
**EMPIRICAL RESULTS FROM THE
REENLISTMENT MODEL**

Overall, we found that nonhostile deployments increased Army, Air Force, and Marine Corps first-term reenlistment. Navy first-term reenlistment was higher for one nonhostile deployment than for none but did not rise further with more deployments. Hostile deployments had little effect on first-term reenlistment. For the most part, first-term reenlistment did not decrease with the number of hostile episodes but remained constant or slightly increased. In one case, for marines without dependents, reenlistment tended to decline as hostile deployments increased. Navy reenlistment was slightly lower for one hostile episode versus none, although it was not lower for two or more hostile episodes.

Second-term reenlistment rose with nonhostile and hostile deployments. The increase in reenlistment was greater for nonhostile deployments than it was for hostile deployments.

We also found that the effect of deployments on first-term reenlistment differed by dependency status, which mostly reflected whether a member was married or not. Members with dependents were more likely to reenlist, and their reenlistment probability rose more rapidly with nonhostile deployment. Their reenlistment was also higher for hostile deployments and showed a tendency to rise with the number of these deployments. Thus, members with dependents were more likely to reenlist at the end of the first term, and their reenlistment was higher with the greater the number of nonhostile deployments and, to a lesser extent, the greater the number of hostile deployments. These relationships help explain the similarity between the deployment and reenlistment relationship of first-term

members with dependents and second-term members overall, most of whom have dependents.

Our results are conditional on the types of deployment and the deployment pays available in our study period, 1993–1999.

APPROACH

We estimated two reenlistment models, a main-effect model and a full-interaction model, by branch of service for first- and second-term reenlistment. The main-effect model contained indicator variables for one, two, or three or more nonhostile deployments and for one, two, or three or more hostile deployments. The full-interaction model created indicators for combinations of nonhostile and hostile deployment, with the omitted variable being no deployment of either type. The main-effect model fit the data better for the Army and Marine Corps, and the full-interaction model fit better for the Navy and Air Force. (Information criteria were used to judge the goodness-of-fit of the models.) The main-effect model reflects the major findings of the empirical analysis, and therefore we discuss it extensively. However, we also present results from the interaction model to show how particular combinations of deployment affect reenlistment.

We used the main-effect model to predict the effect of a 25-percent increase in deployments—all hostile. This increase is within a reasonable range for predictions because it is spread widely across members. That is, many members have no additional deployment, some have a single additional deployment, and a few have multiple additional deployments. Also, we estimated a main-effect model to determine whether the relationship between deployment and first-term reenlistment differed by dependency status.

The figures below show the predicted probability of reenlistment as a function of the number and type of deployments. The predictions were made for a member with a given set of characteristics.¹ A dif-

¹These are: AFQT Category IIIA (score of 50–64), some college, electrical or mechanical equipment repairer, white male with dependents, 6.6-percent unemployment rate at prior enlistment, 4.9-percent unemployment rate at current enlistment, and FY1999.

ferent set of characteristics would change the predictions but have little effect on the shape of the relationship. Appendix C contains the sample means and standard deviations, and Appendix D contains the regression results for all models.

OVERALL RELATIONSHIP BETWEEN DEPLOYMENT AND REENLISTMENT

The predicted probabilities of reenlistment are in Figures 4.1 and 4.2 for the main-effect model and Tables 4.4 and 4.5 for the full-interaction model. The predictions are preceded by the distribution of deployment by service, term, and type of deployment in Tables 4.1 and 4.2.

Distribution of Deployment

The distribution of deployment provides some grounding for interpreting the regression results. Tables 4.1 and 4.2 show the joint distribution of hostile and nonhostile deployment for members. Many members had zero or one deployment, and relatively few had multiple deployments. Even so, we were able to estimate the effect of two or three or more deployments of either type because of our large sample.

For instance, Table 4.1 shows that 65 percent of Army first-term members had no nonhostile deployment, and 27 percent had one nonhostile deployment. The percentages for the Air Force are broadly similar to those of the Army. In comparison, 38 percent of first-term Navy members had no nonhostile deployment, and 25 percent had one nonhostile deployment. The Marine Corps percentages are similar to those of the Navy. Furthermore, the distribution of deployment for the second term (Table 4.2) was similar to that for the first term.²

²Because these are counts over a three-year period, the implied percentage of the force deployed in a given month is fairly small. But the dynamics of sustaining deployment can be much more demanding than a low monthly percent-deployed might suggest. Sortor and Polich (2001) find that a tempo problem can result from two sources. First, the workload caused by the combination of “war-fighting readiness, deployments, and day-to-day peacetime demands of operating a unit and installation” (p. xiii). Second, the service must cope with the dynamics of the operations, personnel

Table 4.1
Distribution of Deployment by Service, First Term (percentage)

	Nonhostile	Hostile				Total
		0	1	2	3+	
Army	0	45.73	14.74	3.40	0.64	64.52
	1	20.90	5.27	0.90	0.16	27.22
	2	5.62	1.03	0.17	0.04	6.86
	3+	1.17	0.20	0.02	0.01	1.40
	Total	73.42	21.24	4.49	0.84	100.00
Navy	0	24.18	8.64	4.99	0.67	38.49
	1	7.19	11.46	5.31	0.54	24.50
	2	6.19	9.91	4.11	0.34	20.54
	3+	7.77	6.26	2.32	0.12	16.47
	Total	45.33	36.28	16.73	1.67	100.00
Air Force	0	56.97	17.03	6.11	3.66	83.77
	1	8.96	3.01	0.95	0.37	13.29
	2	1.67	0.48	0.18	0.07	2.40
	3+	0.39	0.10	0.03	0.01	0.54
	Total	68.00	20.62	7.28	4.11	100.00
Marine Corps	0	36.88	9.03	3.91	0.56	50.39
	1	20.13	7.33	1.81	0.15	29.43
	2	12.11	2.65	0.42	0.02	15.20
	3+	4.36	0.56	0.06	0.00	4.98
	Total	73.49	19.57	6.20	0.74	100.00

SOURCE: Authors' tabulations.

management, and training systems as it seeks to “sustain the peacetime force, prepare and train for [small-scale contingency] deployments, and adhere to various peacetime operational and personnel policy constraints” (p. xiii). They conclude that the service should not focus primarily on the effect of deployment on the individual member, but “on overall force management, to evenly distribute the burden, minimize short-term readiness impacts, and ensure that longer-term skill development and war-fighting capability are sustained” (p. xiv). This recommendation is consistent with our earlier analysis (Hosek and Totten, 1998) and our current analysis.

