Air Reserve Personnel Study: Volume III. Total Force Planning, Personnel Costs, and the Supply of New Reservists

Bernard Rostker

A Report prepared for
UNITED STATES AIR FORCE PROJECT RAND
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This report was prepared as part of Rand's Manpower, Personnel, and Training Program, sponsored by the United States Air Force. It is the third in a series presenting work done under the Air Reserve Forces Personnel Study. The study, which was initiated at the request of the Deputy Chief of Staff/Personnel, Headquarters, United States Air Force, is designed to explore the implications of a changing personnel environment on the airmen personnel structure of the Air Reserve Forces. This report examines recruiting and personnel costs for the Air Reserve Forces in the new draft free environment. The findings should be useful in planning for the reserve forces in the absence of the draft and in the context of total force planning.

The present series of reports represents a continuing effort on the part of The Rand Corporation to consider problems relating to the future of the Air Reserve Forces. Thus far the series consists of the following reports:

Vol. I. The Personnel Structure and Posture of the Air National Guard and the Air Force Reserve (R-1049-PR)

Vol. II. The Air Reserve Forces and the Economics of Secondary Labor Market Participation (R1254-PR)

Vol. III. Total Force Planning, Personnel Costs, and the Supply of New Reservists (R-1430-PR)

Vol. IV. Personnel Shortages and Combat Capability (R-1459-PR)
SUMMARY

The year 1970 held the hope of being one of the most promising in the history of the reserve forces of the United States. In that year the Gates Commission concluded that an all-volunteer reserve was not only desirable but feasible. Furthermore, the concept of total force planning was seen as a means of increasing the role of a cost-effective reserve. By 1973 the hope of an expanded role had faded, as major recruiting problems and personnel shortages developed in the wake of the end of the military draft. This report examines recruiting and personnel costs for the Air Reserve Forces in the new draft free environment. It applies an economic model to the draft period 1968-1969 as a means of understanding the effect that a zero draft has, and will continue to have, on the supply and cost of reserve personnel.

The analysis of the supply of new reservists under the draft is similar to that of any moonlighting situation, except that the draft and the chance of reserve mobilization induce uncertainty into calculations of the various expected wage rates that presumably affect people's behavior. In general, the institution of the draft has the effect of encouraging people to join the reserves. The net benefit to a person from joining the reserves is made up of (a) the money payment he gets from participating in the program, (b) the value from protection of his civilian income, since enlistment in the reserves precludes being drafted, and (c) an adjustment for the probability of reserve mobilization.

The effect of changes in the supply of military personnel with respect to changes in civilian and military incomes is generally estimated using data generated in a period when there was a positive probability of being drafted. While this has also been done in the present study, straightforward interpretation of the statistical results is not possible here, since the partial derivative of the reserve enlistment rate with respect to nominal civilian earnings is not invariant with respect to the probability of being drafted. However, an appropriate adjustment can be made.
The empirical results suggest that the long-range effect of ending the draft is to alter the economic incentives that previously favored participation in the reserves. Most notable is the shift in sign, from positive to negative, of the partial derivative (and elasticity) of the enlistment rate with respect to civilian earnings, as one moves from a draft to a zero draft situation. The results show that, in the draft period of the late 1960s, higher reserve and civilian earnings encouraged reserve enlistment. In a zero draft period, however, the reserve supply curve is forward sloping with respect to the reserve wage rate and backward bending with respect to civilian earnings.

The long-range effect of ending the draft is to change the incentive structure that previously fostered reserve participation. Future enlistments will depend upon the future level of reserve and civilian pay. The critical problem caused by the end of the draft can best be appreciated by comparing projected accessions, using the model developed in this report, with projected requirements for new nonprior service airmen. The following table shows priority accessions required to maintain an Air Reserve Force of approximately 113,000 airmen through 1976. Assuming a 6 percent yearly rate of wage inflation for both the civilian and reserve sectors, the yearly shortage will range between 65 and 67 percent. To counter this projected shortage, reserve earnings would have to more than double.

**REQUIREMENTS AND PROJECTED ACCESSIONS**

<table>
<thead>
<tr>
<th>Year</th>
<th>Required Priority Enlistments</th>
<th>Civilian Earnings Index 1968-1969 = 100</th>
<th>Reserve Earnings Index 1968-1969 = 100</th>
<th>Projected Priority Accessions</th>
<th>Percent Shortage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1973</td>
<td>13,000</td>
<td>134</td>
<td>207</td>
<td>4,040</td>
<td>69</td>
</tr>
<tr>
<td>1974</td>
<td>12,000</td>
<td>142</td>
<td>219</td>
<td>3,940</td>
<td>67</td>
</tr>
<tr>
<td>1975</td>
<td>11,000</td>
<td>150</td>
<td>232</td>
<td>3,860</td>
<td>65</td>
</tr>
<tr>
<td>1976</td>
<td>16,000</td>
<td>159</td>
<td>246</td>
<td>3,760</td>
<td>77</td>
</tr>
</tbody>
</table>
The findings in this report clearly indicate that under present pay and utilization policies the Air Reserve Forces cannot staff their units. Economic incentives—that is, wage increases—can be used to encourage new enlistments. However, the increases would have to be so large that reserve units may no longer be able to compete against active units for scarce defense dollars, especially since the active Air Force is having little trouble enlisting personnel at the prevailing wage rates. Therefore, under total force planning concepts, reserve units would lose their cost-effectiveness edge if they attempted to use traditional economic incentives.

