NAVAL POSTGRADUATE SCHOOL
Monterey, California

DTIC
S ELECTE
DEC 0 3 1993
A

THESIS

An Analysis of Enlisted Early Separations
Under the Navy's VSI/SSB Program:
The Impact of Eligibility and Program Benefits

by

S.J. Giarrizzo

September, 1993

Thesis Advisor: Stephen L. Mehay
Associate Advisor: Carol A. Mitchell

Approved for public release; distribution is unlimited

93

NPS 93-29434

REPORT DOCUMENTATION PAGE

1a Report Security Classification: Unclassified		1b Restrictive Markings		
2a Security Classification Authority		3 Distribution/Availability of Report: Approved for public release; distribution is unlimited		
2b Declassification/Downgrading Schedule				
4 Performing Organization Report Number(s)		5 Monitoring Organization Report Number(s)		
6a Name of Performing Organization Naval Postgraduate School	6b Office Symbol (if applicable) *36	7a Name of Monitoring Organization Naval Postgraduate School		
6c Address (city, state, and ZIP code) Monterey CA 93943-5000		7b Address (city, state, and ZIP code) Monterey CA 93943-5000		
8a Name of Funding/Sponsoring Organization	6b Office Symbol (if applicable)	9 Procurement Instrument Identification Number		
Address (city, state, and ZIP code)		10 Source of Funding Numbers		
		Program Element No	Project No	Task No	Work Unit Accession No

11 Title (include security classification) AN ANALYSIS OF ENLISTED EARLY SEPARATIONS UNDER THE NAVY'S VSI/SSB PROGRAM: THE IMPACT OF ELIGIBILITY AND PROGRAM BENEFITS

12 Personal Author(s)   S.J. Giarrizzo,   Lieutenant, United States Navy

13a Type of Report Master's Thesis	13b Time Covered From To	14 Date of Report (year, month, day) 1993 September 23	15 Page Count 72

16 Supplementary Notation The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.

17 Cosati Codes			18 Subject Terms (continue on reverse if necessary and identify by block number)
Field	Group	Subgroup	

19 Abstract (continue on reverse if necessary and identify by block number)

This thesis investigates the behavior of Navy enlisted personnel who were eligible for the FY93 VSI (Voluntary Separation Incentive)/SSB (Special Separation Bonus) Program. The thesis uses DMDC data on program takers as of February 1993. The objectives of the thesis are: (1) to identify factors that influence individuals to accept or not accept a voluntary separation bonus; (2) to compare FY93 results with FY92 results to determine if the same factors are consistent for both years of the program; (3) to determine the forecasting accuracy of the binomial logit model in predicting VSI/SSB behavior; and (4) to evaluate the effect of changes in the availability of transition benefits in 1993. Both binomial and multinomial logit models are estimated to explain the decision to take a bonus, and also which of the two options to accept. The results show that the statistically significant factors are consistent over the two years, and are consistent with economic theory. The binomial logit model is found to be highly accurate in predicting take behavior and program choice. Finally, making transition benefits available to VSI recipients increased the proportion of leavers choosing VSI. The thesis provides recommendations for improving forecasting accuracy and for future research.

20 Distribution/Availability of Abstract X unclassified/unlimited ___ same as report ___ DTIC users	21 Abstract Security Classification Unclassified	
22a Name of Responsible Individual Professor Stephen L. Mehay	22b Telephone (include Area Code) (408) 656-2643	2c Office Symbol AS/MP

DD FORM 1473, 84 MAR   83 APR edition may be used until exhausted   security classification of this page

All other editions are obsolete   Unclassified

An Analysis of Enlisted Early Separations
Under the Navy's VSI/SSB Program:
The Impact of Eligibility and Program Benefits

by

S.J. Giarrizzo
Lieutenant, United States Navy
B.S., United States Naval Academy, 1986

Submitted in partial fulfillment
of the requirements for the degree of

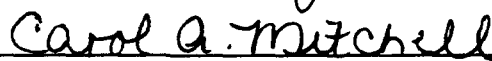MASTER OF SCIENCE IN MANAGEMENT

from the

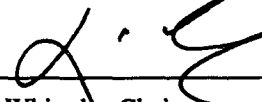NAVAL POSTGRADUATE SCHOOL
September 1993

Author: _____

S.J. Giarrizzo

Approved by: _____

Stephen L. Mehay, Thesis Advisor

_____

Carol A. Mitchell, Associate Thesis Advisor

_____

David R. Whipple, Chairman,
Department of Administrative Sciences

ii

ABSTRACT

This thesis investigates the behavior of Navy enlisted personnel who were eligible for the FY93 VSI (Voluntary Separation Incentive)/SSB (Special Separation Bonus) Program. The thesis uses DMDC data on program takers as of February 1993. The objectives of the thesis are: (1) to identify factors that influence individuals to accept or not accept a voluntary separation bonus; (2) to compare FY93 results with FY92 results to determine if the same factors are consistent for both years of the program; (3) to determine the forecasting accuracy of the binomial logit model in predicting VSI/SSB behavior; and (4) to evaluate the effect of changes in the availability of transition benefits in 1993. Both binomial and multinomial logit models are estimated to explain the decision to take a bonus, and also which of the two options to accept. The results show that the statistically significant factors are consistent over the two years, and are consistent with economic theory. The binomial logit model is found to be highly accurate in predicting take behavior and program choice. Finally, making transition benefits available to VSI recipients increased the proportion of leavers choosing VSI. The thesis provides recommendations for improving forecasting accuracy and for future research.

iii

TABLE OF CONTENTS

I. INTRODUCTION

A. HOW FAR MUST THE FORCE REDUCTION GO?

Doing more with less has become a task of growing importance within the Department of Defense in general, and especially within the U.S. Navy. During this current period of downsizing, virtually every aspect of the Navy will be affected. The fiscal year (FY) 1994 budget authority for national defense will exceed one trillion dollars, and when broken down by branch of service, reveals extensive cuts for the Department of the Navy. The $264.2 billion for outlays in President Clinton's FY 1994 defense budget reflects a real decline in budget authority of five percent from FY 1993, and over twenty-four percent from FY 1990. By FY 1997, estimates show a forty-one percent nominal decline from FY 1985. [Ref.1] Table 1-1 provides a little more insight into just how extensive these budget cuts are expected to be during the 1990s. The most significant portion of cuts in national defense spending will come directly from the Department of Defense, with the Department of Energy and other defense-related departments carrying their share of the burden with respect to funding cuts. It is likely that these funding

reductions will not be the bottom line. Deeper cuts may result from future budget iterations, as has recently been the case.

TABLE 1-1
PREDICTED DEFENSE SPENDING
($Billions)

Budget Authority	1993	1994	1995	1996	1997	1998
DOD Military	259.1	250.7	248.1	240.3	232.8	240.5
DOE & Other	13.9	12.7	13.0	13.4	13.2	13.4
Total	273.0	263.4	261.1	253.7	246.0	253.9
Annual Percent Change (1993 Dollars)	-8.5	-5.0	-3.0	-5.1	-5.0	0.0
Outlays						
DOD Military	277.3	264.2	258.0	251.6	233.7	239.2
Total	290.7	276.9	270.9	264.7	246.9	252.5
Annual Percent Change (1993 Dollars)	-5.6	-6.6	-4.3	-4.5	-8.9	0.0

Source: Secretary of Defense DOD press release, 27 March 1993

The above dollar cuts will translate into significant personnel reductions, as can be seen in the following table:

TABLE 1-2
MANPOWER REDUCTIONS
(End Strength In Thousands)

Active Military	FY 1992	FY 1993	FY 1994	Percent Change (FY 1992-FY1994)
Army	611	575	540	-12
Navy	542	526	481	-11
Marine Corps	185	182	174	-6
Air Force	470	445	426	-9
Total Active Duty	1808	1728	1621	-10

Source: Derived from data from Secretary of Defense DOD press release, 27 March 1993

There is a proportionate amount of hardware going away, as well. Eleven percent of the Navy's ship battle forces is being cut by FY 1994, which in part consists of two deployable carriers and one active air wing. [Ref.2:p.11] Unfortunately, these estimates may not be the end of the cuts absorbed by the Navy. In 1991, the Senate Armed Service Committee recommended achieving an active duty force of 1,692,000 by FY 1995. [Ref.2] When compared with the more recent DOD numbers in Table 1-2, active duty military end strengths will be below the committee recommendations by 1994; a year early. It would appear that the force reduction is gaining momentum. The 480,000 end strength figure for FY 1994 is predicted to reach 400,000 by FY 1999-- an additional 17 percent decrease from the amount already targeted. [Ref.3]

B. OBJECTIVES

As outlined above, there will be additional reductions in the numbers of active duty sailors beyond what has already occurred. Meeting the new end strength requirements is easier said than done when decision makers stop and realize that these cuts affect men and women who have volunteered to serve their country. The current drawdown is the largest since the inception of the all-volunteer force in 1973. This creates a unique challenge to manpower planners, as the Navy is tasked with eliminating from its ranks thousands of individuals who

3

...were led to believe that if they performed in a satisfactory manner, they would be allowed to complete a normal career and retire with an immediate pension. [Ref.2:p.7]

The problem becomes immediately obvious; how does the Navy meet its end strength requirements while at the same time keeping the faith with those individuals who volunteered with these same expectations of completing a Navy career? The House Armed Services Committee advised that:

The force drawdown be accomplished in a balanced and equitable fashion that will preserve the integrity of the military, maintain adequate force readiness, and cushion the blow for adversely affected career personnel. [Ref.2:p.7]

The reductions necessary to meet congressionally-mandated limits will be accomplished. The Navy has at its disposal several methods, or tools, which will be used in varying degrees to meet end strengths, while at the same time, "preserve the integrity of the military."

