2. Pilot Requirements and Inventories

Determinants of Pilot Requirements

We were asked first to examine why requirements have changed, specifically, what underlying factors have driven those changes, and then to look at how pilot requirements have changed since 1988 (the date of the DoD Aviator Retention Study, which was the last comprehensive work on aviator supply and demand issues). Third, we were to project how pilot requirements would change in the near future.

We developed three classes of determinants—force structure, organizational structure, and other policy change. Force structure changes center on the drawdown to include fewer primary aircraft authorized (PAA). Organizational restructuring covers the full spectrum of internal reorganization that the services are undergoing. In addition, we examined other policy changes that affect pilot requirements, such as changes in crew ratios.

We adapted Air Force terminology and divided pilot requirements into four basic categories—force, staff, training, and manyear or other, which includes transients and students. Force requirements include all of the pilots required to man operational flying units. Training programs are necessary to ensure the operational readiness and skill level of the operational units, including both formal and other training. Staff are necessary to provide overhead support and supervision to ensure safe, efficient, and productive flying operations. Finally, manyear or other requirements account for pilots in training, pilots participating in professional development or formal education programs, or pilots taking leave in conjunction with reassignment.

Determinants of Pilot Inventory

Pilot inventories, regardless of service, are determined by (1) production and (2) retention. Inventories are also influenced by other factors to include: (3) distribution; (4) absorption capacity; and (5) assignment and promotion policies. We briefly define these terms below.

Production

The annual rate of graduates from UPT. This factor is closely related to *UPT accessions;* the differences are due to attrition during UPT.

Retention

A measure of the likelihood that pilots will remain in the pilot inventory. This factor is determined by *loss rates*, which give the percentage of a cohort lost from the inventory in a given year. Forced retention has been legislated in the form of a minimum active-duty service obligation (ADSO) following the completion of flying training (currently eight years). Voluntary retention can be influenced by promotion, compensation, quality of life, and other factors such as civilian airline job opportunities and opportunities in the reserve component. Officers can also be promoted out of the pilot inventory, which includes only grades through O-5.

Distribution

The assignment of new pilots (and others not identified for major weapon systems (MWS)) to actual pipeline training that establishes MWS credentials.

Absorption Ability

The number of new and previously qualified pilots that each MWS group can accept each year. This factor is influenced (or constrained) by several policy issues and other parameters. These include:

Experience. This parameter has two components. The first establishes criteria on minimum flying time and / or time in crew position required for a crewmember to be identified as experienced in a given MWS. The second determines minimum proportions of aircrew authorizations (by flying unit) that must be filled by crewmembers who meet these criteria and are thus identified as experienced.

Stability. This includes (1) permanent change of station (PCS) and assignment stability—length of time at one base, unit, or position before PCS move; (2) weapon system stability—length of time flying a particular weapon system; (3) aircraft commander stability—length of time in aircraft after upgrade to aircraft commander; (4) PAA and crew ratios (by MWS)—all absorbing cockpits are part of the crew ratio force; (5) vacancies in absorbing units, or the number of

absorbing cockpits; (6) pipeline (i.e. post-UPT) training capacity (by MWS); (7) loss rates and retention (which are, in turn, affected by a number of other factors).

Absorption ability clearly influences (and constrains) the distribution and number of new pilots to be produced each year.

Interaction of the Factors

These factors dynamically interact to complicate real-world inventory management. For example, over time the Air Force has moved from accessing pilots to sustainment levels, to accessing pilots to absorption ability, and finally to a vacancy-driven system as the factors have changed.

Civilian Airline Hiring

Retention is a key factor affecting pilot inventory. A central problem perceived by some for retention of military pilots is civilian airline hiring.

Our analysis shows that in the near term, there are enough separated military (and other) pilots to satisfy civilian airline hiring requirements through the end of the drawdown in 1997. On the demand side, the airline industry will continue to struggle through the end of this decade, with depressed hiring. On the supply side, a large number of pilots will be separating from the military and will be available for civilian hiring. They will constitute current losses and losses from previous years who have not been able to find jobs in the civilian sector.

