

Tactical Forces Buildup

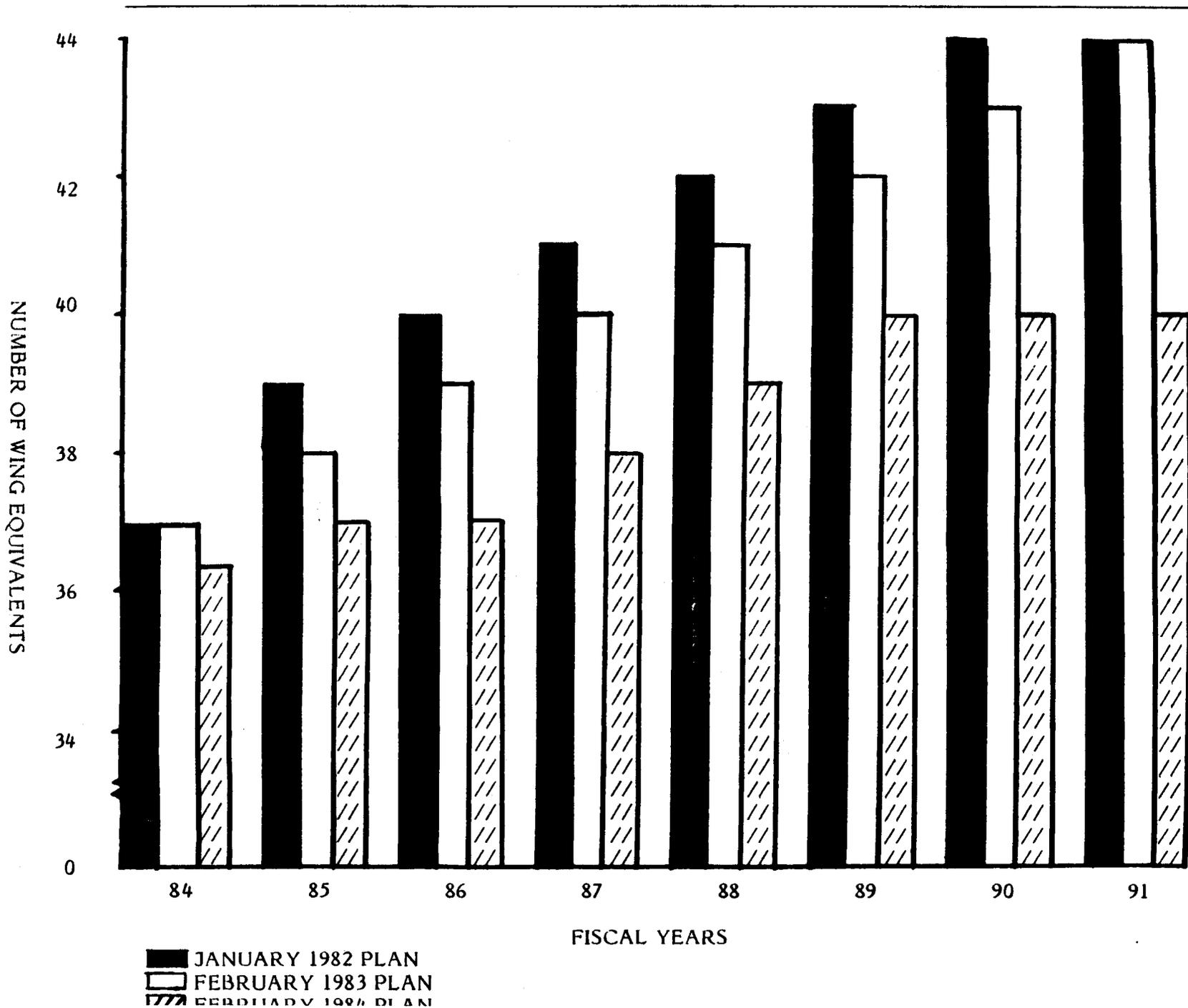
For many years, the current and preceding Administrations have indicated a desire to attain 40 tactical air wings (that is, wing equivalents). Until fairly recently, this Administration also had a stated goal of reaching 44 wings in later years. Currently, force size is slightly over 36 wings.

The goal of increased forces reflects the Administration's perception that the Soviet threat is growing. The size and nature of that threat, however, is highly uncertain, and the process of setting force goals to meet the threat is therefore judgmental. Indeed, the Administration has modified its tactical force goals substantially downward in recent years, even though it has not announced any major decreases in the expected Soviet threat. The wing goals have been delayed with every consecutive plan (see Figure 4). In the plan submitted in January 1982, the Administration announced it planned to reach 40 tactical air wings by 1986, with a further increase to 44 wings in later years (dark bars on the figure). ^{1/} By the time the DoD February 1983 plan was submitted, the goal of 40 wings had slipped to 1987; 44 wings were no longer discussed in the annual report, although they were mentioned in hearing testimony (white bars on the figure). ^{2/} In the February 1984 plan, the 40-wing goal is set for 1989 and the 44-wing goal has been dropped, at least through the early 1990s (hatched bars on Figure 4). The most recent budget revision postpones the 40-wing goal until 1990. Not all the changes have been caused by reductions in anticipated purchases of aircraft. CBO analysis suggests that, even if the Air Force had realized its plans for aircraft procurement presented in its January 1982 plan, it would have been very difficult to achieve the 44-wing goal, as planned procurement was not sufficient to meet this goal.

The malleability of these force goals--and the absence of a clear connection between the goals and procurement plans--may suggest that further changes are possible in light of intense budgetary constraints.

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1. Because the details of the schedule for reaching 40 wings are classified, the chart assumes that the buildup takes place steadily between now and the target year of 1989.
 2. Department of Defense Appropriations Hearings, Defense Subcommittee of Senate Appropriations Committee, 98:1 (1983), pt. 5, p. 562.

