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FEASIBILITY OF MODELLING THE SUPPLY OF OLDER-AGE ACCESSIONS

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FEASIBILITY OF MODELLING THE SUPPLY OF OLDER AGE ACCESSIONS

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This report presents the results of an analysis to determine the feasibility of conducting accession supply modelling for older-age individuals. Current recruiting and demographic trends indicate a need for such modelling. The methodology of supply models is discussed and the availability of data is assessed. The report concludes that it is feasible to model the supply of older-age enlistees and discusses procedures for undertaking such supply modelling.

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FOREWORD

The work described in this report was conducted within program area 9900N, OMN under military interdepartmental purchase request 82-41 (The Feasibility of Modelling the Supply of 23-24 year olds) and was funded by the Office of the Secretary of Defense (Manpower, Reserve Affairs, and Logistics). This effort relates to the Office of Accession Policy.

This report assesses the feasibility of modelling enlistments of individuals 22 to 29 years old and describes data sources that may be used for such an effort. The contracting office's technical representative was Dr. Jules I. Borack.

Appreciation is extended to Dr. G. Thomas Sicilia, Director of Accession Policy, Office of the Assistant Secretary of Defense (Manpower Reserve Affairs and Logistics), for his support of this and other innovative efforts in the manpower supply research arena.

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SUMMARY

Problem

Currently, there are no models for the supply of older-age enlistees. Consequently, manpower planners can neither accurately forecast the supply of these individuals nor evaluate alternative policies to achieve the desired level of accessions.

Objective

The objective of this effort was to assess the feasibility of modelling the supply of older-age accessions.

Approach

The current status of supply modelling was reviewed, with particular attention being given to the decision context of the enlistment choice. The availability of data for conducting supply modelling was evaluated.

Results

Ample data are available for modelling the supply of 20-29 year-old enlistees, and appropriate methodologies can be developed for estimating a variety of models of the supply of these enlistees. Age-specific supply modelling should improve the accuracy of the younger-age supply models.

Recommendations

The supply of older-age individuals should be modelled. Data on the labor force experience, both of those who have enlisted and those who have not, should be used to expand knowledge of the enlistment decision.

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INTRODUCTION

Problem and Background

Although the Department of Defense is authorized to access individuals from ages 17 to 35, all branches of the military have traditionally relied on younger individuals who are initially entering the labor market to provide the required numbers of recruits to maintain desired force levels. As illustrated by Table 1, this has been true as far back as 1920. The median age of the force has remained relatively constant over a 60-year period. During this period, the military has undergone tremendous changes in areas such as weapon systems, technical requirements, and force composition.

Table 1

Age Distribution (%) of Male Military Personnel on Active Duty
For Selected Years

Age	1920	1930	1940	1950	1960	1970	1976
Under 20	23.4	13.3	19.0	19.1	17.0	13.6	16.8
20-24	37.3	36.8	40.9	36.2	36.7	49.7	37.0
Over 24	39.3	49.9	40.1	44.7	46.3	36.7	46.2
Median age	23	24	24	24	24	23	24

Source. Binkin, M. and Kyriakopoulos, M. Youth or Experience? Manning the Modern Military. Brookings Institution, Washington, DC, 1979.

As indicated in Figure 1, in the 1980s, the size of the population age cohort the United States military has historically targeted as its primary enlistment group will decline. Since, under current plans, the active-duty enlisted end strengths of the services are expected to increase, there may be significant potential for a shortfall of nonprior service (NPS) enlistees. The occurrence of a shortfall and its size, if one does occur, will depend upon many factors other than demographic trends, including the general unemployment rate, the military-to-civilian pay ratio, the number of production recruiters, the dollars spent on advertising, the taste for military employment, and the size of youth employment programs. One way to increase the supply of new enlistments is to expand the age window considered as "typical" for new enlistees. Figure 2 indicates that, as the demographic bow wave moves along, recruiting efforts could keep apace of demand by targeting older-age enlistees.

The impact of the demographics indicated in Figures 1 and 2 on enlisted age have already begun to be felt. As indicated in Table 2, the median age of male NPS accessions has been monotonically increasing throughout the all volunteer force (AVF) years. This trend holds for male accessions in each branch as well.

In addition to expanding the numbers of individuals considered available for recruitment, recruiting older individuals may also provide a greater source of high quality recruits than does the traditional younger-aged cohort targeted for military recruitment

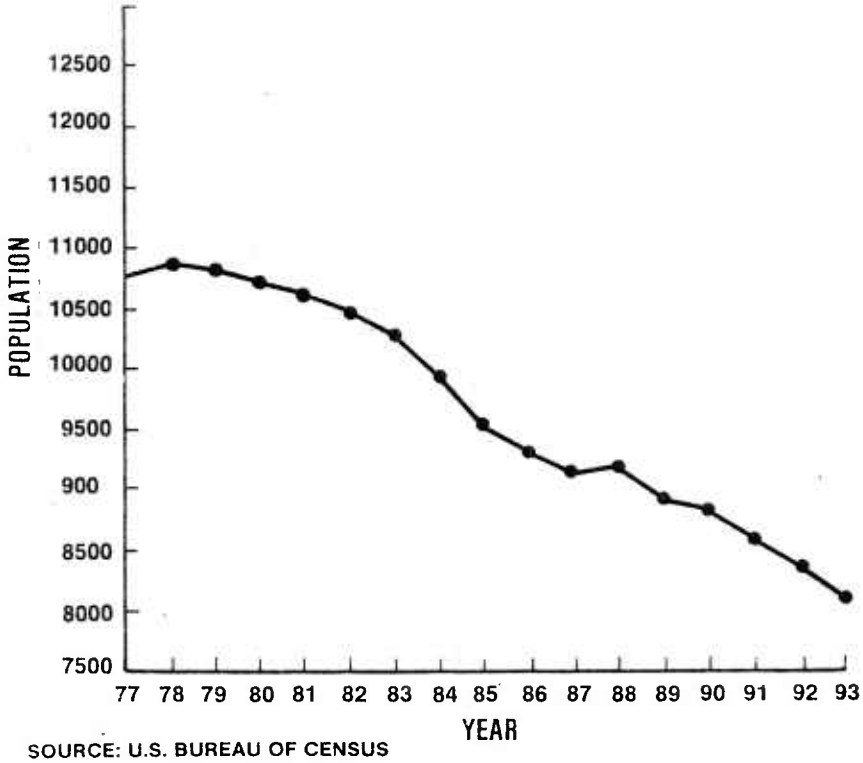

Figure 1. U.S. male population age 17-21 (in thousands).

