An Examination
of the Effects
# of Voluntary
Separation
Incentives

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PREFACE

As a means of facilitating the defense drawdown, the Department of Defense offered eligible personnel either the Voluntary Separation Incentive or the Special Separation Bonus (VSI/SSB), a program to induce mid-career personnel to separate from service. Two key questions for policymakers concerned about the success of this program are (1) Did the program induce substantial separations (over and above what would normally occur)? and (2) Did the program induce marginal performers to leave? In this report, we use data on Army enlisted personnel to answer these questions. The research should be of interest to those concerned with personnel management in the Department of Defense, as well as to those interested in the more general effects of compensation on personnel behavior.

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Between January 1992 and October 1995, the Department of Defense offered a voluntary separation incentive to mid-career personnel to induce them to leave service as a means of facilitating the defense drawdown. This incentive, the VSI/SSB (Voluntary Separation Incentive/Special Separation Benefit) program, was offered to those with specific combinations of occupation, rank, and years of service (YOS). The specific eligibility criteria were determined by the individual services. Two key questions for policymakers concerned about the success of this program are (1) Did the program induce substantial separations (over and above what would normally occur)? and (2) Did the program induce more low-quality personnel to leave than high-quality ones?[1] Answers about the success of the program may also have broader interest. As shown by Asch and Warner (1994b), a voluntary-separation-pay program may play an important role in an alternative to the current military retirement system. Therefore, answers about the efficacy of the VSI/SSB program can give some insights into how such an alternative system might work.

In this report, we address these questions using Defense Manpower Data Center data on Army enlisted personnel.

First, we estimate a simple probit model of the decision to take the benefit in 1992 to describe the characteristics of those who accepted

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[1]A *high-quality enlistee* is defined as one having a high-school diploma (as opposed to a GED) and placing in the top half of the Armed Forces Qualification Test score distribution.

the VSI/SSB offer. The estimated model indicates whether those who took the benefit were more likely to be lower-quality personnel. Lower-quality personnel might be more likely to accept the offer if they view their opportunities within the military as being less advantageous than their civilian alternative, as a result of the drawdown.

Second, we estimate what is known as a difference-in-differences model to investigate what effect the VSI/SSB program had on an individual's probability of leaving service. The difference-in-differences method compares separation behavior[2] of those eligible in 1992 with the behavior of those ineligible in 1992, and it compares the separation behavior of both groups with the behavior of similarly defined groups in a pre-drawdown year: 1989. This methodology allowed us to circumvent some potential biases that could arise by simply comparing the separation behavior of ineligibles and eligibles or the behavior of those eligibles in 1992 relative to that of eligibles in a pre-drawdown year. The methodology also allowed us to control for other observable characteristics, such as demographic characteristics, that might affect separation behavior beyond eligibility for the VSI/SSB program.

One caveat to our approach relates to our ability to disentangle the pure inducement effect of the separation incentive from the compulsory effect of the drawdown on separations. If an individual failed to accept the VSI/SSB offer, he or she might later be involuntarily separated as part of the drawdown. Receiving an offer might even be a signal that the individual would be involuntarily separated at a later point. Members knew that the Army had a sizable drawdown to accomplish and that, if sufficient personnel were not induced to leave voluntarily, the Army might accomplish the drawdown through involuntary means.[3] Thus, for those Army enlisted personnel we study in this report, the effect we estimate might possibly capture a compulsory effect of the drawdown as well as a voluntary one. To account for this possibility, we include a set of variables to control for

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[2]Separation behavior is measured by the fraction of the starting inventory that leaves during the following year.

[3]We used Army data because of some problems we had with data for the other services.

the effects of the drawdown and for the possibility that the effect of the drawdown might have been different for those who were eligible than for those who were ineligible for the program. To the extent that we are successful, the effect we estimated can be attributed to the pure inducement effect of the program.

We found that those who were low-quality were more likely to accept the VSI/SSB offer, but generally the size of the effects was not large. Specifically, those without a high-school diploma were 19 percent more likely to take VSI/SSB than were those with a diploma, and those in the bottom half of the Armed Forces Qualification Test (AFQT) distribution were 6 percent more likely to take the benefit. Those with an additional year in their grade were 8 percent more likely to take the benefit and leave. These results are consistent with the hypothesis that, relative to high-quality personnel, lower-quality personnel tended to view their future career opportunities in the Army as more limited as a result of the drawdown and the Army's tighter up-or-out rules. Thus, to the extent that separation pay can be combined with an implicit or explicit threat of involuntary separation, the results suggest that it is possible to design a separation pay program such as the VSI/SSB program, to target to some extent the separation of the less-educated and marginal performers.

We also found demographic differences among takers and non-takers. Minorities were somewhat less likely to take the VSI/SSB benefit. Blacks were about 8 percent less likely than non-Hispanic whites to take the benefit, although they were more likely to be eligible for separation pay. We also found that Asians and Hispanics were 11 percent less likely to take the benefit than were non-Hispanic whites. Although females were found to be less likely to be eligible for VSI/SSB, they were somewhat more likely to take it than were males. Being female is associated with a 4-percent higher chance of taking the benefit. Finally, we predicted that the taker rate would have been lower had those who were ineligible been given the VSI/SSB offer. Thus, the Army was successful in choosing eligibility criteria that would produce a higher taker rate.

We estimated that the VSI/SSB program had a sizable effect on separation rates. Among high-quality personnel, we estimated that the VSI/SSB program increased the probability of separation 10 percent-

age points. The estimated effect of the program was even larger for low-quality personnel. For them, we estimated that the program almost doubled their separation probability from 13.5 percent to 29.2 percent, a difference of 15.7 percentage points, or 116 percent. Since about 40 percent of the personnel in our data are high-quality, we estimated the mean program effect across all personnel to be 13.4 percentage points, or an increase of 100 percent. Thus, we estimate that the VSI/SSB program increased separations by 13 percentage points over and above what we would have expected for personnel who met the eligibility criteria during the drawdown.

To the extent that the VSI/SSB benefit is conceptually similar to a negative reenlistment bonus, we were able to compare our 13-percentage-point results with past results on the effect of reenlistment bonuses on retention rates. Past studies generally estimate a reenlistment bonus effect of between 2 and 3 percentage points. But, reenlistment bonuses are also less generous than the VSI/SSB program. When we controlled for this difference, our estimate was that a reenlistment bonus would produce an approximate 12–18-percentage-point rise in separation rates. Our 13-percentage-point estimate is within the range of these previous estimates. Since past studies use pre-drawdown data, their results are not confounded by the effects of the drawdown. Thus, the similarity in estimates gives us some confidence that we were able to control for the compulsory effects of the drawdown on separations and to estimate the inducement effect of voluntary separation pay.

We found that about half of the personnel who left in 1992 with the separation pay would have left without it; therefore, our results indicate that half of the eligible personnel earned economic rents. Consequently, this analysis suggests that a separation-pay program such as the VSI/SSB program can be an effective means of inducing separations over and above what would have occurred without such a program.

ACKNOWLEDGMENTS

INTRODUCTION

At the end of the 1980s, the Department of Defense (DoD) began drawing down the size of the U.S. military's active force from a post-Vietnam peak of 2.2 million in FY 1987 to 1.6 million by FY 1997, a decline of about 25 percent. Much of this drawdown was completed in the early 1990s, with three-fourths of the drawdown completed by the end of FY 1993. Initially, the focus of the drawdown was on cutting the number of entrants into the armed forces. But, because this strategy would result in fewer career personnel than were needed in later years, DoD also needed to reduce the number of mid-careerists as well. An additional goal of the drawdown was to accomplish the reduction in personnel while treating service members fairly and maintaining a high state of readiness. DoD therefore chose to rely primarily on voluntary rather than involuntary separations to reduce the size of the mid-career force, and it instituted a temporary program of separation pays, called the Voluntary Separation Incentive and the Special Separation Benefit program (VSI/SSB program), whose purpose was to offer eligible members a financial incentive to voluntarily separate from service.