Table 4.2
Distribution of Deployment by Service, Second Term (percentage)

	Nonhostile	Hostile				Total
		0	1	2	3+	
Army	0	45.07	13.33	3.09	0.66	62.15
	1	20.55	5.35	1.05	0.17	27.12
	2	7.41	1.40	0.22	0.03	9.06
	3+	1.35	0.28	0.04	0.00	1.67
	Total	74.38	20.36	4.40	0.86	100.00
Navy	0	50.29	9.77	2.37	0.46	62.90
	1	13.07	6.59	1.81	0.22	21.69
	2	4.44	3.79	1.09	0.10	9.42
	3+	3.04	2.25	0.67	0.05	6.00
	Total	70.84	22.40	5.94	0.83	100.00
Air Force	0	51.54	15.01	4.73	3.50	74.78
	1	12.82	4.28	1.24	0.70	19.04
	2	3.34	1.06	0.32	0.15	4.88
	3+	0.92	0.25	0.09	0.04	1.30
	Total	68.63	20.60	6.38	4.39	100.00
Marine Corps	0	38.75	5.92	1.39	0.21	46.27
	1	27.25	4.73	0.86	0.07	32.91
	2	12.69	1.93	0.12	0.00	14.75
	3+	5.34	0.58	0.14	0.00	6.07
	Total	84.04	13.17	2.51	0.28	100.00

SOURCE: Authors' tabulations.

Main-Effect Model

Figures 4.1 and 4.2 show the predicted probability of reenlistment for first- and second-term members with respect to the number and type of episodes. For the Army, Air Force, and Marine Corps, predicted first-term reenlistment increased as nonhostile episodes of deployment increased. This was consistent with the idea that members with nonhostile deployment revised their belief upward that future nonhostile deployment will be satisfying and not too frequent, and they did so with each additional nonhostile deployment.

