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Findings and Implications of the Assignment Incentive Survey

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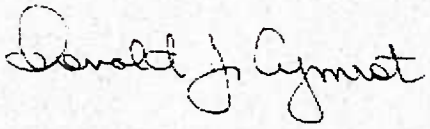

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Objective

The fact that the Navy must order personnel into hard-to-fill billets has potential negative impacts on retention, readiness, recruiting, and morale. In addition, the patchwork of incentives currently used to compensate Sailors for filling undesirable billets can be costly. Consequently, the Navy is considering ways to restructure the assignment system to alleviate these unintended consequences. The Assistant Deputy Chief of Naval Operations, Manpower and Personnel (N1B) asked the Center for Naval Analyses to analyze the relative attractiveness of alternative incentives meant to persuade Sailors to volunteer for historically hard-to-fill billets.

A move to a more voluntary assignment system requires information on which incentives ought to be offered to Sailors, and how those incentives ought to be structured. In this study, we analyze Sailors' preferences for assignment locations and incentives to gauge the impact potential incentives would have on getting Sailors to less preferred assignment locations. To do so, we developed and administered the Assignment Incentive Survey, which focused on a few select assignment locations and a variety of potential incentives. The survey data contribute to our understanding of Sailors' preferences by estimating the value Sailors assign different incentives in reference to assignment locations. This information will tell the Navy which incentives would be the most effective to pursue, and at what levels incentives could be used as starting points for experimentation.

This study answers the following questions:

- In choosing among assignment locations, would Sailors respond to incentives?
- Of some suggested incentive tools ranging from an assignment pay to shorter sea tour lengths, which do Sailors prefer?

- How much bonus pay would it take to encourage Sailors to take an assignment in a less preferred location?

Findings

Using the survey data, we analyzed the relationships between different assignment locations and the monetary and nonmonetary incentives included in the survey. Direct estimates of the impact of different incentives on assignment choice indicate that it is possible to use assignment incentives to affect Sailors' willingness to choose assignment locations that are not considered desirable. Furthermore, we were able to quantify location preferences and estimate appropriate initial levels of assignment pay for specific groups of Sailors. From these estimates, we generate a range of likely pay levels for each location. An overview of the results of the analysis follows.

Overall importance of assignment incentives

Sailors are willing to choose less preferred assignments if given sufficient monetary or nonmonetary assignment incentives. We estimate the value of the nonmonetary incentives in terms of a monthly assignment pay. Of the nonmonetary incentives, having more choice in picking next assignment has the highest monetary equivalent.

Special pay versus location

The amount of special pay required to get Sailors to a less preferred location depends on location preference and assignment options. The less preferred a location is relative to the alternative location choice, the more it takes to make the "typical" Sailor indifferent toward receiving an assignment to that location. For example, the survey results show that San Diego is preferred to Great Lakes, and both are preferred to Japan. If offered shore assignments at Great Lakes and Japan, attaching a $96 monthly assignment incentive to the Japan assignment would make the typical Sailor as likely to choose either assignment; however, the incentive for the Japan assignment would have to be $651 per month if the assignment options were San Diego and Japan.

Impact of dependent status on location preference

Sailors with spouses and/or children cited spouse's employment opportunities and having a permanent residence as the top two family considerations in the assignment process. Both relate to being able to stay at one's current location. We find that these Sailors prefer to be at their current location over all other locations included in the survey in the case of rotating-to-shore assignments. For this subsample, Japan, Great Lakes, and Italy were the least preferred locations.

Sailors without spouses or children have a preference for a variety of locations. For example, Italy was a relatively preferred sea duty location, whereas Norfolk was a less preferred location—reflecting that homebasing is less important for unattached Sailors. Thus, Sailors without dependents may be more likely to volunteer for hard-to-fill billets that had a monthly assignment pay attached.

Impact of homebasing preference on location preference

Sailors at Norfolk and San Diego prefer their current location for reassignment to the other locations offered on the survey. Given this preference, if there are available assignments at a Sailor's current location, it will take more to get that Sailor to a less preferred target location than it will take to move a Sailor from a different initial location to that target location. For example, if two identical typical Sailors, one at Norfolk and the other at San Diego, are both facing shore assignments at Great Lakes or Norfolk, we estimate that it would take $164 per month to get the San Diego Sailor to go to Great Lakes, compared with $298 per month for the Norfolk Sailor.

Implications

Against the backdrop of the upcoming Assignment Incentive Pay (AIP) experiment, the most important findings from this study are those that relate to the effects of special pay on Sailors' assignment preferences. At the most fundamental level, the finding that pay is an effective way to sway people indicates that AIP is likely to work. More specifically, findings about the ranges of pay likely to be needed for each location, or class of locations, can inform initial implementation

of the experiment. However, it's important to keep in mind the following caveats when moving from theory to practice:

- Location preferences and sufficient distribution pay amounts differ depending on a Sailor's current assignment location and dependent status.
- Under a voluntary assignment system, there is the potential for sorting by Sailor's demographic differences, such as current assignment location and dependent status.
- This study's estimated assignment special pay amounts are applicable if assignment pay is targeted at manning a significant number of billets per location.
- If assignment pay is targeted at filling a few billets per location, this study's estimates will be upper bounds on the necessary amounts of assignment pay.