FIGURE 4. TACTICAL FORCE STRUCTURE, BASED ON 1982-1984 PLANS



F-4 Retirement

The second key aspect of the Administration's plans is the retirement of existing F-4 aircraft after about 20 years of service. The U.S. tactical inventory currently contains about 1,200 F-4 aircraft, and almost all of these aircraft are over ten years old. Assuming a 20-year retirement of these aircraft, they would have to be replaced entirely by 1996 and, because of their age distribution, replaced in large quantities in the late 1980s (see Figure 5). The F-4 could be kept in the inventory longer, which would reduce procurement requirements, without undue danger of structural failure. The issue is whether the old F-4s would remain capable against the likely enemy threats.

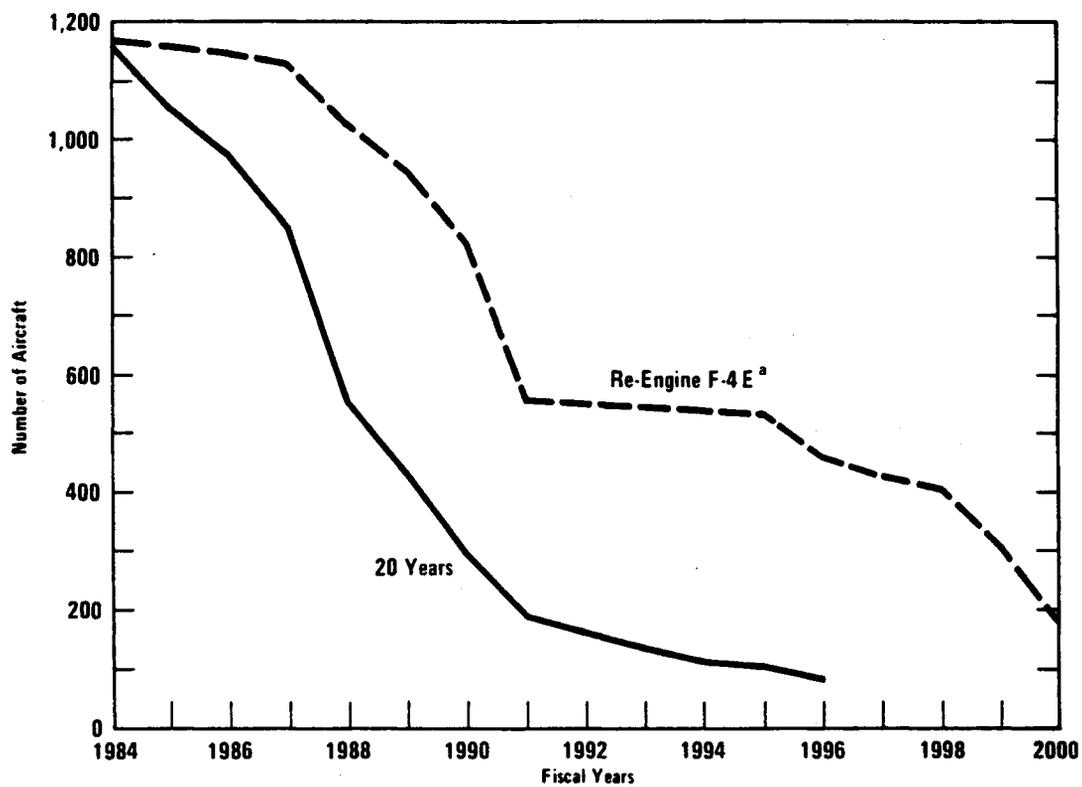
One approach to extending the service life of old F-4s would be to modify them to improve their capability. The Boeing Company and the Pratt and Whitney Group of United Technologies Corporation have presented DoD with an unsolicited proposal to reengine the F-4--giving it the PW-1120 engine, a turbojet derivative of the F-100 engine now used in the Air Force F-15s and F-16s, as well as enhancing its avionics and providing conformal fuel tanks for the aircraft. (These tanks are streamlined to reduce drag.) The new engine would provide more thrust for the F-4s and hence greater capability in combat against newer Soviet fighters; the conformal fuel tanks would extend its range.

The Air Force opposes reengining their F-4s, arguing that they would begin to reach the desired 20-year retirement age before the proposal could be completed and developed. This is true. Even assuming the procurement schedule assumed by Boeing, which the Air Force believes is optimistic, the aircraft would be reaching 20 years of age by the time reengining could occur. The actual structural service life of the aircraft is much longer, however, and, if capability were sufficiently enhanced by reengining, the proposal might be worth considering. Indeed Dr. Richard DeLauer, Under Secretary of Defense for Research and Engineering, has argued that the proposal would improve the F-4 enough to extend its useful service life for ten more years. Reengining the F-4 and so extending its life to 30 years would substantially reduce numbers of aircraft needed to meet Air Force requirements over the next few years (see Figure 5).

Force Modernization

The third aspect of the Administration plan for the tactical air forces is the quality mix of aircraft investment plans. This mix substantially affects costs, since the most capable aircraft are also more expensive. Three key questions suggest the nature of the choices concerning force modernization:

Figure 5.
F-4 Inventory: Two Retirement Profiles



SOURCE: CBO estimates based on Air Force data.

* Re-engine option assumes retirement as follows: F-4E at 30 years; F-4C/D at 23 years; and F-4G at 25 years.

- o What portion of the forces should be made up of the most capable F-15 fighter and what portion of the less capable F-16?
- o Whether to pursue development of the F-15E or its competitor, the F-16E, and what portion of the force should be composed of one of these follow-on aircraft?
- o When should the Air Force introduce an entirely new fighter--the Advanced Tactical Fighter--and what should be the tradeoff between capability and cost in design of this new aircraft?