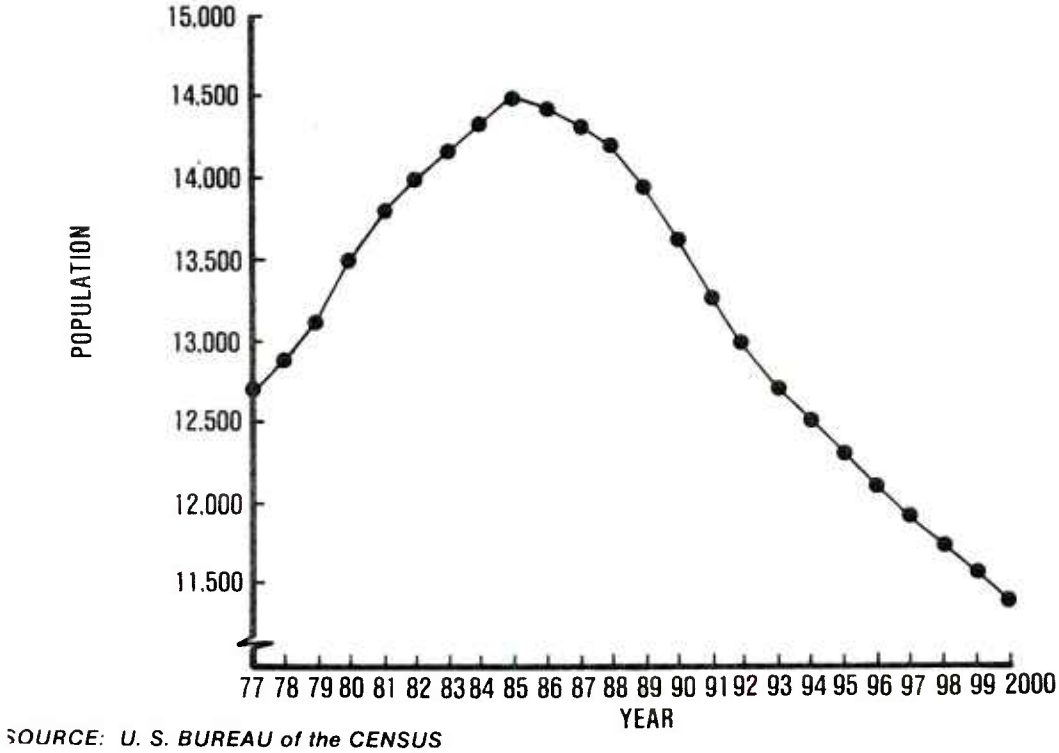

Figure 2. U.S. male population age 23-29 (in thousands).

Table 2

Median Age of Male NPS Accessions FY74-82 (Oct 81--Jun 82)

FY	DoD	Army	Navy	Air Force	Marine
82	19.5	19.7	19.5	19.7	19.0
81	19.2	19.2	19.1	19.5	18.8
80	19.0	19.1	19.0	19.4	18.8
79	18.9	19.1	18.9	19.2	18.7
78	18.9	19.1	18.8	19.2	18.7
77	18.9	18.9	18.9	19.2	18.7
76	18.9	18.9	18.9	19.2	18.6
75	18.9	18.9	18.8	19.3	18.6
74	18.8	18.8	18.6	19.1	18.5

Note. Data provided by the Defense Manpower Data Center (DMDC).

programs. Analysis of results of the Armed Forces Vocational Aptitude Battery (ASVAB) administered in 1980 to a cross-section of American youth aged 18 to 23 (OASD(MRA&L), 1982), indicates that Armed Forces Qualification Test (AFQT) scores of the 1980 youth population increased as age increased. Also, a United States Army recruiting command memorandum (Coleman & Toomepuu, 1981) reports that NPS individuals over the age of 21 who join the Army are of substantially higher mental aptitude than are 17-through-21 aged entrants. Table 3 presents the percent of 1980 male NPS accessions from two age groups in mental groups (MGs) I and II.[1] As shown, almost 35 percent of the DoD 22-and-over age group accessions were MG I and IIs, compared to only 25 percent of the usually recruited 17-21-year-old age group. These data indicate that recruiting older-age recruits may provide a way to meet DoD's increasingly technical manpower requirement. Obviously, however, supply demand and job performance data must also be examined. Enlistment screening procedures may have yielded the "rich" mental group mixture found among older recruits.

Table 3

Percent of 1980 Male NPS Accession in Mental Groups I and II

Age Group	DoD	Army	Navy	Air Force	Marine
17-21	25.1	13.9	35.1	38.3	24.7
22 and over	34.9	25.4	47.6	41.8	35.3

Note. Data provided by DMDC.

[1]Mental groups are defined by AFQT scores: I, 93-99; II, 65-92; IIIA, 50-64; IIIB, 31-49; IV, 10-30; and V, 1-9.

In spite of the above statement, no models currently exist to assess the supply of older-age enlistees. Consequently, manpower planners can neither accurately forecast the supply of these individuals nor evalaute alternative policies to achieve a desired level of accessions.

Objective

The objective of this effort was to assess the feasibility of modelling the supply of 22-29-year-old enlistees. The key (and interrelated) issues concern the availability of data and the development of an appropriate methodology for making enlistment supply projections for 22-29-year-olds.

METHOD

Decision Context

Most supply analyses use data from people who have already enlisted. Even if managers become very good at predicting the supply of similar future enlistees, such enlistees may not be the most preferred recruits. Rather, the most desired group may well be among those who are not currently enlisting. Supply modellers and the users of supply models need to be very knowledgeable about the supply pool that is not choosing military employment. A number of data sets discussed later in this report can be used to gain improved insights into the enlistment decision and thereby used to improve the targeting of preferred recruits.

To model the enlistment supply of older-age individuals effectively, it is necessary to understand the context on which they would base a decision to enlist. For example, as shown in Table 4, 17-20-year-olds may include a disproportionate number who have part- or full-time jobs or who are unemployed. Survey data on entering personnel can be used to test this hypothesis.

The 21-25-year-old group is much more heterogeneous than the younger age group, containing both veterans and 4-year college-educated subgroups. Since these subgroups are already specific targets for prior-service accession programs and officer programs, they probably should be subtracted from the older-age population to size the relevant older-age enlistment pool.

The 17-20 and 21-25 year groups contain trade school and 2-year college graduates, who are prime targets for NPS lateral entry programs. NPS lateral entry programs must be carefully integrated with NPS programs for E-1 level entry.