Introduction

Background

The Navy has used some nonmonetary incentives to encourage Sailors to take hard-to-fill billets. These incentives are costly and constrain the distribution system. For example, related CNA research estimated that the cost of using sea duty credit for overseas shore billets exceeds $83 million annually [1]. Other than sea pay, however, the Navy has not typically used the pay system. If assignment incentives are set too low or are not offered to all such billets, an insufficient number of Sailors volunteer for them. To fill these billets, the Navy has taken to ordering Sailors into billets. This lowers Sailors' retention and results in manning shortages or billet gaps [2, 3]. The Navy then must spend money recruiting and training additional Sailors, or must pay more in enlistment and reenlistment bonuses. The true cost of filling difficult positions or having billets in unfavorable locations is not immediately revealed. Without adequate assignment incentive, the Navy has not necessarily been saving money [2].

Because of the Navy's difficulties in keeping billets filled, it is implementing two assignment pay incentives: the Assignment Incentive Pay and the Location Selective Reenlistment Bonus. Both should address billet shortages and provide more flexibility in the pay system.

The Assignment Incentive Pay (AIP) is a distribution special pay being implemented in FY03. The AIP is a special pay attached to hard-to-fill billets that can be adjusted in response to manning shortages in certain shore billets. AIP is determined at the time of an assignment change and is not tied to reenlistment. Eligible Sailors volunteering for targeted positions receive AIP for the length of that assignment. Eventually, the allocation and pay levels of AIP will be determined by a market-based system to provide just enough incentive and compensation for Sailors to volunteer for specific unfilled priority billets. AIP will range in size, with an expected maximum of $750 per month and

legislative authority maximum of $1,500. AIP would replace nonmonetary incentives, such as sea duty credit for overseas duty. Early implementation of AIP may focus on hard-to-fill locations instead of specific billets, which is one reason for the use of location as the main assignment descriptor in this study's design. Analysis of the Assignment Incentive Survey data will provide information on the relative effectiveness of some of these policies and offer guidance on initial implementation levels of the AIP.

The Location Selective Reenlistment Bonus (LSRB) is an additional reenlistment bonus for Sailors reenlisting to a hard-to-fill priority billet.[1] Currently, as is proposed for the AIP, the LSRB applies only to shore billets. Based on location, activity, Unit Identification Code (UIC), and rating, the LSRB was authorized for FY02 and has been implemented on a pilot basis. For FY02, $3 million was budgeted, concentrating on Zone A Sailors and 1,100 billets.[2]

In addition to the pay incentives, the Navy has tried or considered nonmonetary assignment incentives, including choice of next assignment, additional one-time or annual leave, decreased obligated sea tour length, and credit toward promotion.[3]

Approach

There are at least two approaches to studying the impact of assignment incentives on Sailors' decisions to go to different billets. The first is an econometric approach using historical data on actual assignments, and the second is an operational research approach using stated-preference data. For this study, we employ the latter for two reasons: (1) the survey questions mimic possible assignment

1. The AIP is primarily a distribution device, whereas the LSRB is a retention and distribution device. Although the survey focuses on an AIP type of assignment pay incentive, there are still implications for the LSRB.
2. Over the next few years, the amount spent on LSRBs and the number of Sailors eligible for LSRB is projected to increase.
3. The choice of next assignment could work as a point system, in which taking a less popular billet results in a later opportunity to get a better position.

choices Sailors could face and (2) many of the assignment incentives of interest don't exist.

As opposed to behavioral or historical data, with the Assignment Incentive Survey, we collect data on what respondents stated they would likely do. The survey data do not reflect what actually occurred or will occur, but give an indication of Sailors' preferences for different aspects of the assignment incentive process. For example, in this survey, respondents were shown packages that describe assignments at only eight locations. Based on their choices, there is no guarantee that this paper's estimated location preferences will equal actual or future manning shares at these locations. However, we are able to get a ranking of the relative preferences for different locations and assignment incentives; thus, we can estimate which incentives are the most effective in getting Sailors to go to less preferred locations.

Assignment Incentive Survey

Survey design

In this study, we use a technique known as choice-based conjoint (CBC) that asks survey respondents to indicate only one of a given set of products they would prefer.[4] The Assignment Incentive Survey was designed to collect information on preferences for assignment locations and incentives, along with demographic and background data. The Navy has difficulty filling both sea and shore assignments, so the survey was split into two versions: Rotating to Shore and Rotating to Sea. Participating Sailors were asked to participate in the survey that reflected the type of assignment they would rotate to next. So, respondents currently on sea duty were asked to participate in the Rotating to Shore version, and vice versa.

Both survey versions consist of two sections.[5] In the first section, respondents answered CBC assignment questions covering a range of possible assignment packages. This portion was designed to collect enough data to generate statistically significant results without overloading the respondent with too many questions. Each of 18 CBC assignment questions showed 3 potential assignment packages. These packages included items drawn from a partial list of assignment locations and incentives. Respondents were asked to consider those 3

4. *Conjoint* is a combined form of the words *considered jointly.* Conjoint refers to a family of survey techniques in which respondents indicate their preferences by rating or ranking products. Traditional conjoint surveys ask respondents to explicitly rank or rate the importance of the different product features. Respondents' choices are assumed to be based on preference for a product's features. Although this approach is appealing in its directness, it suffers from the fact that people tend to rank all attributes as important.