This thesis will look briefly at the methods that the Navy is using to reach its targets, and will focus on one particular method-- the Voluntary Separation Incentive (VSI)/ Special Separation Benefit (SSB) program. This program provides qualified individuals who choose to voluntarily leave active duty with a choice between two cash and benefits packages (if approved for separation by the Secretary of The Navy). This thesis will compare VSI/SSB acceptance rates from FY 1993 with those from FY 1992, providing additional data

from which to make observations concerning trends within the program. The 1993 data will also be used to develop a model to determine which varial.es are significant in the decision to voluntarily separate, and to be used to predict future program separation rates.

Chapter II of this thesis presents a more in-depth look at the VSI/SSB program, including eligibility, non-pecuniary benefits, and the actual dollar amounts involved. In addition, literature applicable to individual career decision making, especially military career choices, will be presented. An understanding of how the perceived environment influences an individual's decision-making is extremely useful in forecasting how groups will react.

Chapter III presents the data, along with any restrictions or assumptions made, which were used to determine significant variables in the choice of whether or not to accept VSI/SSB, and if so, which to accept?

Chapter IV contains the results of estimation of the multivariate (logit) models developed in Chapter III. Substantial changes in the nonpecuniary benefits between VSI and SSB occurred in FY 1993, and hopefully the results from the model will reflect how these changes affected acceptance behavior.

This chapter also compares the FY 1992 and FY 1993 results, pointing out any significant trends between the two groups of VSI/SSB-eligible individuals, and the decisions

made. Future offerings of this voluntary separation program can be more effectively targeted with additional data on who did, and who did not, accept, and which option was considered to be most attractive. Chapter V will present the conclusions drawn from Chapter IV, along with any policy recommendations warranted by the results.

C. RESEARCH QUESTIONS

The focus of this thesis is the VSI/SSB program, and therefore the primary research question concerns voluntary separation acceptance, and the choice between VSI versus SSB. Analysis of the 1993 results (from the start of the FY93 program through February 1993) may lend assistance in answering the following additional questions:

- Were the outcomes of the three phases of VSI/SSB in FY 1993 similar to the program results in FY 1992?

- Given the analysis of FY 1992 VSI/SSB data and the results of this thesis for FY 1993, can the Navy now more accurately forecast who is most likely to accept a separation bonus, and if so, which bonus program will be accepted?

- Did changes to the associated benefits packages have the desired effect of increasing the percentage of VSI acceptance in FY 1993 as compared with SSB?

II. LITERATURE REVIEW

A. BACKGROUND

As emphasized in the introduction, the challenge faced by the Navy is one of reducing its numbers while at the same time maintaining an effective, adequate, and well-trained fighting force. Force shaping-- avoiding the "hollow force" that is mentioned frequently-- is as much a part of the reduction as meeting end strength goals. It is dangerous to haphazardly cut personnel (because that's where the quick savings can be made) without ensuring that the numbers of experienced men and women needed to maintain the world's most capable Navy are available. Reduced accessions and involuntary separations could be used to reach end strength goals, but the costs associated with such a policy would be immense. Fortunately, policy-makers have given consideration to the spillover effects associated with the available options before deciding how to go about the reductions. The potential impact of the various policies on morale, readiness, local and national economies, and the fates of those separated are just a few of the considerations.

The Navy has chosen several methods, or tools, to accomplish the necessary reductions. The approach involves paring down over-manned skill areas and paygrades where

crowding has created promotion bottlenecks. A key consideration is to avoid cutting too deeply, thereby creating a serious undermanned condition. Figure 1 provides an overview of the Navy's approach to the downsizing challenge, showing what methods will be applied, and where. The remaining section discusses these methods.
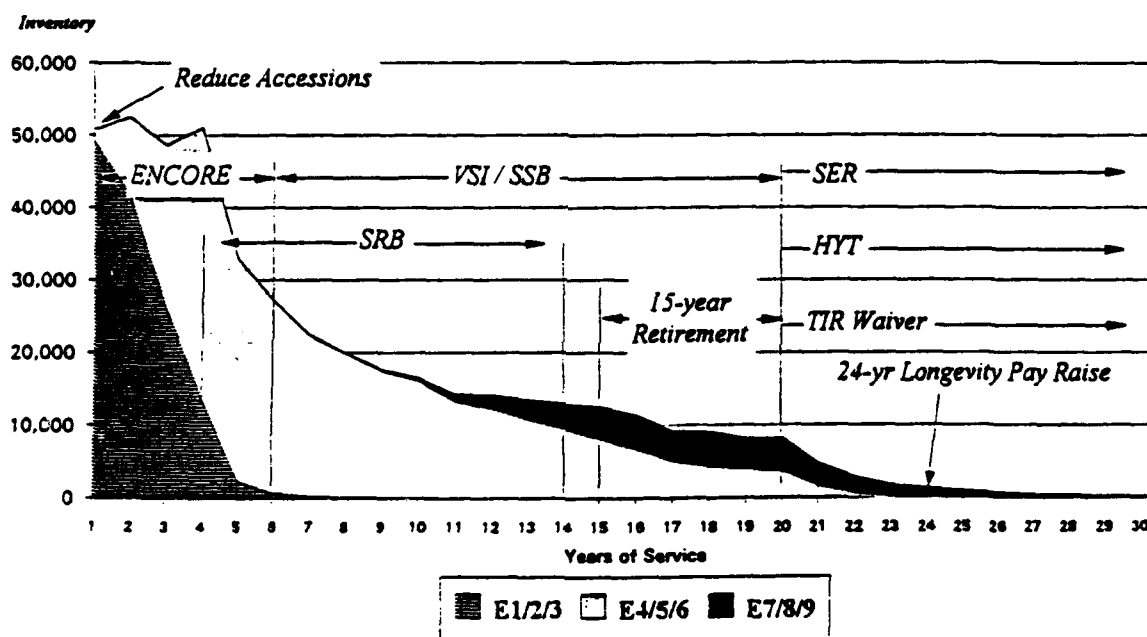

Figure 1.

Shaping The Active Duty Force

Source: RADM M.W. Bordy lecture at Naval Postgraduate School, 20 April 1993.

B. ACCOMPLISHING THE REDUCTION

Reducing accessions is a viable method for cutting the active duty numbers, and as such is being used by the Navy. This method cannot be used to bear the total burden of the force reduction because it would create severe shortages in certain paygrades later, but it can take its share of the cuts. Table 2-1 shows actual and projected active duty Navy enlisted accessions for FY 1990 through FY 1994. The right-most column shows the percent change in accessions as compared with the previous year.

TABLE 2-1
ACCESSIONS AND THE DRAWDOWN

Year	Accessions	Percent Change
1990	73,893	- - -
1991	71,108	-4
1992	59,433	-16
1993 (est.)	57,000	-4
1994 (est.)	52,200	-8

Source: Navy Bureau of Personnel

The FY 1994 prediction, if accurate, will represent a 29 percent decrease in accessions between FY 1990 and FY 1994.

Second on the list of force shaping tools is the ENCORE program. This program centralizes the approval authority for term reenlistments at the Navy Bureau of Personnel level, as opposed to the previous authority of individual commanding officers to approve reenlistments. This provides force

planners with the flexibility to shift qualified reenlistees from over-manned ratings to those that are undermanned. Table 2-2 provides the ENCORE results for calendar year (CY) 1992.

TABLE 2-2
CY 1992 ENCORE RESULTS

Number of Reenlistment Requests Received	41,305
Number Approved	27,821
Number of Rate Conversions Approved	2,293
Separations due to Quota Unavailability	945

Note: remaining requests received by BUPERS are either in work, under consideration, or were withdrawn.
Source: RADM L.F. Gunn, 24 November 1992 lecture at the Naval Postgraduate School

The fifteen year retirement, having been accepted for use within the Department of the Navy, is another tool that has received a great deal of publicity. Congress has authorized the Department of Defense to implement this, if necessary, through 30 September 1995. This program targets specific individuals between the fifteenth and twentieth years of service. Eligible individuals will receive pay and benefits similar to those currently available under the present retirement system. Payments would be received according to the following schedule:

2.5 percent X base pay X YOS   (less 1 percent for each
year under twenty years of service)

This program will target specific groups of individuals as the
needs of the Navy require.

One option that the Department of Defense has provided to
Navy commanding officers is that of "early outs." Commanding
officers are authorized to approve voluntary separation of
enlisted members up to six months prior to an individual's
expiration of active obligated service (EAOS). As of April
1993, 633 active duty sailors have left active duty in
accordance with this program.

At the other end of the career path, Selective Early
Retirement (SER) has been, and is being, used to assist in the
efforts at shaping a declining force. Selected retirement-
eligible individuals who meet the criteria will be separated
from active duty with retirement benefits corresponding to
their paygrade and years of service (YOS). By 31 July 1994,
the following numbers of individuals will be separated under
the SER progi₄m: 200 E-7s, 450 E-8s, and 150 E-9s. These are
not drastically large numbers; the E-9 target, for example,
represents only one percent of the Navy's E-9 total. This is
just one of the various methods currently in use.

The Selective Reenlistment Bonus (SRB) program, although
not a program aimed at force reduction, can be used both as a
force shaping tool and a method to assist in reaching targeted

end strengths. The Navy has approximately $100 million for FY 1993 with which to provide reenlistment bonuses to induce skilled individuals in undermanned ratings to remain on active duty. Significant research has been done concerning the effects that these bonuses have on retention and reenlistment. One such study, "The Effects of Selective Reenlistment Bonuses on Retention," by Donald J. Cymrot, showed that there was indeed a significant relationship between the selective bonus program and retention in the Marine Corps. [Ref.4:p.IV] An interesting aspect of this study is that it also provides an indication of the effects of removing the bonus program. Following short periods (2-5 months) of SRB suspension due to temporary fund depletion, there was a notable decrease in reenlistment in what would have otherwise been SRB-targeted occupational specialties. For one period the decrease in retention reached 13 percent. [Ref.4:p.V]

One consideration when adjusting the use of SRB to influence retention behavior is what can be called the "YOS effect." The years of service an individual has, reflected by his or her paygrade, has a significant impact on the effectiveness of decreasing the bonuses. The Cymrot study looked at bonus effects across differing paygrades, not just military occupational specialties (MOS). He discovered that the bonus (or loss of) had a decreasing effect on individuals as their paygrade increased. This is attributed to the growing influence that retirement has upon the individual as

12

eligibility approaches. Targeted individuals E-6 and higher, for example, were highly likely to reenlist without the SRB. E-1s through E-5s in the study, however, were significantly influenced by the bonus program. [Ref.4:p.59] From this study it can be inferred that personnel reductions are possible in what were considered critical areas through cuts in the current SRB program, provided such reductions are in line with Navy policy.