Age group supply modelling must carefully consider the impacts of complementary and competitive policies on NPS accession, prior-service accession, and, most particularly, lateral entry. Modellers in accession supply should use a perspective of labor-labor substitution for different age enlistees, lateral entrants, and reenlistees. Enlistment supply models should yield information on response rates to policy variables and exogenous demographic and economic factors. Information on relative performance of individuals entering via different accession paths is also needed. With cost information from supply models and benefit information from performance analyses, more efficient and effective manpower policies can be undertaken.

Table 4

Decision Context By Age

Age Group	Status/Activity of Component Subgroups
17-20	Part-time employment Full-time employment Trade school College--path to 4-year degree College--path to 2-year technical degree Unemployment Military employment, enlisted
21-25	Voluntary job changes, civilian sector Involuntary job changes, civilian sector Trade school College Initial job after 2-year college Initial job after 4-year college More college Veteran, entry into college Veteran, entry into civilian employment Unemployment Military employment, enlisted Military employment, officer
25-30	Stable civilian career Voluntary job changes Involuntary job changes 4-year college careers Veteran, entry into civilian employment Veteran, entry into college Unemployment Military employment, enlisted Military employment, officer

Supply Model Evaluation

In January 1981, a workshop on personnel supply models was convened to evaluate three enlistment supply models (Cirie, Miller, & Sinaiko, 1981); those developed by Fernandez (1979), Morey (1980), and Goldberg (1980). Strengths and weaknesses of the models were discussed and suggestions made for improving their usefulness. Goldberg (in press) provides a current bibliography and review of supply models.

This report does not present an independent critique of the current supply model for younger-age accessions. However, as will be seen in the next section, many of the comments on procedures for modelling the supply of older-age accessions have direct import for modelling of younger-age accessions. Throughout the discussion that follows, it must be borne in mind that manpower planners are just entering the second generation of suppy modelling in terms of sophistication and usability for policy decisions.

Supply Modelling Issues

As indicated in Table 5, it appears that sufficient quantities of NPS older-age individuals have been enlisting during the AVF era to measure supply effects in all branches, with the possible exception of the Marine Corps. This is a prime consideration for supply modelling. Other issues in supply modelling are addressed in the following paragraphs.

Table 5

Number of Male NPS Accessions (in thousands) Over Age 21

FY	Army	Navy	Air Force	Marine
81	15.6	11.1	10.0	2.8
80	19.0	9.2	8.5	2.8
79	14.6	7.2	7.6	2.2
78	14.0	7.8	7.5	2.4
77	19.7	9.9	7.6	2.9
76	20.4	8.3	7.7	2.7
75	18.8	7.1	7.7	3.2
74	14.7	4.3	6.3	2.2

1. Basic Geographic Unit of Activity. Models have been developed using geographic areas varying in size from nationwide (e.g., Fernandez, 1979) to recruiting substations (e.g., Crawley, 1979). The preferred geographic unit of activity is one that captures variation in the explanatory variables, particularly the policy variables. The preferred basic unit for measuring activity is probably the recruiting district, since recruiting goals are generally executed at the district level. Also, local unemployment is more important than state or national. It may be worthwhile to explore the use of the youth attitude tracking study (YATS) tracking area (Market Facts, Inc., 1982) as a basic unit of activity, particularly when attempting to incorporate YATS measures of tastes for military employment.

2. Functional Form. Functional forms considered have included linear (e.g., Fernandez, 1979), logistic (e.g., Fechter, 1978), constant elasticity (e.g., Gressmer, 1978), and hybrid (e.g., Goldberg, 1980). This issue is unimportant when there is little variation in the explanatory variables. However, since 1980, there has been more variation in military compensation and unemployment than in the 5 years prior to 1980. Most "current" models were estimated using data gathered prior to 1981. The question of functional form becomes especially critical when using model forecasts from values of the explanatory variables outside the range used for estimation. The question of preferred functional form is not resolved.

3. Time Basis of Observations. Three general time relations have been used: cross-sectional (e.g., Jehn & Shughart, 1976), monthly (e.g., Fernandez, 1979), or quarterly (e.g., Fechter, 1978) time series, and pooled cross-section time series (e.g., Goldberg, in press). Pooled cross-section time series data present some problems in error estmation for statistical reliability. Time series analysis raises the question and opportunity to test for

distributed lags on the explanatory variables. Goldberg (in press) has a good discussion on the effects of the time bases of data on supply modelling.

4. Dependent Variable. A major supply modelling issue is the choice of the dependent variable. Supply and not merely enlistments must be measured (see Siegel & Borack, 1981, for a discussion of this point). A part of this issue is whether to measure contracts signed or people shipped in a time period. Signed contracts is probably the preferred measure, since a person can be in a delayed enlistment pool for up to a year. More important for our purposes is the age distribution of the supply. Current models seem simply to use NPS accessions of all ages, with the age distribution assumed to be stable. As Table 6 indicates, however, this assumption is false. From the beginning of the AVF to the end of FY 1981, the percentage on NPS accessions over age 21 almost doubled.

Table 6

Percent of DoD NPS Accessions
Over 21 by FY

FY	%
81	15.2
80	14.3
79	13.4
78	13.1
77	12.4
76	11.8
75	11.0
74	8.8

Note. Data obtained from DMDC.

The dependent variable can and should be measured in narrower age cohorts, such as ages 17-20, 21-25, and 25+. The precise age cohort determination is both an empirical and a theoretical question. One would expect age 21 and age 25 to indicate breakoff points for different enlistment behaviors. An approach more sophisticated than current efforts could attempt to model supply on an occupational basis. Perhaps a different supply exists for different occuaptions, particularly in the case of older-age individuals having substantially more labor market experience than younger-age accessions.