5. We used Sawtooth Software CBC and Ci3 modules to create the survey.

packages as the only assignments offered for their next assignment rotation and to select the one they preferred the most.

Table 1 shows the type of Rotating to Sea question that respondents saw. Each assignment package in the Rotating to Sea version had seven characteristics, each of which came from a list of eight possible assignment locations or four possible incentive levels.[6]

Table 1. A potential CBC question from Rotating to Sea survey

Characteristic	Assignment package		
	1	2	3
Assignment location	Japan	San Diego	Hawaii
Monthly special pay	Extra $200	Extra $800	No extra pay
One-time bonus leave	Extra 40 days	Extra 10 days	No extra leave
Guaranteed time to study/attend classes	No time	4 hours/week	7 hours/week
Change in sea tour length (reduction)	9 months	18 months	6 months
Time to promotion	As expected	3 months earlier	12 months earlier
Chance of getting next preferred billet	50 percent	Little chance	25 percent

Geographic location was the only job-related characteristic for the Rotating to Sea survey and the main job-related characteristic for the Rotating to Shore survey. The Rotating to Shore version also included an attribute of the amount of time spent working within rating while at that assignment.

Several potential incentives were included to estimate the perceived cost or benefit to the Sailor of an assignment location and to estimate which incentives are most valued by Sailors. The monetary incentive was money received each month while at that location. This attribute reflects an assignment incentive bonus or assignment special pay,

6. Appendix E contains an example of a Rotating to Shore question, all survey locations and incentives, and definitions of the package characteristics.

such as the AIP. The nonmonetary incentives were one-time bonus leave, more time to study, a reduction in the current sea tour or next sea tour, increased chance of getting the next billet of one's choice, and being eligible for promotion sooner.[7]

The second section of the survey consisted of 20 demographic, background, and direct assignment preference questions. The direct questions asked Sailors about the factors that affected their answers to the CBC questions and their actual assignment decision.

Survey fielding and participation

The survey was fielded in February and March 2002 at Coronado, CA; Little Creek, VA; Norfolk, VA; Pearl Harbor, HI; and San Diego, CA. At these locations, specific ships, squadrons, and submarine commands were asked to participate. Participating commands had Sailors take the survey on a voluntary basis. Sailors within 18 months of their next projected rotation date were encouraged to participate because they were close to or in the process of making assignment decisions. Although this group was oversampled, respondents at all stages of the assignment process participated in the survey.

Our study analyzes the data from 1,022 completed surveys: 467 for the Rotating to Shore version and 554 for the Rotating to Sea version.[8]

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7. The two main differences in the survey design between the Rotating to Shore and Rotating to Sea versions were number of package characteristics (the shore version included type of rotational credit and amount of time spent within rating) and assignment locations shown. Otherwise, the surveys had the same characteristics with slightly different wording. For example, the change in sea tour length on the shore version of the survey applied to the *next* sea assignment; for the sea version, it applied to the assignment described in the survey. The non-CBC questions were the same for each version, except for a question on which CBC package characteristic influenced respondents' answers the most.

8. For the Rotating to Shore and Rotating to Sea versions, we excluded from the analysis four and five observations, respectively, that were missing demographic responses and/or CBC answers. Including the excluded observations does not change the estimates.

Survey methodology

By repeatedly asking Sailors to choose between different assignments, we were able to make inferences about Sailors' preferences. The data tell us two things: (1) which assignment characteristics Sailors prefer, and (2) how Sailors make tradeoffs between levels of the different assignment characteristics.[9]

Summing the statistical estimates of the package characteristic levels, we get an overall package preference for different hypothetical assignment packages. These package preferences can then be compared to estimate which of a set of packages would most likely be preferred by our sample and by how much. This allows for the estimation of the probable preferences between package options not seen by all or any of the respondents. None of the data collected from the survey identified individual respondents, so we are not able to link our results with personnel data to determine the type of assignment decisions respondents later made.

Sample characteristics

Table 17 in appendix F lists the sample means by survey version. Of the two surveys, Sailors taking the Rotating to Sea version are older with more dependents. Also, disproportionately more respondents who took the Rotating to Shore survey did so at San Diego—51 percent versus 39 percent. This influences the comparative location preferences for the two samples because San Diego is a location option seen by all respondents.

Tables 18 and 19 in appendix F show the survey samples with two sample distributions from the Enlisted Master Records (EMR) data set: all Sailors and all Sailors within 18 months of their next projected rotation date (PRD). The survey samples are of higher rank and are more likely to have dependent spouses and/or children than the entire Navy population. The survey sample is also older, more likely

9. Reference [4] and appendix A provide a more thorough review of conjoint methodology.

to have had longer lengths of service, to be near the end of active obligated service (EAOS) and near PRD.

Sailors within 18 months of their next PRD make up the sample population we focused on during the fielding and is a more relevant sample comparison. Our sample is more similar in percentage of E-4 to E-9 and in dependent status to all Sailors within 18 months of their next PRD. However, our survey samples also consist of a significant proportion of Sailors not within 18 months of their PRD. For example, 26 percent of the Rotating to Sea sample were over 2 years from their next PRD.