VSI and SSB are two alternative benefits that eligible members could choose. VSI offered members an annuity payable for twice as long as their years of service (YOS) and equal to 2.5 percent times basic pay times YOS. SSB offered members a one-time lump sum equal to 15 percent of basic pay times YOS. Both benefits required affiliation with a Reserve Component. To be eligible, members had to have at least 6 years of service and could not be immediately eligible for retired pay upon separation from service. Each service defined the criteria to be used in determining which individuals would be eligible

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for the VSI/SSB program. In all cases, the services were required to offer the VSI/SSB program before involuntarily separating members who would otherwise be permitted to continue until they were eligible for retirement.

Two key questions for policymakers concerned about the success of this program are (1) Did the program induce substantial separations (over and above what would normally occur)? and (2) Did the program have differential effects by quality category? Answers about the success of the program also have broader interest. As discussed in Asch and Warner (1994a, b), there may be a role for separation pay as a permanent part of the military retirement system. Such pay could be used to target the separation of specific groups of personnel, such as personnel in occupations for which "youth and vigor" are desired or personnel in skills made obsolete by changing technology. Results on the effectiveness of separation pay in inducing separations, especially of specific groups of personnel, might give insights into how separation pay could be used as part of an alternative military retirement system.

In this report, we address these questions by estimating the effect of the VSI/SSB program on active-duty enlisted separations from the Army and by examining the characteristics of those who took the benefit and left service against characteristics of those who did not. To examine whether the services were successful in targeting marginal performers, we also compare the characteristics of the groups who were offered the benefit against the characteristics of those who were not. As explained in Chapter Three, both of these comparisons use probit-model estimation. Because the VSI/SSB program was not implemented independent of the drawdown, it was possible that members who did not take VSI/SSB would be involuntarily separated at a later date. Our analysis attempts to differentiate between the pure inducement effect of the program and the compulsory effect of the drawdown on separations, by including a set of variables in the regression analysis that controls for the drawdown's effect on separations. Thus, it provides insights into the success of the VSI/SSB program in the context of the drawdown and, more generally, into the inducement effects of a separation-pay program.

The approach we took to estimate the effect of the separation-pay program on separations is to use a methodology that first compares

the separation behavior of those eligible to receive the program in 1992 against the behavior of those who were ineligible for the program. However, insofar as those who were eligible would have had a higher propensity to separate even without the financial incentives associated with the program, the methodology also compares the separation behavior of these groups against the behavior of individuals who would have been eligible or ineligible in a pre-drawdown year—1989—had the program been in effect. As discussed in more detail in Chapter Three, this approach, the difference-in-differences approach, addresses some potential biases that could arise in simply comparing separation behavior before and after the drawdown or between the eligible and ineligible groups during the drawdown. The separation model is estimated using ordinary least squares regression.

Two earlier efforts also examined the separation effects of the VSI/SSB program and the characteristics of those who accepted the VSI/SSB offer. Beland and College (unpublished) used data on Army and Air Force officer and enlisted personnel to address the following questions: Were those who accepted the offer lower-quality in terms of aptitude, educational achievement, and promotion history? and Would those who accepted the offer have left service even without the benefit? They found that, generally, lower-quality personnel did accept the offer and that some of those who took the benefit would have left anyway. By comparing the separation behavior of those who accepted the offer during the drawdown to the separation behavior of those in pre-drawdown years, they found, for example, that about 13 percent of the enlisted personnel who accepted the separation incentive would have left service in any case.

One potential problem with the Beland and College analysis is that it ignores the behavior of those ineligible for the program. However, the behavior of this group contains useful information as a comparison for the eligible group. For example, separations during the drawdown may have been unusually high relative to those of pre-drawdown years for reasons unrelated to the VSI/SSB program but related to post–Cold War conditions in the military (i.e., military service is viewed as being less attractive). Comparisons between the behavior of the ineligible group in the pre- and post-drawdown years provide information about general conditions and their effects on separations in the pre- and post-drawdown years. Specifically, how

the separation rate of the ineligible population changes between the two periods helps identify those changes in personnel policy other than separation benefits—such as tighter retention standards—that were implemented in an effort to reduce force levels.

The second study, by Mehay and Hogan (1995), more closely resembles our own in that it uses the difference-in-differences approach. Using data on Navy and Air Force officer and enlisted personnel, including data on those both eligible and ineligible for the program, the study analyzed the pure inducement effect of the VSI/SSB program on separation behavior. Mehay and Hogan argue that, because Navy personnel, in contrast to Air Force personnel, were explicitly told that, if they did not accept the VSI/SSB offer, they would *not* be at risk of involuntary separation, contrasting Navy separations with Air Force separations provides insight into the pure inducement of the VSI/SSB program. As discussed in Chapter Two, the Army policy was somewhere in between the Air Force's explicitly placing those who failed to take the VSI/SSB benefit at risk of involuntary separation and the Navy's policy. The Mehay and Hogan study found that lower-quality personnel generally were more likely to accept the VSI/SSB offer and that the program had the combined effect of releasing personnel from their reenlistment contract (which by itself increased separations) and of inducing them to leave because of the financial incentive. They estimate that only 1 in 12 takers was actually induced to leave by the financial incentive.

This report is organized as follows. In Chapter Two, we provide background on the VSI/SSB program. In Chapter Three, we discuss our approach and our data. In Chapter Four, we present our results. In Chapter Five, we summarize our findings and discuss their implications.

OVERVIEW OF THE VSI/SSB PROGRAM

PROGRAM DESCRIPTION

As a temporary program, VSI/SSB began in January 1992 and continued through October 1995. As noted earlier, members could choose either VSI, which is an annuity, or SSB, which is a lump-sum payment, and they could change their choice up to the date of separation. VSI is calculated as 2.5 percent of the member's basic pay times YOS, and these payments are made for 2 times as long as the member's active YOS. SSB is calculated as 15 percent of the member's basic pay times YOS. Table 2.1 shows examples of the payments for members in different grades and YOS. The relative size of the discounted present value of VSI and SSB depends on the member's personal discount rate, but for real discount rates below 16 percent, the discounted present value of VSI exceeds that of the SSB payment (Warner and Pleeter, unpublished). In addition to separating, members who take either VSI or SSB must also serve in the Ready Reserve.

Table 2.1

VSI Versus SSB Benefits

Grade/YOS	VSI annuity	SSB
E5/10 YOS	$4,290 for 20 years	$25,742
E6/14 YOS	$7,129 for 28 years	$42,774
O3/9 YOS	$7,703 for 18 years	$46,219
O4/14 YOS	$14,640 for 28 years	$87,840

NOTE: Uses FY 1992 Basic Pay Table.

For SSB, the obligation is for 3 years; for VSI, the obligation is for the length of the member's VSI payment.

To be eligible, members must have completed more than 6 years of service as of December 1991, must not be eligible for retired pay, and must have had the last 5 years of service be continuous. Each service determined which personnel were offered the benefit, made the offers, set the time limit for the offers, and determined which member applications would be accepted. As discussed in the following section, each service implemented the policy differently.

In the first year of the program—1992—the VSI and SSB program had differences other than the benefit formula. Those who chose VSI had fewer transition benefits than did those who chose SSB—those who chose SSB received commissary privileges for 2 years, extended military housing for 180 days after separation, and priority affiliation with Reserve and National Guard units—and faced a military-pay offset for any active or reserve military pay that the member earned after separation. There was no offset for those who chose SSB. However, beginning in 1993, these differences were eliminated retroactively.

IMPLEMENTATION

The Army had the biggest reduction to make of any service during the drawdown: 245,000 individuals (officer and enlisted). This service offered VSI/SSB to enlisted members with more than 9 years of service in skills (defined by occupation and grade) that were overfilled. By and large, the main Army eligibility criteria were based on an individual's rank, YOS, and occupation. However, through the judicious choice of these variables, the Army was able to offer the benefit not only to overfilled occupations but also, implicitly, to some marginal performers.