CBO has not attempted to analyze these questions in detail in this preliminary paper. Some, like the portion of forces to be made up of the F-15 and F-16, may not be susceptible to quantitative analysis and may depend on the judgment of the Administration and the Congress. This report does indicate the percentages of the inventory made up of F-15 and F-16 aircraft under various options but the analysis cannot specify the correct levels for the percentages. Other questions--for example, the capability of the follow-on F-15E versus the follow-on F-16E (a two-seat F-16XL)--may be more amenable to analysis, which CBO may attempt in its final report.

ALTERNATIVES

Various combinations of changes in these three key Air Force goals could be proposed to hold down costs. This section compares the Administration approach (Option I) with four such alternative approaches (see Table 4).

The alternative approaches would hold down costs by relaxing one or more of the three goals discussed earlier: expanding to 40 wings, retiring older F-4 aircraft at 20 years, and modernizing with the F-15 and F-16 fighters. The first two options would keep the 40-wing goal but reduce or cancel F-15 procurement and keep F-4s in the force beyond 20 years. The last two options would abandon the 40-wing goal in favor of today's 36 wings. This would allow these options to avoid keeping F-4 aircraft much beyond 20 years of service and to minimize the reductions in the fraction of the force made up of newer fighters.

Specifically the first two alternatives (Options II and III) would attempt to reduce costs while still maintaining the goal of increasing the number of wings to 40 by 1989. Both alternatives would maintain planned purchases of the F-16 aircraft, which is the cheaper of the two fighters now in production. But both options would reduce purchases of the more expensive F-15 aircraft. Option II would reduce procurement to 36 per year (the

TABLE 4. DESCRIPTION OF ALTERNATIVES TO THE ADMINISTRATION PLAN FOR TACTICAL AIR FORCES (By fiscal year, in numbers)

Option	Force Goal by 1989	Plane	Procurement					Total 1985- 1989
			1985	1986	1987	1988	1989	
Option I-- Administration	40 Wings	F-15	48	56	24	24	24	176
		F-15E/F-16E	0	4	48	72	72	196
		F-16	150	216	216	216	216	1,014
		F-4 Reengine	0	0	0	0	0	0
		Total	<u>198</u>	<u>276</u>	<u>288</u>	<u>312</u>	<u>312</u>	<u>1,386</u>
Option II-- Keep 40 wings 36 F-15 per year Same number of F-16s as Administration Keep F-4 as needed	40 Wings	F-15	36	32	0	0	0	68
		F-15E	0	4	36	36	36	112
		F-16	150	216	216	216	216	1,014
		F-4	0	0	0	0	0	0
		Total	<u>186</u>	<u>252</u>	<u>252</u>	<u>252</u>	<u>252</u>	<u>1,194</u>
Option III-- Keep 40 wings Cancel F-15 Reengine F-4 Same number of F-16s as Administration F-4 C/D as needed	40 Wings	F-15	0	0	0	0	0	0
		F-15E	0	0	0	0	0	0
		F-16	150	212	168	144	144	818
		F-16E	0	4	48	72	72	196
		F-4 Reengine	0	0	0	9	147	(156)
Total	<u>150</u>	<u>216</u>	<u>216</u>	<u>225</u>	<u>363</u>	<u>1,170</u>		

(Continued)



TABLE 4. (Continued)

Option	Force Goal by 1989	Plane	Procurement					Total 1985- 1989
			1985	1986	1987	1988	1989	
Option IV-- 36 wings F-15 at 36 per year Slow F-16 purchases	36 Wings	F-15	36	32	0	0	0	68
		F-15E	0	4	36	36	36	112
		F-16	150	200	200	200	200	950
		F-4	0	0	0	0	0	0
		Total	<u>186</u>	<u>236</u>	<u>236</u>	<u>236</u>	<u>236</u>	<u>1,130</u>
Option V-- 36 wings Cancel F-15 Same number of F-16s as Administration Retire F-4 as needed	36 Wings	F-15	0	0	0	0	0	0
		F-15E	0	0	0	0	0	0
		F-16	150	212	168	144	144	818
		F-16E	0	4	48	72	72	196
		F-4	0	0	0	0	0	0
Total	<u>150</u>	<u>216</u>	<u>216</u>	<u>216</u>	<u>216</u>	<u>1,014</u>		

SOURCE: February 1985 Budget Submission (Option I).

number the Congress allowed for fiscal year 1984) which would still allow production of the new F-15E derivative. Option III would terminate F-15 procurement. Both options make up for the reduced numbers of F-15 procurements by maintaining F-4s in the force longer. Option II would simply extend the F-4 retirement age from about 20 years to about 23 years. Option III reengines some F-4 aircraft to prolong their life to 30 years and extend others.

As later discussion shows, only Option III could be pursued within the limits of a 5 percent budget. Neither Option II nor III could be afforded if only 3 percent real growth is permitted. Thus this paper considers two alternatives (Options IV and V) that would abandon the plans to expand the size of tactical forces and leave them at today's levels. Option IV would do so by keeping the F-15 procurement at 36 per year and slowing the F-16 procurement to reflect lower force goals. This approach has the advantage of keeping the two aircraft lines open and two contractors producing aircraft. This would provide more surge capability in case of war and would also stimulate competition between the two contractors. Option V would cancel the F-15 while keeping the Administration procurement plan for F-16s, which would be quite feasible if the goal were to maintain today's force levels. This approach might be required if a 3 percent growth rate were adopted.

Affordability of Alternatives Assuming Constant Readiness Spending

Table 5 shows how well the options would meet the savings needed to reduce costs to 5 percent real growth, assuming "constant readiness spending"--that is, no added money for readiness except that associated with adding new aircraft and wings. Over the next five years, about \$10 billion would have to be cut from the Administration plan to achieve 5 percent real growth, and three of the four options would achieve that reduction under this readiness assumption.