Considerations in the assignment decision process

Respondents were asked a series of non-CBC questions about their assignment decision process. These questions allow for a fuller understanding of what factors, not observable in our CBC data, were important to Sailors. From that, we can determine which factors are best addressed by nonmonetary versus monetary incentives, as they relate to this survey.

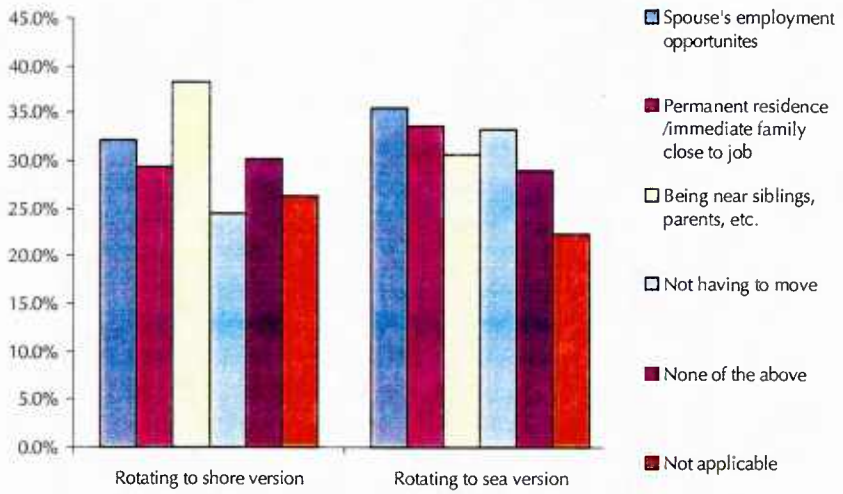
In the second, non-CBC, section of the survey, all respondents were asked which was the most important consideration in the assignment decision process: career, location, or family considerations. For the Rotating to Shore sample (Rotating to Sea sample), 41 percent (55 percent) of respondents stated family, followed by 33 percent (22 percent) stating own career and job considerations, and 26 percent (24 percent) stating location, climate, and facilities as the most important consideration. The divergence in the two samples' preferences reflects differences in the demographic makeup of the samples and the range of considerations in the assignment decision process.

Within each of these categories, respondents were then asked to indicate the significance of specific influences to the assignment decision process. Figure 1 shows that the sample was fairly evenly split between different family-related assignment considerations. For the Rotating to Shore sample, which consists of 42 percent single Sailors without children, "being near other family members (siblings, parents, etc.)" was listed by 38 percent of the sample as the most important family consideration in the assignment process. Thirty-two percent picked spouse's employment opportunities as the most important family consideration.

For the Rotating to Sea sample, where 62 percent of the sample is married, 36 percent of the sample listed spouse's employment opportunities as the most important family consideration. Being near

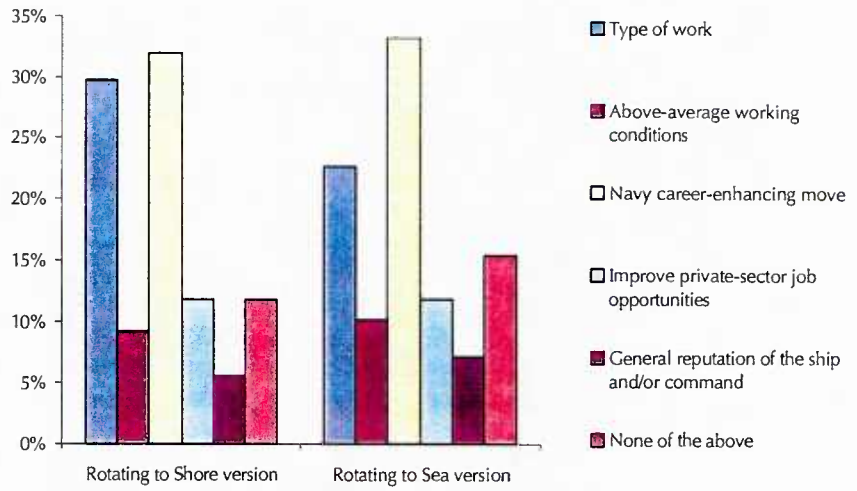
family was listed by 31 percent of the sample. For the sample consisting of more single Sailors, the actual geographic location and proximity to primary family's home are of interest; for the sample of married Sailors, being able to stay in the same location is of interest. Thus, our inclusion of locations as the main assignment description in the survey and fielding at specific locations allows us to examine the value of staying at a particular location, which could reflect either a preference to home-base at a current location or to locate at a specific geographical location.

Figure 1. Importance of family-related aspects in the assignment process



For both samples (see figure 2), the assignment being a Navy career-enhancing move was the most important job- or career-related consideration. In the survey, we include an increased chance of promotion variable, which may be related to this type of assignment consideration. This was followed by type of work, which was stated as the most important consideration by 30 percent of rotating-to-shore respondents compared with 23 percent of the respondents rotating to sea. This slight difference may reflect that sea duty jobs tend to be within a Sailor's rating, whereas shore duty jobs often are not. For the Rotating to Shore version, time spent working in rating was included to indicate type of work done during the shore tour.