5. Explanatory Variables. Measures of explanatory variables used in supply models should include military wages, civilian wages, recruiting effort, advertising, unemployment population, tests for military employment, governmental employment programs for civilians, educational financial assistance, and post-service educational benefits. These measures are discussed in the following paragraphs.

a. Military wages. These wages are generally measured as regular military compensation (RMC) during the first year of service. Perhaps pay-table values are a more

valid measure of military wage attractiveness. Various weighting and discounting methods for first-term pay have been used. Occupation-specific models could use occupational bonuses and different weights. The best measure for military wage is still an open question.

b. Civilian wages. There is even less agreement on the proper civilian wage. Often a simple national wage has been used and this is one of the weaknesses of current models. The wage series should match as closely as possible the prevailing wage structure in the basic unit of activity. Just as importantly, when separate equations are estimated by age group, appropriate civilian wages for each age group must be used. Regional age-specific data are difficult to obtain and may require extensive data processing. Goldberg (in press) discusses some biases from using the average earnings of all production workers. Occupation-specific models should use matching civilian occupational wages.

c. Recruiting effort. This is usually measured by the number of production recruiters. Several methodological issues are involved here. Siegel and Borack (1981) have argued that goals must be used as an explanatory variable. Goldberg (in press) has countered that the correlation of goals and recruiters is so high that the effects of goals are captured by the number of recruiters. Since the question of motivation and operation of recruiting effort is an extremely important one for the efficacy of econometric models, this issue must be further analyzed in any current supply modelling effort. An additional recruiting area concern is the cross effect of different branch recruiters. Goldberg (1980) has rather successfully argued that some cross-recruiter effects are nonzero and must be included in any branch-specific supply modelling. Of just as significant import for age cohort modelling is the problem of distribution of recruiter effort. By refocusing the effort of recruiters from high schools to older-age sources, the numbers of older-age accessions might be increased without any apparent increase in recruiting effort. Hence, some measure other than number of recruiters may need to be devised to capture the distribution of recruiter effort.

d. Advertising. This variable is neither well understood nor properly measured. The lack of independence of advertising and recruiting effort has led a number of researchers to ignore advertising and assume the effects are captured by counting production recruiters. Morey's (1982) work is a notable exception. Also, recent evidence from the Wharton Navy enlistment field marketing experiment (Carroll & Rao, 1981) may be helpful. In any case, differential advertising efforts in recruiting districts need to be captured.

e. Unemployment. Supply models use some measures of the civilian adult unemployment rate as an explanatory variable. This procedure may be satifactory for forecasting purposes if youth unemployment or, more precisely, 17-20 year-old unemployment, has a stable functional relationship with adult unemployment. During the 1980s, it is unlikely that a stable relationship will exist among the unemployment rates for 17-20, 21-25, and over-25 year-olds. Shifts in the relative size of these age cohorts over the next 2 decades will cause changes in the demand/supply relations in the age-specific employment markets. Age-group-specific unemployment rates by sex and race must be used. Additionally, the rates must capture changes in unemployment at the recruiting district level of measurement. It may be that change in local unemployment rates is more important as an explanatory variable than the absolute level of local unemployment. Cowin, O'Connor, Sage, and Johnson (1980) discuss the effects of local economic conditions on enlistments. Survey data on entering personnel may provide a basis for testing a number of hypotheses on the relationship of enlistment to employment history.

f. Population. This variable needs to be partitioned by sex and race for the appropriate age cohorts. Additionally, instead of gross local age group populations, some sizing of relevant populations may be necessary. Some areas have much higher high school graduation rates or much larger 4-year college participation rates than do other areas. These local conditions need to be captured in supply models to improve their accuracy. Most studies simply assume a proportional effect of population. Use of current population surveys and other civilian survey data may provide a means for more properly sizing the relevant age group population. The previous discussion on decision context contains important considerations for sizing the relevant population pool. Use of data files from the Defense Manpower Data Center (DMDC) may indicate different geographic by age group accessioning patterns. Some areas may access proprotionally more of the younger-age cohort; and others, a disproportionate share of older-age cohorts. Data exist to test hypotheses about these relationships and to derive appropriate population weights. Separate supply equations should be estimated by age group. This should improve the younger-age models and yield usable older-age models.

g. Taste for military employment. This variable has almost been ignored in enlistment supply modelling. However, Siegel and Borack (1981) did include, as an explanatory variable, the percentage of ASVAB examinees in a recruiting district who planned a military career. The YATS surveys may very well contain a basis for developing measures of taste for military employment that can be incorporated in enlistment supply models.

h. Governmental employment programs for civilians. Employment programs, such as those sponsored by the Department of Labor, provide pay and training opportunities for civilians. Comprehensive Employment and Training Act (CETA) programs have been found to have a small negative effect on Navy enlistment supply (Goldberg, 1980). Federal and state employment programs need to be measured in supply modelling. These programs probably have different effects on different age cohorts.

i. Educational financial assistance. Such programs are sponsored by the U.S. Department of Education and various state Departments of Education. Goldberg (in press) provides data on federal student aid programs. Also, data from states that have extensive student financial aid programs (e.g., California, New York, Illinois) should be used. These programs may be as important, if not more important, for older-age cohorts as for younger-age cohorts.

j. Post-service educational benefits. These benefits, such as the G.I. bill and its replacement, the Veterans' Educational Assistance Program (VEAP), must also be tested as explanatory variables. The programs may have a different impact on the supply of older-age enlistees than on younger-age enlistees. Personnel data can be used to test hypotheses about the relationship of entry age to VEAP participation.

DATA AVAILABILITY

Ample data exist to model enlistment supply for older-age individuals. More data exist for testing hypotheses about the enlistment decisions than have been fruitfully used.

The accession file maintained by DMDC contains the relevant information on individual service accessions. A good deal of biographical data are available for pool partitioning (e.g., race, sex, geographic area, and education). Also, the DMDC Cohort File can be used to assess the performance of individuals from different age groups.

Underutilized data sets are mainly survey data on personnel in the military and survey data on individuals not choosing military employment. A major thesis of this report is that it is essential to know who is entering the military and who is not entering in order to model accession supply more correctly.

Data sets that may be useful for better understanding the enlistment decision, categorized as military, civilian, or civilian/military, are discussed below.

Military Data Sets

1979 DoD Survey of Officers and Enlisted Personnel

The 1979 DoD survey (Doering, Grissmer, Hawes, & Hutzler, 1981; Doering & Hutzler, 1982), which was administered to personnel in all services, provides information to support research on manpower issues, such as retirement, pay, promotion, retention, and satisfaction with military life. Four different questionnaires were used in the survey. Forms one and two were administered to enlisted personnel; and forms three and four, to officers. Forms one and three emphasized economic issues, reenlistment options, retirement options, and perceptions of civilian opportunity; and forms two and four, aspects of military life (e.g., rotation experience, promotions, and utilization of women). The survey was issued in late January 1979 worldwide to men and women in all four services. Data collection was completed in June 1979.