Table 5 suggests it would probably not be possible to achieve a 40-wing goal if the budget is constrained to 5 percent real growth. Option II, which would keep 40 wings but hold F-15 procurement at 1984 levels of 36 per year, would not save enough money to get down to 5 percent. ^{3/} Option III,

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3. For options that involved reduced F-15 procurement, the aircraft unit costs were increased to reflect production rate decreases. Options that involve cancellation of the F-15 include cancellation costs, and since it was assumed that without an F-15E, a derivative aircraft would still need to be procured, costs for the F-16E were included in

TABLE 5. AFFORDABILITY OF ALTERNATIVES ASSUMING CONSTANT READINESS SPENDING (By fiscal year, in billions of then-year dollars in budget authority) a/

Option	1985	1986	1987	1988	1989	Total
Savings in Tactical Air Forces from Administration Plan Required to Attain 5 Percent Real Growth						
	1.9	2.8	2.2	2.3	1.0	10.2

Options Savings						
Option II (40 Wings)						
Investment	0.6	1.2	1.6	2.4	2.2	8.0
Operating Costs	---	---	---	---	---	---
Total	<u>0.6</u>	<u>1.2</u>	<u>1.6</u>	<u>2.4</u>	<u>2.2</u>	<u>8.0</u>
Option III (40 Wings) <u>b/</u>						
Investment	2.2	2.5	2.7	3.4	0.8	11.6
Operating Costs	---	---	---	---	---	---
Total	<u>2.2</u>	<u>2.5</u>	<u>2.7</u>	<u>3.4</u>	<u>0.8</u>	<u>11.6</u>
Option IV (36 Wings) <u>b/</u>						
Investment	0.6	1.5	1.9	2.7	2.5	9.2
Operating Costs	<u>0.1</u>	<u>0.2</u>	<u>0.3</u>	<u>0.5</u>	<u>0.7</u>	<u>1.7</u>
Total	<u>0.7</u>	<u>1.7</u>	<u>2.2</u>	<u>3.1</u>	<u>3.1</u>	<u>10.9</u>
Option V (36 Wings) <u>b/</u>						
Investment	2.2	2.5	2.8	3.6	3.3	14.4
Operating Costs	<u>0.0</u>	<u>0.2</u>	<u>0.3</u>	<u>0.5</u>	<u>0.7</u>	<u>1.7</u>
Total	<u>2.2</u>	<u>2.7</u>	<u>3.1</u>	<u>4.1</u>	<u>4.0</u>	<u>16.1</u>

SOURCE: CBO projections from Fiscal Year 1984 Budget (for 5 percent real growth and operating costs); and CBO projections from Fiscal Year 1985 Budget Submission (investment).

NOTE: Numbers may not add to totals because of rounding.

a/ Administration inflation assumptions.

b/ Could be bought at 5 percent real growth.



which would also include Administration plans for 40 wings, could be afforded within 5 percent real growth only by cancelling the F-15 and procuring F-16s at currently planned Administration rates. But Option III would also reengine the F-4. ^{4/} A total of 400 would eventually be reengineered under this option but, because of the time required to develop the program, only 156 could be procured during the five-year period. If the costs for all 400 of the aircraft had been included in Option III, it too would exceed 5 percent. Thus Option III would remain within 5 percent real growth only because it would not fully pay the costs over the next five years.

Realistically, then, only the two options (Options IV and V) that would keep the current force structure would probably be attainable at 5 percent real growth. Option IV would retain current force levels but keep the two fighter lines--F-15 and F-16--open at slower rates. This option would raise unit costs but might prove to be the most appealing of the options affordable at 5 percent, since it would produce a smaller but certainly more capable force structure than that produced by Option III and maintain the competition inherent in two fighter lines. Option V, which would hold the tactical forces to 36 wings and cancel the F-15, might be necessary should the Congress decide that 3 percent real growth is sufficient.

Administration Readiness Spending

The preceding discussion assumed that readiness rates were held at today's levels. Yet the Administration plans to increase readiness for all defense forces, with commensurate increases in costs of operations and maintenance. If tactical air readiness spending growth is consistent with overall increases, investment resources would be even more constrained in a 5 percent real growth budget. Indeed, relative to current plans, it would be necessary to cut \$12 billion over the five years (see Table 6). This would clearly increase the difficulty of reducing spending to achieve 5 percent real growth. As can be seen in Table 6, only the lowest cost option, Option V, fits within a 5 percent real growth budget under these readiness-spending assumptions.

Footnote Continued

those options. The costs are \$1.6 billion over the five years and, should the Congress decide that a derivative is too expensive, that money could be taken out of Options III and IV.

4. For F-4 reengining (Option III), contractor costs were used with a factor added for spare parts funding.



TABLE 6. AFFORDABILITY OF ALTERNATIVES ASSUMING ADMINISTRATION READINESS SPENDING, WITH INCREASES IN OPERATIONS AND MAINTENANCE COSTS (By fiscal year, in billions of then-year dollars in budget authority) a/

Option	1985	1986	1987	1988	1989	Total
Savings in Tactical Air Forces from Administration Plan Required to Attain 5 Percent Real Growth						
	2.0	3.1	2.6	2.7	1.6	12.1

Options Savings						
Option II (40 Wings)						
Investment	0.6	1.2	1.6	2.4	2.2	8.0
Operating Costs	---	---	---	---	---	---
Total	<u>0.6</u>	<u>1.2</u>	<u>1.6</u>	<u>2.4</u>	<u>2.2</u>	<u>8.0</u>
Option III (40 Wings)						
Investment	2.2	2.5	2.7	3.4	.8	11.6
Operating Costs	---	---	---	---	---	---
Total	<u>2.2</u>	<u>2.5</u>	<u>2.7</u>	<u>3.4</u>	<u>0.8</u>	<u>11.6</u>
Option IV (36 Wings)						
Investment	0.6	1.5	1.9	2.7	2.5	9.2
Operating Costs	0.1	0.2	0.3	0.5	0.7	1.8
Total	<u>0.7</u>	<u>1.7</u>	<u>2.2</u>	<u>3.2</u>	<u>3.2</u>	<u>11.0</u>
Option V (36 Wings) <u>b/</u>						
Investment	2.2	2.5	2.8	3.6	3.3	14.4
Operating Costs	0.1	0.2	0.3	0.5	0.7	1.8
Total	<u>2.3</u>	<u>2.7</u>	<u>3.1</u>	<u>4.1</u>	<u>4.0</u>	<u>16.2</u>

SOURCE: CBO projections from 1984 budget submission and in 1985 budget submission of DoD-wide readiness increases (5 percent real growth and operating costs); and CBO projections from 1985 budget submission (investment).