Figure 2. Importance of job or career aspects in the assignment decision process

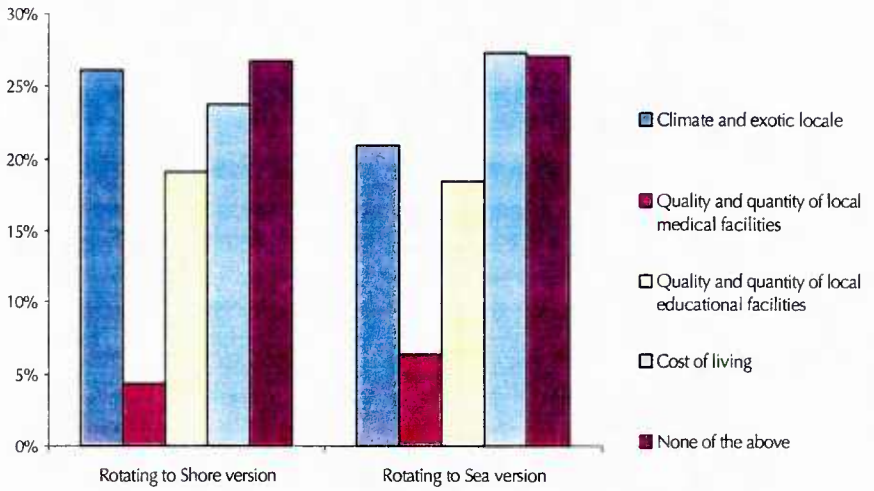


For the climate and facilities option (see figure 3), "none of the above" was prevalent for both samples, which implies that the options offered did not reflect actual considerations. The samples did differ slightly between the importance of cost of living, climate, and exotic locale. For the climate and facilities options listed, 26 percent of rotating-to-shore respondents picked climate and exotic locale as the most important consideration for the assignment decision; 24 percent of that sample chose cost of living as the most important consideration. For the Rotating to Sea sample, 27 percent of respondents listed cost of living as the most important aspect, and 21 percent selected climate and exotic locale as the most important consideration. This very slight difference may result from the amount of time spent at the actual location during the tour of duty. Climate may be slightly more of a consideration for respondents rotating to a shore assignment where there will be no deployments away from home.

Because the impact of the assignment process on senior personnel is of particular interest, we examined considerations to the assignment process by paygrade. Compared with Sailors in E-1 to E-3 paygrades, E-4–E-9 Sailors are more concerned with an assignment that is a Navy career-enhancing move, having a permanent residence, spouse's

employment, climate, and local medical facilities. The younger personnel are more interested in educational facilities, the general reputation of a ship, and being near siblings and/or parents.

Figure 3. Importance of location, climate, and facilities in the assignment decision process



Underlying data and estimation results

In this section, we analyze the preferences of Sailors as revealed by their responses to the CBC questions. The benefit of the CBC framework is that it provides statistical estimates for each assignment location and incentive that, when summed, can be interpreted as the perceived benefit of a hypothetical assignment package. The estimates of the data allow us to calculate a quantitative measure of respondents' relative preferences for different potential packages. For a set of assignment packages, we simulate the predicted proportion of respondents who would choose each package based on estimated relative preferences. This provides information on "what if scenarios" that weren't asked in the actual survey.[10]

This method for modeling choice contains a useful and realistic assumption about human behavior. Specifically, it can be shown that within this model, the marginal impact of a given change in an incentive level for the product of interest will be greatest when an individual's probability of choosing the product is equal to 50 percent [5]. The impact of any change diminishes as the probability of choosing the product approaches zero or one. This means that the impact of any change is greatest when the consumer is "on the fence" about choosing it and that the impact of any change is smallest when the consumer's preferences for (or against) the product are very strong. This is what we use as our yardstick to measure the price of getting a Sailor to a less preferred billet.

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10. To simulate how people actually choose between various products in the marketplace, we use a market simulation model, specifically the Share of Preference with Correction for Package Similarity model. This model predicts the percentage of respondents likely to choose a product from a set of products, accounting for packages that are similar. These calculated percentages are called shares of preference. Further discussion of the Share of Preference model is provided in appendix A.

Overall preferences for assignment incentives

The packages from which respondents choose included a variety of assignment incentives. To determine which incentive levels were preferred the most, we estimate a within-level comparison of the six incentives that appeared in both surveys.[11] This within-level comparison was done at low-, medium-, and high-incentive levels.

We were interested in answering the following two questions: At each of the three incentive levels, which incentive is preferred and by how much?[12] We find that, as the incentive levels being compared are increased, the increase in the perceived benefit of nonmonetary incentives decreases (see figures 4 and 5). For low levels of incentives, the preferences are close in value. As higher levels of incentives are offered, money is relatively more important in the assignment decision than the other incentive options. So, if offered the choice between higher levels of pay and even more time spent studying per week, respondents are more interested in pay and less interested in receiving the higher levels of nonmonetary incentives.

Holding all else equal, at each level the bonus assignment special pay is the most preferred incentive offered. This implies that at these levels of monthly pay ($200, $400, and $800) an assignment incentive pay has more influence on the assignment decision than the levels of the other incentives.