Another subtle method to influence retention behavior is through adjustments in High Year Tenure (HYT). This is a way of paring down mid- and upper-level enlisted ranks without affecting the retirement eligibility of the targeted individuals, while at the same time making more room at the top for promotions. The HYT numbers represent the limit to time-in-rate for respective paygrades before individuals would be mandatorily separated or retired. These separations are part of the Navy's "up-or-out" philosophy. Table 2-3 shows the changes that have recently been made in the HYT numbers.

TABLE 2-3
FY 1994 HYT CHANGES

| | PAYGRADE | | | | | |
Year	E-4	E-5	E-6	E-7	E-8	E-9
FY 1993	10	20	23	26	28	30
FY 1994	10	20	20	24	26	30

Source: RADM M.W. Bordy lecture, Naval Postgraduate School, 20 April 1993

As can be seen, these changes do not affect members who have yet to reach retirement eligibility.

The Navy has also changed advancement opportunities throughout the higher paygrades. These changes have a significant impact on reenlistment decisions and on overall career planning. As pointed out by Russell W. Beland in his study "Military Retirement, Voluntary Separations, and the Reduction of the Armed Forces," missing a promotion is very similar to being offered a voluntary separation in that both can be a "...signal to members that the military places a relatively low value on their services. [Both] also suggest the potential of being involuntarily separated in the future." [Ref.5:p.416] Table 2-4 reflects the changes in advancement rates through FY 1994.

TABLE 2-4
ADVANCEMENT RATE PROJECTIONS

| Paygrade | Historical | ADVANCEMENT RATE | | | PROJECTED |
		Sep 91	Mar 92	Sep 92	Mar-Sep 93
E-5	22	17	11	12	10
E-6	19	16	10	8	7

	Historical	1991	1992	1993	Proj. 1994
E-7	22	22	21	12	10
E-8	13	19	15	8	7
E-9	24	24	22	18	4

Source: RADM M.W. Bordy lecture Naval Postgraduate School
        20 April 1993

These advancement rate changes, together with HYT and the voluntary separation incentives, present a relatively benign method of reducing the size of the enlisted paygrades. As previously suggested by Beland, individuals who fail to advance may, in fact, see the writing on the wall and choose to leave active duty in the numbers needed to prevent an involuntary reduction-in-force (RIF). This has been a goal of the Navy, and has so far been successful. Other services have had to resort to involuntarily separating large numbers of their active duty force, which can have serious spillover effects on morale and accessions. Even the methods described above are not without negative effects on the morale of the force. The publicity and rumors surrounding the force reduction have created an air of uncertainty among the enlisted ranks. Military duty is arduous enough without added concern over whether or not members will have their jobs a month or year from now.

The voluntary separation program (VSI/SSB) has been mentioned several times, and what follows is an overview of the program. As outlined by the FY 1992 National Defense Authorization Act, qualified service members who accept and are approved for the program must choose between two payment/benefit options in exchange for voluntarily leaving active duty.

The VSI option provides an annuity-type payment plan whose value and payment method are based on the following formula:

$$\text{Annual VSI amount} = 2.5 \text{ percent} \times \text{final month's base pay} \times 12 \times \text{YOS}$$

(where the total number of payments equals twice the member's years of service.)

The SSB option provides a lump sum cash payment, the value of which is figured according to the following formula:

$$\text{Total SSB payment} = 15 \text{ percent} \times \text{final month's base pay} \times 12 \times \text{YOS}$$

Accepting SSB will obligate the member to serve three years in the Ready Reserve, while the VSI option means an obligation that is as long as the period of the VSI payments. The VSI payments will also be affected by any military retirement or Reserve drill pay, which will be deducted from VSI. SSB recipients will have to pay back certain amounts at the time military retirement payments begin. There are other restrictions and considerations, but this covers the main points.

Also as mentioned, individuals must be eligible and qualified for the program. Program eligibility is based on rating, YOS, and paygrade, with exceptions made for specific reasons. For example, certain Navy enlisted codes (NECs) are

ineligible, as are explosive ordnance disposal (EOD), divers, and SEALs. Individuals must be eligible for reenlistment and retention, not on limited duty, not in training for an NEC that is ineligible, and not awaiting disciplinary action or administrative separation. Also, members must have five years of continuous service prior to separation, and six years of active duty as of 5 December, 1991.

The FY 1993 program was offered in three separate phases. Each phase targeted slightly different groups, and provided separation dates that were phase-specific. Members who accepted and were approved under phase 1 were separated from active duty by 31 December, 1992. Phase 2 and phase 3 separations had to be effected by 31 January, 1993 and 31 March 1993, respectively. The benefits package offered with both the VSI and SSB is shown in Table 2-5.

All eleven benefits listed in Table 2-5 were available only with the SSB option prior to phase 3 of the FY 1993 program. VSI for FY 1992 and the first two phases of FY 1993 offered only the first three benefits outlined in Table 2-5. Recent legislation made the benefits packages equal (both programs offered all eleven benefits) and retroactive for all members who accepted the program in FY 1993. However, by the time this information was available, only the phase 3 applicants had yet to make the decision between VSI and SSB. Had the phase 1 and phase 2 applicants known of the equalized benefits packages, they might have made different choices

between VSI and SSB. The impact of this will be analyzed in a later chapter of this thesis.

TABLE 2-5
VSI/SSB NONPECUNIARY BENEFITS

- Employment assistance, pre-separation counseling, and overseas relocation assistance.

- One year storage of household goods.

- Twenty days of permissive TDY or excess leave (without pay) for job/house hunting (thirty days if OCONUS).

- Travel to home of selection, if within CONUS.

- Preferential Reserve billet assignment.

- 180 days continued use of military housing after separation.

- One-time preference for employment in certain base positions.

- Two years commissary and exchange privileges.

- 120 days traditional health care.

- Extension in DODDS system if dependent(s) have completed eleventh grade by sponsor's separation.

- Montgomery G.I. Bill enrollment ($1,200 contribution).

Source: Chief of Naval Operations VSI/SSB implementation message, 092320Z Nov 92

Table 2-6 provides a brief overview of the dollar value, by paygrade and YOS (ten to fifteen years), of both VSI and SSB. Also included are present value calculations for each paygrade at the ten and fifteen year point. Seven percent was used as the discount rate to obtain present values and provide

a reasonable basis for comparison of the current dollar value of the two programs.

TABLE 2-6
VSI/SSB DOLLAR VALUES

Years of Service

Paygrade		10	11	12	13	14	15
E-5	SSB	26,692	29,361	33,210	35,978	39,448	42,266
total	VSI	88,980	107,668	132,840	155,896	184,100	211,320
annual VSI							
payment		4,449	4,894	5,535	5,996	6,575	7,044
present value							
of VSI		47,132	--	--	--	--	87,409
E-6	SSB	29,214	32,135	36,865	39,937	44,355	47,523
total	VSI	97,380	117,832	147,456	173,056	206,976	237,600
annual VSI							
payment		4,869	5,356	6,144	6,656	7,392	7,920
present value							
of VSI		51,582	--	--	--	--	98,279
E-7	SSB	32,848	36,133	40,649	44,036	49,517	53,112
total	VSI	109,500	132,484	162,600	190,814	231,336	265,560
annual VSI							
payment		5,475	6,022	6,775	7,339	8,262	8,852
present value							
of VSI		58,200	--	--	--	--	109,844

Source: Department of Defense Office of Compensation figures

As can be seen by the highlighted figures, the present value of VSI payments is considerably higher than the lump-sum value of SSB. Previous research into the actual acceptance rates for FY 1992 between the two options revealed that SSB was, by far, the more popular of the two. Approximately eighty-five percent of the service members approved for the

program selected SSB over VSI. [Ref.6:p.55] It is obvious that the dollar value was not the driving factor in this decision. It appears that the method of payment and the associated benefits (as mentioned previously) figured greatly in the choice.

Although there is not a great deal of literature specifically associated with voluntary separation incentives, research has been conducted on the stay/leave military decision and can be applied to the VSI/SSB voluntary separation decision. One well-known and widely-applied approach to modelling retention has become known as the ACOL, or the Annualized Cost of Leaving, model. This approach is relatively unique among decision forecasting models in that it incorporates a variable for the nonpecuniary aspects of civilian and military life in its development.

As mentioned earlier, the VSI/SSB program is designed to influence service members to leave active duty who otherwise would have remained. It is hoped that the program is not just providing an exit bonus to individuals who would have left the service anyway. As an example, the FY 1993 VSI/SSB program had 17 years as its maximum YOS. At the seventeen-year point, it has been shown that the retirement effect is extremely strong, and individuals have demonstrated a preference for military life. The incentive needed to get these individuals who are almost retirement-eligible to leave would predictably be large. For these reasons, the cost of leaving varies

significantly across different paygrades, as one would expect. As a matter of fact, preference for military life in general is assumed to fit a logistic distribution. [Ref.4:p.27]

Briefly, ACOL is based on several components. The first component is the value of the income stream if the individual stays:

$$RS_s = \sum_{j=t}^{t+s} d^{j-t} M_j + d^{s+1} [R_{t+s} + W_{t+s}]$$

(1)

where

- RS_s is the expected present value of s more years of military service;

- M_j is the expected military pay in year j;

- R_{t+s} is the present value of retirement after serving t+s years;

- W_{t+s} is the present value of civilian wages after t+s years of military service;

- d is equal to $1/(1+\rho)$ where ρ is the individual's rate of time preference. [Ref.7:p.25]

Equation (1) provides the dollar value of continued military service as of a specific point in time. If a service member leaves immediately, the dollar value can be estimated by using equation (2):

$$RL = R_t + W_t \qquad (2)$$

R_t and W_t represent the present values of military retirement and the civilian wage stream for an individual who leaves at

21

time t. The cost of leaving equation, then, incorporates the two portions above along with a new variable, δ, which represents the net preference for civilian life. The model assumes that a person will stay in the military so long as the present value of the difference between RS and RL is positive <u>and</u> exceeds the net "distaste" (δ) for military life, as shown by equation (3):

$$RS_s - RL + \sum_{j=t}^{t+s} d^{j-t}\delta > 0$$

(3)

The result is the cost in dollars of leaving the military. As shown, this model incorporates the nonpecuniary aspects of civilian and military life. By analyzing historical data on stay/go decisions, along with estimates for expected civilian and military pay streams, the cost of leaving variable can be estimated. ACOL can then be incorporated in a logistic equation to estimate the probability of staying in the military:

$$P(staying) = \frac{1}{1 + e^{-(\alpha_1 - \beta_1 ACOL)}}$$

(4)

Where $(\alpha_1 + \beta_1\ ACOL)$ is the logit model.