In the future the reserves must find new means to improve the efficiency of their recruiting effort. Moreover, they should reexamine the manning of reserve units and their stated requirements for nonprior service airmen. It is likely that, if the increased cost of reserve personnel is taken into account in the force planning process, the future personnel structure of the Air Reserve Forces will be quite different from the one developed during the draft era and continued today. If force planners fail to react to the new zero draft environment, it is likely that the reserves cannot be staffed; and reserve units will cease to be a cost-effective addition to the United States Air Force.
ACKNOWLEDGMENTS

The author is indebted to Julie DaVanzo, Glenn Gotz, Gus Haggstrom, Gary Nelson, and Robert Shishko of Rand, and Arnold Moore of the Center for Naval Analyses, for criticism of early drafts of this report. The author, of course, accepts final responsibility for the report contents.
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I. INTRODUCTION

BACKGROUND

The year 1970 held the hope of being one of the most promising in the history of the reserve forces of the United States. From an era of neglect during the Viet Nam War, the reserve forces looked forward to a new role in the country's defense. In February, the President's Commission on an All-Volunteer Armed Force (commonly called the Gates Commission after its Chairman, former Secretary of Defense Thomas Gates) published its long awaited report. In it they concluded that an All-Volunteer Armed Force, including the reserve forces, not only was desirable but was also feasible. In August, then Secretary of Defense Melvin Laird published a policy letter calling for the "planning, programming, manning, equipping and employing of the Guard and Reserve Forces" within the context of a "total force concept." By 1973 the hope of an expanded role for the reserves had faded as major recruiting problems and personnel shortages developed in the wake of the end of the military draft. This report examines recruiting and personnel costs for the Air Reserve Forces in the new draft free environment. It applies an economic model to the draft period 1968-1969 as a means of understanding the effect that a zero draft has and will continue to have on the supply and cost of reserve personnel. This information is important in the continuing efforts to plan for the reserve forces in a zero draft environment and in the context of total force planning.

THE AIR RESERVE FORCES AND THE TOTAL FORCE CONCEPT

The Gates report and the total force concept are interrelated. The Gates Commission considered the availability of personnel at various force levels and at various rates of pay. In planning for the future reserve force, under the total force concept, a major factor

*The report of the President's Commission on an All-Volunteer Armed Force (The Gates Report), February 1970.
†The term Air Reserve Forces or reserves refers collectively to the Air National Guard and the Air Force Reserve.
which determines the cost-effective mix of reserve and active units is the availability and cost of personnel. Personnel costs are important in determining force size under the total force concept.

Unfortunately, the cost analysis included as part of most force planning decisions generally assumes that there is an inexhaustible supply of personnel at the prevailing wage rate—that is, the labor supply curve is infinitely elastic. Although this may be adequate for micro decisions, it is not appropriate for major force planning decisions. To some extent this is understandable. Before 1973 the draft guaranteed the supply of young men for both active and reserve forces. As a result, force planning decisions were not considered an important determinant of manpower costs. However, the end of the draft forced the military to compete in the nation's labor markets. Force planners must now recognize that their decisions are major factors in determining both the average and marginal costs of personnel. In the zero draft environment, manpower becomes an increasingly expensive resource as total force size increases. Therefore, before major force planning decisions can be made on the future structure of reserve and active units it is necessary to determine under what conditions and at what cost the reserves will be able to staff their units.

THE AIR RESERVE FORCES AND THE GATES COMMISSION

While the Gates Commission clearly saw the link between personnel costs and force size in a zero draft environment, their analysis failed to accurately predict the problems in recruiting young men to join reserve units that have developed since the draft has ended. In fact, the Commission noted, "Research . . . indicated that planned reserves can be maintained on an all-volunteer basis at reasonable levels of compensation."* They did hedge by noting, "Given the uncertainty which surrounds projections of reserve enlistment and losses . . . further steps beyond the recommended pay increases may be necessary."†

From a technical sense the conclusion of the Gates Commission was

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†The Gates Report, pp. 116-117.
based on two major flaws. First, the conclusions relied upon a sensitivity analysis and questionable assumptions concerning the effects of a change in military pay and population on reserve enlistment. They assumed a pay elasticity of between 0.8 and 1.25 for the entire reserve force, the latter number being the estimated active duty pay elasticity and the former being the estimated active duty reenlistment pay elasticity. The elasticity with respect to population was assumed to be unity. Furthermore, the civilian and military pay elasticities were assumed to have the same absolute value, differing only in sign. It will be shown below that, at least for the Air Reserve Forces, the absolute value of the civilian pay elasticity is greater than that of the military pay elasticity, and the population elasticity is less than unity.

Second, the Commission did not provide separate estimates or projections for the various reserve force components. This limited the usefulness of the work since it is known that elasticity estimates for the active force differ by Service. The implications of a given pay increase for the various reserve components are likely to be different.

**PLAN OF THE REPORT**

This report attempts to provide better estimates of the effect of the draft and of civilian and military pay on reserve enlistments. It attempts to provide information on the cost of reserve personnel that can be used by force planners in determining the appropriate mix of reserve and active units within the context of the total force concept. Section II presents an economic model of reserve force participation. The analysis of the supply of reservists under the military draft is similar to any moonlighting situation except that the draft and the chance of reserve mobilization result in uncertainty in the implicit calculations of the various expected values that are assumed to have an effect on decisions. Section III presents the statistical model and results obtained from fitting the reserve supply function to the

1968-1969 data for specific ("priority") age groups. Section IV applies the results of the statistical model by projecting reserve priority accessions at various levels of military and civilian pay for the period 1973 through 1976. The major conclusions are:

1. Reserve priority enlistments for 1973 are likely to be higher than expected, given the 1972 Selective Service lottery experience. However, they are likely to be less than projected enlistments based upon the economic model estimated here.

2. Assuming present utilization of nonprior service airmen, yearly enlistment shortfalls will range between 65 and 77 percent.

3. Even if utilization were changed so that only 30 percent of the force was made up of nonprior service airmen, the average shortfall would be 40 percent. Even to meet this reduced requirement an increase in reserve earnings of about 20 percent would be necessary.

The final section points out the importance of this type of research for total force planning and for determining the future role of reserve forces.
II. THE ECONOMICS OF RESERVE FORCE PARTICIPATION

THE EFFECTS OF THE DRAFT

The analysis of the supply of reservists under the military draft is similar to any moonlighting situation except that the draft and the chance of reserve mobilization result in uncertainty in the calculation of the various expected wage rates.*

Each individual may be viewed as facing three options: (1) enlisting in the military with earned income M; (2) entering the civilian labor force with expected earned income W; or (3) entering the civilian labor force and joining the reserves with expected total income T. The net income gain (R) from joining the reserves, which is the difference between T and W, can be shown under various assumptions about the probability of being drafted and the probability of the reserves being mobilized. For example, if we assume a single multiyear time period, and if \( \pi \) is the probability of being drafted and \( \delta \) is the probability of reserve mobilization, then in the present zero draft and zero mobilization situation (\( \pi = 0, \delta = 0 \)) the expected income consequence of various employment options is:

Case I \( \pi = 0, \delta = 0 \)

<table>
<thead>
<tr>
<th>Option</th>
<th>Expected Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joining the active military</td>
<td>( M = m )</td>
</tr>
<tr>
<td>Taking a civilian job</td>
<td>( W = w )</td>
</tr>
<tr>
<td>Taking a second reserve job</td>
<td>( T = w + r )</td>
</tr>
</tbody>
</table>

where \( m = \) military active duty money income,
\( w = \) civilian money income,
\( r = \) reserve money income.