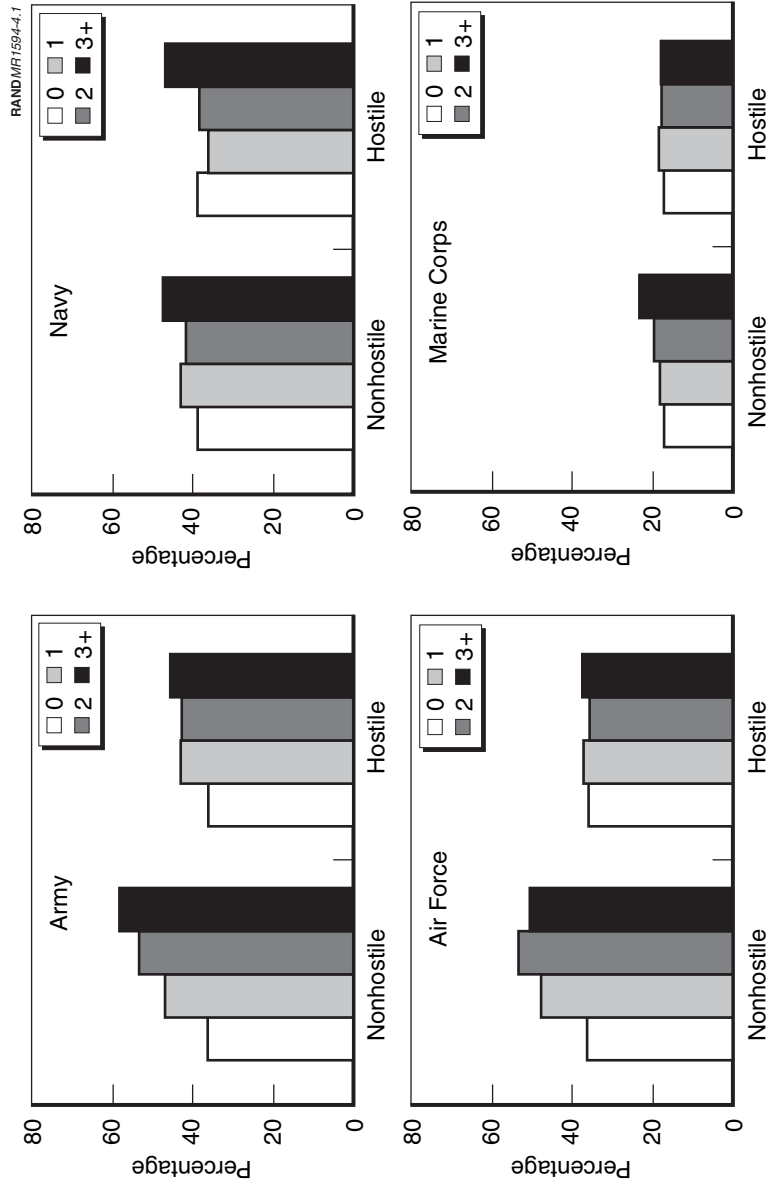


Figure 4.1—First-Term Reenlistment Probability by Number of Deployment Episodes

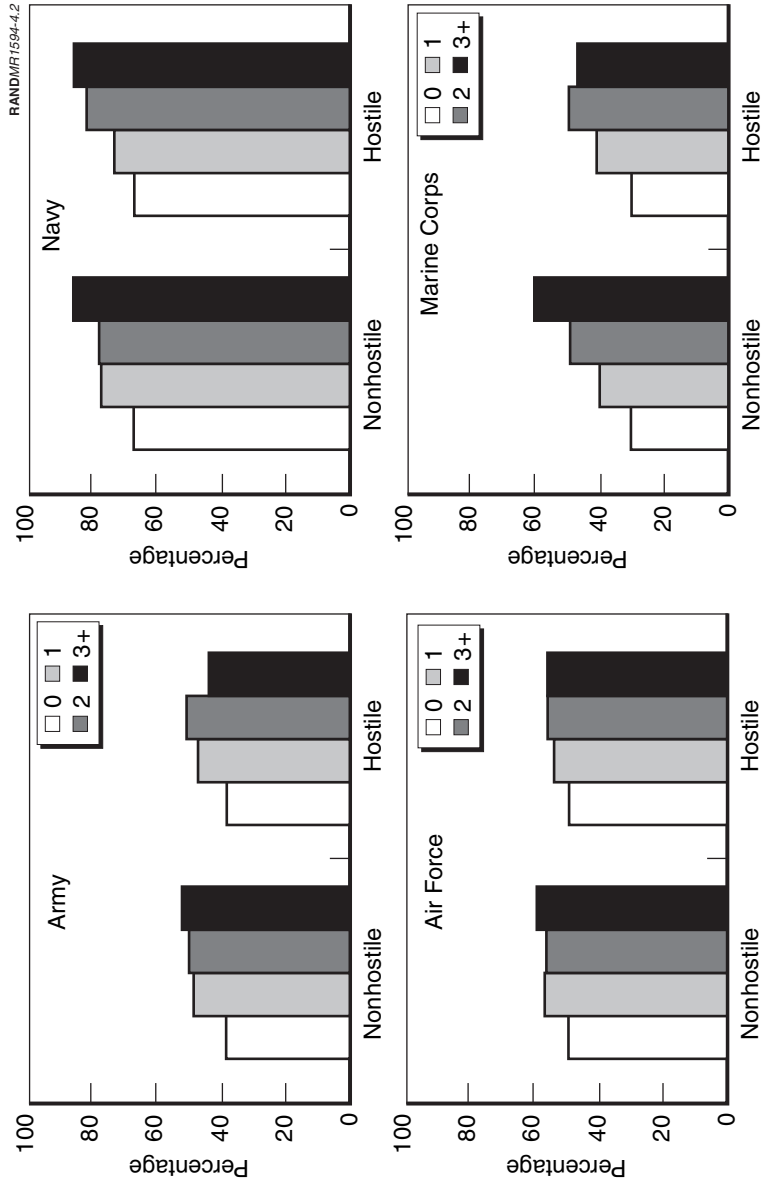


Figure 4.2—Second-Term Reenlistment Probability by Number of Deployment Episodes

Reenlistment in the Navy varied little with the number of nonhostile deployments. The type, frequency, and duration of deployment was probably more predictable in the Navy than in the other services. Many Navy deployments derive from vessels following a rotation of six months at sea and twelve months in port. The rotation was well established, so a sailor may have had little reason to revise expectations about future voyages even if deployment during the three years prior to the reenlistment decision point deviated from expectation. The results suggest that first-term sailors formed accurate expectations before their first deployment and did little subsequent updating. We show below, however, that the relationship between deployment and first-term reenlistment differed between sailors with and without dependents. Sailors with dependents had a probability of reenlistment as nonhostile deployments increased; that is, they appeared to revise their beliefs despite the predictability of Navy deployments. We think this is related, not to predictability, but to self-discovery about how much the member liked deployment.³

For hostile deployment, the relationship of deployment to reenlistment was largely similar across the services: Hostile deployment had little effect on reenlistment. The Army was an exception; reenlistment increased from zero to one hostile deployment and changed little thereafter. For the Navy, we found slightly lower reenlistment at one hostile deployment versus none. The findings suggest that hostile deployment, inclusive of deployment-related pay and cost, caused little net change in a member's beliefs about the satisfaction from hostile deployment. Hostile deployment may be both highly demanding and personally fulfilling. To understate, it may involve moments of extreme risk, personal loss, disease, primitive conditions, and long hours, and yet it may provide high intrinsic reward.

Second-term reenlistment (Figure 4.2) rose with nonhostile and hostile deployment up to two episodes, which encompassed most members with hostile deployment. In the Army, Marine Corps, and Air Force, there was a decrease or no increase in reenlistment with

³In terms of the functional form for utility in Chapter Two, deployment led sailors with dependents to increase values parameters a , b , c , and f through deployment, but probably not to change λ and μ .

three or more hostile deployments relative to two.⁴ Members with three or more may have reached the point where hostile deployment resulted in too much time away from home, a negative impact large enough to offset the positive aspects of deployment. To state a “negative” result, we found no evidence that hostile deployment reduced reenlistment to a level below that for members who had no hostile deployment.

It is interesting to ask why there should be any effect of deployment during the second term on second-term reenlistment. Many second-term members have been promoted to the rank of a noncommissioned officer (paygrade E-5 or higher), and the satisfaction from deployment could be greater when experienced as a noncommissioned officer than as a junior enlisted member. Noncommissioned officers have leadership responsibilities and more involvement with planning and conducting missions than do junior personnel. (E-5 corresponds to a sergeant in the Army, a staff sergeant in the Air Force, a sergeant in the Marine Corps, and a petty officer second class in the Navy. The respective ranks for an E-4 are specialist, senior airman, lance corporal, and seaman.)

Also, second-term members are still learning about deployment. Even with eight or so years of service at the time of second-term reenlistment, most members have had only a few deployments. Table 4.3 shows the *unconditional* average number of deployments in the three-year period prior to reenlistment.⁵ At the outset of the second term, an average member would have had roughly the average number of hostile and nonhostile deployments in the first term. Even considering hostile and nonhostile deployments together, they averaged less than one—except in the Navy, where the average was two.

⁴The Army coefficient for three or more hostile deployments was significantly lower than the coefficient for two hostile deployments. In the Marine Corps, these coefficients were not statistically different.