The development of the ACOL model provides a quantitative approach to the premise that:

> Economic theory suggests that the decision to leave military service would be based on a comparison of total current monetary compensation, nonpecuniary benefits, and appropriately discounted retirement benefits in the military versus the most lucrative civilian package available.   [Ref.5:p.414]

Theory suggests that individuals who enter the military voluntarily will remain on active duty until the combination of military and post-military civilian compensation (including nonpecuniary aspects) is at its greatest value. ACOL helps to quantify this value. [Ref.5:p.414]

Armed with this economic theory, military policy-makers can better influence service members' decision making as the needs of the military dictate. The Navy in particular can directly influence the monetary portion of the equations above through pay, bonuses, and incentives such as VSI/SSB. However, the Navy can also inadvertently influence individuals' tastes for military life through the atmosphere created during the drawdown.

The degree to which VSI/SSB decisions are influenced by perceived changes in the likelihood of reaching retirement eligibility is uncertain, but theory suggests that the effect is significant. Given the nature of military retirement, it does not make sense to leave active duty after ten or fifteen years of service, unless unanticipated decreases in

23

compensation occur. [Ref.5:p.415]   The threat of being involuntarily separated or facing a future with shrinking advancement opportunities could be viewed as unanticipated compensation reductions.   Over twelve percent of the VSI/SSB offers in FY 1992 were accepted, and these were made to what were previously considered career service members.   The remainder of this thesis analyzes the FY 1993 takers to determine if there is a pattern to VSI/SSB acceptance, and in the attributes of the takers.

III. METHODOLOGY

A. DESCRIPTION OF DATA

Information on both the eligible population and those members who accepted either VSI or SSB was provided by the Defense Manpower Data Center (DMDC). Two separate data files were provided. The first data set contained information on Navy enlisted personnel who accepted either VSI or SSB under the FY 1993 program, through February 1993. This data set contained 2,992 observations of "takers." The second data set used was the DMDC version of the Navy Enlisted Master File (EMF) as of 30 September 1992. This data set did not identify those individuals who were eligible, therefore it was necessary to separate the bonus-eligible individuals from the EMF. This was accomplished using the program qualification criteria outlined in the FY 1993 Enlisted Voluntary Separation Incentive (VSI) and Special Separation Benefit (SSB) Program message. [Ref.10] This message specified the eligible rates, paygrades, and years of service, as well as specific NECs that were ineligible for the FY 1993 program, by phase. The merged data set, now consisting of both eligible non-takers from the enlisted master file and bonus-takers from the DMDC "taker" file, contained 26,325 observations. There were three phases, separated by date, in the FY 1993 VSI/SSB program. The first

phase ended on 31 December 1992, while the second and third phases ended on 31 January 1993 and 31 March 1993, respectively. Phases 2 and 3 expanded bonus eligibility over the previous phase by adding several ratings and, in some cases, relaxing the years of service criterion.

B. MODEL CONSTRUCTION

In order to determine what factors were significant in the decision to accept or not accept a separation bonus, and which bonus to accept if such was the case, several binomial logit models were specified. The binomial logit model is the most widely-accepted method of regression analysis when the dependent variable is of a binary nature and the response function is non-linear. [Ref 7:p.518] Multinomial logit models were also estimated for the above decisions, and an explanation of the method and results appears in the appendix. The binomial logit model utilizes the equation below in its calculations to determine the probability that an individual will make the decision corresponding to $D_i = 1$.

$$D_i = \frac{1}{1+e^{-(\beta_0+\beta_1 X_{1_i}+\beta_2 X_{2_i}+\epsilon_i)}}$$

Where: (5)
- e = base of the natural logarithm
- β_0 = constant
- β_1, β_2 = parameters to be estimated
- X_1, X_2 = explanatory variables
- ϵ = stochastic error term (assumed to follow cumulative logistic distribution)

26

Given the above equation, the values for D_i are limited to values (probabilities) between 0 and 1, and the model coefficients can be used to determine the effect selected variables have on the "log of the odds" that the choice in question will be made. [Ref 7:p.519] Linear probability models are not as accurate in this type of analysis due to the fact that linear probability models do not limit D_i (accept or not accept, for example) to values between 0 and 1. The linear probability approach makes interpreting the results easier because the coefficients represent the impact of a one-unit change in one of the independent variables, holding the others constant, on the probability of D_i equaling 1. However, the accuracy is questionable. Three logit models for the TAKE decision were estimated: one for the total population, one for phases 1 and 2 combined, and one for phase 3. Logit models for the VSI versus SSB decision were estimated using the total sample of takers, and for those takers in phase 3.

Specification of the models involved choosing those variables that are most relevant to an individual's decision (take versus not take, and VSI versus SSB). In addition, hypotheses were developed concerning the direction of the effect of each variable. In order to make comparisons between the results of the FY 1992 program and the results for FY 1993 in this thesis, the variables selected approximated those used in *Shrinking The Force: Effects of the Navy's Separation*

Incentive Program, by Professor Stephen L. Mehay and Lieutenant Mary Kirby of the Naval Postgraduate School. [Ref.8] The variables, and how they were coded for use in the logit models, are shown in Table 3-1.

Having decided upon the models and the variables to be used, the next step, as previously mentioned, was to hypothesize the signs of the variables. The general equations and expected signs are shown below.

$$\text{TAKE} = f(\overset{-}{\text{MINORITY}}, \overset{+}{\text{AFQT}}, \overset{-}{\text{MALE}}, \overset{-}{\text{YOS}}, \overset{-}{\text{GRADE}}, \overset{-}{\text{MARRIED}}, \overset{-}{\text{CHILD}},$$

$$\overset{+}{\text{MILSPS}}, \overset{+}{\text{HSD}}, \overset{-}{\text{NONGRAD}}, \overset{-}{\text{UNEMP}}, \overset{-}{\text{ADVRATE}}, \overset{+}{\text{HITECH}})$$

$$\text{VSI} = f(\overset{-}{\text{MINORITY}}, \overset{+}{\text{AFQT}}, \overset{-}{\text{MALE}}, \overset{-}{\text{YOS}}, \overset{-}{\text{MARRIED}}, \overset{-}{\text{CHILD}}, \overset{+}{\text{MILSPS}},$$

$$\overset{-}{\text{NONGRAD}}, \overset{-}{\text{UNEMP}}, \overset{+}{\text{HITECH}}, \overset{+}{\text{PHASE3}})$$

The explanation for the hypothesized signs follows the explanation found in Mehay and Kirby (1993).

TABLE 3-1
VARIABLES USED IN LOGISTIC ANALYSIS

Dependent Variables	Definition	Values
TAKE	Accept separation bonus	1=member accepted 0=did not accept
VSI	Choice of VSI or SSB	1=accepted VSI 0=accepted SSB

Independent Variables		
MINORITY	White or non-white	1=minority, 0=white
AFQT	AFQT score	Entered as raw score
MALE	Gender of individual	1=male, 0=female
YOS	Years of service	Number of years
GRADE	Paygrade of individual	1=E-6, 0=E-5 or E-7
MARRIED	Marital status	1=married, 0=not
CHILD	Number of children	Total number
MILSPS	Military spouse	1=military spouse 0=single or non-military spouse
NONGRAD	Non-high school grad	1=non-grad,college 0=grad
HSD	High school grad	1=high school grad 0=non-grad, college
UNEMP	Unemployment rate for home of record in 1992	Percentage
ADVRATE	Advancement rates for individual ratings	Percentage
HITECH	Technical ratings	1=hitech, 0=other
PHASE3	Separated members who accepted bonuses by phase	1=accepted bonus in phase 3 0=accepted in phase 1 or 2

In the TAKE model, the variable MINORITY is expected to have a negative effect as reenlistment rates are generally higher for minority groups than for whites [Ref. 6: p.45]. AFQT is expected to be positive, as are HSD and HITECH, reflecting increased civilian job opportunities for better-educated, better-trained individuals. Because men generally have higher retention rates than women, [Ref.6:p.46] MALE is hypothesized to be negative. MARRIED and CHILD are both expected to have negative signs, as previous research indicates that individuals with dependents have a tendency to remain in the military. [Ref.6:p.44] YOS and GRADE are hypothesized to negatively associated with the take decision, as service members who approach retirement eligibility are less likely to voluntarily separate. MILSPS is hypothesized to have a positive effect due to the fact that individuals who voluntarily separate and have a military spouse receive many of the same benefits they were entitled to while on active duty. Also, the increasing difficulty of managing dual military career families provides additional support for this hypothesized effect. UNEMP, the unemployment rate in the individual's home state, is forecasted to have a negative effect. It is assumed that many of the separated service members will return to their homes of record, and the local employment prospects will affect their decisions [Ref. 6:p.49]. ADVRATE is expected to be negative, indicating that increased advancement opportunities means a decreasing

30

likelihood of separating. Finally, NONGRAD is hypothesized to have a negative effect on the TAKE decision. Individuals with limited civilian employment opportunities are likely to stay in the military. One significant variable difference between the TAKE model and the VSI model is the addition of the PHASE3 variable to the VSI model. This variable is hypothesized to have a positive effect on the decision to accept VSI versus SSB, once the decision to TAKE has been made. This goes back to the discussion on the non-pecuniary benefits packages associated with each of the decisions. Individuals making their VSI/SSB decisions prior to the phase 3 "window" (31 January 1993 to 31 March 1993) were not aware that the FY 1993 Defense Authorization Act had equalized the benefits for VSI and SSB. During phase 3, however, this information became available to eligible members and it is expected that this would influence a greater percentage of individuals in phase 3 to choose VSI over SSB, as compared to the previous two phases. VSI had a greater present value and also equivalent associated benefits for the phase 3 decision makers.