NOTE: Numbers may not add to totals because of rounding.

- a. Administration inflation assumptions.
- b. Could be bought at 5 percent real growth.

TABLE 7. EVALUATION OF ALTERNATIVES USING QUALITATIVE MEASURES (By fiscal year)

	Numbers		F-4 Retirement Age	Average Age of Inventory by 1991	Inventory Mix by 1991 (In percents)	
	Wings by 1989	Quantity Procured 1985-1989			F-15	F-16
Option I	40	1,386	21	9.1	23	42
Option II	40	1,194	23	10.1	18	42
Option III	40	1,014 (156) <u>b/</u>	26 <u>a/</u>	10.9	14	43
Option IV	36	1,130	20	9.5	19	44
Option V	36	1,014	21	10.3	14	45

SOURCE: CBO estimates from Air Force Data (Option I); CBO analysis (Options II, III, IV, and V).

- a. Includes reengining 400 F-4Es and retiring them at 30 years of age.
- b. Number of F-4Es to be reengined during fiscal years 1985-1989.

EVALUATION OF ALTERNATIVES

Costs are, of course, not the only issue in evaluating tactical air forces. The effectiveness of the U.S. tactical forces hinges both upon the quantity and quality of their aircraft, as well as the readiness of both the aircraft and their crews and the ability to sustain the aircraft with spare parts and weapons in a protracted war. CBO has not attempted to evaluate in detail the capabilities of the various aircraft considered in these options. A qualitative assessment of the combat effectiveness of these alternative forces would necessitate detailed computer simulation and analysis, which are beyond the scope of this report. So, too, is an analysis of the readiness of the aircraft and their crews and the ability to sustain the aircraft in war.

This paper does present some simple measures that are proxies for capability: average age of the force and percentage of the inventory made up of newer and more capable aircraft, the F-15 and F-16. Although these measures are not a substitute for detailed judgments about capability, they do suggest the direction of qualitative changes resulting from the various options.

Evaluation of the Administration Option

For many years, the Air Force has used the age of the forces as a proxy for effectiveness. The Air Force has set ten years as an upper bound for the average age of the force. By fiscal year 1991, the force would be under that limit if the Administration's plans--which would procure some 1,400 aircraft--were followed (see Table 7).

Another indicator of capability is the percentage of relatively newer aircraft types in the force structure. Thus the analysis provides the percentage of the inventory in fiscal year 1991 that consists of F-15s and F-16s. While the F-16 is a capable aircraft, the Air Force believes the F-15 is the most capable in the tactical forces. And, according to the Air Force, the follow-on F-15E will be superior to its competitor, the F-16E, in the air-to-surface role. Hence the percent of F-15s could be viewed as the most capable part of the inventory, with the percent of F-16s indicating the newer but somewhat less capable portion of the mix. Because of the composition of procurement under the Administration plan, approximately 23 percent of the inventory would be F-15s and 42 percent of the inventory F-16s by 1991.

Effects of the Options

The options confront the Administration and the Congress with some clear if difficult trade-offs. If the United States is to expand the number of tactical forces to 40 wings, while also holding down costs to somewhere near 5 percent annual real growth, it would have to accept an approach like Option III, which would produce a force substantially older than the Air Force wants and would eliminate competition among aircraft manufacturers by buying only one type of fighter. Option II would also maintain 40 wings and produce a fairly capable inventory though less so than the Administration program. Under this option, the force would be only a year older than the Administration program. Unfortunately it is also too expensive to procure at 5 percent real growth.

On the other hand, if the Administration was willing to accept today's force levels, it could stay within a 5 percent budget. Moreover, it could hold average age below the ten-year ceiling set by the Air Force. This alternative would also keep the percent of capable F-15s within four percentage points of the Administration plan and the percent of F-15s and F-16s together within just 2 percentage points of the Administration plan (see Option IV in Table 7). Thus the choice about numbers of future forces will have to do much with the quality of those forces, at least under a 5 percent real growth budget.

CHAPTER IV. LONGER-TERM CONSEQUENCES OF CURRENT DECISIONS

This chapter discusses problems in the 1990s that might occur as a result of decisions about the Air Force tactical forces made in the next few years. One of the potential problems involves the Advanced Tactical Fighter (ATF), which the Air Force expects to field by the mid to late 1990s. It may appear that this is too far in the future to be of relevance to the current budget debate, but many key decisions about the future of the tactical aircraft will be made in the next few years.

The reason for concern is the likely high cost of the aircraft, given the capability the Air Force wants. The Air Force has indicated that it will have to fight more capable Soviet fighters in an environment that the service expects to have denser enemy defenses and offenses. In order to do this, the Air Force wants its tactical fighter to have much more capability than existing aircraft. Among the improvements is enhanced avionics; the fighter, for example, is to have voice-activated controls and very sophisticated displays to help its pilot. The plane is also to incorporate stealth technology--which would reduce its visibility to enemy radar. Sustaining supersonic cruise speed for long periods--without the need for an afterburner--is another desired capability. The ATF, according to the Air Force, should also have a short take-off and landing capability to enable it to operate from battle-damaged runways. And finally the aircraft is to be highly reliable and maintainable.