After the year 2002, airline hiring will increase again at a modest pace, fueled at least partly by the need to replace aging Vietnam veterans and partly by projections of increased, though still moderate, growth in the airline industry. During this time period, the available pool for hires will become much smaller because of the markedly smaller cohorts of military pilots being accessed currently. This imbalance may well cause problems for military pilot retention, unless civilian airlines can "grow their own pilots."[1]

Air Force Inventory Compared to Requirements

An examination of the underlying determinants that drive changes in pilot requirements provides a window into what these future requirements are likely

[1]A more important problem, from the military perspective, is the inadequacy of the flow of military pilots to the Air Reserve Components—a problem discussed below.

to be. Force requirements, which are driven by the crew ratio subcategory, are a direct function of force structure (PAA times crew ratio times crew complement). This category is reduced by 34 percent, which is similar to the cut in PAA in the base force. Earlier data regarding staff requirements did not appear to fully reflect the ongoing Air Force reorganization. In particular, wing and below-wing staff reductions of 15 percent did not reflect the projected 20 percent reductions from the new objective wing nor the 27 percent reduction in the number of wings.

Our earlier analysis projected that staff requirements would be reduced by a total of 20 percent when all organizational changes were fully reflected in databases. As a result, our earlier work estimated that FY93 and later requirements would be lower than original Air Force projections by about 14 percent—10 percent in further force reductions[2] and 20 percent in staff requirements reflecting decisions already made about reorganization. Using the Air Force inventory line, as shown in Figure 3, we concluded that there should be no near-term problem in meeting pilot requirements, although we warned that some of the changes in requirements could exacerbate or cause long-term problems. Since our initial

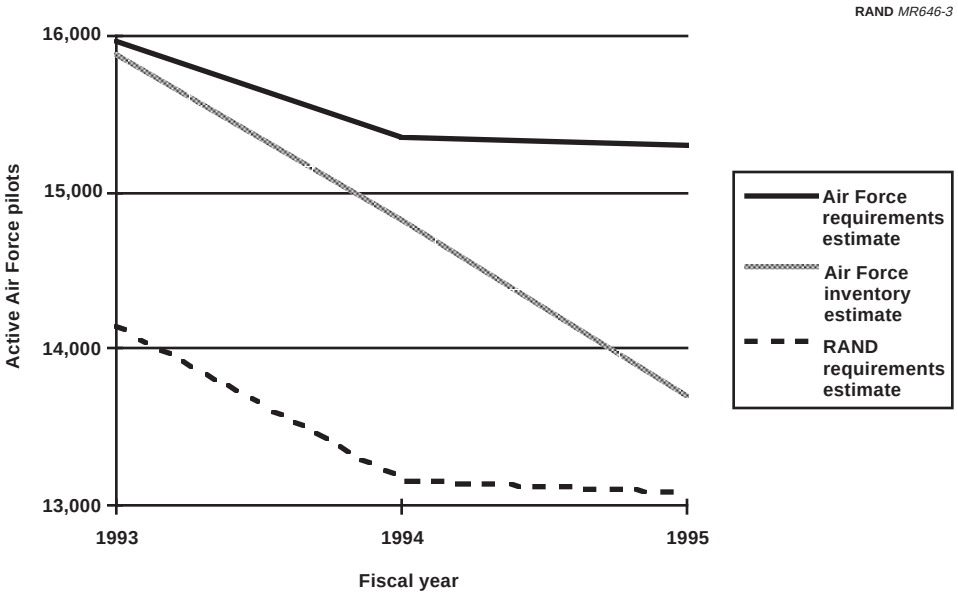

Figure 3—Projected Near-Term Requirements for Air Force Pilots Under Air Force and RAND Assumptions

[2] At the time of the requirements work, the base force was the official plan for force cuts. We postulated that there would be an *additional* 10 percent force cut, on top of the base force, as called for in a plan put forth by Congressman Les Aspin. Subsequent force cuts in the *Bottom-Up Review* have come close to matching our projection of a further 10 percent force cut.

work, the Air Force has revised downward its estimate of requirements in the near future as shown in Figure 4; this estimate reflects force cuts called for in the *Bottom-Up Review* (Aspin, 1993), and a further 20 percent decline primarily in staff positions, much as we had predicted. These cuts in staff have been assessed to the major commands and presumably will take place in the near future. The new requirements line is close to the RAND estimated line shown in Figure 3. Clearly, this new requirements line is predicated on the current force structure; if the force structure changes or if greater staff efficiencies could be found, this line could come down still further. Nonetheless, the remainder of the analysis is based on the Air Force requirements projections.

Since we ultimately want to compare future inventories of pilots with requirements for them, we used the Air Force pilot requirements to estimate objective profiles for those requirements in the steady state (FY97+). These profiles convert data by grade to data by years or length of service. We use them as an objective that policies for pilot management and training are trying to achieve. Such policies change inventory profiles, which can then be compared to the requirements profiles to see whether and if the objectives are being met.