Because an AIP may replace existing nonmonetary incentives, or at least sea duty rotational credit, we estimate what level of assignment pay is needed to make the so-called typical respondent as likely to choose a package with that level of pay as a package with that nonmonetary incentive level.

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11. For the Rotating to Sea survey, we excluded the rotational shore credit incentive because the preference order is not obvious. Time spent working within one's rating was also excluded because this is not a distribution incentive policy the Navy has tried or is considering.

12. For example, for the low-incentive levels, we compared the likelihood of choosing among six incentive packages: (1) $200 bonus special pay, (2) 25-percent chance of getting billet of choice next, (3) 10 days of bonus leave, (4) promotion 3 months sooner than expected, (5) 4 hours of study time, and (6) 6-month reduction in next sea tour.

Figure 4. Rotating-to-Shore sample: relative preferences for incentives at different levels

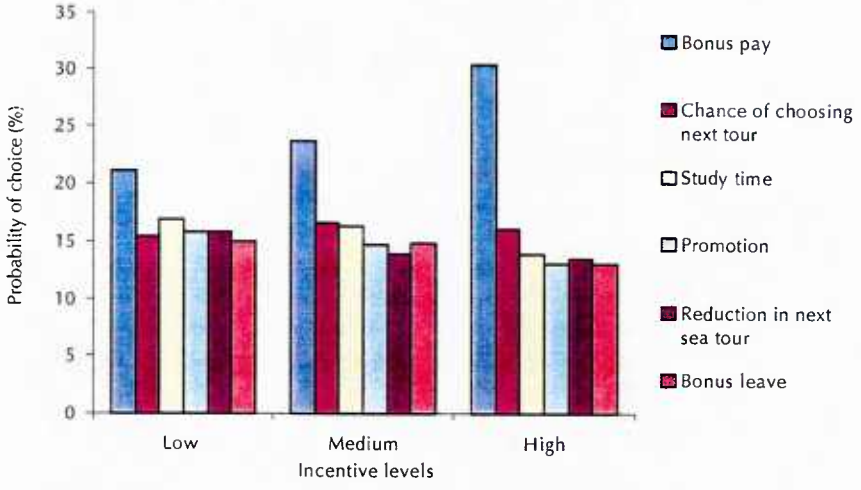
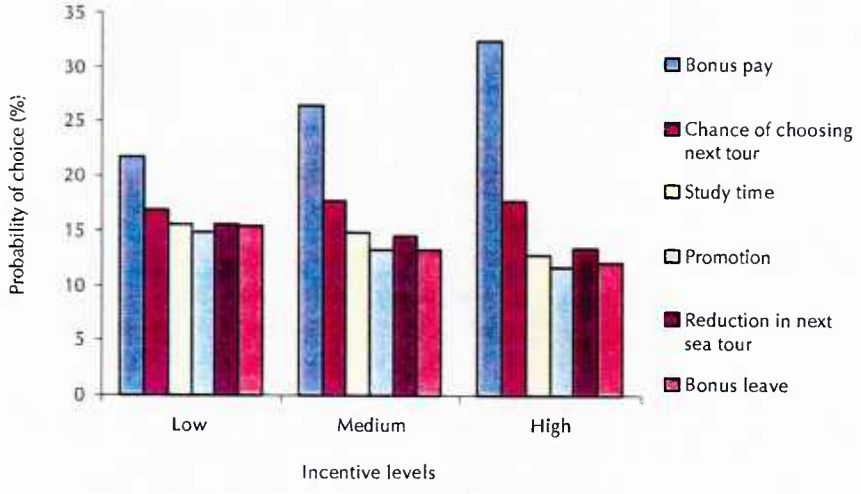


Figure 5. Rotating-to-Sea sample: relative preferences for incentives at different levels



The typical respondent, as shown in table 2, is as interested in a shore assignment with rotational sea credit as an assignment with a $60 monthly bonus pay.[13] The highest valued nonmonetary incentive is having a 99-percent chance of getting the next assignment of one's choice, which is equivalent to $291 per month.[14]

Table 3 lists the results for the Rotating to Sea version. For respondents rotating to sea assignments, choice of next billet was the only nonmonetary incentive that was valued more than in the Rotating to Shore survey. Having a 99-percent chance of picking next billet makes a hypothetical assignment as attractive to the typical respondent as $316 per month in special pay. This is $25 higher than for the other sample, implying that Sailors are more interested in being able to pick their next assignment if rotating to a shore duty assignment. The nature of shore duty may account for this discrepancy. Shore duty assignments allow for more time with family, so being close to family may have even more value during a shore duty assignment. Also, shore duty assignment results in more Sailors working outside their rating than during sea duty assignments. Increased choice of next shore duty assignment would decrease the chance of having to work outside their rating. This is consistent with time spent in rating being the second highest estimated nonmonetary incentives in the Rotating to Shore survey.

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13. The estimated monetary equivalent for rotational sea credit may be an underestimate for two reasons. First, Sailors with a strong preference for not being on sea duty may be less likely to be on sea duty at one time and thus would be less likely to be included in our sample. Second, Sailors rotating to shore duty expect to be there at least 24 months. With sea duty credit they can wait a few more years before having to return to sea duty. Given the high discount rate among enlisted Sailors of about 17 percent any incentive received in the future is likely to not be valued highly [6, 7].