The net gain from joining the reserves (R) is r.
If, as has been true through most of the post-war period, there is a positive probability of being drafted (π > 0) then:

Case II \[ \pi > 0, \quad \delta = 0 \]

<table>
<thead>
<tr>
<th>Option</th>
<th>Expected Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joining the active military</td>
<td>( M = m )</td>
</tr>
<tr>
<td>Taking a civilian job</td>
<td>( W = w(1 - \pi) + m\pi )</td>
</tr>
<tr>
<td>Taking a second reserve job</td>
<td>( T = w + r )</td>
</tr>
</tbody>
</table>

In this case the net gain from joining the reserves (R) is:

\[ (w + r) - [w(1 - \pi) + m\pi] = r + \pi(w - m) \]

For completeness we should also consider that a reserve unit has the possibility of mobilization (δ > 0). In that case

Case III \[ \pi > 0, \quad \delta > 0 \]

<table>
<thead>
<tr>
<th>Option</th>
<th>Expected Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joining the active military</td>
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</tr>
<tr>
<td>Taking a civilian job</td>
<td>( W = w(1 - \pi) + m\pi )</td>
</tr>
<tr>
<td>Taking a second reserve job</td>
<td>( T = (w + r)(1 - \delta) + m\delta )</td>
</tr>
</tbody>
</table>

In this case the net gain from joining the reserves (R) is:

\[ (1 - \delta)r + (\pi - \delta)(w - m) \]

In sum, the net benefit a person derives from joining the reserves is made up by (a) the money payment he gets from participating in the program (r), (b) the value from protecting his civilian income, since enlistment in the reserves precludes being drafted (π[w - m]), (c) an adjustment for the probability of reserve mobilization (δ[m - w - r]).
In general, the institution of the draft has the effect of encouraging people to join the reserves. Presumably, people's behavior results from consideration of expected, rather than nominal values. Even though young men are not drafted directly into the reserves since \( w > m \) and \( n > \delta \) in the late 1960s, in that period the presence of the draft resulted in \( w > W \) and \( R > r \). An increase in \( w \) resulted in an increase in both \( W \) and \( R \). In effect, the draft discounted the effect of civilian earnings and inflated the effect of reserve pay.

**ESTIMATING THE RESERVE SUPPLY CURVE**

The effect of changes in the supply of military personnel with respect to changes in civilian and military incomes has generally been estimated using data generated in a period when there was a positive probability of being drafted. Characteristic of earlier studies of active duty enlistment is the following equation:

\[
E = b_0 + b_1 r + b_2 w + b_3 w. 
\]

\( E \) = enlistments/population.

Most studies assume that the effect of the draft is simply \( b_3 (\partial E / \partial r) \) and that \( b_1 \) and \( b_2 (\partial E / \partial r \) and \( \partial E / \partial w) \) are constant regardless of the level of \( n \). However, it can be shown that, based upon the expected values as formulated above, \( \partial E / \partial w \) is not invariant with respect to \( n \). Therefore, the method used to analyze active duty enlistments would be inappropriate for analysis of reserve enlistments.

The relationship between \( n \), and \( \partial E / \partial r \) and \( \partial E / \partial w \) can be developed as follows: If the underlying reserve supply curve

\[
E = F(R, W) \quad (1)
\]

---

where $R = (1 - \delta)r + (\pi - \delta)(w - m)$,  
$W = w(1 - \pi) + mw$

can be approximated by

$$E = a_0 + a_1W + a_2R$$  \hspace{1cm} (2)

then $\partial E/\partial W$ and $\partial E/\partial R$ are independent of $\pi$. However,

$$\frac{\partial E}{\partial w} = \frac{\partial E}{\partial R} (\pi - \delta) + \frac{\partial E}{\partial W} (1 - \pi)$$  \hspace{1cm} (3)

is not independent of $\pi$, while

$$\frac{\partial E}{\partial r} = \frac{\partial E}{\partial R} (1 - \delta)$$  \hspace{1cm} (4)

is independent of $\pi$. Moreover, if one can estimate $\partial E/\partial r$ and $\partial E/\partial w$ for some value of $\pi$ ($= \pi_0$) and $\delta$ ($= \delta_0$) then one should be able to solve for $\partial E/\partial r$ and $\partial E/\partial w$ in a zero draft situation ($\pi = 0$).

For example, if we estimate

$$E = b_0 + b_1w + b_2r$$  \hspace{1cm} (5)

during a draft period when $\pi = \pi_0$ and $\delta = \delta_0$, then from (3) and (4)

$$b_1 = \frac{\partial E}{\partial w} = \frac{\partial E}{\partial R} (\pi_0 - \delta_0) + \frac{\partial E}{\partial W} (1 - \pi_0)$$  \hspace{1cm} (6)

$$b_2 = \frac{\partial E}{\partial r} = \frac{\partial E}{\partial R} (1 - \delta_0)$$  \hspace{1cm} (7)

*The partial $\partial E/\partial w$ could be independent of $\pi$ if

$$E = a_0 + a_1(R - W)$$

However, the mathematical conditions for independence are not only that $\partial^2 E/\partial R \partial \pi = 0$ and $\partial^2 E/\partial W \partial \pi = 0$ but also that $\partial E/\partial R = \partial E/\partial W$, which is most unlikely.
Solving for $\frac{\partial E}{\partial r}$ and $\frac{\partial E}{\partial \omega}$ in terms of $\frac{\partial E}{\partial \omega}$ and $\frac{\partial E}{\partial r}$,

$$\frac{\partial E}{\partial r} = \frac{1}{1 - \delta_0} \left[ \frac{\partial E}{\partial r} \right]$$  \hspace{1cm} (8)

$$\frac{\partial E}{\partial \omega} = \frac{1}{1 - \pi_0} \left[ \frac{\partial E}{\partial \omega} \right]$$


$$\frac{\partial E}{\partial r} = \frac{\frac{\partial E}{\partial r}}{1 - \delta_0} - \left[ \frac{\partial E}{\partial \omega} \left( \frac{\frac{\partial E}{\partial \omega}}{1 - \delta_0} \right) \right] \right].$$  \hspace{1cm} (9)