For example, the Army offered the benefit to those who demonstrated very slow promotion speeds and relatively long time spans in a given grade, suggesting a poor job match with the Army. These individuals tended to have many years of service and relatively low ranks. At the beginning of the drawdown, as an additional incentive for these individuals to leave, the Army also made its up-or-out rules more stringent so that many of the marginal performers would be in-

voluntarily separated under the new rules. For example, at the beginning of the drawdown, the Army reduced the up-or-out point for E4s from 13 to 8 YOS. Thus, E4s with, say, 10 YOS would be subject to involuntary separation as a result of the change in the up-or-out rule. These individuals were also offered the VSI/SSB benefit. Similarly, the up-or-out rule for E5s was changed from 20 to 15 YOS, and those affected were also offered the VSI/SSB benefit.

It is interesting to contrast the Army's implementation approach to that of the Air Force and Navy. The Air Force also had a sizable reduction to accomplish: 177,000. It primarily offered VSI/SSB to mid-grade (E4 and E5) enlisted members in less-critical skills and more than 9 years of service. The Navy had to reduce its strength by a smaller amount: 86,000. It offered VSI/SSB to mid-grade (E5 and E6) enlisted members in overfilled occupations who had 10 or more years of service.

The Navy and Air Force represented two extremes in implementation. Navy personnel were told (in various issues of the *Navy Times*) that if they opted not to take the VSI/SSB incentive, they would not be subject to involuntary separation. In contrast, Air Force members were presented with probabilities of being involuntarily separated if they opted not to take the benefit. Some personnel were told that their chances were 100 percent. Thus, those who did not voluntarily leave the Air Force ran the risk of compulsory separation.

For those not affected by the tighter up-or-out rules, the Army policy was, anecdotally, somewhere in between that of the Air Force and Navy. Individuals were not presented with explicit estimates of their risk of involuntary separation, but members were aware that the Army had a large reduction to make. Those who opted not to take the benefit knew that they might face involuntary separation if the Army could not achieve the reduction via voluntary separations.

Implementation has some implications for our analysis of separation behavior across services. Our estimates of the effect of the VSI/SSB program on separations for the Army will capture both the pure inducement effect of separation pay and, potentially, a compulsory effect to the extent that individuals believed that they would be involuntarily separated at a later date.

METHODOLOGY

APPROACH FOR DESCRIBING TAKER CHARACTERISTICS

The straightforward approach for describing the characteristics of those who accepted the VSI/SSB offer is to start with a simple model of individual choice. We assumed that individuals are more likely to take the offer if they are better off by doing so than by staying in service. An interesting question to consider is why an individual would be better off by taking the benefit, and why low-quality personnel in particular might decide to take the benefit more often than high-quality personnel.[1]

Previous retention models (see Asch and Warner, 1994a, for an example) assume that, when individuals decide whether to stay in service or leave at a given point in time, they weigh their expected utility from each decision and choose what would make them better off. In that framework, the VSI/SSB would increase the expected returns to leaving and so should increase a given individual's probability of separating.

More formally, if V^s is the individual's expected value of staying and V^l is the expected value of leaving, then the individual stays if his or her net gain to staying, $G = V^s - V^l$, is greater than zero. Otherwise, he or she leaves. If we let S be the separation incentive that the

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[1]A *high-quality enlistee* is defined as one having a high-school diploma (as opposed to a GED) and placing in the top half of the AFQT score distribution.

individual takes,[2] then S increases V^l. Consequently, an individual is more likely to leave because $G = V^s - V^l - S$ is more likely to be less than zero.

Not all individuals will take the benefit and leave. First, individuals have different attitudes toward military service—some preferring it more than others do. Second, they have different civilian opportunities, which affect V^l. Finally, they have different promotion opportunities and career paths within the military, which affect V^s. One goal of our analysis is to estimate the effect on separation rates of offering the VSI/SSB program, i.e., the probability that an individual takes the benefit and leaves service.

As shown in Asch and Warner (1994a), ability, or quality, has an ambiguous effect, theoretically, on an individual's decision to stay. On the one hand, better-able personnel have better opportunities within service because they have better promotion opportunities. On the other hand, they also have better civilian opportunities. Thus, theory cannot tell us *a priori* whether higher- or lower-quality personnel will be more likely to remain in service. More formally, if α denotes an individual's ability or quality, both V^s and V^l depend positively on α. The effect of α on G is given by

$$dG/d\alpha = dV^s/d\alpha - dV^l/d\alpha \qquad (3.1)$$

Theoretically, the effect of α on the probability of leaving is unknown, because both $dV^s/d\alpha$ and $dV^l/d\alpha$ are positive.

We also cannot say theoretically whether those who take the VSI/SSB benefit will be of lower or higher quality without having additional information or some assumptions about whether and how the VSI/SSB program or the drawdown might have affected $dV^s/d\alpha$ or $dV^l/d\alpha$.

Under what circumstances might the term $dV^s/d\alpha$ have changed as a result of VSI/SSB or the drawdown? The expected gain to staying for

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[2]S equals Max(VSI,SSB).

high-quality relative to low-quality personnel (i.e., $dV^s/d\alpha$) might have changed if lower-quality personnel view themselves as having fewer promotion opportunities in the post-drawdown environment relative to higher-quality personnel and relative to their own civilian opportunities. In this case, $dV^s/d\alpha$ and, therefore, $dG/d\alpha$ would rise, and higher-quality personnel would be more likely to stay and lower-quality personnel would be more likely to take the benefit.

The term $dV^s/d\alpha$ might also change because of changes in the services' up-or-out rules during the drawdown. As described in Chapter Two, the Army reduced the up-or-out points for some ranks at the beginning of the drawdown. As a result, some of those who were offered the VSI/SSB benefit would later be subjected to involuntary separation if they failed to accept the offer. To the extent that lower-quality personnel are more likely to be subjected to up-or-out rules, this policy means that the term $dV^s/d\alpha$ will be higher under the VSI/SSB program because lower-quality personnel are more likely to be involuntarily separated if they fail to accept the VSI/SSB offer. Thus, for the Army, we would expect lower-quality personnel to have a lower gain to staying and thus to be more likely to accept the VSI/SSB offer.[3]

To describe empirically the characteristics of those in the Army who accepted the VSI/SSB offer, we estimated a probit model of the decision to take the benefit conditional on being eligible. More formally, we let the indirect utility ($R_i{}^*$) associated with taking either the VSI or SSB benefit conditional on being eligible be equal to

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[3]For the Navy, the answer was less clear cut. The Navy stated that it would not involuntarily separate personnel who failed to accept the VSI/SSB benefit. Furthermore, while the Navy increased the stringency of its up-or-out points, it did so only for retirement-eligible and not VSI/SSB-eligible personnel. Thus, for the Navy, it is unclear, *a priori*, whether high- or low-quality personnel would be more likely to accept the program. The Air Force made it clear that those who failed to take the benefit increased their chances of involuntary separation, and it also lowered its up-or-out points, primarily for retirement-eligible personnel. The Air Force also set its eligibility criteria to target those who were relatively slow in receiving promotions, i.e., those in low ranks but with a relatively large number of years of service. Thus, we would expect low-quality personnel to be more likely to take the benefit in the Air Force as well. See Mehay and Hogan (1995) for an analysis of Air Force and Navy taker characteristics.

$$R_i^* = k_0 + kX_i + \upsilon_i \tag{3.2}$$

where X_i is a vector of observed individual characteristics, i indexes individuals, k_0 and k are parameters to be estimated, and υ_i is a vector that represents unobserved factors that influence R_i^*.

Since our focus is on describing the characteristics of those who took the benefit rather than on how various characteristics affected the underlying indirect utility associated with taking the benefit, Eq. 3.2 is a reduced-form model that includes the characteristics by which takers might differ, such as demographic characteristics and rank, YOS, and occupation. These characteristics are assumed to influence individuals' attitudes toward service, civilian opportunities, and their internal military career opportunities. Since we are particularly interested in the question of whether takers tended to be of lower quality than nontakers, the X_i include variables that indicate whether the individual is in the upper half of the Armed Forces Qualification Test (AFQT) distribution, whether they are high-school graduates, and whether they have been promoted more quickly than have their peers.[4] We assumed that these characteristics are correlated with an individual's performance in the military.[5]

We let R_i be a 1/0 indicator of whether an individual took either the VSI or SSB benefit and left service conditional on being eligible. R_i equals 1 if $R_i^* > 0$, and R_i equals 0 if $R_i^* \leq 0$. Thus,

$$\Pr(R_i = 1) = \Pr(\upsilon_i > - k_0 - kX_i) \tag{3.3}$$

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[4]We measure *relative promotion speed* as time in pay grade (measured in years). In place of time in grade in the regression models in Tables 4.1–4.3 in the next chapter, we also used variables representing months of service at last promotion and time in pay grade relative to the mean time in pay grade for a given grade. These other variables performed about the same as the time-in-grade variable. We therefore opted to use the more-simple time-in-grade variable in our models.