Results from this survey can be used to analyze the behavior, motivations, and intentions of enlisted personnel grouped by entry age. The sample size of AVF enlisted personnel is 7,366 (1,711 Air Force, 1,623 Army, 1,643 Marine Corps, and 2,389 Navy), with 5,586 of these being in their first term. This sample can be partitioned into a number of different age groups. Preliminary analysis indicates it includes 5,263 in the 17-19-year-old group, 1,861 in the 20-24-year-old group, and 211 in the 25-or-over-year-old group. The areas of potential analysis using survey results are listed below:

1. Individual characteristics--education, socioeconomic status, and marital status.

2. Employment and compensation perceptions--perceived military compensation, civilian income while in the military, civilian employment expectations, and expected civilian earnings.

3. Perception of military life--unit readiness perception, satisfaction with military life, and race relations.

4. Military employment--promotion chances, reenlistment bonus intention, and intended years of service.

These survey data can be used to test hypotheses on the relationships of age to job satisfaction, civilian expectations, and career intentions.

1979 DoD Survey of Personnel Entering Military Service

This survey (Doering, Grissmer, & Morse, 1980a, 1980b) was administered to enlistees at all 67 Armed Forces Entrance Examination Stations (AFEES) just after they were sworn in. It was administered in two phases: wave 1 in March-April 1979 and wave 2 in September-October 1979. It is the only survey administered to personnel in all four branches at the time of their enlistment, and included questionnaires in four forms. Each

wave had a form emphasizing enlistment and a form emphasizing attrition and issues related to women. The sample design was established such that the enlistee population could be compared with individuals not entering the military. There were over 25,000 individual responses to waves 1 and 2.

The survey of entering personnel included questions falling under the following categories (not all categories were included on all forms):

1. Individual and family background.
2. Marital history and fertility.
3. Educational background.
4. Labor force status and experience.
5. Assets and expenses.
6. Enlistment characteristics.
7. Enlistment decision.
8. Enlistment process.
9. Attitude of women enlistees.

Of particular interest to supply modelling is the information on labor force experiences. By analyzing earnings, occupational, and unemployment distributions for different age cohorts, hypotheses about employment effects by age can be tested.

1979 Reserve Force Surveys

Reserve force surveys (Doering, Grissmer, & Hawes, 1981a, 1981b) were used to study a sample of 441 company-sized units, 224 in the Army National Guard and 217 in the Army Reserve. Four separate questionnaires were used:

1. Reserve Force Personnel Survey--For Enlisted Grades E-1-E-4.
2. Reserve Force Personnel Survey--For Enlisted Grades E-5-E-9.
3. Reserve Force Commander Survey.
4. Reserve Force Unit Survey.

The thrust of Form 1, which was administered to all junior enlisted personnel members of the sample units, was to gain information on the first-term enlistment decision process and on the background and experiences of the individual prior to enlistment. It included questions on the following areas:

1. Individual background.
2. Educational background.
3. Marital history and fertility.
4. Family background.
5. Civilian labor force experience.
6. Family resources.
7. Military background.
8. Military training and work.
9. Enlistment decision process.
10. Military compensation and benefits.
11. Military attitudes/opinions.
12. Leisure time activities.

For supply modelling, there is special interest in the areas of civilian labor force experience, military background, and enlistment decision/process. These areas are expanded in Table 7.

Table 7

Junior Reserve Force Survey Areas of Interest to Supply Modelling

Area	Question
Civilian Labor Force Experience	Respondent's labor force status, current Spouse's labor force status, current Type and size of employer Hours usually worked in 1979 Wage type and current earnings Overtime hours and weeks worked in 1979 Overtime wage rate Employer's leave policy for annual training Employer's attitude toward Guard/Reserve Paid vacation days Civilian earnings during annual training, 1979 Contact with federal job programs Months worked, 1979 Months unemployed/looking for a job, 1979 Unemployment compensation received, 1979 Difficulty finding part-time civilian job Anticipated earning from part-time job
Military Background	Reserve/Guard experience, current: Reserve component Unit location Pay grade, current Date of last promotion Date of next promotion Term of service ETS date Years of service (YOS) Past military experience (active and reserve) Entry year in any branch Service at entry (active or reserve) Services served in (active or reserve) Years of active service, active MOS, pay grade
Enlistment Decision/Process	Reasons for enlistment Information sources about Reserve/Guard First person contacted regarding Reserve/Guard Recruiters seen Knowledge of unit members prior to entry Attempts to enlist in active Attempts to enlist in other Reserve/Guard unit Reasons for selecting Reserves/Guard instead of active Perceptions of attrition difficulty

Hypotheses on differential age group participation in the Army Reserves and National Guard can be tested by analyzing relationships by entry age grouping. The competition with the active duty force may vary with entry age.

Civilian Data Sets

1981 Youth Attitude Tracking Study

The YATS, begun in 1975, is a cross-sectional national tracking of 16 to 21 year-olds' attitudes, perceptions, and behavior with respect to future military employment. The twelfth wave of YATS was completed in the fall of 1981 (Market Facts, Inc., 1982). The YATS survey includes content areas on individual background, schooling, employment, future plans, job characteristics preferences, registration opinion, and potential influences. The following-military relevant items are of particular interest to supply modelling:

1. Likelihood of military employment.
2. Branch preference.
3. Active duty/Reserves/National Guard.
4. Time preference for joining.
5. Problems with joining.
6. Recruiter contact.
7. Military pay awareness.
8. Enlistment bonus preferences.

If YATS were expanded to include 22-to-25-year-olds, the survey would provide insights into the preferences of older males and how those preferences relate to employment. By comparing relationships of the younger and older age groups, tests could be made of hypotheses on the age stability of such things as unemployment as a motivator for intentions to join the military. Additional analyses of interest would include recruiter contact as a function of age.

1981 Special Survey of Military Employment Interests of Older Men

A special telephone survey of men 23-29-year-olds on their intention to join the military was conducted (Borack, 1982) to provide specific information concerning:

1. The background and present circumstances of 23-29-year-olds who express positive interest in joining the military.

2. The demographic and attitudinal characteristics of such individuals.

3. The proportion of the age group having a positive interest in military employment, by branch of mililitary.

4. The relative attractiveness of pay, bonuses, and military benefits.

5. Comparisons between younger (17-21-year-olds) and older (23-29-year-olds) men in terms of the factors important in their decision to join the military.

Phone interviews were conducted with 4,000 respondents drawn from a national probability sample of households. The content areas included in survey are listed in Table 8. Questions such as those concerning propensity to enlist and important factors in

Table 8

Content Areas of Survey of 23-29-year-old Men

Area	Item
Background	Age Marital status Dependents High school grades Education Race
Civilian Labor Force Experience	Total personal income Total household income and sources Employment status Job tenure Occupation Job satisfaction Satisfaction with job training Sources of job training Future work plans
Military-specific	Military intentions Reasons for enlistment Reasons against enlistment Military advertising awareness Past military experience (active and reserve) Reasons for leaving military Reenlistment intentions Reenlistment pay and bonus incentives Enlistment pay and bonus incentives Enlistment educational support incentives

the decision to enlist were the same as in the YATS study of 16-21 year olds (Market Facts, Inc., 1982). Hence, the special survey provides unique information on intentions of older-age men as well as a basis for testing relationships of age to factors affecting military intentions.