Then since $\frac{\partial E}{\partial r}$ and $\frac{\partial E}{\partial \omega}$ are independent of $\pi$ and since we know $\frac{\partial E}{\partial r}$ and $\frac{\partial E}{\partial \omega}$ for $\pi = \pi_0$, then for $\pi = 0$

$$\frac{\partial E}{\partial r} = \frac{\partial E}{\partial r} \left( 1 - \delta_0 \right),$$  \hspace{1cm} (10)

and substituting (8)

$$\frac{\partial E}{\partial r} = \frac{\partial E}{\partial r}.\right]$$

In addition, since

$$\frac{\partial E}{\partial \omega} = \left( \frac{\partial E}{\partial r} \times -\delta_0 \right) + \frac{\partial E}{\partial \omega}$$  \hspace{1cm} (12)

and substituting (8) and (9)

$$\frac{\partial E}{\partial \omega} = - \frac{\partial E}{\partial \omega} \times \delta_0 + \frac{1}{1 - \pi_0} \left[ \frac{\partial E}{\partial \omega} - \left( \frac{\partial E}{\partial \omega} \times \frac{\pi_0 - \delta_0}{1 - \delta_0} \right) \right].$$

Or in terms of Eq. (5) for $\pi = \pi_0$

$$\frac{\partial E}{\partial \omega} = b_1 \text{ and } \frac{\partial E}{\partial r} = b_2;$$

however, for $\pi = 0$

$$\frac{\partial E}{\partial \omega} \neq b_1 \text{ and } \frac{\partial E}{\partial r} = b_2.$$
In other words, the coefficients estimated from Eq. (5) would equal their respective partial derivatives only when the probability of being drafted was \( \pi_0 \), the probability observed in the data. In a zero draft situation, the partial derivatives with respect to nominal civilian wages would not equal the estimated coefficient \( b_1 \), but would equal Eq. (13).

**ESTIMATES OF \( \pi \) AND \( \delta \)**

The lack of information on the expected distribution of \( \pi \) and \( \delta \) precludes direct estimation of \( \partial E/\partial W \) and \( \partial E/\partial R \). Since the reserve commitment is six years, the distribution of expected values of \( \pi \) and \( \delta \) over time would be necessary to estimate \( W \) and \( R \) as the present value of six years of civilian and reserve earnings.

The distribution of \( \pi \) will depend upon local draft board policies, national deferment policies, and overall draft calls. In the late 1960s, a time for which enlistment data are available and for which the reserve supply model will be estimated, draft calls were very high and most deferments had been eliminated. Moreover, the Selective Service policy of inducting the oldest qualified individual first resulted in a cumulative probability of being drafted approaching unity. This suggests that, although an individual might not be able to determine the exact probability that he would be in the Army in any given year, he should have expected that in the very near future he would be drafted and would serve two years on active duty. In such a case \( \pi_0 \) would equal the cumulative probability of being drafted (1.0) multiplied by the time he could expect to serve on active duty (two years), compared with a tour in the reserve (six years) 2/6. Therefore, \( \pi_0 \) would be equal to 0.33.

Furthermore, the probability of mobilization in the late 1960s was extremely small. Guard and Reserve units were not widely used in Southeast Asia, and those called up during the "Pueblo" crisis served a fairly short time. For simplicity, we will assume that the probability of mobilization is zero, and thus in a zero draft environment

\[
\frac{\partial E}{\partial w} = \frac{1}{0.66} \left[ \left( \frac{\partial E}{\partial w} - \frac{\partial E}{\partial r} 0.33 \right) \right]
\]  
(14)
\[ \frac{\partial E}{\partial r} = \frac{\partial E}{\partial r} \quad (15) \]

or in terms of Eq. (5)

\[ \frac{\partial E}{\partial w} = \frac{1}{0.66} \left[ b_2 - (b_1 \times 0.33) \right] \quad (16) \]

\[ \frac{\partial E}{\partial r} = b_1 \quad (17) \]
III. THE SUPPLY OF RESERVISTS

THE STATISTICAL SUPPLY FUNCTION

Based upon the previous discussion, the following supply equation was estimated using least-squares regression

\[ E_{a,s,t} = b_0 + b_1 w_{a,s,t} + b_2 r_{a,s,t} + b_3 p_{a,s,t} \]

\[ + \sum_{i=4}^{8} b_i A_{1-3} + \sum_{i=9}^{13} b_i R_{1-8} \]

where

- \( a \) = age group
- \( s \) = state of residence
- \( t \) = time period
- \( E_n \) = enlistee-applicant
- \( E \) = \( E_n / \overline{P} \)
- \( P \) = qualified and eligible population*
- \( r \) = present value of reserve cash income*
- \( w \) = present value of civilian cash income*
- \( A \) = age dummy
- \( R \) = region dummy

\[ \frac{\partial \hat{E}}{\partial w} = \frac{1}{.66} [b_2 - (b_1 \times 0.33)] \]

\[ \frac{\partial \hat{E}}{\partial r} = b_1 \]

DATA

Enlistee-Applicants

One of the most critical problems in estimating the supply of reservists is simply measuring the number of young men who were willing to join the reserves. The reserves keep records on the number of

*Per 1000 units.
nonprior service airmen they enlist. However, in the recent past there
has been an excess of applicant over the number of available positions,
and the total numbers assessed have been less than the available sup-
ply. Therefore, direct measurement of the "true" supply of new airmen
is not possible. However, careful analysis of the mechanism by which
the available positions were rationed make it possible to measure the
"true" supply of at least a portion of the eligible population.