C. MARGINAL PROBABILITIES

Following the construction of the models, it was necessary to determine the individual effect that the selected variables had on the probability of accepting a separation bonus. The analysis also needed to determine the effect of

31

each explanatory variable on the probability of accepting VSI, once the decision to accept a separation bonus had been made. Of primary interest was the PHASE3 variable and how the change in phase (embodying the additional benefits information) would affect the probability of accepting VSI. In conjunction with the logit model analysis, it is possible to define a "notional person" and to calculate the change in the probability of taking a separation bonus when one independent variable is allowed to change. The other independent variables are held constant during this procedure, making the probability analysis more accurate. The notional person used in this analysis is defined below, and the results of the marginal probability calculations appear in the following chapter. The TAKE notional person used in these calculations is a white male, single, with no children. The unemployment rate in his home state is 7.36, he has 12.6 years of service, is an E-6, faced an average advancement rate last cycle of 5.44 percent, and scored 64.5 on the AFQT. He is a high school graduate.

The VSI notional person is also a white male, no dependents, and a high school graduate. He has 11.6 years of service, scored 67.6 on the AFQT, and is also an E-6. These attributes are arbitrary; it is up to the analyst to determine what the notional (average) person will look like. The descriptions above are based on the overall composition of the samples (using mean values where applicable).

D. MODEL FORECASTING

The next step in the analysis was to determine a method to measure the forecasting ability of logit models similar to the ones used in this analysis. A method for using logit models for prediction is presented in *Logit Modeling: Practical Applications*, by Alfred Demaris. [Ref.9] The FY 1992 model (Mehay and Kirby,1993) was chosen to be the test model. [Ref.8:p.17] Using the logit coefficients found in the results of the FY 1992 model and the data from FY 1993, calculations could be made that tested the model's predictive accuracy on FY 1993 data. The following series of equations provides the basis for this analysis. The value of the first equation, L, equates to the logit value for each of the observations.

$$L = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3$$

(6)

The value of the previous equation is then changed to a probability using the following equation:

$$\rho = \frac{1}{1 + e^{-L}}$$

(7)

A prediction success threshold was set at ρ (the probability of $D_i = 1$) equal to .5. This means that if the **predicted** probability of an individual accepting VSI or SSB was greater

than .5, that individual was considered a taker; less than .5, and the individual was considered a non-taker. These calculated TAKE rates were then compared to the actual TAKE behavior for FY 1993 to determine how accurate the previous year's model was at predicting the current year's behavior. Also, the actual VSI acceptance rates were compared with the FY 1992 model predictions using the above method. This procedure was tested on a specific group within the population of eligibles to determine the model's accuracy at predicting group behavior. Paygrades E-5 and E-6 for both decision models were selected as test subsets. The results of the prediction accuracy are presented in Chapter IV.

IV. RESULTS

A. OVERVIEW

This chapter presents the results of the four binomial logit models outlined in Chapter III. Two models for the take decision and two models for the choice between VSI and SSB are presented. Included are each model's relevant variables and their effects on the selected dependent variables. Also included is a comparison of these results, using FY93 data, with the results of using FY92 data in *Shrinking The Force: Effects of the Navy's Separation Incentive Program*, by Professor Stephen L. Mehay and LT Mary Kirby of the Naval Postgraduate School. [Ref.8] This approach will highlight any trends in acceptance behavior over the two years of the voluntary separation incentive program, point out variables that remain significant over the two year life of the program, and indicate the reliability of the logit predicting model.

Following the logit results is an analysis of the marginal probabilities associated with the explanatory variables in each model. The analysis of the marginal probabilities provides an estimate of the individual effects of selected independent variables on the decision to accept a separation bonus, and as mentioned earlier in this thesis, which type of bonus to accept.

An analysis of the forecasting accuracy of the logit model is also conducted. It focuses on the ability of the Mehay/Kirby model (Mehay and Kirby, 1993) to predict the behavior of the FY93 bonus-eligible population. This approach, as outlined in Chapter III, is used to forecast both the acceptance (take/not take) and the program choice (VSI or SSB) decisions.

B. ELIGIBLE POPULATION

Table 4-1 provides an overview of program acceptance rates for both FY92 and FY93. Tables 4-2, 4-3, 4-4, and 4-5 provide the means of the relevant variables for the FY93 VSI/SSB eligible populations compared with FY92, and also of the samples that did not separate and the samples that accepted VSI. Logit models for the take/not take decision are run on the total sample of eligibles and also on the group who were eligible during phases 1 and 2, so that comparison of these two groups can be made. The logit models for the choice between VSI and SSB are run on the total sample, and also on the group who were eligible and made their decision during phase 3 of the FY93 program (31 Jan 93 to 31 Mar 93).

Of interest in Table 4-1 is the fact that the overall bonus acceptance rate was approximately equal in the two years. Also, the overall VSI acceptance rate for FY93 was approximately 10.6 percent, while that number increased to 12.9 percent for the decision makers in phase 3. As

previously mentioned, it is hypothesized that the greater availability of transition benefits was responsible for the increase in VSI acceptance among bonus takers, and this simple statistic lends support to this premise.

TABLE 4-1
NUMBER OF SAILORS ELIGIBLE FOR VSI/SSB PROGRAM
AND NUMBER (AND PERCENT) OF TAKERS BY
FISCAL YEAR AND PHASE

	FY92[a]	FY93[b]		
		ALL	PHASE 1&2	PHASE 3
NUMBER ELIGIBLE	31,872	24,076	22,743	24,076
NUMBER TAKERS (% of eligibles)	3,876 (12.2%)	2,840 (11.8%)	2,235	605
NUMBER ACCEPTING VSI (% of takers)	589 (15.2%)	300 (10.6%)	222 (9.9%)	78 (12.9%)
NUMBER ACCEPTING SSB (% of takers)	3,287 (84.8%)	2,540 (89.4%)	2,013 (90.1%)	527 (87.1%)

Source: [a] Figures derived from Navy Bureau of Personnel data for FY92
[b] Figures based on data provided by DMDC for FY93

Table 4-2 shows the means of the relevant variables for the bonus-eligible populations for FY92 and FY93. Notable differences in Table 4-2 between the FY92 and FY93 eligible populations can be seen in minority representation and the education variables. Minority representation was higher in the FY92 sample (37.2 percent versus only 23 percent in the FY93 sample), while the FY93 population reflected higher AFQT scores (a 10.2 percent increase over FY92) and a greater

percentage of high school graduates. Also, the proportion of eligibles in FY93 who were in hi-tech fields was almost double the proportion in FY92. This difference may reflect recent efforts by the Navy to fill the ranks with high quality high school graduates.

TABLE 4-2
MEANS OF RELEVANT VARIABLES FOR THE VSI/SSB
PROGRAM ELIGIBLE POPULATIONS IN FY92 AND FY93
(in percent, unless noted)

VARIABLE	FY92 ELIGIBLE[a] (n=31,872)	FY93 ELIGIBLE[b] (n=25,069)
MINORITY	37.2	23.0
MARRIED	79.2	79.1
MILSPS	5.4	5.9
CHILDREN (avg)	1.5	2.2
MALE	89.6	92.4
YOS (years)	12.9	12.6
UNEMP	7.4	7.4
NONGRAD	14.1	10.6
HS GRAD	82.0	85.3
HI TECH	20.1	39.4
GRADE (% E-6)	70.2	61.4
AFQT (raw score)	58.5	64.5

Source: [a] Figures derived from Navy Bureau of Personnel data for FY92
[b] Figures based on data provided by DMDC for FY93

Table 4-3 shows the mean values of the explanatory variables used in the Take and VSI acceptance models for those who voluntarily separated in FY92 and FY93. The sample of FY93 eligibles who separated appears to be more educated than the FY92 group; the proportion of high school graduates among the FY93 leavers is 86.2 percent, versus only 78.1 percent for

FY92 leavers. Minority representation decreased among leavers between the FY92 and FY93 samples, falling from 23.6 percent in FY92 to only 14.6 percent in FY93. Other than the differences noted, the two samples appear to be very similar, as the eligibility criteria for the programs during FY92 and FY93 were similar.

TABLE 4-3
MEANS OF RELEVANT VARIABLES FOR ELIGIBLE SAILORS
VOLUNTARILY SEPARATED IN FY92 AND FY93
(in percent, unless noted)

VARIABLE	FY92 SEPARATED[a] (n=3,876)	FY93 SEPARATED[b] (n=2,840)
MINORITY	23.6	14.6
MARRIED	76.5	76.4
MILSPS	7.0	5.9
CHILDREN(avg.)	1.5	2.0
MALE	86.1	90.7
YOS(years)	12.7	11.1
UNEMP	7.2	7.3
NONGRAD	18.7	11.0
HS GRAD	78.1	86.2
HI TECH	----	43.2
GRADE(% E-6)	58.8	51.8
AFQT(raw score)	60.7	67.6

Source: [a] Figures derived from Navy Bureau of Personnel data for FY92
[b] Figures based on data provided by DMDC for FY93

Table 4-4 shows the mean values of selected demographic and explanatory variables for the FY92 and FY93 eligible personnel who chose not to accept a separation bonus. For the stayers, with the exception of a decrease in minority representation (down from 38.8 percent in FY92 to 24.1 percent

39

in FY93) and an increase in educational achievement (average AFQT scores increased from 58.1 in FY92 to 64.1 in FY93) the two samples are relatively similar. It is also of interest to note that the FY93 samples in each category reflected an increase in the number of children, with little if any change in the MARRIED percentages. The logit models should indicate if this difference in the number of dependents has a significant effect on the decision to accept a separation bonus.