While all of these goals are commendable, they clearly will come at a cost. Indeed, this fighter may be many more times more capable than the F-15--which it is to replace--but it also will probably be more expensive. History may be some guide here. The F-15 was, according to the Air Force's Affordable Acquisition Approach Study, 3.4 times more capable than the F-100 aircraft over which the study describes as the F-15's predecessor. Also, according to that study, it was 14 times more expensive.

Given the potential expense, can the Air Force maintain a 40-wing force without prohibitive increases in costs? The severity of the challenge depends in part on procurement over the next few years. If the Air Force realizes its planned procurement levels in fiscal years 1985-1992, and continues to buy F-16 aircraft at the high rate of 216 annually through the early 1990s, then it should need to buy only about 180 planes a year between 1995 and the year 2000 to maintain 40 wings with an average aircraft age of 10

years, the Air Force goal. Purchasing 180 aircraft a year seems reasonable since Air Force is buying 180 aircraft in 1984. But in 1984 the Air Force is buying mostly F-16s. Buying 180 aircraft in the 1990s, if it consisted mostly of ATFs, would be dramatically more expensive.

Moreover, the Air Force may well not realize its planned high procurements in the rest of the 1980s. If, instead, it is only able to buy 180 aircraft a year through the mid-1990s, then it would have to purchase 260 aircraft a year between 1995 and the year 2000 to attain the 40-wing goal by the year 2000 while keeping an average age of 10 years. If most or all these 260 aircraft were ATFs, it is likely that the cost would be prohibitive. Clearly, the Air Force could lower the needed level by giving up its goal of 40 wings but, even at 36 wings, it would probably have to buy more aircraft than it is buying today and do it with a much more expensive fighter.

These potential problems suggest the urgency of holding down the costs of the tactical air fleet of the 1990s. This could involve future improvements to the capabilities of aircraft already in the force so that they could be retained longer. This might also involve design of a less costly fighter as a companion to the Advanced Tactical Fighter--similar to the F-16 development in the 1970s as a companion to the more expensive F-15. But holding down the costs of future tactical aircraft would also depend on designing an ATF that is reasonably affordable while also meeting key tactical requirements. Thus the Congress may wish to ensure that cost is one of the key design ingredients in the ATF.

Nor is it too early to worry about ATF costs. The aircraft will not be deployed until the mid or late 1990s, and its development costs today (\$35 million in 1984) are relatively modest. But many key decisions that will determine future ATF costs will be made in the next few years. If costs are to play a fundamental role in the design of the ATF, decisions about funding will probably have to be made in the next few years.

APPENDIXES

APPENDIX A. ADDENDUM: NEW PLANS FOR TACTICAL AIR FORCES

Two recent documents--an Air Force briefing paper of its plans for the tactical forces 1/ and the Administration's May 1984 budget revision--show changes to the program discussed in the main body of this report, both in terms of reduced aircraft procurement and altered force goals. Unfortunately, the two sources do not provide a clear statement of the details of the new program. In this appendix, CBO analyzes a combination of the two plans that appears to be the probable new program. This addendum first presents CBO's assumptions about the new plan. The remainder of the section provides an analysis of the new plan's consistency and affordability.

ASSUMPTIONS ABOUT THE NEW PROGRAM

The Tactical Fighter Roadmap shows a new procurement schedule for the F-15 that would hold procurement constant at 60 aircraft per year in fiscal year 1986 and beyond, rather than increasing to 96 aircraft annually by 1988 as planned in the February 1984 budget. In the Roadmap document, F-16 procurement was kept at the February 1984 budget level of 216 annually in 1986 and beyond. In the May 1984 budget revision, however, the Department of Defense reduced F-16 annual procurement quantities from 216 aircraft per year in 1986 and beyond to 180 annually. It also indicated that the goal of 40 wings would be delayed yet another year to fiscal year 1990. While F-15 procurement quantities for fiscal year 1985 were reduced, the May budget revision does not provide new out-year procurement quantities for the fighter. The analysis that follows assumes that the Administration has accepted the Air Force plan for reduced F-15 procurement in addition to the other changes (see Table A-1 for details).

CONSISTENCY AND CAPABILITY OF THE NEW PLAN

In contrast to the February 1984 budget plan, the assumed new procurement plan would no longer fully support the planned force increases--assuming F-4s are retired at 20 years of age (see Figure A-1). The inventory would be about 250 airplanes short of requirements in fiscal year 1990,

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1. U.S. Air Force, The Tactical Fighter Roadmap, briefing paper (April 1984).

TABLE A-1. AIRCRAFT PROCUREMENT UNDER POSSIBLE NEW ADMINISTRATION PLAN (By fiscal year, in numbers of planes)

Plan	1985	1986	1987	1988	1989	Total 1985- 1989
Air Force Plan						
F-15C/D	42	52	12	0	0	106
F-15E	--	8	48	60	60	176
May 1984 Budget Revision						
F-16	150	180	180	180	180	<u>870</u>
Total						1,152

SOURCES: U.S. Air Force, The Tactical Fighter Roadmap (April 1984); and Administration's May 1984 Budget Revision.