In 1967, the Department of Defense established a rationing system
based on "priorities" for the "assignment of applications to vacancies
in units of the Ready Reserve." Within the nonprior service class of
applicants, priority was given to applicants between the ages of 17 and
18-1/2. Applicants over the age of 18-1/2 who did not have prior mili-
tary service could be enlisted only "after the unit commander concerned
has determined that qualified applicants in high priority categories
are not available." Furthermore, the regulation states, "Within the
above priorities, it shall be normal practice to accept the earliest
applicant for enlistment."*

In 1968, reserve enlistment policy was revised. Priority consid-
eration for nonprior service airmen was given first to applicants be-
tween the ages of 17 and 18-1/2 and second to applicants between the
ages of 18-1/2 and 20. Applicants over age 20 were required to wait
until all qualified applicants in higher priority classes had been en-
listed. Within each priority class qualified applicants were still
enlisted in chronological order of their application.

Appendix A presents a model of the priority rationing system based
upon stated policy. This model shows that the "true" supply of appli-
cants from the higher priority class for the $T - 1$ (six-month) time
period can be approximated as the actual enlistees in period $T$, since
in each six month period between 1967 and 1970, members of the lower
priority class were enlisted. Therefore, the supply of applicants for
the higher priority class was estimated by assuming no attrition from
the waiting list and an initial application-enlistment lag of six months.

Enlistments themselves had to be estimated, since published reserve

records do not identify enlistees by age cohort or geographic location. Enlistments for FY 1968 and FY 1970 were obtained by identifying non-
prior service airmen and their dates of enlistment from the 30 June
1970 Uniform Airmen Record computer tape file. This procedure may un-
derestimate the number of enlistments, and thus applicants, if large
numbers of airmen were enlisted in FY 1969 or FY 1970 and were dis-
charged before 30 June 1970.

Total applicants for the Air Reserve Forces were disaggregated into
432 cells, providing a like number of units of observation for the sta-
tistical analysis. Each cell contained the number of high priority ap-
plicants for a six-month period for each of 36 state aggregates. Be-
cause of the assumed six-month lag between application and enlistment,
the time period covered is CY 1968 and CY 1969. In CY 1968 the high
priority age group (17 through 18-1/2) was divided into six-month age
cohorts, resulting in 216 observations. In CY 1969 a second high pri-
ority class was established—ages 18-1/2 through 20. This would nor-
mally have resulted in 432 new observations. However, enlistments in
the first half of CY 1970 for ages over 19 were excluded from the anal-
ysis because they would have received their selective service lottery
number and the model presented here would not reflect their behavior.

Since each cell represents only a small portion of the total ap-
plicants, the prediction of the total high priority supply is equal to:

\[
\text{Total high priority supply} = \text{maximum number of priority age}
\text{groups in sample (6) } \times \text{number}
\text{of state aggregates (36) } \times \text{num-
ber of period per year (2)} \times \text{pre-
diction of applicants per}
\text{cell.}
\]
\[
= 432 \times \text{prediction of applicants}
\text{per cell.}
\]

In the period of analysis, CY 1968-1969, there was an average of
30.08 applicants per unit of observation, with an average total high
priority supply of 13,000 airmen.
Qualified and Eligible Population

Population was explicitly entered into the analysis as an independent variable to test the hypothesis that the elasticity of supply with respect to population was one. This also eliminated the possibilities of heteroscedasticity. Age and regional dummy variables were added to control for the different labor market conditions throughout the country and among different age cohorts.

The qualified and eligible population for each cell was estimated from the 1970 Census by working backward to obtain population figures for each age cohort in the period CY 1968-1969—that is, a person 20 years of age in 1970 was assumed to belong to the 18 years of age cohort in 1968. This, of course, neglects mortality and migration. Total population was adjusted to obtain eligible population in several ways. First, the eligible population was restricted to white males. In the period under study over 99 percent of enlistees were male, and 98 percent were white. (Restricting the population for analysis does not imply that in the future large numbers of reservists could not be recruited from female and nonwhite groups. However, including these groups in the analysis would have overstated the actual population from which reservists were taken.)

Second, population was obtained for only the county in which a reserve unit was located. Air Force regulations state that to be considered for enlistment an applicant must live within 100 miles of the unit he wishes to join. Since it was not possible to calculate the eligible population in terms of geographic distance from units, the county in which reserve units were located was used as a proxy. In fact, 34.72 percent of the nation's white male population live in counties that host Air Reserve units.

Finally, eligible population was adjusted to take account of the physical and mental standards of the Air Reserve Forces. The combined Selective Service pre-induction and induction physical and mental test results, corrected for year, state, and race, were used to obtain the "qualified and eligible" population.
The Present Value of Civilian Income

The present value of civilian income \((w)\) was estimated as follows:

\[
w_{a,s,t} = \bar{w}_{a,s,t} + \sum_{i=1}^{5} \frac{\bar{w}_{a+i,s,t+i}(1 + g)^i}{(1 + d)^i}
\]

where \(\bar{w}\) = mean civilian income,
\(g\) = civilian income inflation factor,
\(d\) = discount rate.

The mean civilian income was calculated from the March 1969 and 1970 Consumer Population Survey. This shows income for the period 1968 and 1969 and permitted disaggregation by age cohort and state. The civilian inflation factor was assumed to be 6 percent per year, and the time preference discount rate was assumed to be 10 percent per year.

The Present Value of Reserve Income

The present value of reserve income \((r)\) was estimated as follows:

\[
r_{a,s,t} = \bar{r}_{l,t} - w^*_{a,s,t} + \sum_{i=1}^{5} \frac{\bar{r}_{l+1,t+i}(1 + h)^i}{(1 + d)^i}
\]

where \(\bar{r}\) = mean reserve income,
\(h\) = reserve inflation factor,
\(w^*\) = civilian income lost during the five months of initial training.

The mean reserve income for each of the six years of reserve service was calculated by assuming the historical promotion rate and adjusting for the average number of days of reserve drill in each time period and the loss of civilian earnings during the initial five-month training period. It was also assumed that reservists expected future pay raises equal to the average raise in the period preceding their application. The stream of earnings was discounted back to the present by assuming a 10 percent discount rate.
Age Group and Region

The effect that the various age groups and geographic regions have on supply was considered with the use of binary (or dummy) variables. Six age groups were explicitly considered, 17 through 19 in half-year increments. The nine standard Census subregions were also used. The results reported in Table 1 show only the statistically significant regional dummy variables.