Civilian/Military Data Sets

Current Population Surveys

The current population survey (CPS) (Bureau of the Census, 1978), which has been conducted monthly since the 1940s, provides records for persons 14 and over living in sampled units. It is the only source of monthly estimates of total employment and unemployment and is a comprehensive source of information on the following personal characteristics of the total population: age, sex, race, marital status, location, family status, educational background, current school status, employment status, reasons for not working, earnings, occupation, hours worked, and veteran status. Since the CPS provides

detail not otherwise available on the economic status and activities of the population, it can be very useful for testing hypotheses concerning the size of the relevant pool for enlistment supply.

1979 Youth Cohort of the National Longitudinal Survey of Labor Force Behavior

The target population for this survey, which provides one of the best data sets for use in understanding the occupational choice paths of military-aged individuals, is between the ages of 14 and 21 (Center for Human Resource Research, 1981; Kim, Nestel, Phillips, & Borus, 1980; Fredland & Little, 1982). Blacks, Hispanics, economically disadvantaged whites, and those serving in the military were oversampled to achieve useful sample sizes for selected subgroups. A sample of 1,281 persons within the age group who were employed in the military on September 30, 1978 were included in the longitudinal sample. Weights are available in the data set to correct for the oversampling. By November of 1982, 3 years of data should be available: 1979, 1980, 1981. Currently, the Center for Human Resource Research plans to conduct 3 additional years of interviews: 1982, 1983, and 1984.

The national longitudinal survey (NLS) data set has important advantages relative to most other data sets available for the occupational choice paths of young men and women. Only by studying data containing both civilians and military personnel can enlistment inclinations and relative quality be analyzed. A civilian sample is necessary to assess fully the alternatives available to those who do not join the military.

The NLS set has some of the richest data on labor force experience over time, providing over 2,000 items of information on each respondent. Table 9 gives a brief list of available data.

The NLS data set allows one to discern what portion of the age-specific employment and quality distribution enters military employment. In addition, once in the military, career orientation can also be analyzed. The military-specific variables available are included in Table 9.

Although the NLS set provides a great deal of data on each person, there are a reduced number of cases. If the sample were large enough and applied over a long enough time, few other data sources would be needed. However, this data set is best utilized in conjunction with other data sets described in this report.

Profile of American Youth

This data set resulted from a project assessing the vocational aptitudes of a nationally representative sample of youth to develop new national norms for the ASVAB (OASD(MRA&L), 1982). Since the individuals used for the profile were conjoint with the NLS youth cohort, these two data sources can be merged to create a data set matching occupational histories with aptitude measures.

Additionally, the profile data sets provide a basis for partitioning NPS pool into aptitude profiles by age cohort. Preliminary analysis demonstrates that mean AFQT percentile scores increased directly with age for age groups 18-19, 20-21, and 22-23.

High School Class of 1972 Study Report

The NLS of the high school class of 1972 (Taylor, Stafford, & Place, 1981) focused on the educational, vocational, and personal development of high school graduates. The

Table 9

NLS Data for Youth Cohort

Type of Variable	Variables
Labor market experience	Current labor force and employment status Characteristics of current job Work experience Characteristics of job
Human capital and other socio-economics	Early formative influence Migration Education Vocational training outside regular school Government jobs and training program Health and physical condition Marital and family characteristics Financial characteristics Military service Work attitudes Educational and occupational aspirations and expectations Other social/psychological variables Retrospective evaluation of labor market experience Significant others
Environmental	Place of birth Location Standard metropolitan statistical area
Military-specific	Branch Length of service Military occupation ROTC or officer training Reserve or guard activities Pay grade and income Type and amount of military training Formal education while in service Future military plans Reasons for entering military Reasons for leaving military Contact with military recruiters Type of discharge Civilian job offer at time of discharge Return to same employer after active duty with reserves or guard

study began in 1972 with a national probability sample of over 19,000 high school seniors. Follow-up surveys were taken in 1973, 1974, 1976, and 1980. The data file for the base-year and all follow-ups have been merged.

The NLS-72 data base includes the following content areas:

1. Constitutional factors.
2. Ability.
3. Socioeconomic status.
4. Home background.
5. Community environment.
6. Ethnicity.
7. Significant others.
8. Activity status.
9. Educational attainment.
10. School characteristics.
11. School experience.
12. School performance.
13. Work status.
14. Work performance and satisfaction.
15. Noncognitive traits.
16. Goal orientations.
17. Marriage and family.
18. Opinions.
19. Military.

The current review and annotation of reports using NLS-72 lists only four studies utilizing the data set. One of these concerned educational benefits (Eisenman, Eitelberg, Purcell, Richmond, Wagner, & Hunter, 1975); and the other three (Eitelberg, 1976, 1979; Purcell, Eisenman, Eitelberg, & Hicks, 1976), on representativeness. The data set appears to have substantial applicability to the need for analyzing the occupational career paths of military participants. It provides the following information on work status, performance, and satisfaction:

1. Type of work.
2. Hours of work.
3. Work plans.
4. Job hunt resources.
5. Reasons for not working.
6. Income.
7. Work conditions.
8. Satisfaction.
9. Application of job training.
10. Supervision.
11. Application of schooling.

Also, it lists the following information on military experience: plans for military, type of military training, length of service, satisfaction, and plans.

High School and Beyond 1980 Cohort Data

The high school and beyond (HS&B) study, which is similar to the NLS-72 study, is a nationally representative sample survey of 1980 high school sophomores and seniors (Peng, Fetters, & Kolstad, 1981). The base-year (1980) cohort contained over 30,000 sophomores

and 28,000 seniors. Each student in the survey was administered cognitive tests in addition to the questionnaires. The data set may be one of the best for information on the NPS pool during the 1980s.

Table 10 lists categories of information on the first survey. Of particular interest are the questions on attitudes about military employment. Preliminary analysis indicates a substantially larger interest in military employment as compared to the 1972 high school class. Of even greater interest, however, are the planned survey followups in 1982 and 1984. These data should provide a basis to confirm or disconfirm hypotheses developed and tested from more limited data sets such as NLS-youth and also from older data sets such as NLS-72.