We first projected a future FY97 inventory line.[3] This was then matched to the projected FY97 requirements line to see whether problems of mismatch are likely

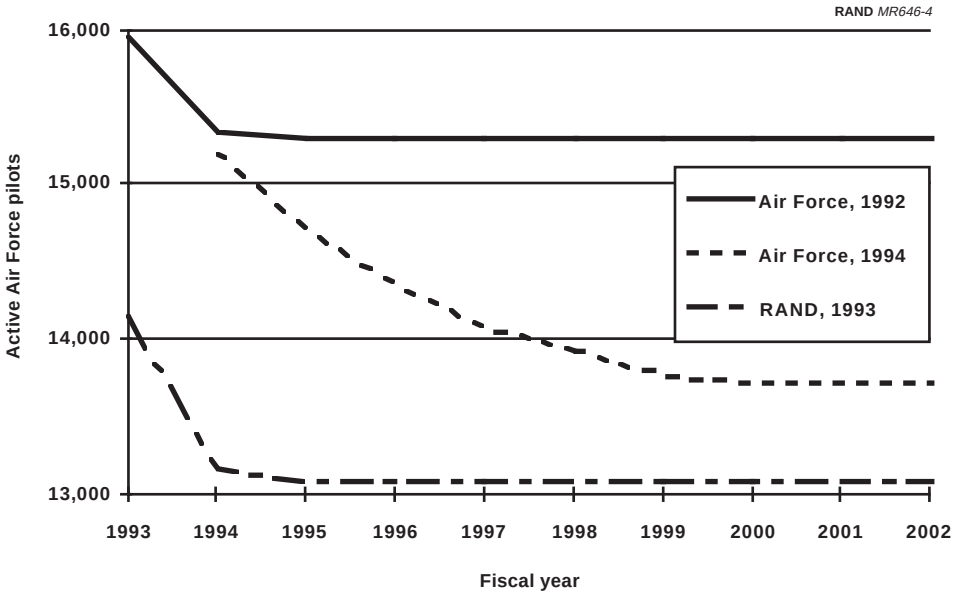

Figure 4—Changes in Air Force Requirements

[3]See Thie et al. (1994) for a more detailed discussion of our projections.

to exist in the near future. Our basic conclusion, shown in Figure 5, is that no critical numerical shortages will exist in the aggregate or in any major weapon systems through FY97.

Although there is no short-term numerical shortage of pilots, there is a serious maldistribution of experience when we compare the FY97 inventory projection for a given year of service with the corresponding requirements objective profile for that year. This maldistribution generates no *immediate* operational problem, since shortages occur among the least-experienced (and presumable least-capable) pilots, and the overages occur among the most-experienced cohorts. However, an important question is: What is the potential operational effect as the shorted cohorts age to where they would normally assume increased flying responsibilities? To examine this issue, we continued our projection model for another five years.

Figure 6 confirms that the damaged cohorts will generate a "bathtub" effect in the inventory by FY02, and it also establishes that significant inventory shortfalls will occur by that time. On the basis of early 1995 planned training levels, we estimate that the FY02 inventory will consist of 12,300 pilots and the Air Force projects a requirement of 13,700 pilots. The shortage is particularly distributed in the 6–12 YOS group—the critical years for having experienced pilots in cockpits in operational units. This bathtub is likely to cause serious problems by FY02 and later. In general, individual MWS reflect similar patterns to those exhibited by the total inventory.