Table 1

<table>
<thead>
<tr>
<th>Reserve Supply Function</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population(^a)</td>
<td>-0.30270</td>
<td>0.03279</td>
<td>7.700</td>
</tr>
<tr>
<td>Present value of civilian income(^a)</td>
<td>0.00362</td>
<td>0.00068</td>
<td>17.540</td>
</tr>
<tr>
<td>Present value of reserve income(^a)</td>
<td>0.00058</td>
<td>0.00013</td>
<td>2.394</td>
</tr>
<tr>
<td>Age cohorts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17-17(\frac{1}{2})</td>
<td>3.103</td>
<td>1.635</td>
<td></td>
</tr>
<tr>
<td>17(\frac{1}{2})-18</td>
<td>8.717</td>
<td>1.635</td>
<td></td>
</tr>
<tr>
<td>18-18(\frac{1}{2})</td>
<td>10.158</td>
<td>1.296</td>
<td></td>
</tr>
<tr>
<td>18(\frac{1}{2})-19</td>
<td>7.691</td>
<td>1.536</td>
<td></td>
</tr>
<tr>
<td>19-19(\frac{1}{2})</td>
<td>-3.922</td>
<td>1.439</td>
<td></td>
</tr>
<tr>
<td>Region</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New England</td>
<td>-3.9217</td>
<td>0.0887</td>
<td></td>
</tr>
<tr>
<td>South Atlantic</td>
<td>1.1997</td>
<td>0.7448</td>
<td></td>
</tr>
<tr>
<td>East South Central</td>
<td>-1.6422</td>
<td>0.9428</td>
<td></td>
</tr>
<tr>
<td>West South Central</td>
<td>7.0922</td>
<td>0.9888</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>-16.59</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:** \(R^2 = 0.4269\), Standard Error = 6.104, DF = 527, \(F = 32.71\), Mean = 6.66.

\(^a\)Per 1000 units.

RESULTS---Supply of Reservists when \(\pi = \pi_0\)

The standard statistical techniques of least squares regression were used to estimate the model. The results are presented in Table 1. In a draft situation, reserve income and civilian income are positively
and significantly (.001 probability level) related to the number of reserve applicants. Similarly, significant positive relationships were found for the age groups that coincide with high school graduation. This would indicate that the most likely time a young man will apply for reserve service is immediately after he graduates from high school. The regional variables also show two significant results. They indicate that the best recruiting area is the "west-south central" census region, which is dominated by the State of Texas. The worst recruiting region is the "northeastern" United States.

The effect that population has on reserve enlistment is illustrated in two ways. First, results directly show a significantly negative relationship between the propensity to enlist and population. Small population areas appear to enjoy a greater relative acceptance of the reserves. However, if we evaluate $\partial En/\partial P$ at the mean of all independent variables, then an increase in population will result in an increase in enlistments—that is, $\partial E/\partial P = -0.3027$, but at the mean $\partial En/\partial P = 4.33$. *

If

$$E = a + bP + cZ,$$

where $E = En/P$,

$$Z = \text{vector of all other independent variables},$$

then

$$En = aP + bP^2 + cZP$$

or

$$\frac{\partial En}{\partial P} = a + 2bP + cZn$$

$$= a + bP + cZ + bP.$$ Evaluating at the mean of all independent variables

$$\frac{\partial En}{\partial P} = 6.66 + bP$$

$$= 6.66 - 2.33$$

$$= 4.33.$$
IV. THE SUPPLY OF RESERVISTS IN THE ABSENCE OF THE DRAFT

The end of the draft had an immediate and long-run effect on the supply of nonprior service airmen. Immediately after the draft ended the number of young men enlisting in the Air Reserve Forces dropped substantially. In the long run the elimination of the draft altered the incentives that previously encouraged reserve force participation.

IMMEDIATE EFFECT

As early as 1971, analysis of the Selective Service lottery experience indicated that the end of the draft would result in about an 80 percent drop in enlistments. Table 2 presents lottery data for the last six months of 1972—the last period the draft was in effect. The "true volunteer" rate computed from the data varies only slightly by reserve component and supports earlier findings.

An indication of the initial effect of the end of the draft is presented in Table 3. This table shows the 1973 enlistments by calendar quarter and reserve component, and the true volunteer enlistments for the corresponding period in 1972. The 1973 enlistments are assumed to be all true volunteers since the draft was not in effect in that year. The 1972 true volunteers were obtained by applying the true volunteer rate, from Table 2, to total 1972 enlistments. Although there has been a total drop in enlistments from 8792 in 1972 to 3052, the decrease was less than expected based upon an extrapolation of recent lottery experience.

LONG-RANGE EFFECTS

The long-range effect of ending the draft is to alter the economic incentives that favored participation in the reserves. This can be seen most clearly (Table 4) by a comparison of the elasticities and partial derivatives of the enlistment rate with respect to nominal reserve and civilian earnings. Most notable is the shift in sign of the partial and the elasticity of enlistment with respect to civilian earnings as one moves from a draft ($\pi = \pi_0$) to a zero draft ($\pi = 0$).
Table 2
NONPRIOR SERVICE ENLISTMENTS IN
AIR RESERVE FORCES BY LOTTERY
NUMBER, JULY-DECEMBER 1972

<table>
<thead>
<tr>
<th>Lottery Number</th>
<th>Group</th>
<th>ANG</th>
<th>AFRES</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-40</td>
<td>1</td>
<td>838</td>
<td>318</td>
<td>1156</td>
</tr>
<tr>
<td>41-80</td>
<td>2</td>
<td>1194</td>
<td>387</td>
<td>1581</td>
</tr>
<tr>
<td>81-120</td>
<td>3</td>
<td>561</td>
<td>171</td>
<td>732</td>
</tr>
<tr>
<td>121-160</td>
<td>4</td>
<td>48</td>
<td>20</td>
<td>68</td>
</tr>
<tr>
<td>161-200</td>
<td>5</td>
<td>41</td>
<td>15</td>
<td>56</td>
</tr>
<tr>
<td>201-240</td>
<td>6</td>
<td>41</td>
<td>18</td>
<td>59</td>
</tr>
<tr>
<td>241-280</td>
<td>7</td>
<td>45</td>
<td>17</td>
<td>62</td>
</tr>
<tr>
<td>281-320</td>
<td>8</td>
<td>32</td>
<td>12</td>
<td>44</td>
</tr>
<tr>
<td>321-366</td>
<td>9</td>
<td>37</td>
<td>16</td>
<td>53</td>
</tr>
<tr>
<td>Unknown</td>
<td>10a</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>285</td>
<td>127</td>
<td></td>
<td>412</td>
</tr>
<tr>
<td></td>
<td>3122</td>
<td>1101</td>
<td></td>
<td>4223</td>
</tr>
</tbody>
</table>

Estimated percent true volunteer\(^b\) 20.8 24.5 21.9

\(^a\)The enlistees whose lottery numbers were unknown (Group 10) were less than 19 years of age and therefore had not received their lottery numbers at the time of their enlistments.