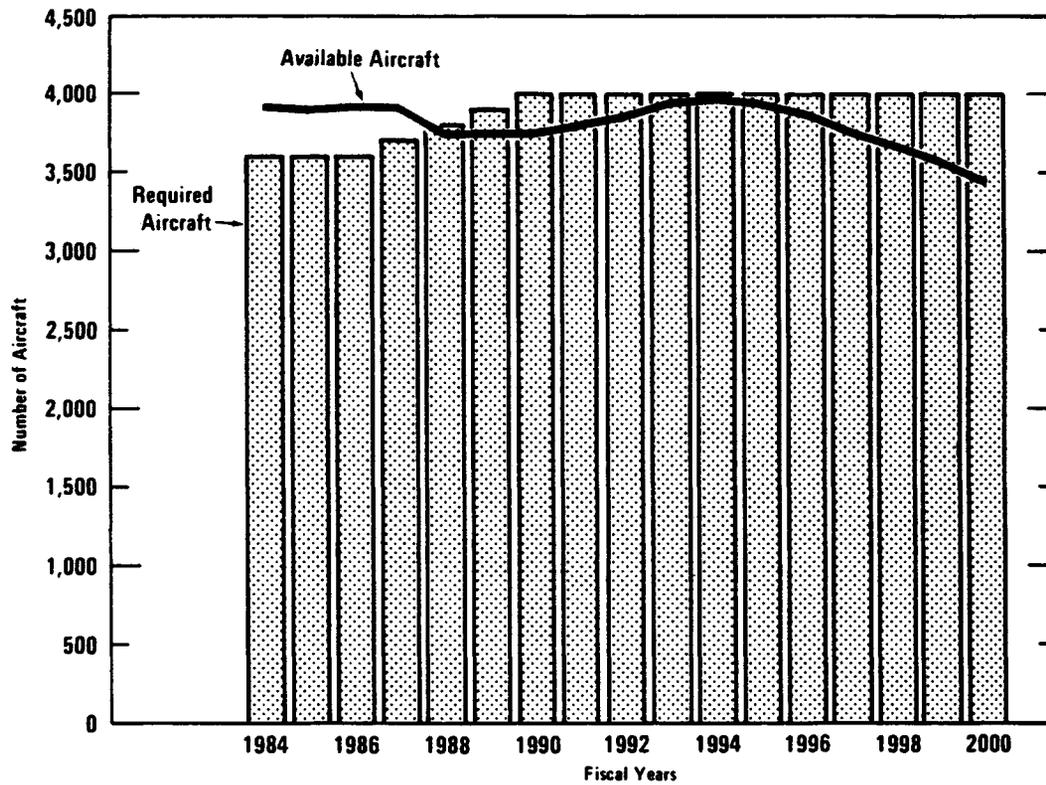
NOTE: May 1984 plans call for a force goal of 40 wings by fiscal year 1990.

and it would not contain enough planes to meet the requirements associated with the 40-wing goal until fiscal year 1993--three years after the Administration plans to meet that goal. In fact, under the new procurement schedule, aircraft inventory levels would not even regain the levels experienced in the mid-1980s until about 1993. Moreover, inventory levels would only meet requirements for two years; by fiscal year 1995 requirements and peacetime crashes would cause another shortfall.

One way of meeting requirements under this new procurement plan would be to retire F-4s later than 20 years of age. To meet the shortfall shown here, F-4s would have to be retired on average after about 22 rather than 20 years. This would raise the average age of the force to 10.2 years--slightly above what the Air Force has described as the acceptable maximum age of ten years.

As this plan delays modernization, the percent of the force consisting of F-15s and F-16s would also be reduced, to 21 percent and 39 percent, respectively, by fiscal year 1991. This compares to 23 and 42 under the February submission.

Figure A-1.
Air Force Requirements Versus Available Aircraft



SOURCE: Required Aircraft—CBO estimates from Department of Defense Plans—FY 1985 Budget Revisions, May 3, 1984, Available Aircraft—CBO estimates from Air Force data with revised procurement schedules for F-15/F-16 from May 3, 1984 Plan.

AFFORDABILITY OF THE NEW PLAN

Since the force appears to be smaller, older, and less modern than the February 1984 program, it is not surprising that it is also cheaper. CBO has not estimated the costs of this new plan in detail. But it seems clear that the new plan, though cheaper, would still require more than 5 percent annual real growth in the budget for the tactical air forces. The new plan would reduce operating and support costs slightly below those of Option II as a result of the delay in achieving the 40 wings. But investment costs would be higher than those associated with Option II. As Option II exceeded 5 percent real growth by \$2.2 billion, the new program would certainly exceed it as well.

APPENDIX B. MODEL METHOD

Projecting aircraft inventories requires a model that accounts for numerous details about Air Force plans. This appendix describes the CBO model used in this analysis.