TABLE 4-4
MEANS OF RELEVANT VARIABLES FOR STAYERS
IN FY92 AND FY93
(in percent, unless noted)

VARIABLE	FY92 STAYERS[a] (n=27,996)	FY93 STAYERS[b] (n=22,229)
MINORITY	38.8	24.1
MARRIED	79.6	79.4
MILSPS	5.2	5.9
CHILDREN(avg.)	1.5	2.8
MALE	90.1	92.6
YOS(years)	12.9	12.8
UNEMP	7.4	7.4
NONGRAD	13.4	10.6
HS GRAD	82.5	85.2
HI TECH	N/A	34.8
AFQT(raw score)	58.1	64.1

Source: [a] Figures derived from Navy Bureau of Personnel data for FY92
[b] Figures based on data provided by DMDC for FY93

Table 4-5 presents the means of the relevant variables for VSI takers. Minority representation among FY92 VSI takers compared to FY93 takers was 22.4 percent versus 9.3 percent.

Also, the percentage of males accepting VSI in FY93 stands out over the FY92 figure, with an increase from 83.2 percent in FY92 to 92.0 percent in FY93. High school graduates also saw an increasing share of the VSI group in FY93, increasing from 79 percent to 81 percent between the two years. As a great deal of the analysis in this thesis concerns the behavior of the phase 3 decision makers, Table 4-6 is included. This table compares the means of the relevant variables for VSI takers in phase 3 with the overall taker population of phase 3 to determine if there are noticeable differences between these two groups. The table reveals no significant differences in the two samples, indicating that the phase 3 takers are fairly similar. A large amount of research in this thesis concerns the behavior of decision makers in phase 3 of the FY93 program in both the "Take" and VSI decisions. A comparison of the means in Tables 4-3 and 4-6, the total sample of FY93 takers compared with the FY93 phase 3 takers, reveals only slight differences. The percentage of phase 3 takers in highly technical jobs was five percent less than the overall taker percentage. Also, the overall percentage of takers with military spouses was 7.3 percent, while phase 3 takers had a MILSPS percentage of 3.8 percent. Other than this, there were no extreme variations in the composition of the overall FY93 taker sample and phase 3 subsample that might account for differences in the take rates for the two groups.

A comparison of Table 4-5, the total sample of members accepting VSI in FY93 (column 2), with Table 4-6, the FY93 phase 3 VSI takers (column 2), reveals some differences. Minority representation increased from 9.3 percent overall to 14.1 percent in the phase 3 group. Average years of service for the entire sample was 12.5, decreasing to 11.3 for the phase 3 sample. In addition, the total sample's married percentage was 74.7 percent, increasing to 79.5 percent when looking only at phase 3 individuals. In summary, those who waited until phase 3 to accept VSI differed from non-phase 3 takers by having a higher minority representation, fewer years of service, and a higher proportion of married persons.

TABLE 4-5
MEANS OF RELEVANT VARIABLES FOR VSI TAKEPS
IN FY92 AND FY93
(in percent, unless noted)

VARIABLE	FY92 VSI TAKERS[a] (n=589)	FY93 VSI TAKERS[b] (n=300)
MINORITY	22.4	93.0
MARRIED	7.5	74.7
MILSPS	9.5	4.7
CHILDREN(avg.)	1.4	2.2
MALE	83.2	92.0
YOS(years)	13.7	12.5
UNEMP	7.2	7.2
NONGRAD	16.5	13.7
HS GRAD	79.0	81.0
HI TECH	----	38.0
AFQT(raw score)	63.5	68.2

Source: [a] Figures derived from Navy Bureau of Personnel data for FY92
[b] Figures based on data provided by DMDC for FY93

TABLE 4-6
MEANS OF RELEVANT VARIABLES FOR FY93 PHASE 3 ALL TAKERS
AND PHASE 3 VSI TAKERS ONLY
(in percent, unless noted)

VARIABLE	FY93 PHASE 3 TAKERS (n=605)	FY93 PHASE 3 VSI TAKERS (n=78)
MINORITY	13.3	14.1
MALE	89.4	92.3
YOS(years)	11.0	11.3
GRADE(%E-6)	48.0	51.3
MARRIED	77.8	79.5
MILSPS	7.3	3.8
NONGRAD	12.2	11.5
HS GRAD	84.9	82.1
CHILDREN (avg)	2.1	2.0
HI TECH	38.0	39.7

Source: Figures derived from DMDC data for FY93

43

C. LOGIT MODEL RESULTS

The results of the FY93 "Take" model shown in Table 4-7 are very close to the hypotheses developed in Chapter III. MINORITY is negatively significant, supporting the premise that minorities have higher retention rates than whites. AFQT, HSD, and HITECH are all positively associated with the take decision. NONGRAD turned out to be positively significant, but was originally forecasted to have a negative effect on bonus acceptance. The decreased Navy opportunities for service members in the targeted ratings may influence individuals to accept a separation bonus even if they do not have a high school diploma, and face fewer job opportunities in the civilian sector. MARRIED was significant and negative, as hypothesized, but CHILD was positive, which is the opposite of the original expectation. From this model, having children appeared to influence individuals into accepting a separation bonus. The more children an individual has, the more likely he/she is to accept. This may be because it is more favorable to separate with a cash bonus rather than with nothing. YOS and GRADE are both negatively significant, as predicted, lending support to the original hypothesis that the closer members draw towards retirement, the less likely they are to separate. MALE was negative and significant, with this variable reflecting lower retention rates for females. UNEMP, ADVRATE, and MILSPS were all insignificant in this model.

TABLE 4-7
LOGIT MODEL RESULTS ON DECISION TO TAKE
A SEPARATION BONUS, FY93 ELIGIBLE POPULATION

VARIABLE	LOGIT COEFFICIENT	WALD χ^2	Pr $> \chi^2$	ΔProb/$\Delta\chi$[a]
INTERCEPT	1.480	- -	- -	- -
MINORITY	-.570	78.1	.0001	-.046
AFQT	.005	18.7	.0001	.001
MALE	-.180	5.0	.0250	-.014
YOS	-.324	1021.9	.0001	-.028
GRADE	-.348	.3	.0001	-.038
MARRIED	-.197	9.8	.0018	-.018
CHILD	.074	15.8	.0001	.006
MILSPS	-.062	.4	.5126	-.006
NONGRAD	.653	20.3	.0001	.055
HSD	.403	9.5	.0021	.035
UNEMP	.018	1.2	.2657	.002
ADVRATE	-.007	2.3	.1312	-.001
HITECH	.200	19.0	.0001	.017

Model χ^2 = 1560.5 with 13 DF
[a] Computation from Ordinary Least Squares estimates
Source: Data derived from Navy Bureau of Personnel figures

Table 4-8 provides the results of the same logit model run on the subsample of service members who were eligible prior to phase 3 of the program. This was done to determine if there are noticeable differences in acceptance behavior between the first two phases of the program and the program as a whole.

Comparing the results of the logit model run on the FY93 takers prior to the expanded phase 3 eligibility (Table 4-8) with the results of the model run on the total FY93 sample (Table 4-7) shows that there is very little difference in the impact of the selected variables on the decision to take a separation bonus. The additional phase 3 eligibility increased the total eligible sample size used in the model by only 1402 additional observations, from $n = 22,743$ to $n = 24,145$, but had very little impact on the coefficients and levels of significance. The only notable difference in the results is in the variable ADVRATE, which appears positive and significant in the Phase 1&2 model and insignificant in the model run on the total sample. The original hypothesis was that ADVRATE would have a negative effect on the decision to take a separation bonus. It is uncertain why the direction of this variable's effect has changed. However, it should be noted that the coefficient in Table 4-7 is not statistically significant.

TABLE 4-8
LOGIT RESULTS FOR TAKE DECISION FOR
FY93 SAMPLE OF PHASE 1 AND 2 ELIGIBLES

VARIABLE	LOGIT COEFFICIENT	WALD χ^2	Pr > χ^2	ΔProb/$\Delta\chi$[a]
INTERCEPT	1.570	--	--	--
MINORITY	-.581	80.7	.0001	-.049
AFQT	.005	19.3	.0001	.001
MALE	-.150	3.4	.0644	-.012
YOS	-.325	986.6	.0001	-.030
GRADE	-.411	86.0	.0001	-.046
MARRIED	-.193	9.2	.0024	-.018
CHILD	.075	5.8	.0001	.007
MILSPS	-.046	.3	.6275	-.004
NONGRAD	.631	18.7	.0001	.056
HSD	.386	8.6	.0034	.035
UNEMP	-.017	1.0	.3097	-.002
ADVRATE	.010	3.7	.0538	.001
HITECH	.145	9.8	.0017	.013

Model χ^2 = 1566.1 with 13 DF
[a] Computation from Ordinary Least Squares estimates
Source: Derived from Navy Bureau of Personnel data

Table 4-9 presents a summary of selected results from the FY92 Mehay/Kirby model[Ref.8:p.18] and from Tables 4-7 and 4-8 above, which permits a comparison of the FY92 and FY93 models. The highlighted figures in Table 4-9 indicate variables that had the same signs and significance levels in both the FY92 and FY93 models.

As shown in Table 4-9, the results of the FY93 model were extremely close to both the FY92 Mehay/Kirby model and to the results hypothesized in Chapter III. The difference in significance associated with the MILSPS (military spouse) variable may be attributed to the small number of observations within the FY93 data that had military spouses (less than six

percent). Differences in the UNEMP (unemployment) and ADVRATE (advancement rate) variables may be attributed to fluctuations in both numbers between FY92 and FY93.