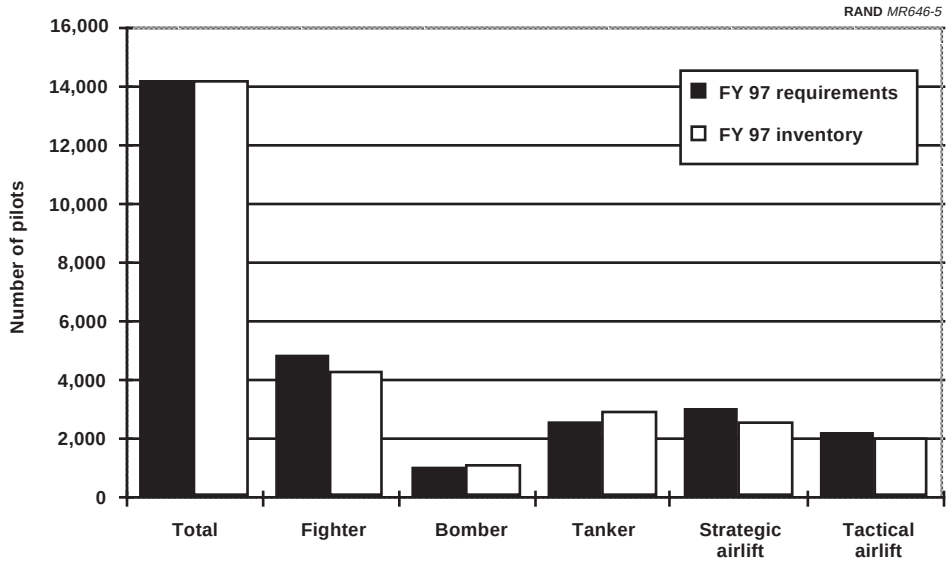

Figure 5—Projected Supply of and Demand for Air Force Pilots in FY97

To place the overall estimates of expected overages and shortages in context, we reproduce the earlier chart and compare our estimates with historical swings in pilot inventory and requirements (Figure 7).

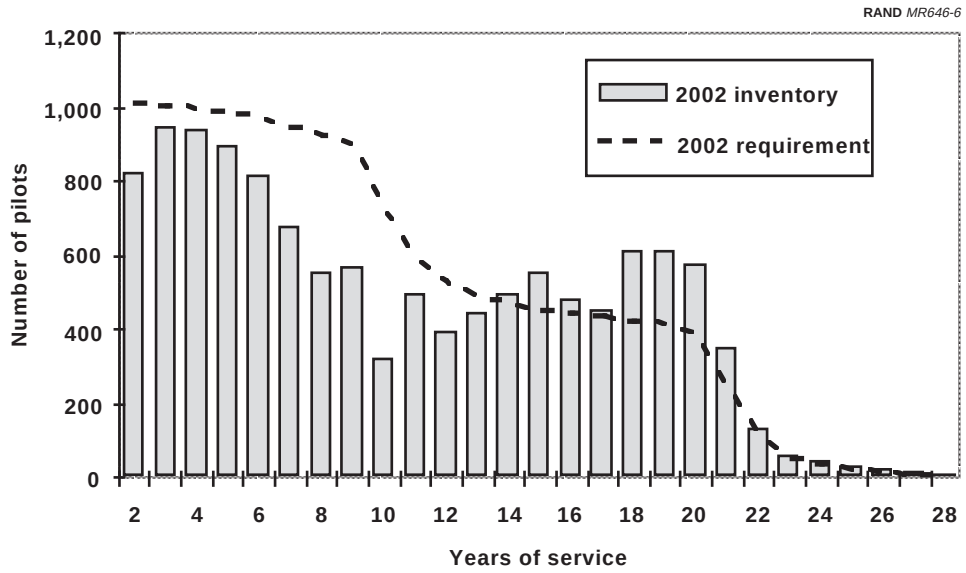

Figure 6—Projected YOS Profile of Air Force Pilot Inventory and Requirements in FY02

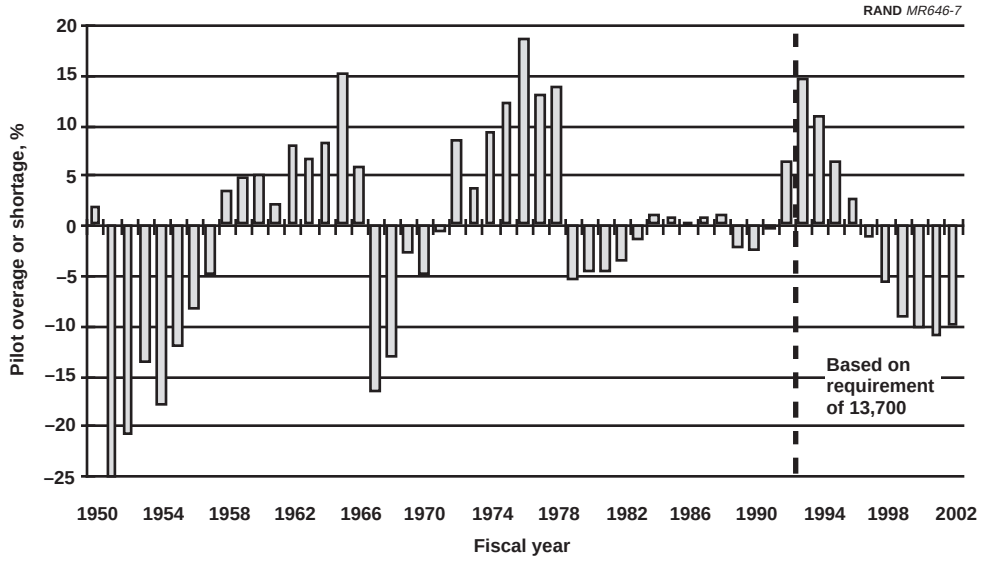

Figure 7—Historical Air Force Pilot Overage and Shortage Proportions (computed as inventory minus requirement divided by requirement)

There is a long-term downward trend in the magnitude of fluctuations—the overages experienced in FY91–FY95 are clearly not as large as we experienced during the late 1970s and the shortages projected for the outyears are not as large as the nation experienced during the 1950s or at the end of the Vietnam War. However, it is clear that the near term will undoubtedly experience the same swings that have been observed historically.