\(^b\)True volunteer rate =

\[
\left( \frac{1}{6} \sum_{i=4}^{9} G_i \right) \times 9 + G_{10}
\]

\[\sum_{k=1}^{10} C_k\]
Table 3

NONPRIOR SERVICE TRUE VOLUNTEER ENLISTMENTS, 1972-1973

<table>
<thead>
<tr>
<th>Reserve Component</th>
<th>Period</th>
<th>1972&lt;sup&gt;a&lt;/sup&gt;</th>
<th>1973&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air National Guard</td>
<td>January-March</td>
<td>304</td>
<td>381</td>
</tr>
<tr>
<td></td>
<td>April-June</td>
<td>352</td>
<td>564</td>
</tr>
<tr>
<td></td>
<td>July-September</td>
<td>400</td>
<td>596</td>
</tr>
<tr>
<td></td>
<td>October-December</td>
<td>253</td>
<td>564</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>1309</td>
<td>2105</td>
</tr>
<tr>
<td>Air Force Reserve</td>
<td>January-March</td>
<td>207</td>
<td>178</td>
</tr>
<tr>
<td></td>
<td>April-June</td>
<td>116</td>
<td>156</td>
</tr>
<tr>
<td></td>
<td>July-September</td>
<td>142</td>
<td>260</td>
</tr>
<tr>
<td></td>
<td>October-December</td>
<td>131</td>
<td>353</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>596</td>
<td>947</td>
</tr>
<tr>
<td>Total Air Reserve Force</td>
<td>January-March</td>
<td>511</td>
<td>559</td>
</tr>
<tr>
<td></td>
<td>April-June</td>
<td>468</td>
<td>720</td>
</tr>
<tr>
<td></td>
<td>July-September</td>
<td>542</td>
<td>856</td>
</tr>
<tr>
<td></td>
<td>October-December</td>
<td>384</td>
<td>917</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>1905</td>
<td>3052</td>
</tr>
</tbody>
</table>

<sup>a</sup>1972 true volunteer enlistments = total 1972 enlistments times true volunteer rate.

<sup>b</sup>1973 true volunteer enlistments = total 1973 enlistments.

situation. The discussion above and the empirical results show that, in the draft period of the late 1960s, both higher reserve and higher civilian earnings encouraged reserve enlistments. However, in a zero draft period higher civilian earnings are no longer associated with higher reserve enlistments. Moreover, this is consistent with research on the economics of moonlighting—namely that "the (moonlighting) supply curve is forward sloping with respect to the moonlighting wage rate (r) and backward bending with respect to primary earnings (w)."

* Rostker and Shishko, p. 17.
Table 4

DERIVATIVES AND ELASTICITIES: DRAFT AND ZERO DRAFT ENVIRONMENT

<table>
<thead>
<tr>
<th></th>
<th>Draft</th>
<th>Zero Draft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Derivatives</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( \frac{\partial E}{\partial r} )</td>
<td>0.00058</td>
<td>0.00058</td>
</tr>
<tr>
<td>( \frac{\partial E}{\partial w} )</td>
<td>0.00362</td>
<td>-0.000935</td>
</tr>
<tr>
<td>( \frac{\partial E}{\partial p} )</td>
<td>-0.3027</td>
<td>-0.3027</td>
</tr>
<tr>
<td>Elasticities (evaluated at mean)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( e_r )</td>
<td>1.3007</td>
<td>1.3007</td>
</tr>
<tr>
<td>( e_w )</td>
<td>1.5384</td>
<td>-2.460</td>
</tr>
<tr>
<td>( e_p )</td>
<td>-0.347</td>
<td>-0.347</td>
</tr>
</tbody>
</table>

\(^a\)See Eq. (14).

THE SUPPLY OF RESERVISTS IN A ZERO DRAFT ENVIRONMENT

Although the long-range effect of ending the draft is a change in the incentive structure that previously fostered reserve participation, future enlistments will depend upon the future level of reserve and civilian pay. An examination of recent wage changes shows that reserve earnings have increased 107 percent between 1968-1969 (the period for which the empirical model was estimated) and 1973. However, civilian earnings increased by only 34 percent during the same period. If we assume that 20 percent of the average 13,000 priority enlistments (age 17-20) from the 1968-1969 period were true volunteers, about 2600, then applying the zero draft pay elasticities to the 1973 earnings levels would result in a projection of about 4000 priority enlistments in 1973. This is, of course, somewhat greater than the actual enlistments of 3052, as shown in Table 3.
The critical problem caused by the ending of the draft can best be seen by comparing projected accessions with projected requirements for new nonprior service airmen. Table 5 shows priority accessions required to maintain an Air Reserve Force of approximately 113,000 through 1976. Assuming a 6 percent yearly rate of wage inflation for both the civilian and reserve sectors, the yearly shortfall will range between 65 and 77 percent.