[5]Orvis et al. (1992) show that AFQT has a significant effect on measures of performance among Patriot System operators in the Army. By contrast, Ward and Tan (1985) show that observed measures of quality, such as AFQT and education, explain only a small portion of the overall quality of job matches in the military and that unobserved factors explain a larger portion.

If we assume that the v_i's are uncorrelated with the X_i's, and have zero mean and a variance equal to 1, we can estimate Eq. 3.3 as a probit model using maximum-likelihood techniques.

APPROACH FOR ESTIMATING THE SEPARATION EFFECT

Ideally, the effect of the VSI/SSB on separation behavior would be obtained experimentally by offering the separation benefits to some group of individuals within a homogeneous (e.g., skill) group and not to others. If the eligible and ineligible groups were identical in all other respects, the program effect would simply be the difference in the separation rates of the two groups. If the groups differed in some respects other than eligibility (e.g., race, sex, education, or AFQT), then a regression for separation that includes a dummy variable for program eligibility and controls for these other observable characteristics could be estimated. That is, the model would be

$$S_i = a + bZ_i + cE_i + \varepsilon_i \qquad (3.4)$$

where S is a 1/0 indicator of separation (1 = yes; 0 = no), Z is a vector of controls for observable characteristics, E is a program-eligibility indicator, and i indexes individuals.[6] The parameter c measures the separation effect of the VSI/SSB program. As long as eligibility for separation benefits is not systematically related to factors omitted from the model (the ε_i)—if individuals were randomly selected to be eligible or ineligible for separation benefits—regression estimates will be unbiased.

Unfortunately, when the VSI/SSB program was conceived in 1991, the Department of Defense and the services did not have the luxury of conducting experiments to determine program effects. The program had to be implemented quickly on a mass scale to induce separations of mid-careerists in skills either deemed to be currently in

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[6]Both Eqs. 3.3 and 3.4 are models of the separation decision. To avoid confusion, we index the separation variable as R in the taker equation, Eq. 3.3, and we index it as S in the separation equation, Eq. 3.4. Similarly, both the vectors X and Z include variables that describe the characteristics of the individual. We use different notation because Eq. 3.3 is a probit model whereas the separation model is a linear-probability model (as discussed later in this chapter).

surplus or in which fewer personnel would be needed in a smaller force after the completion of the drawdown. And, as Chapter Two describes, in some cases the program was targeted toward slow promotees and individuals approaching up-or-out or high-year-of-tenure (HYT) points within their ranks. The program thus potentially targeted "easy-to-retain" groups. The fact that the program was implemented nonrandomly would bias a within-year analysis of the program because the eligibility for separation benefits would be systematically related to other (unobservable) factors affecting retention that could not be controlled for in the regression.

Another way to approach the problem would be to compare the separation of groups that were eligible for the program in 1992 with similarly defined groups in some base year. Such a model would appear as follows:

$$S_{i,t} = a + bZ_{i,t} + dT_{i,t} + \varepsilon_{i,t} \qquad (3.5)$$

In Eq. (3.5), $T_{i,t}$ has a value of 1 if the individual made his or her separation decision in the test year and 0 if he or she made the decision in the base year. The parameter d measures the change in separations between the base year and the separation year within the skills eligible for the separation payment. If the availability of a separation benefit in the later period is the only reason for separations to change between periods, then d will provide an unbiased estimate of the program effect. Unfortunately, there is no reason to believe that the program is the only reason for the change in separations. Other time-related factors associated with the drawdown but not controlled for in the regression could also matter.

These two models help motivate our methodology. Pooling data from the following four cohorts can give a better estimate of the program effect than either of the methods described above: (a) individuals who were eligible for the benefit in 1992, (b) individuals who were ineligible for the benefit in 1992, (c) individuals who would have been eligible had the program been in effect in the base year, and (d) individuals who would not have been eligible in the base year. (We chose 1989 as the base year; see the data description in the next section of this chapter.) Pooling of the data allows us to estimate the following model:

$$S_{i,t} = a + bZ_{i,t} + cE_{i,t} + dT_{i,t} + e(E_{i,t}{}^{*}T_{i,t}) + \varepsilon_{i,t} \qquad (3.6)$$

This model is known as a difference-in-differences model.[7] The interaction variable $E_{i,t}{}^{*}T_{i,t}$ has a value of 1 for individuals who were eligible for separation benefits in the test year and 0 otherwise. The parameter e measures the effect of the program net of differences in separation between the eligible and ineligible groups in both years (controlled for by the program-eligibility variable, $E_{i,t}$) and differences in separation between the years that are common for both groups (controlled for by the time variable, $T_{i,t}$).

The regression approach is necessary because individuals may differ by observable characteristics other than eligibility and year of separation decision. But an example of the estimator for the case of homogeneous individuals helps illustrate the difference-in-differences approach. Consider the pattern of mean separation rates provided in Table 3.1 for the four groups defined above. When observable characteristics are the same, the least squares estimator of e will turn out to be the change in the mean separation rate of the eligible group minus the change for the ineligible group. Thus, the program effect is $(.4 - .2) - (.4 - .3) = .1$. That is, the program raised the separation rate by 10 percentage points relative to what the rate would have been without the program.

The amounts in Table 3.1 illustrate the potential bias in the first two procedures described above. First, it is apparent that the eligible group has a higher average separation rate across the two years than the ineligible group (because of unobservable factors). Because of these unobservable factors, a comparison of the separation rates of the eligible and ineligible groups in the test year biases downward the estimated program effect, which in the example would be zero. Second, the change in the separation rate of the eligible group only (.2 in the example) overstates the program effect because other factors were causing separations to rise in both groups between the base and test years. In fact, it is the change in separations among the ineligibles between the base and test years that helps identify the program effect.

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[7]See Meyer (1995) for a treatment of difference-in-differences models. Gruber (1995) provides an application to the effect on employment of mandated maternity benefits.

Table 3.1

Example of Difference-in-Differences Approach

	Eligible	Ineligible	Difference-in-Differences
Base Year	.20	.30	
Test Year	.40	.40	
Difference	.20	.10	.10

Identification of the program effect hinges on a critical assumption: that the effect of time (the change between 1992 and 1989) on separation (e.g., d in Eq. 3.6) is the same for the eligible and ineligible populations. If this assumption is not true, the program effect (e in Eq. 3.6) will not be identified. A key reason why this assumption is probably not true is the drawdown. As discussed earlier, separation rates may be higher among the eligible population in 1992 because eligibles could be lower-quality personnel, and lower-quality personnel were more likely to face compulsory separation during the drawdown as the Army tightened retention standards. Consequently, the program effect will measure both the pure inducement effect of the program and the compulsory effect of the drawdown on separation rates.

In an attempt to control for the compulsory effect of the drawdown on separation rates, we let the coefficients on $Z_{i,t}$ depend on time. By interacting $Z_{i,t}$ with $T_{i,t}$, we allowed the characteristics that affect $S_{i,t}$ to change between 1989 and 1992 as a result of the drawdown. These characteristics include personnel quality as well as rank, YOS, and occupation, and are the characteristics that often affect an individual's chances of being allowed to stay in the Army at key retention points. More generally, these are the characteristics that are often used to manage personnel flows in the Army.