TABLE 4-9
COMPARISON OF TAKE/NOT TAKE LOGIT MODEL RESULTS
FOR FY92 MEHAY/KIRBY MODEL, FY93 TOTAL SAMPLE,
AND FY93 PHASE 1&2 ONLY

INDEPENDENT VARIABLE	FY92 MODEL (Mehay/Kirby)[a]	FY93 MODEL (total sample)	FY93 MODEL (phase 1&2)
MINORITY	-.565*	-.570*	-.581*
AFQT	.004*	.005*	.005*
MALE	-.365*	-.180*	-.150*
YOS	-.019*	-.324*	-.325*
GRADE (paygrade)	-.680*	-.348*	-.411*
MARRIED	-.175*	-.197*	-.193*
CHILD (children)	.075*	.074*	.075*
MILSPS	.263*	-.062	-.046
NONGRAD	.495*	.653*	.631*
HSD (HS grad)	.140	.403*	.386*
UNEMP (unrate)	-.053*	.018	-.017
ADVRATE	-.005*	-.007	.010*
HITECH	.166*	.200*	.145*

* indicates that variable is significant at the .10 level or better
[a] For a more in-depth look at the Mehay/Kirby model results, see *Shrinking the Force: Effects of the Navy's Separation Incentive Program*, by Stephen L. Mehay and Mary A. Kirby, Naval Postgraduate School, Monterey, California, 1993.

Differences in the results of the logit models set up to analyze the VSI versus SSB decision were significantly greater. Table 4-10 provides the results of the FY93 VSI model, with Table 4-11 providing the results of the FY93 VSI model with the PHASE3 variable added. As previously noted, this variable is included to determine whether or not phase was significant in the VSI decision.

TABLE 4-10
LOGIT MODEL RESULTS FOR THE VSI VERSUS SSB DECISION
FOR THE FY93 TOTAL SAMPLE OF TAKERS

VARIABLE	LOGIT COEFFICIENT	WALD χ^2	Pr > χ^2	ΔProb/$\Delta\chi$[a]
INTERCEPT	-4.558	--	--	--
MINORITY	-.560	6.6	.0101	-.044
AFQT	.001	.1	.8241	.000
MALE	-.081	.1	.7421	-.007
YOS	.228	97.8	.0001	.025
MARRIED	-.225	1.5	.2181	-.020
CHILD	.020	.1	.7000	.001
MILSPS	-.201	.4	.5192	.020
NONGRAD	-.041	.1	.8266	-.007

Model χ^2 = 114.1 with 8 DF
[a] Computation from Ordinary Least Squares estimates
Source: Derived from Navy Bureau of Personnel data

TABLE 4-11
LOGIT MODEL RESULTS FOR THE VSI VERSUS SSB DECISION
FOR THE FY93 TOTAL SAMPLE OF TAKERS
WITH PHASE3 VARIABLE

VARIABLE	LOGIT COEFFICIENT	WALD χ^2	Pr > χ^2	ΔProb/$\Delta\chi$[a]
INTERCEPT	-4.558	--	--	--
MINORITY	-.549	6.3	.0118	-.043
AFQT	.001	.1	.7374	.000
MALE	-.058	.1	.8141	-.006
YOS	.229	98.5	.0001	.025
MARRIED	-.231	1.6	.2074	-.021
CHILD	.018	.1	.7307	.001
MILSPS	-.211	.5	.4972	-.021
NONGRAD	-.046	.1	.8049	-.008
PHASE3	.326	5.1	.0244	.032

Model χ^2 = 118.9 with 9 DF
[a] Computation from Ordinary Least Squares estimation
Source: Derived from Bureau of Personnel data

The only significant variables (.10 significance level or better) in this model are MINORITY, YOS, and most importantly, PHASE3. MINORITY was negatively significant, indicating that minority status influenced individuals towards SSB rather than VSI. YOS was significant in a positive direction, lending support to the hypothesis that, as an individual's time in the service increases, he/she has an increasing tendency to choose VSI, as VSI more closely approximates "normal" retirement payments. PHASE3 was positively significant, indicating that phase 3 decision makers were drawn towards VSI. This supports the hypothesis that the equated benefits package would be significant on the margin in influencing individuals to choose VSI over SSB. Table 4-12 shows the logit results of the sample of individuals who made the VSI or SSB decision during phase 3 of the FY93 program, for comparison purposes.

TABLE 4-12
LOGIT MODEL RESULTS FOR THE VSI VERSUS SSB DECISION
FOR FY93 PHASE 3 DECISION MAKERS

VARIABLE	LOGIT COEFFICIENT	WALD χ^2	Pr > χ^2	ΔProb/$\Delta\chi$[a]
INTERCEPT	-4.808	--	--	--
MINORITY	.194	.3	.6098	.019
AFQT	.006	.9	.3436	.000
MALE	.325	.5	.5006	-.038
YOS	.199	18.2	.0001	.025
MARRIED	.267	.5	.4736	-.032
CHILD	-.127	1.5	.2273	-.015
MILSPS	-.716	1.2	.2664	-.063
NONGRAD	-.303	.6	.4398	-.038

Model χ^2 = 20.8 with 8 DF
[a] Computation from Ordinary Least Squares estimates
Source: Derived from Navy Bureau of Personnel data

YOS was the only significant variable in the above model of those individuals making the VSI or SSB decision during phase 3 of the FY93 program. MINORITY, which is significant in the model using the total sample, is not significant when the sample included only phase 3 decision makers. Table 4-13 provides a brief summary of the FY93 logit model results presented in Tables 4-10 and 4-12, along with selected results from the FY92 Mehay/Kirby model [Ref.8:p.19]. This allows for a comparison of variable significance, and whether the effect was positive or negative, between the three "VSI versus SSB" models.

TABLE 4-13
A COMPARISON OF VSI LOGIT MODEL COEFFICIENTS
FOR THE FY92 MEHAY/KIRBY MODEL AND FY93 MODELS

INDEPENDENT VARIABLE	FY92 MODEL (Mehay/Kirby)[a]	FY93 MODEL (total sample)	FY93 MODEL (phase 3)
MINORITY	**-.204***	**-.560***	**.193**
AFQT	.006*	.001	.006
MALE	-.283*	-.081	.325
YOS	**.300***	**.228***	**.199***
MARRIED	-.272*	-.225	.267
CHILD	-.069*	.020	-.127
MILSPS	.442*	-.201	-.716
NONGRAD	-.203	-.041	-.303

* Indicates significant at the .10 level or better
[a] For a more in-depth look at the Mehay/Kirby model results, see *Shrinking the Force: Effects of the Navy's Separation Incentive Program*, by Stephen L. Mehay and Mary A. Kirby, Naval Postgraduate School, Monterey, California, 1993.

As shown in Table 4-13, the VSI results differ somewhat between FY92 and FY93. The actual sample of VSI/SSB decision makers was not quite as homogeneous as the population of eligibles, which might account for some of the differences between the FY92 and FY93 models. The logit model results for the VSI/SSB decision for phase 1&2 eligibles only are shown in Table 4-14, for comparison purposes. Again, the results are very close to those of the FY93 total sample. One significant difference between the phase 1&2 subsample and the total sample is the variable MARRIED. It was hypothesized in Chapter III to be negatively significant and this was also the result in the Mehay/Kirby model. Although not significant in the logit model for the FY93 total sample, it was negatively significant, as originally hypothesized, in the logit model for the phase 1&2 subsample.

TABLE 4-14
LOGIT MODEL RESULTS FOR THE VSI VERSUS SSB DECISION FOR FY93 PHASE 1&2 DECISION MAKERS

VARIABLE	LOGIT COEFFICIENT	WALD χ^2	Pr > χ^2	ΔProb/$\Delta\chi$[a]
INTERCEPT	-4.545	--	--	--
MINORITY	-.845	9.6	.0019	-.057
AFQT	.000	.0	.9469	.000
MALE	-.223	.6	.4391	-.020
YOS	.240	81.1	.0001	.025
MARRIED	-.383	3.3	.0699	-.034
CHILD	.062	1.0	.3117	-.005
MILSPS	-.047	.0	.8966	-.007
NONGRAD	.028	.0	.8973	.000

Model χ^2 = 20.8 with 8 DF
[a] Computation from Ordinary Least Squares estimates
Source: Derived from Navy Bureau of Personnel data

D. MARGINAL PROBABILITY RESULTS

The discussion in Chapter III concerning the "notional person" provides additional background in understanding how the attributes of the "notional person" are determined. Chapter III also provides a brief discussion on the technique of changing only one variable at a time, holding the others constant, to determine the effect of that change on the estimated probabilities. Table 4-15 provides the results of the "notional person" calculations for the TAKE logit model (Table 4-7) using the total sample of eligible service members. Tables 4-15 and 4-16 outline several "notional persons" and the likelihood that they would make the respective decisions.

TABLE 4-15
MARGINAL PROBABILITY RESULTS FOR TAKE MODEL

DESCRIPTION OF INDIVIDUAL	CALCULATED PROBABILITY OF TAKING A BONUS (%)
white male, single, HS grad	7.8
minority male, single, HS grad	4.6
white female, single, HS grad	9.3
white male, married, HS grad	6.6
white male, E-5, single, HS grad	10.8

* "Notional" individuals have average AFQT scores, are E-6s (unless noted), and face the average state unemployment rate and the average advancement rate for the entire sample.

The results shown in Table 4-15 are consistent with the TAKE logit model results (Table 4-7). From the above calculations, a minority male (all other variables held constant) has one of the lowest calculated probabilities of accepting a separation bonus. Also, being married in the above probability calculations decreases the calculated probability of accepting, which was evidenced earlier in Table 4-7. MARRIED, like MINORITY, was also negatively significant in the Take logit model. The single female above had a high calculated probability, as did the E-5 male, supporting the results of the GRADE and MALE variables from Table 4-7. Table 4-16 shows the results of the "notional person" calculations for the decision to accept VSI versus SSB, based on the logit results shown in Table 4-11.