Navy Inventory Compared to Requirements

Specific details about the Navy inventory and requirements lines are provided in our earlier report. Our basic conclusion is summarized in Figure 8—the Navy, unlike the Air Force, will not face any major problems in this area in the future. (Although not shown here, this conclusion holds for the near term as well, where the projected FY97 requirement line, matched against the FY97 inventory line, shows no major experience maldistribution either.)

Alignment of inventory and requirement distributions for the Navy in FY02 is remarkably close. Indeed, an overall 200-pilot overage is a significant improvement over the pre-drawdown situation in FY92, which showed a shortage of 2,000 pilots. (Some drawdown losses probably occurred in FY92 inventory that were not reflected in requirements.) There are several ways to obtain the slight retention improvements required to match the requirement numbers, and it is also possible that requirements will continue to drop in the outyears if the Navy initiates aggressive policy action.

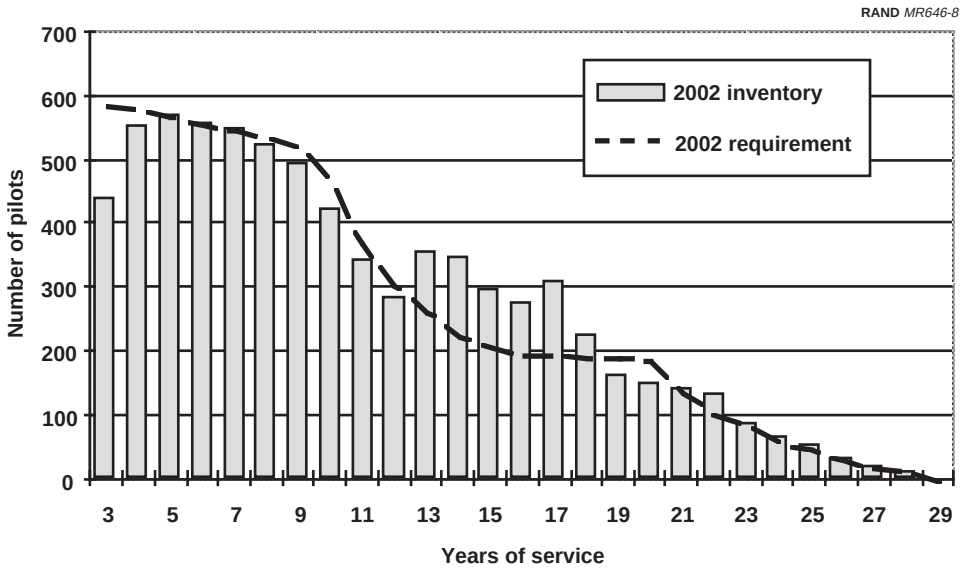

Figure 8—Projected YOS Profile of Navy Pilot Inventory and Requirements in FY02

Differences Between Air Force and Navy Comparisons

We can offer two reasons to explain the marked difference in the projected outcomes for the Navy and the Air Force. First, somewhat ironically, the Navy's higher attrition experience before ten years of service (due to shorter active-duty service obligations and lower natural retention) allows the Navy to avoid the significant overages encountered by the Air Force in the YOS 7 through YOS 12 cohorts and enables the Navy to maintain reasonable UPT production levels throughout the drawdown period, which will help avoid future cohort shortfalls. Second, the Air Force began its drawdown sooner than the Navy and aggressively implemented its plans. Although some experienced pilots were cut, the Air Force cut training of new pilots significantly in the face of an inability to place newly trained pilots into cockpits. This measure leads to the maldistribution of experience—or what we referred to as the bathtub effect—as the "damaged" cohorts fall short of the numbers required in the 6–12 YOS experience groups in later years.

The conclusions reported here are somewhat conditional, because the potential severity of the problems will depend critically on the policy options chosen to counter the problems. Part of our tasking was to examine available options and how successful they might be in alleviating these problems. Although we focus on the Air Force for the remainder of our analysis, many of the policy options, of course, apply to the Navy.