14. There is a willingness to continue in the Navy if there is some expectation of assignment at a future preferred location. This is consistent with the fact that Sailors at overseas locations are more likely to continue in the Navy for 12 and 24 months than those not currently at overseas locations . This may be because of (a) a willingness to take a foreign billet as a career-enhancing move or (b) Sailors expecting a better assignment following a high-priority assignment.

Table 2. Rotating to Shore: monetary equivalent to nonmonetary incentive levels[a]

Nonmonetary attribute	Nonmonetary attribute level	Monthly special pay equivalent ($)
Rotational credit	Shore credit	0.00
	Neutral credit	0.00[b]
	Sea credit	59
Expected promotion	3 months earlier	66
	6 months earlier	102
	12 months earlier	163
One-time basket leave	10 days	45
	20 days	104
	40 days	160
Guaranteed time to study/attend classes	4 hours per week	98
	7 hours per week	148
	12 hours per week	189
Reduction in next sea tour length	6-month reduction	70
	9-month reduction	75
	18-month reduction	177
Chance of picking next assignment	25% chance	56
	50% chance	154
	99% chance	291
Time spent working or training in rating[c]	25% time	112
	50% time	194
	All time spent in rating	272

a. The estimates of this table can be interpreted as the "typical" respondent being as willing to choose an assignment package that includes the nonmonetary incentive as one with the corresponding monetary amount, holding all else equal. So, having a shore assignment with sea credit is, to the so-called typical respondent, as attractive as receiving $59 monthly assignment pay.

b. The estimate for neutral credit was -$11; however, the Navy would never make Sailors pay money to avoid having neutral credit.

c. Although time spent in rating is not an incentive that necessarily could be implemented, the "value" of doing work or training within rating provides information about what makes an assignment attractive.

Table 3. Rotating to Sea: monetary equivalent to highest nonmonetary incentive levels

Nonmonetary attribute	Nonmonetary attribute level	Monthly special pay equivalent ($)
Expected promotion	3 months earlier	64
	6 months earlier	83
	12 months earlier	125
One-time basket leave	10 days	78
	20 days	82
	40 days	139
Guaranteed time to study/attend classes	4 hours per week	64
	7 hours per week	122
	12 hours per week	158
Reduction in expected sea tour length	6-month reduction	81
	9-month reduction	116
	18-month reduction	175
Chance of picking next assignment	25% chance	108
	50% chance	188
	99% chance	316

As we saw in figures 4 and 5, tables 2 and 3 show that some of the nonmonetary incentives have decreasing benefits from increased levels of incentives.[15] For example, for the Rotating to Shore sample, doubling the amount of basket leave from 10 days to 20 has proportionally more of an impact than doubling the amount of basket leave from 20 to 40 days. This suggests that for incentives targeted at a large population, bundling of a number of low-level nonmonetary incentives may be more effective than having a high level of only one nonmonetary incentive.

In particular, two of the incentives were valued higher than we expected: basket bonus leave and promotion. For basket leave, the effective amount of leave spread over an average sea tour would be 0.2 day of leave per assignment month for 10 days of basket leave, 0.4 day for 20 basket leave days, and 0.8 day for 40 days of basket leave. The average rank of our sample was E-5, which, according to the September 2001 EMR, has an average sea tour length of 49.6 months. The cost to the Navy of having basket leave seems low compared to our estimates for the typical rotating to shore respondent of $78, $82, and $139 per month. The high valuation of basket leave could be because of a misinterpretation of the incentive as additional leave received each year of the assignment as opposed to a one-time bonus vacation leave. Promotion was also valued higher than what we would expect. Because promotion results in an increase in basic pay and

15. Not all of the nonmonetary incentives reveal diminishing returns. For the Rotating to Shore sample, the perceived benefit of the next sea tour decreasing from 9 to 18 months was proportionally more than the benefit from the next sea tour decreasing from 6 to 9 months. For both samples, the reduction of the current or next sea tour of 18 months was valued at similar monetary equivalents; the difference between the samples was in the value of a 9-month reduction of a sea tour. This is because, for the Rotating to Shore sample, the reduction in sea tour length was in reference to the Sailor's next sea tour assignment, which would follow the upcoming shore assignment. For the Rotating to Sea sample, it was in reference to the Sailor's upcoming assignment. For respondents closer to their next sea duty assignment, a 9-month reduction of sea tour is valued more. Along with this case, for the Rotating to Sea sample, the increased chance of promotion characteristic has constant returns and basket leave has increasing returns.

allowances, we compared the discounted value of the alternate pay schemes: (1) receive bonus leave during the assignment and get promoted at expected time and (2) get promoted early. For both samples at the three levels of increased chance of promtion, the estimated present discount value of the assignment bonus option is greater than the present discounted value of being promoted earlier. Thus, the value perceived from being promoted is higher than the actual increased monetary value received from a promotion. This suggests that there is a nonmonetary component, such as prestige or recognition, of promotion that is valued in addition to the increase in pay.[16]

Money can influence Sailors, but it still may be more or less cost effective than a nonmonetary incentive. For example, allowing Sailor time to study would reduce the amount of available man-hours per month: by 17.4 for 4 hours of study per week, 30.5 for 7 hours per week, and 52 for 12 hours per week. For the Rotating to Shore sample, these three levels of time to study are estimated as being equally attractive to the typical respondent as monthly bonuses of $98, $148, and $189. Losing slightly more than 2 days of work a month is more costly to the Navy than a monthly pay under $100 for more senior Sailors. A more in-depth analysis of the costs of nonmonetary incentives in comparison with our estimated monthly assignment special pay is included in a subsequent CNA paper.