Changes between 1989 and 1992 in the effect of these characteristics upon separation are likely to reflect changes in the Army's personnel policies during the drawdown as well as decisions to leave that were made because of the drawdown. By allowing that effect to change between the two years, the model captures changes that occurred as a result of the drawdown but not as a result of the VSI/SSB program. If including these control variables captures all of the effects of the drawdown on separations, then the effect of the VSI/SSB program

will be identified. Therefore, the regression we estimated is as follows:

$$S_{i,t} = a + bZ_{i,t} + cE_{i,t} + dT_{i,t} + e(E_{i,t}*T_{i,t}) + f(Z_{i,t}*T_{i,t}) + \varepsilon_{i,t} \qquad (3.7)$$

where f is the drawdown effect. For comparison's sake, we also estimated Eq. 3.6 and present the results in the Appendix.

In the next section, we present the results of estimating Eq. 3.7 as a linear-probability model using ordinary least squares (OLS). A problem with this approach is that the dependent variable is constrained to lie between zero and one. This constraint means that the $\varepsilon_{i,t}$ are not distributed normally, and the OLS estimates of b, c, d, e, and f in Eq. 3.7 will not be efficient in a statistical sense. A nonlinear model such as a logit or probit model will produce efficient results. However, in a nonlinear model, the coefficient estimate of e can no longer be interpreted as the difference-in-differences estimator (see Angrist, 1991). Thus, we cannot estimate Eq. 3.7 as a logit or probit model.

Despite the inefficiency problem associated with the linear-probability model, the problem is more a conceptual than a practical one. When the effects of the regressors on the probability of a positive outcome are evaluated at the sample means, the linear-probability model, in practice, generally yields estimates similar to those produced by the probit or logit models (Greene, 1993, pp. 638–640). Thus, while our estimates will be inefficient, inefficiency is unlikely to be an important problem.

DATA

The data were provided by the Defense Manpower Data Center (DMDC). The year 1989 was selected as the control, or base, year because that was the last year of stable force levels. Since the VSI/SSB program was begun in January 1992, we compared separations during calendar year 1989 with separations during calendar year 1992. To do this comparison, DMDC constructed a beginning inventory data file consisting of all individuals on active duty as of December 31, 1988, for 1989 and as of December 31, 1991, for 1992. Individuals were then tracked during the following 12-month period

to determine who stayed and who separated. We restricted our analysis to those who had between 7 and 15 YOS at the start of the respective calendar year. Those with less than 7 YOS were ineligible for the program. Those with 15 or more YOS, while eligible, would require highly unusual circumstances before accepting the VSI/SSB offer and forgoing the military's generous retirement benefits, which they could begin claiming at YOS 20.[8]

Although the VSI/SSB program continued until October 1995, we restricted our analysis to the first year of the program, 1992, for simplicity. Many individuals received several offers over the course of the program. Thus, estimating the effect of the program on separation behavior in later years would require a model of why individuals refused an earlier offer but accepted a later one. By simply focusing our analysis on the first year, we circumvented the need for a complicated model of the decision to accept the VSI/SSB offer.

Unfortunately, the DMDC data that we received did not have complete information for all who received offers in 1992. During the implementation of the drawdown program, the services were directed by DoD to provide DMDC with monthly or quarterly reports on service members who were offered VSI/SSB benefits and were therefore "eligible." Reports were to include whether the service member was offered separation benefits and the dates of eligibility. Benefits received upon separation were recorded by the Joint Uniform Military Pay System (JUMPS). DMDC merged the service reports regarding program eligibility and JUMPS data on benefits received at separation with starting inventory and separations transaction data to form the full dataset.

The quality of the reporting hampered our analysis and limited it to Army data only. Because DMDC continually updated individual VSI/SSB records as additional information was received, DMDC has complete information only on an individual's most recent VSI/SSB offer. Thus, for those individuals who received multiple offers, there

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[8]The services have a general policy of not involuntarily separating those who are close to being eligible for retirement. Thus, those eligibles who had over 15 YOS but less than 20 and refused the VSI/SSB offer were highly unlikely to be forced out involuntarily. In fact, in the early 1990s, DoD instituted a 15-year retirement program that the services could use to induce eligibles in this YOS range to leave voluntarily.

would be a complete record of only the most recent offer. This updating created a problem for us because we initially wanted to include in our analysis Air Force and Navy personnel. But many individuals in the Air Force received multiple offers. For example, the Air Force made approximately 120,000 offers in 1992. However, because a substantial number of offers were also made to the same people in later years, current DMDC records only report a total of 58,000 Air Force offers in 1992. Thus, we were unable to get 1992 data for the Air Force from the current DMDC VSI/SSB file. Ideally, a separate VSI/SSB file would be kept for every quarter of the program, much like the other inventory files that DMDC maintains for the Department of Defense. We also found that the data we received from DMDC on Navy offers contained too few offers.

Because of these data problems, we conducted our analysis for the Army only, the service for which we did not need to rely on DMDC reporting to indicate which individuals were eligible for the benefit in 1992.[9] The Army provided only information on those who actually took the benefit, but not information on those offered benefits. This presented us with a problem: how to determine who was eligible and who was not. The Army program was implemented along broad lines of military occupation specialty (MOS), rank, and YOS. The *Army Times* published periodic reports about who was eligible by MOS, rank, and YOS. To create eligibility dummies for the Army, we made use of this information, along with reported dates of eligibility provided by the Army. We also used this information to determine who would have been eligible had the program been in effect in 1989.

The data on eligibility and the JUMPS data were not entirely consistent. Unfortunately, JUMPS data did not record a separation payment for about 8,000 observations, or approximately 10 percent of Army personnel who separated and were declared eligible to receive a benefit. An examination of the Army data indicated that a large percentage of these separations occurred in the first four months of 1992 and represented individuals who had probably scheduled a separation prior to the implementation of the program and who were

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[9]Mehay and Hogan (1995) were able to conduct their analyses using complete data on Air Force and Navy personnel in 1992 because they received their data earlier than we did and, more important, before the Air Force made a major re-offer of the benefit in 1993. Therefore, their data did not contain the same problems as ours did.

actually not qualified for the program. We excluded these observations from the analysis.

A minor problem with the data is that we found some personnel receiving the benefit who were classified as "ineligible." However, these 281 cases represented only 0.3 percent of those ineligible in the test year. We excluded these observations from the analysis as well. Including them would have an extremely minor effect on the results.

RESULTS

We begin this chapter with some descriptive statistics that compare the characteristics of those in the test year with those in the base year to determine on which dimensions, if any, they differ. We also compare the characteristics of those eligible with those ineligible for the VSI/SSB to examine whether, in the process of assigning eligibility on the basis of rank, YOS, and occupation, the services also made some demographic groups more likely to be eligible than others. Such would be the case if the likelihood of being in a given group (say, being female) is not equal across all ranks, YOS, and occupations. We then turn to the main focus of our analysis, which is to compare the characteristics of takers versus those of nontakers to determine whether the *marginal performers*, defined in terms of lower AFQT score, less educational attainment at enlistment, and slower promotion than high-AFQT, more-educated enlistees, were more likely to accept the VSI/SSB offer. Finally, we estimate the effect of the VSI/SSB program on separations.

DESCRIPTIVE STATISTICS

Table 4.1 shows the mean characteristics of Army enlisted personnel in the base and test years. As background information for the regressions presented later in this chapter, it also presents the means for the eligible and ineligible populations and for the taker and nontaker populations.