⁵The average is not conditional on the member having had some episodes.

Table 4.3
Average Number of Episodes

	First Term		Second Term	
	Hostile	Nonhostile	Hostile	Nonhostile
Army	0.33	0.45	0.42	0.50
Navy	0.76	1.25	0.50	0.61
Air Force	0.34	0.76	0.62	0.33
Marine Corps	0.50	0.20	0.32	0.82

SOURCE: Authors' tabulations.

Furthermore, second-term members are a self-selected subset of first-term members on the strength of their quality of job match with the military and preference for the military. Retention models typically assume that a member's preference, or taste, for the military is a given but unobserved factor in determining whether the member remains in service. This preference helps explain why reenlistment is higher among career members than among first-term members. But it is not obvious that a higher preference for the military leads to a positive relationship between the reenlistment probability and the *number* of deployments. If a member cannot affect deployment, there should be no relationship between preference and deployment—assuming deployment does not cause the member's preference to change. In this case, self-selection into the second term cannot explain the positive relationship between deployment and reenlistment. If the member can affect deployment, a positive relationship between deployment and reenlistment can arise if members with a stronger preference are more likely to reenlist *and* obtain more episodes. More episodes may result because the member volunteers for them or because the commanding officer selects “gung ho” members for deployment.

While that is a possibility, we return to the point that the member may still be learning about deployment. Actual deployment may shape the member's preference for the military, which can change his or her expected utility of continuing in service. If members typically find deployment to be more satisfying than expected, we will find a positive effect of deployment on reenlistment. This will be true of second-term members as well as first-term members; we expect the relationship to be stronger among second-term members

because of the selectivity of first-term reenlistment. First-term members who disliked deployment presumably tend to leave the services, and second-term members who liked deployment in their first term may be deployed again in the second term and again revise their expected utility upward.

Full-Interaction Model

Tables 4.4 and 4.5 show the reenlistment probability predicted from the full-interaction model for first- and second-term reenlistment. As mentioned, the full-interaction model did not fit better than the main-effect model for the Army and Marine Corps but did for the Navy and Air Force.

For the Army first-term members, predicted reenlistment typically increased with nonhostile deployment, and it increased from zero to one hostile deployment, although the change thereafter was sporadic. Also, reenlistment decreased for three or more hostile *and* three or more nonhostile deployments, versus two hostile or two nonhostile deployments. Marine Corps first-term reenlistment tended to follow the same pattern as that of the Army.

Navy first-term reenlistment was higher for one or more nonhostile deployments compared with none, but this was true only for members who had no hostile deployments. With one or more hostile deployments, reenlistment tended to remain unchanged as nonhostile deployment increased. For members with three or more hostile deployments, reenlistment tended to decline as nonhostile deployment increased, which again was a possible sign of too much deployment. Furthermore, for one, two, or three or more nonhostile deployments, reenlistment tended to decrease as hostile deployment increased from zero to one or from one to two. The pattern for the Air Force was similar but not identical to the Navy's. Reenlistment tended to rise with nonhostile deployment and was lower for three or more hostile and three or more nonhostile deployments, compared with two hostile or two nonhostile deployments. Also, for Air Force members with one or two nonhostile deployments, reenlistment declined as hostile deployment increased from zero to one and then changed little.

Table 4.4
Predicted First-Term Reenlistment Probability,
Full-Interaction Model

	Nonhostile	Hostile			
		0	1	2	3+
Army	0	36.06	43.06	43.57	44.76
	1	46.84	52.57	49.57	61.20
	2	52.90	59.14	66.82	57.81
	3+	57.87	65.69	64.73	48.70
Navy	0	36.88	38.72	39.77	49.99
	1	42.88	37.60	40.28	49.14
	2	42.13	38.46	38.75	44.80
	3+	49.31	41.78	46.81	46.27
Air Force	0	35.72	37.73	36.03	37.61
	1	49.18	45.99	45.21	47.66
	2	55.31	49.28	49.78	57.53
	3+	50.45	51.70	55.03	49.31
Marine Corps	0	16.92	17.92	17.69	15.96
	1	18.02	19.04	18.44	26.12
	2	19.48	21.11	17.52	23.81
	3+	22.83	25.09	17.35	16.92

NOTE: Member has high school or some college, AFQT IIIA, electrical or mechanical equipment repairer, white, male, with no dependents, unemployment rate at prior reenlistment was 6.6 percent, current unemployment rate was 4.9 percent, and year of reenlistment decision was FY1999.

The predicted second-term Navy reenlistment probability, on a whole, rose with nonhostile and hostile deployment. Also, although reenlistment was lower among the most-deployment members versus members with two nonhostile or two hostile deployments, there was no longer a decrease in reenlistment as hostile deployment increased from zero to one or from one to two. The pattern for the Air Force was similar. In particular, among members with one, two, or three or more nonhostile deployments, there was no decrease in reenlistment as hostile deployment increased from zero to one or more deployments. Also, reenlistment was lower for the most-deployed members (three or more hostile *and* three or more nonhostile deployments). Furthermore, the patterns for the Army and Marine Corps were similar to those of the Navy and Air Force. Thus,

Table 4.5
Predicted Second-Term Reenlistment Probability,
Full-Interaction Model

	Nonhostile	Hostile			
		0	1	2	3+
Army	0	38.26	48.18	51.72	47.21
	1	49.34	56.77	59.59	44.25
	2	50.32	58.23	54.75	31.60
	3+	52.53	55.15	82.55	38.26
Navy	0	66.54	75.67	86.01	90.07
	1	79.12	79.72	87.44	90.16
	2	80.72	81.29	87.12	83.60
	3+	86.51	89.04	91.7	83.27
Air Force	0	49.38	54.39	56.48	55.76
	1	57.65	59.74	63.15	67.22
	2	56.18	61.80	57.86	69.91
	3+	57.36	65.10	86.98	61.96
Marine Corps	0	29.89	39.25	58.33	45.85
	1	40.06	53.49	52.45	59.89
	2	48.65	64.76	73.70	29.89
	3+	62.96	65.53	46.04	29.89

NOTE: Member has high school or some college, AFQT IIIA, electrical or mechanical equipment repairer, white, male, with no dependents, unemployment rate at prior reenlistment was 6.6 percent, current unemployment rate was 4.9 percent, and year of reenlistment decision was FY1999.

for all services, second-term reenlistment tended to increase with nonhostile and hostile deployment, but reenlistment among the most-deployed members was lower than among members with two hostile or two nonhostile deployments.