Table 5

<table>
<thead>
<tr>
<th>Required Priority Year</th>
<th>Required Priority Year</th>
<th>Projected Priority Year</th>
<th>Percent Shortage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enlistments a</td>
<td>Enlistments a</td>
<td>Enlistments a</td>
<td>Accessions</td>
</tr>
<tr>
<td>1973</td>
<td>13,000</td>
<td>134</td>
<td>207</td>
</tr>
<tr>
<td>1974</td>
<td>12,000</td>
<td>142</td>
<td>219</td>
</tr>
<tr>
<td>1975</td>
<td>11,000</td>
<td>150</td>
<td>232</td>
</tr>
<tr>
<td>1976</td>
<td>16,000</td>
<td>159</td>
<td>246</td>
</tr>
</tbody>
</table>


An alternative that could help reduce the problems likely to result from the projected shortage of new airmen is to reorganize the Air Reserve Forces so as to reduce the future requirement for nonprior service airmen. A proposal currently under study by Air Force personnel planners is to reverse the present (70 percent/30 percent) mix of nonprior service and career airmen. However, if the enlisted force remains at the 113,000 level, the new mix would require a steady-state force of 33,900 airmen. With the current six year enlistment, the number of yearly nonprior service accessions (in the steady state)
would have to average 6552, * with 5900 coming from the priority age group. Under present pay projections, enlistment shortages would range from 41 percent in 1976 to 37 percent in 1973.

A second alternative is to use economic incentives to attract new nonprior service enlistees. Table 6 shows the increases in the reserve earnings index necessary to meet accession requirements. As indicated, even a reduction in requirements accompanying a shift in the present mix of nonprior service and career airmen would require a substantial increase in reserve earnings.

Table 6
RESERVE EARNINGS NECESSARY TO MEET NPS PRIORITY REQUIREMENTS

<table>
<thead>
<tr>
<th>Priority Year Requirement</th>
<th>Civilian Earnings Index</th>
<th>Reserve Earnings Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 70% Nonprior Service/30% Career</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1973 13,000 134 207 471</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1974 12,000 142 219 457</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1975 11,000 150 232 443</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1976 16,000 159 246 607</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. 30% Nonprior Service/70% Career (steady state)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1973 5,900 134 207 261</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1974 5,900 142 219 276</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1975 5,900 150 232 292</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1976 5,900 159 246 309</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Based upon an analysis of nonprior service loss rates which range from a low of 0.0453 in the first year of service to a high of 0.1010 in the fifth year of service. In total, the probability that an entering airman will complete a full tour of service is 0.69. See Rostker, Air Reserve Forces Personnel Study: Volume 1. The Personnel Structure and Posture of the Air National Guard and Air Force Reserve, R-1049-PR, April 1973, p. 40.
V. THE AIR RESERVE FORCES AND TOTAL FORCE PLANNING

The research presented in this report clearly indicates that under present pay and utilization policies the Air Reserve Forces cannot staff their units. Economic incentives—that is, wage increases—can be used to encourage new enlistments. However, the increases would have to be so large that reserve units may no longer be able to compete against active units for scarce defense dollars, especially since the active Air Force is having little trouble enlisting personnel at the prevailing wage rates. Therefore, under total force planning concepts, reserve units would lose their cost-effectiveness edge if they attempt to use traditional economic incentives.

In the future the reserves must look toward new means to improve the efficiency of their recruiting effort. Moreover, they must reexamine the manning of reserve units and their stated requirement for nonprior service airmen. It is likely that if the increased cost of reserve personnel is taken into account in the force planning process, the future personnel structure of the Air Reserve Forces will be quite different from the one developed during the draft era and continued today. If force planners fail to react to the new zero draft environment, it is likely that the reserves cannot be staffed; and reserve units will cease to be a cost-effective addition to the United States Air Force.
Appendix

A MODEL OF NONPRIOR SERVICE PRIORITY APPLICANTS

The basic problem in measuring the "true" supply of reservists is that there are not adequate records on the number of reserve applicants. The following model shows that in at least one case, that of the first priority class of enlistees, sufficient information is available to approximate the "true" supply of the higher priority applicants.

Consider the following model, in which there are two priority classes, a and b. Members of class 'a' are given preference over members of class 'b' in accordance with the published policies of the Department of Defense. Assume that, although a person can make application in time period t, administrative processing results in a delay so that he is not actually enlisted until time period t + 1. In such a case:

\[ A_p^t = \sum_{\tau=1}^{m} (E_{t,t+\tau}^i + z_{t,t+\tau}^i), \quad i = a, b, \]  
(A.1)

where \( A_p^t \) = number of people in priority class i, in time period t, who make application to join the reserves; these are the "true" supply of reservists;

\( E_{t,t+\tau}^i \) = the number of people who join the reserves in the period \( t + \tau \) from priority class i, who made application in time period t;

\( z_{t,t+\tau}^i \) = the number of people who dropped off the waiting list without joining the reserves in time period \( t + \tau \), from priority class i, who made application in time period t.

Equation (A.1) indicates that people who sign up in any given time period are either enlisted in the reserves or drop off the waiting list so that at some time in the future, \( t + m \), all people are accounted for and none of the original applicants are waiting to join the reserves.
If the present time period is designated at \( T \), the sufficient condition for \( E_T^b \) to be positive and for class 'b' people to be enlisted is

\[
A_{p_j}^a - \frac{1}{\sum_{K=J}^{T} (E_{j,K}^a + \lambda_{j,K}^a)} = 0 \text{ for } J = 1 \ldots T - 1. \quad (A.2)
\]

Equation (A.2) indicates that enlistments from class 'b' cannot take place until the entire class 'a' waiting list is exhausted.

If in the previous period \( E_{T-1}^b \) was also greater than zero, the following condition must also have been true:

\[
A_{p_j}^a - \frac{1}{\sum_{K=J}^{T-1} (E_{j,K}^a + \lambda_{j,K}^a)} = 0 \text{ for } J = 1 \ldots T - 2. \quad (A.3)
\]

Subtracting (A.3) from (A.2):

\[
A_{p_j}^a = (E_{T-1,T}^a + \lambda_{T-1,T}^a) = 0
\]

or

\[
A_{p_j}^a = E_{T-1,T}^a + \lambda_{T-1,T}^a.
\]

Since, in such a case, the length of the class 'a' waiting list is the minimum one period, it seems reasonable that \( \lambda_{T-1,T}^a \) is equal to zero. In that case, if \( E_T^b \) and \( E_{T-1}^b \) are positive then

\[
A_{p_j}^a = E_{T-1,T}^a. \quad (A.4)
\]
In sum, the model indicates that if stated policies were followed and if it was observed that over the previous period members of the lowest priority group were allowed to join the reserves, the true supply of people from the higher priority groups for period \( t - 1 \) can be approximated as the accessions of people from the higher priority group in period \( t \). In fact, this was the case in the period 1968-1969.