With some notable exceptions, personnel characteristics in the base and test years are similar. The exceptions tend to reflect policies, including the VSI/SSB program, that were implemented during the

Table 4.1
Mean of Control Variables Used in Regressions

Variable	Base Year (1989)	Test Year (1992)	Eligible (Test Yr)	Ineligible (Test Yr)	Taker	Nontaker
Race/ethnicity						
Black	0.41	0.40	0.46	0.35	0.47	0.46
Hispanic	0.06	0.05	0.06	0.05	0.05	0.06
Asian	0.02	0.02	0.02	0.02	0.02	0.02
Other race	0.03	0.04	0.04	0.03	0.04	0.04
White	0.48	0.49	0.42	0.55	0.42	0.42
Age (yr)	31.12	31.20	32.07	30.44	31.15	32.49
Dependents (no.)	2.30	2.22	2.38	2.10	2.22	2.46
Female	0.11	0.11	0.10	0.12	0.12	0.10
Quality measures						
High education	.86	.902	0.88	0.92	0.86	0.89
AFQT (score)	46.83	48.54	43.48	52.81	43.08	43.67
High AFQT	.43	.46	0.37	0.53	0.35	0.37
High quality	.38	.41	0.32	0.49	0.30	0.34
Rank	5.67	5.51	5.55	5.68	4.88	5.86
Years of service (YOS)	10.44	10.50	11.46	9.62	10.60	11.86
Time in pay grade	3.48	3.67	4.43	2.94	5.37	3.99

Table 4.1—continued

Variable	Base Year (1989)	Test Year (1992)	Eligible (Test Yr)	Ineligible (Test Yr)	Taker	Nontaker
Occupational categories						
Infantry, seamanship	.29	.29	.285	0.28	.221	.328
Electronic equip. repairers	.05	.04	0.06	0.03	0.04	0.06
Communication & intelligence specialists	.13	.13	0.12	0.13	0.13	0.12
Health care specialists	.07	.07	0.03	0.10	0.05	0.03
Other technical specialists	.03	.03	0.04	0.02	0.04	0.05
Functional supply and admin.	.19	.19	0.19	0.18	0.22	0.17
Elect./mech. equip. repairers	.13	.14	0.17	0.11	0.18	0.16
Craftsmen	.02	.02	0.02	0.01	0.03	0.02
Service and supply	.10	.10	0.07	0.13	0.10	0.06
Other	0.00	0.00	0.00	0.00	0.00	0.00
Separation rate	.07	.20	0.316	0.10	1.00	0
Eligibility rate	.48	.49	1.00	0	1.00	1.00
Taker rate (1992)	0	.32	0.316	0	1.00	0
N	155,896	151,056	74,278	76,778	23,437	50,841

drawdown. Specifically, personnel in each year have similar demographic characteristics: race and ethnicity, gender, and age. However, the quality of personnel is a little higher in the test year. Personnel in the test year also had more years of service, on average, and more time in pay grade. The latter no doubt reflects the fact that, on average, the time an individual was required to wait prior to promotion increased during the drawdown. Finally, mean separation rates are dramatically higher in the test year than in the base year, reflecting both the effects of the drawdown and of the VSI/SSB program, as we analyze below.

About half of those in the Army with between 7 and 15 YOS in the test year were eligible for the VSI/SSB benefit. The means of the eligible personnel versus those of the ineligible personnel in 1992 suggest that those who were eligible differed from those who were not in some of their observed characteristics. Since these differences may reflect a deliberate Army effort to target marginal performers, we used the 1992 data to estimate a simple probit model to describe how they differed.

As discussed in Chapter Two, eligibility criteria were based primarily on an individual's rank, YOS, and occupation.[1] To the extent that individual characteristics such as ethnicity are distributed differently across ranks, YOS, and occupation, eligibility will also vary by these characteristics. Therefore, although program eligibility was not defined in terms of these characteristics, it is possible that some groups will be more or less likely to be eligible for the benefit as a result of the correlation between individual characteristics and the eligibility criteria. If E_i is a dummy variable equal to 1 if the individual is eligible for VSI/SSB and 0 if he or she is ineligible, then the probit model we estimate is of the form

$$\Pr(E_i = 1) = \Pr(a + bW_i + n_i) = \Pr(n_i > -a - bW_i) \tag{4.1}$$

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[1]Grissmer, Eisenman, and Taylor (1996) present an evaluation of alternative criteria for determining eligibility. They show that low-quality personnel could be targeted through judicious choice of the YOS and rank combinations that are made eligible for the benefit. Holding YOS constant, they found that low-quality personnel tended to be concentrated in lower grades. They also show how eligibility could vary along different dimensions to generate different taker rates.

where W_i is a vector of individual characteristics (other than the occupation, rank, and grade criteria the Army used to determine eligibility), and n_i is a random disturbance term.

Table 4.2 shows the results. Because we estimate a probit model, the coefficient estimates must be transformed to get an estimate of the effect of the variable on the probability of being eligible. The transformed coefficient estimates are presented in the rightmost column.

The results in the table indicate that those who were eligible in the Army tended to have lower AFQT scores, less education, and more years in their pay grade, suggesting slower promotion times. Thus, those who were eligible tended to be lower-quality. Specifically, scoring in the bottom half of the AFQT score distribution has the largest correlation with eligibility among the three quality variables we examined: Being in the bottom half of the distribution increased the likelihood of being eligible by 9 percentage points, an increase of 18 percent. Having an additional year in a pay grade increased the likelihood by 7 percent.

Table 4.2

Probit Regression Results: Dependent Variable = Eligibility Status

Variable	Coefficient Estimate	Standard Error	dF/dX_i
Intercept	−1.959*	.029	
High education	−.274*	.012	−.069
High AFQT	−.361*	.008	−.090
Time in pay grade	.136*	.001	.034
Age	.055*	.001	.014
Dependents	.032*	.003	.008
Female	−.127*	.011	−.032
Black	.207*	.008	.052
Hispanic	−.028	.016	−.007
Asian	−.065**	.026	−.017
Other	.090*	.019	.023
Log likelihood	−93090		
N	151,056		
Mean eligibility rate	.492		

NOTE: * denotes statistically significant at the 1 percent level; ** denotes statistically significant at the 5 percent level.

The results also indicate that eligibles differed from ineligibles in terms of their demographic characteristics. Being female reduced the likelihood of being eligible in the Army by 3 percentage points, or by about 6 percent. Being Black raised the chances of being eligible by 10 percent, but being Asian has only a small correlation with eligibility. Finally, the correlation between age and eligibility is strong. Those who are 5 years older than the mean are about 15 percent more likely to be eligible in the Army, if other characteristics are held constant.

These results suggest that, while the Army did not explicitly identify specific demographic groups for eligibility, its criteria for eligibility implicitly caused some groups to be more or less likely to be eligible. In some cases, the effects are large. They also indicate that, because of the correlation between the eligibility criteria and AFQT, high-school-diploma status, and time in grade, marginal performers were more likely to be eligible for the VSI/SSB benefit in the Army.

DESCRIPTION OF THOSE WHO ACCEPTED THE VSI/SSB OFFER

Table 4.3 shows the results of estimating Eq. 3.3. We find that takers are generally more likely to be lower-quality personnel, given eligibility. Specifically, those without a high-school diploma were 19 percent more likely to take VSI/SSB than were those with a diploma, and those in the bottom half of the AFQT distribution were 6 percent more likely to take the benefit. Those with an additional year in their grade were 8 percent more likely to take the benefit and leave.

These results are consistent with the hypothesis that lower-quality personnel viewed their expected opportunities in the military as being more limited than did their higher-quality counterparts. But it is interesting to note that the differences in taker rates by AFQT status, while present, are not extremely large. In fact, the difference in eligibility rates by AFQT status is larger than for taker rates. The relatively small taker-rate difference possibly suggests the theoretical ambiguity of the effect of AFQT on separation. As noted earlier, lower-quality personnel have reduced opportunities in both the military and civilian alternative, making the effect of quality on separation theoretically ambiguous. An alternative explanation for the

Table 4.3

Probit Results: Dependent Variable = Taker Status

Variable	Coefficient Estimate	Standard Error	dF/dX_i
Intercept	.115	.131	
High education	−.273*	.016	−.059
High AFQT	−.088*	.012	−.019
Time in pay grade	.111*	.002	.024
Age	.001*	.274	−.0002
Dependents	−.004	.004	.0008
Female	.054*	.012	.012
Black	−.114*	.013	−.024
Hispanic	−.161*	.025	−.035
Asian	−.158*	.041	−.034
Other	−.074*	.029	−.016
Rank/YOS			
E1–E3, YOS 10–12	−.384	.269	−.083
E1–E3, YOS 13–15	−.567	.377	−.122
E4, YOS 7–9	.565*	.123	.122
E4, YOS 10–12	.656*	.130	.142
E4, YOS 13–15	.576*	.186	.234
E5–E6, YOS 7–9	−1.000*	.122	−.216
E5–E6, YOS 10–12	−.948*	.122	−.205
E5–E6, YOS 13–15	−1.219*	.123	−.263
E7–E9, YOS 7–9	−1.770*	.235	−.382
E7–E9, YOS 10–12	−1.625*	.130	−.351
E7–E9, YOS 13–15	−1.685*	.123	−.364
Electronic equip. repairers	.008	.025	.002
Communications & intelligence specialists	.144*	.018	.031
Health care specialists	.142*	.030	.031
Other technical specialists	.079*	.027	.017
Functional support and admin.	.122*	.017	.026
Elect./mech. equip. repairers	.207*	.016	.045
Craftsmen	.202*	.035	.044
Service and supply	.198*	.022	.043
Other occupation	−1.226*	.323	−.265
Log likelihood	−37001		
N	74,278		
Mean taker rate	.316		