REENLISTMENT AND DEPLOYMENT BY DEPENDENCY STATUS

We found the relationship between deployment and first-term reenlistment to differ between members with and without dependents, or put more loosely, between married and unmarried members. Compared with those without dependents, first-term members with dependents had higher reenlistment, and their reenlistment rose

with nonhostile deployments and, to a lesser extent, with hostile deployments.

A possible explanation for this behavioral difference lies in the effect of deployment on the member's preference for the military. Members who discover they like deployment may also decide that the military is a preferable environment for starting and raising a family. That is, these "positive" discoveries may be correlated and affect the member's decisions to reenlist and to marry. Under this explanation, marrying is also an outcome of the learning process, and that process extends to service life overall.⁶

We considered whether the effect of deployment on reenlistment was more positive for members with dependents because they received FSA, whereas members without dependents did not. We decided FSA was likely to be a minor factor. Most deployments were less than a few months long, and FSA was \$75 per month until January 1998, when it rose to \$100 per month. FSA could help cover a family's deployment-related costs, but it would not appreciably change the family's standard of living.

Figure 4.3 shows predicted first-term reenlistment by dependency status; the predictions come from the main-effect model. Reenlistment was higher for members with dependents than for those without in the Navy, Air Force, and Marine Corps and about the same or perhaps slightly higher in the Army. In addition, the effect of deployment differed by dependency status (or marital status). Army reenlistment increased with nonhostile deployments, and the increase was greater for members with dependents than those without. Hostile deployments increased Army reenlistment for members with dependents. For those without dependents, reenlistment increased from zero to one hostile deployment and did not change as hostile deployments increased further. In the Navy, reenlistment for members without dependents declined slightly for zero to two nonhostile deployments. It also declined for zero to two hostile deployments but increased as deployments rose from two to three or more. Reenlistment for members with dependents increased with non-

⁶Future work might treat dependency status as an endogenous variable and test whether it is related to deployment.

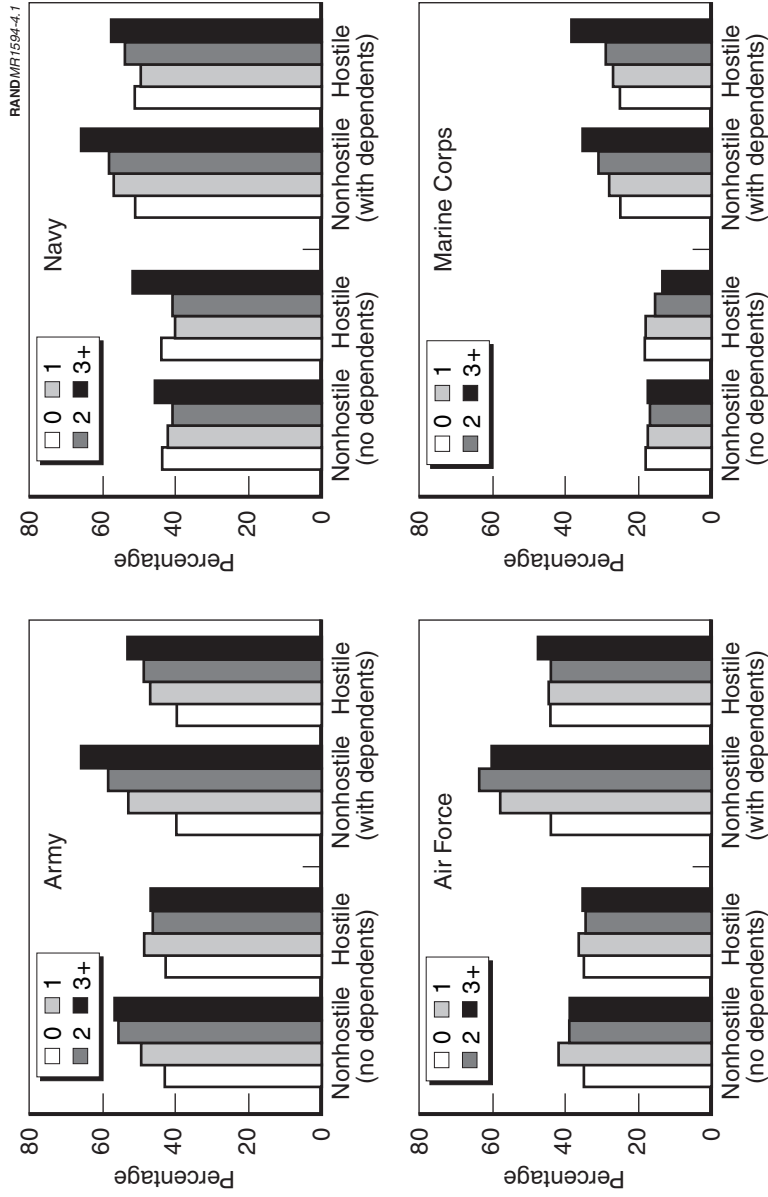


Figure 4.3—Predicted First-Term Reenlistment Probability by Episodes and Dependency Status

hostile deployments. For hostile deployment, reenlistment at first decreased and then rose. The Army and Navy results suggest that a member with dependents at the time of reenlistment had a higher expected utility of deployment than did a member without dependents. This may reflect higher revised preferences and, perhaps, higher deployment pay. Many members with dependents at the time of reenlistment might not have had dependents when deployed in the preceding three years and therefore did not receive FSA then but could expect to receive it on future long deployments. Also, sailors can expect to receive Career Sea Pay once they become eligible (see Appendix A).

