one AC, and thus each hour of aircraft flight generates two CP flying hours. We divide the C-17 aircraft flying-hour cost of $61,000 by two to get the C-17 CP flying-hour cost of $30,000. The corresponding CP flying-hour costs for the C-5 and C-141 are $54,000 and $21,000.

7This is the case not only for the C-17 but also for other airlifters and tankers. For all cases, we have assumed that the extra flight is dedicated to training and is not reimbursed for expenses. It is possible that AMC reduces commercial buys and uses these extra organic flights to carry the same cargo.
flying hours, changing the mix to include more CPs would actually increase its net cost, at least in the short term.

In reality, many flights require more than two pilots. For example, while an airlift aircrew is normally limited to 16 hours of operations per day (for flying and pre- and postmission activities), this limit was raised during the Gulf War to 18 hours per day. Moreover, with an additional pilot or an augmented crew, crew duty time is allowed to increase to 24 hours per day. Indeed, it is not uncommon for augmented flights to account for as much as half or even two-thirds of all strategic airlifter flights. Special operations flights, which are more complex and often take place at night, require three pilots regardless of flight time. Unlike augmented flights, however, special operations flights account for only a small percentage of all flights. Adjusting for the extra pilots needed for these augmented and special operations flights as well as for other considerations, Congress, with inputs from the Air Force, authorizes specific numbers of full-time CPs and ACs at AMC every year.

Shifts in the pace of recruitment, promotion, transfer, resignation, and retirement in AMC cause the actual ratio of CPs to ACs in any given year to differ from that authorized. When the actual ratio deviates significantly from that authorized, concerns can arise that Congress’ authorization is not being met. Fortunately, Congress generally does not enforce the ratio that it authorizes.

Figure 3.2 shows the two CP/AC ratios (actual and authorized) for the C-5. In the 1980s, the negative deviation of actual from authorized figures showed that there were too few CPs relative to ACs, if congressional authorization were used as a reference. Immediately after the demise of the Soviet Union, the U.S. Air Force began to reduce its number of fighter pilots. To counteract the decrease in pilot positions in the Air Combat Command, AMC accepted more pilots graduating from Undergraduate Pilot Training (UPT) for airlift missions. Consequently, the number of CPs (and thus the actual ratio) surged during 1992–1995. Fortunately, AMC quickly processed the excess CPs through the aging program. As these CPs turned into ACs, the actual ratio dropped signifi-

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8 The C-5, C-141, and C-17, but not the C-130, are used for special operations.
9 The actual ratio can also be called the assigned ratio because AMC calls the actual numbers of CPs and ACs the “assigned numbers.”
10 The number of CPs in AMC surged from 112 in FY 1990 to a peak of 276 in FY 1995, while the number of ACs dropped from 169 to 146 in the same time frame.
Do Actual Numbers of Copilots and Aircraft Commanders Deviate from Those Authorized?

The actual ratio for the C-141 dropped significantly further below the authorized ratio in the 1990s than in the 1980s.\(^{13}\) During FY 2000, however, the actual ratio increased while the authorized ratio dropped significantly, bringing the two ratios much closer together. In FY 2001, the actual ratio was very close to the authorized value, showing only a 2 percent deviation above that value.

The actual ratio for the C-17 rapidly approached the authorized ratio through 2000. By 2001, the actual ratio was 35 percent above that authorized.

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\(^{11}\)Because it is difficult to hit the target exactly, a difference of a few percentage points can be interpreted as matching the authorized number.

\(^{12}\)In March 2002, Craig Vara at AMC/DOT provided us with data for FY 2001. These points (not plotted in Figures 3.2 and A.26 to A.30) are included in the discussion in the text.

\(^{13}\)See Figures A.26 to A.30 in the appendix for the C-141, C-17, C-130, KC-135, and KC-10.
The actual ratio for the C-130 had long been considerably below the authorized ratio. In the late 1990s, the deviation was about 30 percent. Since the authorized ratio is near unity, there were 30 percent fewer CPs than ACs, if the authorized ratio is used as a guide. In FY 2001, the actual ratio rose from well below the authorized ratio to 19 percent above it.

The actual ratio for the KC-135 tanker was significantly below that authorized (30 percent to 40 percent) during 1996–2000. The actual ratio for the other tanker, the KC-10, deviated from the authorized ratio by an even larger amount—40 percent to 50 percent—during the same period. For 2001, the actual ratio for the KC-135 was only 15 percent below the authorized ratio, but that of the KC-10 was still 42 percent below.

In sum, the actual CP/AC ratio can fluctuate widely and deviate substantially from that authorized. During 2001, the actual ratios for all four airlifters (the C-5, C-141, C-17, and C-130) were above those authorized, while those for the two tankers (the KC-135 and KC-10) continued to fall well below their authorized numbers. In the context of a flying-hour shortage, however, it would be costly to replace ACs with CPs because the latter must fly more than ACs, yielding an extra flying cost much higher than the salary savings. Therefore, the key result in this section is not so much that the deviations in the numbers and ratios of CPs and ACs have been identified but rather that the authorized, not the actual, numbers should sometimes be adjusted. Otherwise, the cost of complying with the authorized ratio could be costly, with the extra flying cost far exceeding any salary savings achieved.