NOTE: * denotes statistically significant at the 1 percent level.

small difference is that AFQT, which is an easily observed character-
istic, is not a strong measure of α in the model outlined in Chapter
Three. Consequently, it may capture well the difference in eligibility
since it is easily observed by Army administrators of the VSI/SSB
program as well as by us, the researchers. But it may not capture well
the difference in military and civilian opportunities, which is better
known by the individual and the direct supervisor of the individual,
but not by us or the VSI/SSB administrators.

We also found demographic differences among takers and non-
takers. Minorities were somewhat less likely to take the VSI/SSB
benefit. For example, blacks were about 8 percent less likely than
non-Hispanic whites to take the benefit. Thus, although blacks are
more likely to be eligible for separation pay, they were somewhat less
likely to take it even with their eligibility. We also found that eligible
Hispanics and Asians were 11 percent less likely to take the benefit
than were eligible non-Hispanic whites. These results suggest that,
relative to non-Hispanic whites, eligible minorities were more likely
to view their opportunities in the military as being better than their
civilian alternatives. We also found that although females were less
likely to be eligible for VSI/SSB in the Army, those who were eligible
were somewhat more likely to take it than were males who were
eligible. Being female is associated with a 4 percent higher chance of
taking the benefit. Thus, given eligibility, women were more likely to
view their opportunities as being better in the civilian sector. Given
the condition of being eligible, taker status does not vary in any
sizable way with age or number of dependents.

Taker rates did differ significantly by occupation. To examine how
taker rates varied by YOS and rank, and to account for the possibility
that the effect of YOS might vary by rank, we included variables for
various rank and YOS combinations. Estimates in Table 4.3 show
that, within rank categories, the taker rates tend to decline with YOS.
Thus, within YOS categories, the taker rates are generally lower for
higher-ranking personnel.

We also use the regression results in Table 4.3 to predict what frac-
tion of the ineligible personnel in 1992 would have taken the VSI/SSB
offer had it been offered to them. This prediction gives some indica-
tion of how well the Army defined the eligibility criteria to maximize
the percentage of personnel who took the offer. We predict that,

given the demographic characteristics of the ineligible personnel, 21.1 percent of them would have taken the VSI/SSB offer had it been offered. This figure is smaller than the 31.6 percent actual take rate for the eligible group. Thus, the Army chose the eligibility criteria in such a way that a high rate of acceptance of the VSI/SSB offer was achieved.

SEPARATION-RATE ANALYSIS

We use the difference-in-differences approach to estimate the separation effects of the VSI/SSB program for the Army. As noted earlier in this chapter, a regression approach is necessary because individuals may differ on the basis of observable characteristics other than their eligibility status and their year of separation. Still, it is interesting to consider how mean separation rates in the Army differed for the four groups defined in Table 3.1, i.e., eligibles and ineligibles in the base and test year, when other observable characteristics are not held constant. Table 4.4 replicates Table 3.1 using the actual Army figures.

When observable characteristics are not held constant, the program effect is estimated to be $(.316 - .077) - (.097 - .059) = .201$. That is, when other characteristics are not held constant, we estimate that the program raised the separation rate by 20.1 percentage points relative to what it would have been without the program. Had we simply focused on the behavior of the eligible population in the base and test years, we would have overestimated the program effect to be 23.9 percentage points. The overestimate would have been slightly less (21.9 percentage points) had we simply compared the separation rates of eligibles with those of ineligibles in the test year.

Table 4.4

Mean Separation Rates, Army Enlisted Personnel

	Eligible	Ineligible	Difference-in-Differences
Base Year	.077	.059	
Test Year	.316	.097	
Difference	.239	.038	.201

In our regression framework, we held other observable characteristics constant. In addition, we estimated a separate program effect for low-quality personnel and for high-quality personnel. Finally, by interacting the $Z_{i,t}$ variables with the dummy variable representing the test year (see Eq. 3.7), we attempted to control for changes in separation behavior that are attributable to the drawdown rather than to the VSI/SSB program. Table 4.5 shows the results. We show the results when we do not interact $Z_{i,t}$ with T_i in the Appendix, Table A.1.

We see that the VSI/SSB program had a sizable effect on separation rates. Among high-quality personnel, the VSI/SSB program increased the probability of separation by 10 percentage points. The estimated effect of the program is even larger for low-quality personnel. For them, we estimate that the program more than doubled their separation probability from 13.5 percent to 29.2 percent, a difference of 15.7 percentage points. Since about 40 percent of the personnel are high-quality, the mean program effect across all personnel is estimated to be 13.4 percentage points, or an increase in the separation rate of 100 percent as a result of the program.

While this estimated effect is large, we estimated an even larger effect when we did not include the control variables or their interaction with the time variable (Table A.1 and Table 4.4). For example, our estimated 13.4-percentage-point effect is smaller than the 20.1-percentage-point estimate shown in Table 4.4. Therefore, including these variables enables us to control for other factors that affected separation rates during this time frame—most notably, the drawdown.[2]

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[2]As an additional means of controlling for the compulsory effects of the drawdown on separation rates, we reestimated Eq. 3.7, excluding those personnel who would have been subjected to the tighter up-or-out rules that were implemented as part of the drawdown. Presumably, these individuals would have been involuntarily separated as part of the drawdown had they not taken the VSI/SSB program and left voluntarily. We excluded personnel who met the tighter rules in both 1989 and 1992. We found no difference in the estimated program effect, because we already controlled for those subject to the tighter rules by including the YOS-and-rank combination variables, especially those that indicate personnel who are in low ranks and higher YOS. Consequently, excluding these personnel does not affect the program estimate presented in Table 4.5.

Table 4.5

OLS Regression Results: Dependent Variable = Separation Status

Variable	Coefficient Estimate	Standard Error
Intercept	.423*	.015
Year = 1992	.012	.013
Eligible for VSI/SSB	.003	.002
Eligible in 1992	.157*	.003
Eligible * High quality	−.057*	.003
High education	−.027*	.003
High AFQT	−.007	.004
High quality	.009	.006
Time in pay grade	.002*	.0004
Age	.001*	.0004
Dependents	−.002*	.0002
Female	.012*	.003
Black	−.017*	.002
Hispanic	−.017*	.004
Asian	−.024*	.006
Other	−.016*	.004
Rank/YOS		
E1–E3, YOS 10–12	.127*	.030
E1–E3, YOS 13–15	.069	.058
E4, YOS 7–9	−.211*	.013
E4, YOS 10–12	−.121*	.015
E4, YOS 13–15	−.065*	.027
E5–E6, YOS 7–9	−.338*	.013
E5–E6, YOS 10–12	−.354*	.013
E5–E6, YOS 13–15	−.374*	.128
E7–E9, YOS 7–9	−.400*	.021
E7–E9, YOS 10–12	−.390*	.013
E7–E9, YOS 13–15	−.400*	.013
Electronic equip. repairers	−.004	.004
Communications & intelligence specialists	.002	.003
Health care specialists	−.002	.003
Other technical specialists	−.005	.004
Functional support and admin.	−.010*	.002
Elect./mech. equip. repairers	−.003	.003
Craftsmen	.004	.006
Service and supply	−.001	.003
Other occupation	−.059*	.023