In the Air Force, reenlistment rose more rapidly with nonhostile deployments for members with dependents than for members without dependents. Reenlistment did not change as hostile deployments increased for members with or without dependents, although reenlistment was higher for members with dependents (as mentioned above). In the Marine Corps, the difference between members with and without dependents is striking. Reenlistment increased with nonhostile and hostile deployment for members with dependents and decreased for members without dependents. The results for the Air Force and Marine Corps thus also point to an evolving, higher expected utility of deployment for members with dependents compared with members without dependents.

The patterns in Figure 4.3 help explain the similarity in the effect of deployment on reenlistment between first-term members with dependents and second-term members. At first-term reenlistment, about half of the members had dependents. This figure increased to about 80 percent at second-term reenlistment (Tables C.1 and C.2). The selectivity of first-term reenlistment affected the composition of second-term personnel. We found that first-term reenlistment was *higher* for members with dependents and *rose* with nonhostile deployments and, to some extent, also rose with hostile deployments. Thus, deployment was associated with a higher reenlistment rate for members with dependents. These patterns might also be present among members who soon planned to marry and start a family. As seen, the results for first-term members with dependents were largely similar to results for second-term members, with the second-term results amplifying the pattern seen for first-term members with dependents.

WHAT IF HOSTILE DEPLOYMENTS INCREASED?

We used the main-effect model to conduct a policy experiment in which deployments increased by 25 percent, and all of the new deployments involved hostile duty. The 25-percent increase is relative to a base of total deployments, so the increase is larger relative to hostile deployments. One can think of this as sustaining the level of nonhostile deployments and increasing the number of hostile deployments—e.g., peace-ops plus a new small-scale contingency.

We assumed that the hostile deployments were of the same nature as those in FY1993–FY1999 and that deployment pays and family support remained the same. We spread the additional deployments across members reenlisting in FY1999⁷ via random draws from a Poisson distribution with a mean equal to 25 percent of the mean of hostile plus nonhostile deployments per member. In particular, if H was the random variable and μ was the mean number of hostile plus nonhostile deployments per member in a three-year period, then

$$\Pr(H = h) = \exp(-\lambda) \frac{\lambda^h}{h!}$$

$$E(H) = \lambda \equiv 0.25 \mu.$$

To illustrate the values generated by this approach, suppose $\lambda = 0.25$ (and μ is assumed to equal 1). Then the probability of a member being assigned zero additional deployments is 0.7788, one additional deployment is 0.1947, two additional deployments is 0.0243, three additional deployments is 0.0020, and four additional deployments is 0.0001. More specific, Table 4.6 displays the increase in deployments. As seen, the 25-percent increase in total deployments, with all additional deployments being hostile, produced a one-third to two-thirds increase in hostile deployments, depending on the service. Within a service, the added deployments were spread randomly across members at first- and second-term reenlistment.

⁷The results would have been similar if we had used members reenlisting in any of our other fiscal years: 1996, 1997, or 1998.

Table 4.6
Simulated Increase in Hostile Deployments

	Initial Total Deployments	Initial Hostile Deployments	Added Hostile Deployments
Army	11,874	5,597	3,022
Navy	30,772	12,518	7,251
Air Force	14,679	11,486	3,482
Marine Corps	23,795	8,655	6,098

We found that the increase in hostile deployments had little overall effect on reenlistment for first- and second-term members (Table 4.7). In no case did the average reenlistment probability decline, and in several cases it rose slightly. This result is in keeping with the small effect of hostile deployment on reenlistment we found in the regression results. If the increase in deployments had included non-hostile deployments, the overall effect on reenlistment would have been positive, again in keeping with the regression results.

EFFECT OF OTHER EXPLANATORY VARIABLES

In our analysis, reenlistment decisions were made in the period from mid-1995 to the end of FY1999. The national economy boomed and military pay fell relative to civilian pay during this period. By the end of the 1990s, the services reported difficulty in recruiting and retention, and steps were taken to increase military pay, enlistment and reenlistment bonuses, enlistment advertising, the number of

Table 4.7
Effect on Reenlistment of Adding 25-Percent More Episodes, All Hostile

	Army	Navy	Air Force	Marine Corps
First Term				
Before	0.44	0.32	0.49	0.19
After	0.45	0.33	0.49	0.20
Second Term				
Before	0.51	0.56	0.61	0.59
After	0.53	0.58	0.61	0.61

recruiters, and the number of recruiting stations. The FY2000 National Defense Authorization Act mandated a 4.8-percent across-the-board increase in basic pay plus targeted increases that averaged out to an additional 1.4-percent increase. The Act also mandated higher-than-usual basic pay increases through FY2006.

Our data do not include enlistment or reenlistment bonus information and do not include military or civilian pay. But we used fiscal year indicators as “blunt instruments” to account for the year-to-year change in reenlistment conditions.

First-Term Reenlistment

The coefficients in the first-term main-effect model indicate that the services tended to lose high-quality members. Relative to AFQT IIIB high school graduates, the Army lost more of the highest-scoring members (AFQT I–II), kept more members with GEDs (General Equivalency Diplomas), and lost more members with some post-secondary school. The Navy lost IIIA, kept a relatively high fraction of low-scorers (AFQT IV), and kept non-high school graduates and those with GEDs. The Air Force lost AFQT I–II, AFQT IIIA, and airmen with some post-secondary education. Unlike the other services, the Marine Corps kept AFQT I–II and AFQT IIIA.

The Army and Marine Corps tended to keep women relative to men, while the Navy did not. All services had higher reenlistment rates for African Americans and Hispanics than for other (self-reported) race/ethnicity groups—primarily whites.