Table 10

High School and Beyond Survey Information

Category	Information
High school experiences	Curriculum placement Mathematics and science courses taken Grades and homework Participation in federally-funded programs (including CETA) Basic skills remedial instruction Vocational training Proper school behavior Minimum competency test Student opinions of their school
Activities outside of school	Working for pay Organized group activities Other leisure activities
Values and attitude	Life goals Factors in occupational choice National service
Plans of high school seniors	Short-range plans (including military employment) Long-range plans (postsecondary education, occupational goals, and family formation)
Plans for college	Criteria for choosing a college Plans to use financial aid Type of college chosen Expected field of study

CONCLUSIONS

It is feasible to model the supply of 22-29-year-old enlistees. Ample data are available for supply modelling and appropriate methodologies can be developed for estimating a variety of models of the supply of older enlistees. More data exist for modelling the enlistment decision than have been fruitfully used. Survey, economic, and accession data can be jointly used to estimate the supply of older-age enlistments. With existing sources of data, modelling could range from the aggregate and rather naive to occupation-specific and policy robust. The R&D investment required increases as the usability for policy appraisal increases.

There are several costly areas of research and analysis. One costly area would be the use of surveys, such as those discussed herein to help understand the enlistment decision process. A second costly area would be to place the economic and intentional data on a recruiting district-specific basis.

A naive and aggregate supply model might subtract college enrollments, veterans, military members institutionalized, mentally unqualified, and physically unqualified from census population estimates of 22-29-year-olds to obtain an estimate of eligible supply. This approach would leave unknown the amount enlisting from this coarse measure of qualified military available (QMA) pool or the relationship of enlistments to military pay and other explanatory variables.

A less naive aggregate supply model might use census data in conjunction with survey data discussed in the previous section to estimate the supply of enlistees. The proportion enlisting from different "intentions to enlist" groups can be used to estimate numbers of enlistees. This procedure would also not yield response rates for changes in policy variables such as recruiting targets.

A more sophisticated approach would use econometric models for enlistments in groups, such as MG I-IIIA, which most likely have not been demand-constrained. The following is an illustrative example of a method for utilizing survey, economic, and accession data for econometric supply modelling. Accession data for MG I-IIIA high school graduates by sex, race, and geographic area (e.g., SMSA or county) over time (e.g., quarterly) can be obtained from DMDC. Accession and survey data can be used to partition the qualified military available pool by race, sex, age, and geographic area over time. The NLS-72, HS&B, and profile of American youth data can be used to obtain quality measures (e.g., high school graduation rates or AFQT distribution) by geographic area over time. Data from the survey of personnel entering military service, reserve force survey, profile of American youth, NLS youth cohort, special survey of military employment interests of older men, and YATS can be used to obtain measures of taste for military employment by age by geographic area over time.

Recruit commands can be used to obtain measures of recruiting and advertising efforts by geographic region over time. CPS and Bureau of Labor Statistics (BLS) data can be used to obtain employment measures by age by geographic area over time. CPS and BLS wage data can be used along with military wage rates to obtain relative military wage measures by age, race, sex, and geographic region.

The accession data can be used together with the explanatory variable data in a pooled cross-sectional time series for econometric estimation of an enlistment supply model for older-age accessions. This procedure will yield estimates of accession response rates for changes in policy variables such as military compensation and recruiting efforts.

RECOMMENDATIONS

Important considerations for supply modelling are listed below:

1. Information about the supply pool that is not choosing military employment should be analyzed.

2. The decision context of potential enlistees should be better understood--particularly the age-specific factors involved in the decision context.

3. The interaction of branch-specific policies, goals, recruiters, and enlistments should be considered in supply models.

4. Age-specific supply modelling should improve the accuracy of the younger-age supply models.

5. Age-specific wage and employment series should be developed for the basic geographic unit of activity.

6. Age-specific tastes for military employment should be measured and included in supply models.

REFERENCES

Bureau of the Census. Current population survey: Technical Documentation. Washington, DC, 1978.

Binkin, M., & Kyriakopoulos, M. Youth or experience? Manning the modern military. Brookings Institution, 1979.

Borack, J. I. The intentions of men 23-to-29-years-old to join the military: Results of a national survey (NPRDC Tech. Rep. 82-62). San Diego: Navy Personnel Research and Development Center, September 1982. (AD-A119 611)

Carroll, V., & Rao, A. The Navy enlistment field marketing experiment, Volume 1: Excutive overview and summary. Philadelphia, PA: University of Pennsylvania, December 1981.

Center for Human Resource Research. The national longitudinal surveys handbook. Columbus, OH: Ohio State University, Author, February 1981.

Cirie, J., Miller, J., & Sinaiko, H. (Eds.). Department of Defense and Navy personnel supply models: Report of a workshop. Washington, DC: Office of Naval Research, May 1981.

Coleman, F., & Toomepuu, J. Age group 22 and over: A good source of high mental ability recruits. Fort Sheridan, IL: U.S. Army Recruiting Command, June 1981.

Cowin, M., O'Connor, F., Sage, L., & Johnson, C. The effects of local economic conditions on Navy enlistment. Information Spectrum, March 1980, p. 163.

Cralley, W. The supply of Marine Corps recruits: A micro approach. Alexandria, VA: Center for Naval Analysis, September 1979.

Doering, Z., Grissmer, D., & Morse, J. 1979 DoD survey of personnel entering military service: Wave 1 user's manual and codebook. Santa Monica, CA: Rand, November 1980. (a)

Doering, Z., Grissmer, D., & Morse, J. 1979 DoD survey of personnel entering military service: Wave 2 user's manual and codebook. Santa Monica, CA: Rand, December 1980. (b)

Doering, Z., Grissmer, D., & Hawes, J. 1979 Reserve Force studies surveys: Survey design, sample design, and administrative procedures. Santa Monica, CA: Rand, August 1981. (a)

Doering, Z., Grissmer, D., & Hawes, J. 1979 Reserve Force studies surveys: User's manual and codebooks. Santa Monica, CA: Rand, September 1981. (b)

Doering, Z., Grissmer, D., Hawes, J., & Hutzler, W. 1978 DoD survey of officers and enlisted personnel: User's manual and codebook. Santa Monica, CA: Rand, January 1981.

Doering, Z., & Hutzler, W. Description of officers and enlisted personnel in the U.S. armed forces: A reference for military manpower analysis. Santa Monica, CA: Rand, March 1982.