Table 4.5—continued

Variable	Coefficient Estimate	Standard Error
High education * Y1992	−.039*	.005
High AFQT*Y1992	−.013**	.007
High quality*Y1992	.031*	.007
Time in pay grade*Y1992	.021*	.005
Age*Y1992	−.002*	.0004
Dependents*Y1992	−.001	.0008
Female*Y1992	.003	.004
Black*Y1992	−.014*	.003
Hispanic*Y1992	−.020*	.005
Asian*Y1992	−.013	.008
Other*Y1992	−.002	.006
Rank/YOS		
E1–E3, YOS 10–12*Y1992	−.265*	.064
E1–E3, YOS 13–15*Y1992	−.267*	.102
E4, YOS 7–9*Y1992	.453*	.008
E4, YOS 10–12*Y1992	.377*	.013
E4, YOS 13–15*Y1992	.309*	.040
E5–E6, YOS 7–9*Y1992	.047*	.006
E5–E6, YOS 10–12*Y1992	.049*	.006
E5–E6, YOS 13–15*Y1992	.015**	.007
E7–E9, YOS 7–9*Y1992	.057*	.021
E7–E9, YOS 13–15*Y1992	−.019*	.007
Electronic equip. repairers*Y1992	.002	.006
Communications & intelligence specialists*Y1992	.021*	.004
Health care specialists*Y1992	.024*	.005
Other technical specialists*Y1992	.013**	.006
Functional support and admin.*Y1992	.019*	.003
Elect./mech. equip. repairers *Y1992	.036*	.004
Craftsmen*Y1992	.040*	.009
Service and supply*Y1992	.022*	.004
Other occupation*Y1992	.170*	.039
R-Squared	.209	
N	306,952	
Mean separation rate	.135	

NOTE: The variable Y1992 equals 1 if year is 1992, and 0 otherwise. Regression excludes the category E7–E9, YOS 10–12 interacted with Y1992 because no observations fell in this category.

* denotes statistically significant at the 1 percent level.

** denotes statistically significant at the 5 percent level.

Given our estimated effect of the VSI/SSB program of 100 percent, the results in Table 4.5 suggest that about half of the individuals who separated under the VSI/SSB program in 1992 left because of the program. The other half would have separated in any case, even without the program. Thus, applying our results to the raw separation rates, we estimated that, of the 31.6 percent of eligible personnel who separated in 1992, about half, or 15.8 percent, would have separated even without the program. This result indicates that DoD paid "economic rents" to some personnel: paying them to leave when they would have left even without the program. Nonetheless, we estimate that the program had a substantial effect on separations, even when we controlled for the compulsory effects of the drawdown.

The estimated effects of the other variables on separation rates accord fairly well with other retention studies, although most previous studies tend to focus on first-term or second-term retention rather than the separation decision of all mid-career personnel, as in this study. For example, as with previous studies (e.g., Buddin et al., 1992; Smith et al., 1991), we found that minorities have lower separation rates. We also found slightly lower separation rates for high-quality personnel, a result that Smith et al. (1992) find for those making a second-term reenlistment choice.[3]

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[3]As shown by Buddin et al. (1992), when the effect of quality on retention as opposed to its effect on promotion is not disentangled, the estimated effect of AFQT on retention is small and downward-biased.

Chapter Five

CONCLUSIONS

In this report, we have described the characteristics of those who accepted the VSI/SSB offer to determine whether they were lower-quality personnel. We have also estimated the effect of the program on separation behavior to determine whether the program successfully induced separations over and above what we would have expected normally. We found that, indeed, lower-quality personnel were more likely to accept the VSI/SSB offer, that taker rates differed by demographic characteristic, and that, had the program been offered to the ineligible population, the taker rate would have been lower than it was. The last result suggests that the Army was successful in setting the eligibility criteria in such a way that a high taker rate was achieved.

We also found that the program had a sizable effect on separations; we estimated that the program increased the separation rate by 13 percentage points, or by 100 percent. We also found that the effect is larger for lower-quality than for higher-quality personnel.

What can we conclude from these results?

First, they suggest that lower-quality personnel viewed their future career opportunities in the Army as being more limited as a result of the drawdown and the Army's tighter up-or-out rules. Thus, the results indicate that it is possible to design a separation-pay program, such as the VSI/SSB program, that will successfully target the separation of the lower-quality and marginal performers.

Second, to gain some insight into what we can conclude from our analysis of separation rates, it is useful to compare our 13-

percentage-point estimate of the VSI/SSB program effect with the results of previous retention studies on the effect of Selective Reenlistment Bonuses (SRBs) on retention rates. After all, the VSI/SSB benefit is conceptually similar to a negative reenlistment bonus. Past studies generally estimate the effect of a one-level increase in the SRB multiplier to be between 2 and 3 percentage points.[1] A one-level increase in the multiplier represents roughly a 25 percent increase in a member's annual pay. Since the SSB program represents a 150 percent increase in a member's annual pay, we need to adjust the earlier retention results for this difference in scale. To do so, we make the following rough calculation: Since the SSB program is roughly 6 times as generous, we multiply the 2–3-percentage-point effect found in earlier studies by 6, for an estimated effect of 12–18 percentage points. The 13-percentage-point estimate we found in this study is similar to these figures.

Since the earlier studies were estimated using pre-drawdown data, their results are not confounded by the effects of the drawdown. The similarity in estimates between these studies and our study suggests that we were successful in disentangling the effects of the VSI/SSB program on separations from the effects of the drawdown in general. Put differently, we have some confidence that our estimate captures the voluntary-inducement effect of the program while controlling for the compulsory effects of the drawdown.

As noted in Chapter Four, we estimated that the VSI/SSB program increased separations by 100 percent. Therefore, on the one hand, about half of the eligible personnel who left with the VSI/SSB benefit would have left even without the program. These personnel earned economic rents. On the other hand, we estimate that the other half of those who left were induced to leave by the program and would not have left without it. This substantial effect suggests that DoD was able to design a successful voluntary-separation-incentive pay program during the drawdown.

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[1]Warner and Asch (1995) provide a review of these past studies.

To the extent that we were able to control for the effects of the draw-down on separations, our results can be applied more broadly. They suggest that it is possible to design a permanent separation-pay program for military personnel.

UNINTERACTED SEPARATION RESULTS

This appendix presents the separation results without interacting the control variables with the dummy variable controlling for test year. As described in the main text, the estimated effect of the program is larger without the extra interaction variables.

Table A.1

OLS Regression Results Without Time-Interaction Variables:
Dependent Variable = Separation Status

Variable	Coefficient Estimate	Standard Error
Intercept	.440*	.014
Year = 1992	.039*	.002
Eligible for VSI/SSB	−.026*	.002
Eligible in 1992	.218*	.002
Eligible * High quality	−.053*	.003
High education	−.039*	.002
High AFQT	−.003 °	.002
High quality	.018*	.003
Time in pay grade	.015*	.0003
Age	−.0005*	.0004
Dependents	−.002*	.0004
Female	.010*	.002
Black	−.024*	.001
Hispanic	−.027*	.003
Asian	−.028*	.004
Other	−.017*	.003
Rank/YOS		
E1–E3, YOS 10–12	.078*	.028
E1–E3, YOS 13–15	−.030	.049
E4, YOS 7–9	−.032**	.013
E4, YOS 10–12	.021	.014
E4, YOS 13–15	.030	.024
E5–E6, YOS 7–9	−.354*	.013
E5–E6, YOS 10–12	−.371*	.013
E5–E6, YOS 13–15	−.413*	.129
E7–E9, YOS 7–9	−.406*	.016
E7–E9, YOS 10–12	−.418*	.013
E7–E9, YOS 13–15	−.448*	.013
Electronic equip. repairers	−.004	.003
Communications & intelligence specialists	.013*	.002
Health care specialists	.004	.002
Other technical specialists	.0005	.003
Functional support and admin.	.0003	.002
Elect./mech. equip. repairers	.017*	.002
Craftsmen	.023*	.004
Service and supply	.016*	.002
Other occupation	−.013*	.019
R-Squared	.181	
N	306,952	
Mean separation rate	.135	

NOTE: * denotes statistically significant at the 1 percent level.

** denotes statistically significant at the 5 percent level.

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