TABLE 4-16
VSI MARGINAL PROBABILITIES

DESCRIPTION OF INDIVIDUAL	CALCULATED PROBABILITY OF TAKING A BONUS (%)
white male, single, HS grad	11.0
minority male, single, HS grad	7.3
white female, single, HS grad	16.0
white male, married, HS grad	9.7
white male, single, HS grad, phase 3	**15.8**

* All individuals have AFQT scores and years of service that equ.. the VSI/SSB decision sample average (67.6 and 11 YOS, respectively). They are E-6s, unless noted.

Highlighted in Table 4-16 is the result of the change in the PHASE3 variable, all other variables constant. Chapter III hypothesized that this variable would be positive and significant, which was in fact the result, as shown in Table 4-11. Table 4-16 shows one method of estimating how strong the PHASE3 effect is calculated to be; all other variables constant, changing the base case male to phase 3 increased the estimated probability of choosing VSI over SSB by 4.8 percentage points.

E. FORECASTING RESULTS

Table 4-17 shows the results of the forecasting calculations, using the equations outlined in the Methodology section of this thesis. Calculations were done for both the TAKE model and the VSI model. In addition, the ability of the FY92 Mehay/Kirby model to predict by group was also tested. Predictions for E-5 and E-6 subsamples were made. As Table 4-17 shows, The Mehay/Kirby logit model proved to be highly accurate at predicting actual acceptance behavior, using a success threshold set at p > .5 as a taker, and p < .5 as a non-taker. The decision threshold can be adjusted to increase the probability of making an accurate prediction to better than 50-50, with an expected decrease in the predictive accuracy.

TABLE 4-17
PREDICTIONS FOR FY93 POPULATION
USING FY92 MEHAY/KIRBY MODEL

Take/Not take decision	Percent predicted correctly
Total sample	88.7%
E-6	90.4%
E-5	83.0%
VSI versus SSB decision	
Total sample	96.3%
E-6	96.3%
E-5	98.5%

V. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

This thesis conducted an analysis of the voluntary separation behavior of Navy enlisted personnel during FY93, using taker data from October 1992 through February 1993. The thesis built upon previous research concerning the FY92 VSI/SSB program conducted by Professor Stephen L. Mehay and LT Mary Kirby, and supported many of the previous study's findings. [Ref.8] As evidenced by both the FY92 Mehay/Kirby model and the FY93 model, certain background variables significantly influence an individual's decision to accept a voluntary separation bonus. A comparison of the logit model results between FY92 and FY93 reveal a great deal of consistency in the effects and significance levels of the explanatory variables. It can be concluded from this that the populations of eligible service members between the two years made similar decisions concerning voluntarily separation.

The hypotheses in Chapter III concerning the individual variables and their effects on both the take decision and the VSI decision were supported. In the current environment of active duty force downsizing, recognizing which variables are significant in this decision can make the application of the

57

VSI/SSB program more efficient by providing an indication of what the "take" behavior is likely to be for specific groups of individuals.

The "notional person" calculations added additional support to the ability of the logit model to estimate the probability of acceptance for selected groups. It is necessary for decision makers involved with both force planning and budgeting to have an idea of how effective the VSI/SSB program will be in the future. The model created in this thesis can assist in this forecasting. As demonstrated by the accuracy of the FY92 Mehay/Kirby model, the logit results can accurately predict what the behavior will be for selected eligible populations.

It is also important to view the results of the FY93 VSI/SSB program in light of other Navy programs and efforts. Currently the Navy is focusing its efforts on maintaining, and in some cases increasing, the female and minority representation of its ranks. VSI/SSB participation can have an impact on these efforts, as the models presented indicate an increased likelihood of women accepting the separation bonus. Though the numbers involved are small, it is still necessary to evaluate their impact.

The effects of the PHASE3 variable on the likelihood of accepting VSI demonstrated that the VSI or SSB decision is not made solely on the method of payment or present value of the payment stream (in the case of VSI). By adjusting the

associated benefits, planners may be able to increase program participation without incurring prohibitive cost increases.

B. RECOMMENDATIONS FOR FURTHER RESEARCH

It was not within the scope of this thesis to determine the effects of phase differences on VSI/SSB acceptance, other than to analyze the effects of phase 3 on the FY93 VSI decision. Further analysis into the phase effects, including individual behavior across both program years, may lend additional insight into the decision-making process.

Incorporating information from Navy separation questionnaires into this type of analysis may be valuable in more accurately determining the effects of non-pecuniary factors, including the separation benefits, on the decision to accept voluntary separation.

APPENDIX

MULTINOMIAL LOGIT MODELING

An alternative approach to the two binomial logit models of the take and choice decisions used in this thesis is to use a single multinomial logit model. This type of model allows analysts to model decision making when more than two options are available to the decision maker. The multinomial logit model assumes that sailors view the stay-leave and program-choice choices as one single decision instead of a series of decisions. The single decision involves three options:

- Take VSI and leave.

- Take SSB and leave.

- Remain in the Navy (do not take).

The binomial logit models used in this thesis looked at the Take/Not Take and VSI/SSB decisions as two separate and sequential decisions. The decision maker is assumed to first decide to take or not take a bonus (voluntarily separate). If he/she does decide to separate, the next decision is which bonus to take. The multinomial logit model approach is based on the premise that the decision maker makes one decision but with several options.

The multinomial logit modeling approach arbitrarily selects one of the decisions as a "base" decision, and

60

calculates probabilities as a ratio of each of the remaining decisions to that base decision in a "log-odds" method shown in the following equation: [Ref.7:p.528]

$$Ln \ (P_{1i}/P_{Bi})$$

where:
- P_{1i} = the probability of individual i choosing option 1
- P_{Bi} = the probability of individual i choosing the base option

Thus, the model based on the three decisions outlined on the previous page would have two equations to be estimated. These two equations are presented below.

$$Ln \ (P_{VSI}/P_{NOT \ TAKE}) = \alpha_0 + \alpha_1 X_{1i} + \alpha_2 X_{2i} + \epsilon_i$$

where:
- P_{VSI} = probability of accepting VSI
- $P_{NOT \ TAKE}$ = probability of not accepting (base decision)
- α_0 = constant
- α_1, α_2 = estimated coefficients
- X_{1i}, X_{2i} = independent variables
- ϵ_i = stochastic error term

$$Ln \ (P_{SSB}/P_{NOT \ TAKE}) = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \epsilon_i$$

where:
- P_{SSB} = probability of accepting SSB
- $P_{NOT \ TAKE}$ = base decision
- β_0 = constant
- β_1, β_2 = estimated coefficients
- X_{1i}, X_{2i} = independent variables
- ϵ_i = stochastic error term

The model calculates each of the log-of-the-odds ratios shown in the previous two equations. Interpreting the results is similar to that of the binomial logit model. The results of the multinomial logit model specified for the choice between VSI, SSB, or not to accept a bonus are shown in Table A-1.

The signs indicate the effect of each variable on the relative odds of making each decision (numerator) with respect to the base decision (denominator). A negative sign, for example, indicates that the explanatory variable **decreases** the likelihood of making the decision shown in the numerator as compared with the decision shown in the denominator.

TABLE A-1
MULTINOMIAL LOGIT RESULTS FOR THE DECISION
BETWEEN VSI, SSB, OR NOT TO ACCEPT A BONUS

Independent Variable	$Ln(P_{VSI}/P_{NOT\ TAKE})$	$Ln(P_{SSB}/P_{NOT\ TAKE})$
MINORITY	-1.093*	-.524*
AFQT	.005*	.005*
MALE	-.126	-.199*
YOS	-.050*	-.373*
GRADE	-.275*	-.346*
MARRIED	-.510*	-.133*
CHILD	.092*	.068*
MILSPS	-.153	-.697
NONGRAD	.164	.723*
HSD	-.180	.478*
UNEMP	-.058*	-.015
ADVRATE	.045*	.001
HITECH	-.239*	.257*

Source: Derived from DMDC figures; n=24,145
* Indicates significance at the .10 level or better, based on a one-tailed t-test with DF = 26, $t_{critical}$ = 1.315

When comparing the results of the two equations, the coefficients provide an indication of the relative effects of each independent variable on the log-odds of both sets of decisions. The coefficient for MINORITY, for example, indicates that minority status has a much stronger negative effect on taking VSI than it has on taking SSB. Similarly, the negative effect of YOS is much stronger on the probability of taking SSB versus taking VSI. In some cases, the sign of the variable differs between the two equations. High school graduates and those in high tech ratings, for example, are less likely to choose VSI, but more likely to take SSB.

Multinomial logit modeling is an additional method of analysis that can be used to provide valuable insight into the decision making process when there are more than two choices to be made.

LIST OF REFERENCES

1. Secretary of Defense Department of Defense press release "FY 1994 Defense Budget Begins New Era", 27 Mar 1993.

2. Kruzel, Joseph, ed. *Military Personnel in a Changing World* American Defense Annual 1991-1992 (Ohio State University: Mershom Center 1992) pp.127-146.

3. Rear Admiral W. Bordy, Superintendent's Guest Lecture, Naval Postgraduate School, April 20, 1993.

4. Cymrot, Donald J. *The Effects of Selective Reenlistment Bonuses on Retention*, Center For Naval Analysis, CRM 87-43, March 1987.

5. Beland, Russell W., *Military Retirement, Voluntary Separations,and the Reduction of the Armed Forces*, Social Science Quarterly, vol.73 no.2 (June 1992), pp.411-419.

6. Kirby, Mary A., *A Multivariate Analysis of the Effects of The VSI/SSB Separation Program on Navy Enlisted Personnel*, Master's Thesis, Naval Postgraduate School, Monterey, California, September 1992.

7. Studemund, A.H., *Using Econometrics* (New York: HarperCollins Publishers 1992).

8. Mehay, Stephen L., and Kirby, Mary A., *Shrinking the Force: Effects of the Navy's Separation Incentive Program* (Naval Postgraduate School Draft).

9. Demaris, Alfred, *Logit Modeling: Practical Applications* (Newberry Park: Sage Publications, 1992)

10. Chief of Naval Operations (CNO) message dated 092320Z Nov 92, *Implementation of Enlisted Voluntary Separation Incentive (VSI) and Special Separation Benefit (SSB).*

INITIAL DISTRIBUTION LIST