Eisenman, R., Eitelberg, M., Purcell, A., Richmond, B., Wagner, C., & Hunter, R. Educational benefit analysis: An examination of the effects of G.I. bill educational benefits on service accessions. Alexandria, VA: Human Resources Research Organization, November 1975.

Eitelberg, M. Evaluation of Army representation. Alexandria, VA: Human Resources Research Organization, November 1976.

Eitelberg, M. Military representation: The theoretical and practical implications of population representations in the American armed forces (Dissertation). New York: New York University, 1979.

Fechter, A. The supply of enlisted volunteers in the post-draft environment: An evaluation based on pre-1972 experience. Santa Monica, CA: Rand, December 1978.

Fernandez, R. Forecasting enlisted supply: Projections for 1979-1990. Santa Monica, CA: Rand, September 1979.

Fredland, J., & Little, R. Socioeconomic characteristics of the all-volunteer force: Evidence from the national longitudinal survey. Annapolis, MD: Economics Department, U.S. Naval Academy, February 1982.

Goldberg, L. An econometric model of the supply of enlistment estimates and applications. McLean, VA: General Research Corporation, June 1975.

Goldberg, L. The supply of Navy enlistments. Alexandria, VA: Center for Naval Analyses, December 1980.

Goldberg, L. Enlisted supply: Past, present, and future. Alexandria, VA: Center for Naval Analyses, in press.

Grissmer, D. The supply of enlisted volunteers in the post-draft environment: An analysis based on monthly data, 1970-1975. Santa Monica, CA: Rand, December 1978.

Jehn, C., & Shughart, W. Recruiters, quotas, and the number of enlistments. Alexandria, VA: Center for Naval Analyses, December 1976.

Kim, C., Nestel, G., Phillips, R., & Borus, M. The all-volunteer force: An analysis of youth participation, attrition, and reenlistment. Columbus, OH: Ohio State University, Center for Human Resource Research, May 1980.

Market Facts, Inc. Youth Attitude tracking study, fall 1981. Arlington, VA: Author, Public Sector Research Group, April 1982.

Morey, R. The impacts of various types of advertising media, demographics, and recruiters on quality enlistments: Results from simultaneous and heteroscedastic models. Durham, NC: The Center for Applied Business Research, Duke University, July 1980.

Office of the Assistant Secretary of Defense (Manpower, Reserve Affairs, and Logistics). Profile of American youth, 1980 nationwide administration of the Armed Services Vocational Aptitude Battery. Washington, DC: Author, March 1982.

Peng, S., Fetters, W., & Kolstad, A. High school and beyond: A national longitudinal study for the 1980's, a capsule description of high school students. Washington, DC: National Center for Educational Statistics, April 1981.

Purcell, A., Eisenman, R., Eitelberg, M., & Hecks, J. Army representativeness: The national longitudinal study. Alexandria, VA: Human Resources Research Organization, January 1976.

Siegel, B., & Borack, J. An econometric model of Navy enlistment behavior (NPRDC Tech. Note 81-16). San Diego: Navy Personnel Research and Development Center, June 1981. (AD-A101 365)

Taylor, E., Stafford, C., & Place, C. National longitudinal study of the high school class of 1972 study reports update: Review and annotation. Washington, DC: National Center for Educational Statistics, June 1981.

BIBLIOGRAPHY

Altman, S. Earnings, unemployment, and the supply of enlisted volunteers. Journal of Human Resources, 1969, IV-1, 38-59.

Baker, M. Untitled brief on lateral entry. San Diego: Navy Personnel Research and Development Center, 1981.

Cook, A. Supply of Air Force volunteers, The report of the Presidential Commission on an all-volunteer force. Washington, DC: U.S. Government Printing Office, November 1970.

Cooper, R. Military manpower and the all-volunteer force. Santa Monica, CA: Rand, September 1977.

Cralley, W. The impact of youth unemployment rate and the expiration of the G.I. bill on Marine Corps enlistments. Alexandria, VA: Center for Naval Analyses, October 1981.

Doering, Z. Rand-Department of Defense survey research program: Fiscal years 1978-1979. Santa Monica, CA: Rand, December 1979.

Doering, Z., Grissmer, D., Hawes, J., & Hutzler, W. 1978 DoD survey of officers and enlisted personnel: Survey design and administrative procedures. Santa Monica, CA: Rand, April 1980.

Doering, Z. Organizing survey research to support military manpower policies. Santa Monica, CA: Rand, March 1982.

Fechter, A. Impact of pay and draft policies in Army enlistment behavior. The report of the Presidential Commission on an all-volunteer force. Washington, DC: U.S. Government Printing Office, November 1970.

Fernandez, R. Enlisted supply in the 1980s. Santa Monica, CA: Rand, February 1980.

Fisher, A. The cost of the draft and the cost of ending the draft. American Economic Review, 1969, LIX, 239-254.

Goldberg, L. Recruiters, advertising, and Navy enlistments. Alexandria, VA: Center for Naval Analyses, March 1980.

Goldberg, L. CNA and Rand forecasts of Navy enlistments. Alexandria, VA: Center for Naval Analyses, April 1980.

Goldberg, L. Long-range planning of requirements for Navy recruiters and advertising. Alexandria, VA: Center for Naval Analyses, May 1980.

Gray, B. Supply of first-term military enlistees. The report of the Presidential Commission on an all-volunteer force (II-2-1). Washington, DC: U.S. Government Printing Office, November 1970.

Hawes, J. 1979 reserve force studies surveys: Description and evaluation of survey procedures. Santa Monica, CA: Rand, September 1981.

Hutzler, W., & Doering, Z. 1978 DoD survey of officers and enlisted personnel: Sample design and selection. Santa Monica, CA: Rand, February 1980.

Lockman, R. Success chances of recruits entering the Navy (CNS 1086). Alexandria, VA: Center for Naval Analyses, February 1977.

Looper, L. Recruiting resource and goal allocation decision model. Brooks Air Force Base: Air Force Human Resources Laboratory, January 1980.

Morey, R. Budget allocation and enlistment prediction models for the Navy's recruiting command: Testing and validation. Durham, NC: The Center for Applied Business Research, Duke University, October 1979.

Muller, W. Feasibility and benefits of lateral placement to meet the technical personnel shortfall of the U.S. Navy. Washington, DC: George Washington University, June 1981.

Sims, W., & Truss, A. A reexamination of the normalization of the Armed Services Vocational Aptitude Battery (ASVAB) forms 6, 7, 6E, and 7E (CNS 1152). Alexandria, VA: Center for Naval Analyses, April 1980.

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