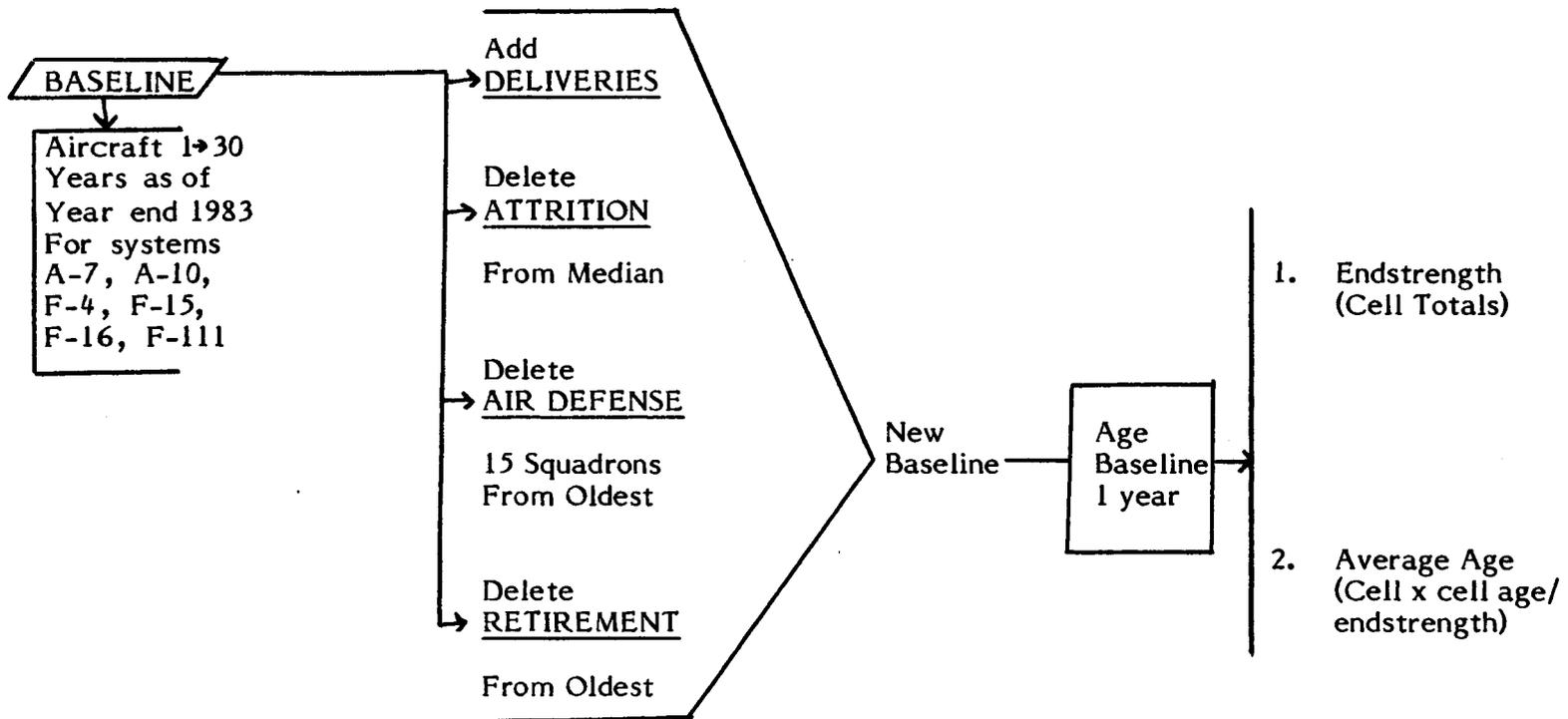
The model starts with an inventory as of the end of fiscal year 1983 provided by the Air Force (see Figure B-1). To this baseline, aircraft deliveries, dependent upon procurement schedules, are added. Air Force delivery schedules--which lag about two years behind procurements--were used. Several kinds of deletions from inventory are then made. First, in any year the Air Force can expect to lose aircraft because of accidents; in fiscal year 1982, for example, 52 tactical aircraft were lost. Planning factors from the Air Force based upon historical rates--and based upon hypothesized flying levels, also from the Air Force--were used to delete these "attrition" aircraft. ^{1/}

Second, as the inventory also supplies aircraft for strategic defense interceptors, these aircraft are deleted to meet the Air Force's expressed goals for modernization of those forces. Specifically, the Air Force has indicated that it intends its strategic interceptor force to be composed entirely of F-15 and F-16 aircraft by 1990. There are 15 squadrons, with 18

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1. There is some controversy over whether the attrition rates that the Air Forces uses are accurate or not. Over the past several years, the General Accounting Office (GAO) has published several reports indicating that averaging historical attrition rates, as the Air Force has done, captures the higher attrition rates typically associated with the early years of introduction of an aircraft to the fleet, thus inflating the rates when they are applied to mature aircraft. As attrition forms a relatively small portion of those factors influencing the inventory, and as the results of this analysis are fairly insensitive to small changes to them, CBO accepted the Air Force planning factors. For more in depth information on the subject, see Statement of Werner Grosshans, GAO, Planning Director, National Security and International Affairs Division, before the Subcommittee on Legislation and National Security, House Committee on Government Operations (June 2, 1983); and Report to the Congress by the Comptroller General of the United States, The Congress Should Require Better Justifications of Aircraft for Noncombat Missions (July 22, 1980).



FIGURE B-1. MODEL METHOD



aircraft each, in the strategic force, and the mix of the two aircraft was assumed to be 8 squadrons of F-15s and 7 squadrons of F-16s. For the purposes of this analysis, enough F-15s and F-16s to modernize these squadrons were removed from the inventory on the basis of a schedule that was kept constant for all alternatives. This modernization schedule could be slowed should procurement be reduced.

Finally aircraft are deleted based upon the assumed retirement age; this age was varied in some of the options to meet force requirements. According to the Air Force, aircraft are retired either because of obsolescence in face of the threat or because of structural fatigue. As a general principle, the Air Force would like to retire aircraft at 20 years of age, although projected structural service lives for most aircraft far exceed this goal. For example, the F-4E, which has been in the fleet for an average of 15 years, has approximately 17 years of service life remaining. Thus, if the F-4E were retired on the basis of structural fatigue, it would be retained until it was over 30 years old.

But retirement around 20 years may still, in the Air Force's view, be required by the caliber of the Soviet fleet against which U.S. forces would fight. While the Soviet tactical air forces have been larger than U.S. forces for many years, the Air Force has maintained that qualitative differences--such as greater maneuverability, longer-range radar and missiles, and so forth--would improve U.S. chances against a numerically superior force. Press reports have indicated that three Soviet aircraft entering the fleet now or within the next few years--the Sukhoi SU-27 Flanker, Mikoyan MIG-29 Fulcrum, and the MIG-31 Foxhound--have a qualitative edge over older U.S. aircraft, and potentially have as good an aerodynamic performance as the F-15s and F-16s. If this proves to be true, obsolescence in face of an increasingly capable threat might require replacing older aircraft with more capable, younger F-15s and F-16s, and speeding development of the Advanced Tactical Fighter.

All these additions and deletions translate the end-1983 baseline into an estimate of strength at the end of fiscal year 1984 (the new "end-strength"). This procedure was repeated for each year through the year 2000.

The model also calculates the average age of the fleet. ^{2/} The Air Force has used average age as a proxy for capability, indicating that it

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2. The calculation of average age assumes that aircraft are at the mid point of their age "cell." Thus aircraft that are between zero and one years of age at the end of a year are assumed to be one-half years old.

would prefer to keep the average age of the inventory at no more than ten years. This is simply a different way of looking at the 20-year retirement goal discussed earlier. This proxy was included in the analysis to display any aging effects associated with the different options.