Members who entered when the unemployment rate was high in their state relative to other states were more likely not to reenlist, at least for the Army and Air Force. A high unemployment rate at the time of the reenlistment decision, however, made members more likely to reenlist in the Army, Air Force, and Navy (the current unemployment rate effect could not be reliably estimated for the Marine Corps). Marine reenlistment occurred on a first-come, first-served basis starting at the beginning of the fiscal year, and much of the reenlistment occurred at that time. This affected our ability to estimate the unemployment rate effect because there was little variation in the unemployment rate over the few months when much of the reenlistment occurred.

The decline in military and civilian pay in the late 1990s led us to expect that the coefficients on the fiscal year indicators would decline from one year to the next. But for the Army and Navy, the reverse was true. Most likely, these two branches managed their manpower reduction (drawdown) in the early 1990s in a way that kept first-term reenlistment rates and accessions low through FY1996, and then sought increasingly higher reenlistment rates. For the Air Force, reenlistment worsened with each passing year in the late 1990s. In managing its drawdown, the Air Force may have tried to protect all incumbent personnel and hence may have allowed first-term reenlistment to remain relatively high in FY1996. Additionally, the Air Force faced unusually strong competition from the private sector, that is, increasingly high demand for the high-aptitude, technically trained personnel the Air Force is known for. Compared with the other services, the Marine Corps' fiscal year effects were small and nearly negligible. In handling its drawdown, the Marine Corps used a "bang bang" approach and scaled down across the board in a very short period of time in the early 1990s. Thus, it was at its new steady-state personnel force structure almost immediately and, unlike the other services, did not have to cope with the ripple effects of a prolonged or shaped drawdown.

Second-Term Reenlistment

In contrast to the first-term results, second-term reenlistment rates were higher for members with higher AFQT scores and higher education. The services tended to reenlist AFQT I–II and AFQT IIIA members at a higher rate than AFQT IIIB members, and tended to shed AFQT IV members. The Navy reenlisted relatively fewer members with GEDs, and the Army, Navy, and Marine Corps kept relatively fewer non-high school graduates and relatively more members with some post-secondary education. (Air Force GED and non-high school graduate coefficients were insignificant because it had so few members with GEDs and nongraduates.)

The Army had a higher reenlistment rate for women than for men, but the Navy and Air Force had lower rates for women than for men. In every service, African Americans and Hispanics had a higher reenlistment rate than other race and ethnicity groups (again, mostly whites). In the Air Force, a higher unemployment rate at accession

was associated with a lower reenlistment rate, as we expected; but in the Army and Navy, higher unemployment at accession was associated with a higher reenlistment rate. The unemployment rate at the time of reenlistment had a positive effect on reenlistment in the Air Force, also expected. But for the other services, its effect was small and insignificant; the current unemployment rate had little effect on second-term reenlistment. Finally, fiscal year effects were mostly small and insignificant. However, the Army fiscal year effect rose from FY1996 to FY1997, then declined toward the FY1996 value in FY1998–FY1999. The Marine Corps’ fiscal year effects were identical in FY1996–FY1998 but lower in FY1999. In sum, there was no simple pattern to the fiscal year effects—e.g., a steady decline—and, on the whole, the fiscal year effects were small.

ADDING MONTHS OF DEPLOYMENT

The main-effect and full-interaction models used indicator variables for deployments. We realized, however, that deployments differ in length and that overall time away could affect reenlistment decisions, as the expected utility model suggests. Holding the episodes of deployment constant, lengthy deployment could cause an upward revision in the member’s subjective estimate of the mean and variance of a deployment. This would affect expected utility by increasing total expected time deployed and by increasing the variance in the length of a deployment.

To allow for this, we explored models that added total months of deployment during the three-year window to our main-effect specification. In some cases, adding months had little effect on the deployment-indicator coefficients, but in other cases the coefficients changed. The intuitive explanation is both deployment indicator variables and months deployed reflect total time deployed. Non-hostile and hostile months were separately entered as a quadratic, that is, months and months squared.

Conditional on the deployment indicators, we found that reenlistment was unrelated to total nonhostile months away but was related to hostile months. We showed in Chapter Two that either a positive or negative effect of months of deployment on reenlistment was consistent with the expected utility model. We found a positive effect of months of deployment for the Army and a negative effect for

the other services. Conditional on one hostile deployment, an increase from one hostile month to six hostile months changed first-term reenlistment as follows: Army, from 0.40 at one month to 0.44 at six months; Navy, from 0.39 to 0.33; Air Force, from 0.39 to 0.36; and Marine Corps, 0.19 to 0.17.⁸

This range of change in months roughly corresponds to a one-standard deviation decrease or increase from the average length of a deployment. Deployment average length and standard deviation are shown in Table 4.8. For example, the average length of a hostile deployment for first-term members in the Air Force was 3.00 months, with a standard deviation of 2.25 months.

The findings on the effect of months of deployment may be compared with tabulations from the 1999 Survey of Active Duty Personnel on the likelihood to reenlist with respect to the number of months the member was away during the year. For members who did not deploy, the likelihood to reenlist was 47 percent. This rose to 57 percent for members away less than one month, then fell gradually as follows: away one to three months, 54 percent; away four to

Table 4.8
Average Length and Standard Deviation of a Deployment

	Any Deployment		Hostile Deployment	
	Average months	Standard deviation	Average months	Standard deviation
First Term				
Army	4.6	4.1	4.6	3.1
Navy	3.8	2.6	5.5	2.3
Air Force	3.1	2.9	3.0	2.3
Marine Corps	4.5	3.1	4.7	2.9
Second Term				
Army	4.5	4.3	4.7	3.2
Navy	3.8	2.6	5.2	2.4
Air Force	3.2	3.5	2.8	2.5
Marine Corps	3.5	3.4	4.8	2.9

⁸Results are available from the authors on request.

five months, 52 percent; away five to seven months, 47 percent; and away seven to twelve months, 46 percent.⁹ This is a rough comparison because the tabulations are overall, not by term or service, and do not control for member characteristics. Nevertheless, the tabulations indicate that among members with some days away during the year, the likelihood of reenlistment declines as days away increase.

In earlier work, we found a similar pattern: higher reenlistment among members with some deployment, and given some deployment, a negative effect of months deployed on reenlistment (Hosek and Totten, 1998). The results above show a negative effect of months deployed for three services, when the number of deployments is controlled. For most members, the combination of the deployments and months-of-deployment led to a higher reenlistment probability than that for members without deployment. The net positive effect on reenlistment for most members was consistent with our earlier work and with the tabulations from the 1999 survey.

CONTROLLING FOR YEARS OF SERVICE

We addressed a concern that the effect of deployment on first-term reenlistment was biased upward. The bias, if present, resulted from the likelihood that first-term members with more years of service at the reenlistment date had a stronger taste for the military and, having been in service longer, had more, and more accurately counted, deployments. Our sample population, described in Chapter Three, included members who made a reenlistment decision in FY1996–FY1999, had an initial term of 3.5 to 6.0 years, and for whom we had at least a 36-month deployment measurement window. We followed members to their final first-term decision to address the common phenomenon of extensions. Term length is chosen by the member, within the service guidelines allowed for that occupation, and therefore expresses the member's initial taste for the military. To explore the sensitivity of our models to length of initial obligation, we estimated the one-equation reenlistment model (and the two-equation model of promotion and reenlistment, discussed in the next chapter) and included a variable for length of the initial term. We

⁹DMDC supplied these tabulations via personal communication with the authors.

then refit these models on a smaller sample limited to members with an initial term length of 3.5 to 4.5 years.

We found that the length of the initial term was significant but had a very small effect on reenlistment. Longer initial terms were associated with higher reenlistment. Inclusion of this variable did not change the coefficients on the deployment variables. The more-selective subsample with initial terms of 3.5 to 4.5 years showed similar results, although the reduction in sample size caused some loss in statistical significance.¹⁰

We also reestimated the first-term reenlistment models for members with and without dependents, with the sample limited to members with initial terms of 3.5 to 4.5 years. The results were highly similar to the results discussed above.

SUMMARY

For the majority of members who had one or more nonhostile or hostile deployments in the three-year period preceding their reenlistment decision, we found that reenlistment increased as the number of nonhostile deployments increased. The exception to this pattern was the Navy, where first-term reenlistment increased from zero to one nonhostile deployment and then remained approximately constant. For hostile deployments, Army first-term reenlistment increased as hostile deployments rose from zero to one, and then stayed at about the same level. For the other services, first-term reenlistment changed little from zero to one or more hostile episodes. However, in the full-interaction model, we found that Navy and Air Force reenlistment was lower as hostile deployment increased from zero to one and one to two, for members with one or more nonhostile deployments. Among second-term members, reenlistment tended to rise with nonhostile and hostile deployments, although the increase with hostile deployments was not as rapid as with nonhostile deployments. There was little evidence that nonhostile or hostile deployment reduced first- or second-term reenlistment below the reenlistment level of members who did not deploy. However, there was evidence suggesting that the most-

¹⁰Results are available from the authors on request.

deployed members (three or more hostile deployments and three or more nonhostile deployments) had more deployment than they preferred. Their reenlistment rate was less than that of members with either two hostile or two nonhostile deployments.

In the context of the learning model and the expected utility model (Chapter Two), the results suggested that each nonhostile deployment resulted in an upward revision of expected utility. This was true for both first- and second-term members. That is, the evidence suggested that learning continued in the second term and that nonhostile deployment was a “positive” experience. Understanding precisely why this occurred is a potentially important topic for future research.

Hostile deployments seemed to bring a combination of highs and lows that resulted in little effect on reenlistment. Apart from the Army, where first-term reenlistment increased for the first hostile deployment, there appeared to be little net revision of expected utility as witnessed by the comparatively flat relationship between first-term reenlistment and hostile deployment. For second-term members, reenlistment tended to increase with hostile deployment. This suggested that among second-term members, each hostile deployment caused an upward revision of expected utility.

The second-term results revealed a more positive relationship between reenlistment and deployments for both nonhostile and hostile episodes than did the first-term results. There may be several reasons for this. Second-term members are self-selected from the first-term population; members with dependents at the end of the first term are more likely to reenlist and their reenlistment rate is higher the more deployments they had. Dependency status may be a marker for a subset of members who find military life to be satisfying in general and deployment to be satisfying in particular. Their positive reaction may be a factor in their decision to marry while serving in the military, i.e., marriage itself could be an outcome of the process of learning about their own valuation of the military. Some evidence consistent with this notion came from a comparison of the reenlistment patterns for first-term members with and without dependents. Members with dependents had reenlistment patterns similar to those of second-term members, whereas members without dependents did not. This observation is relevant because, as men-

tioned above, first-term members with dependents were more likely to reenlist. Equally important, their reenlistment probability was considerably higher and positively related to the number of deployments, compared with members without dependents.

In addition, second-term members typically have a higher rank than first-term members; many second-term members gain leadership responsibility as they are promoted to E-5 and become noncommissioned officers. The satisfaction from deployment may be greater as a noncommissioned officer than as an E-3 or E-4. Finally, the process of selecting members to take part in nonhostile or hostile deployments may not be completely random. To some extent, members might self-select or be selected by their commanding officer. Self-selection or commander-selection may be de facto related to the member's preference for reenlistment. If so, the relationship between reenlistment and deployment will be biased upward. If the selection process is stronger or more pervasive among second-term members than first-term members, the relationship between reenlistment and episodes will appear more positive for second-term members.

We conducted a policy experiment with the main-effect model to determine the effect of a major increase in hostile deployment on reenlistment. We predicted that a 25-percent increase in deployment, consisting entirely of hostile episodes, would have little effect on first- or second-term reenlistment. On average, reenlistment was the same or slightly higher after the increase. The experiment assumed that hostile deployments would be the same kind that occurred during our data period for counting episodes, approximately 1993–1999. Casualties and fatalities were low, and by and large the deployments were supported by the public.