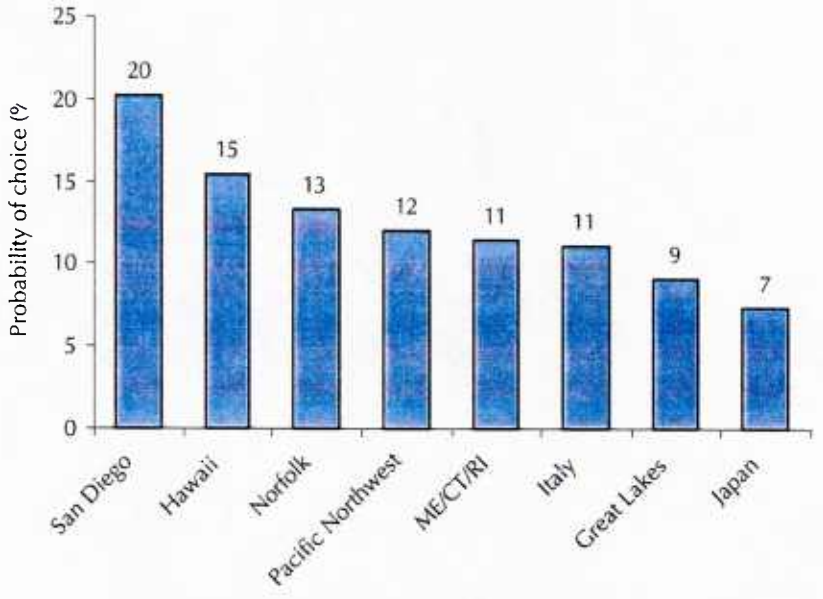
Location preference

Because the amount of assignment incentive required to get Sailors to a location is going to depend, at least somewhat, on that location's

16. This is assuming a 0.17 discount rate [6, 7]. The present discount value was estimated from the time the survey was taken through next promotion. The average Rotating to Shore (Sea) respondent had a rank of E-5 (E-5) with a median length of service of 5 years (7 to 10 years), and time to next PRD was 1 to 2 years (1 to 2 years). We used 2 years until next PRD and 8 years of service for the Rotating to Sea sample. For both samples, 74 percent of the E-5 sample had a dependent, which was used in calculating allowances received. For the entire Navy, the average promotion to E-6 happens at 11 years of service, so length of service of 11 years was our expected time of promotion. For tour lengths, we used the average shore (sea) tour length for E-5s of 37 months (50 months).

attractiveness, in this subsection, we look at location preference.[17] For the Rotating to Shore sample (see figure 6), San Diego was the most preferred location, followed by Hawaii. Great Lakes and Japan were the least preferred locations.[18] The overwhelming preference for San Diego may be because 51 percent of this sample was stationed at San Diego and has a preference for staying there for another tour.

Figure 6. Relative preferences for locations, Rotating to Shore sample (percentage)

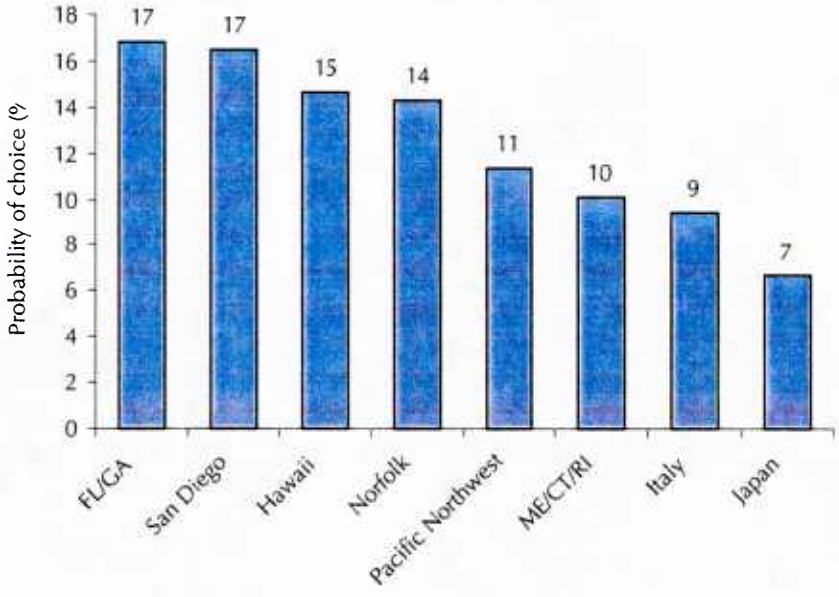


17. These estimates were calculated with the Share of Preference model discussed in appendix A.

18. Unlike the Rotating to Sea version, Florida and Georgia were not included on the Rotating to Shore version of the survey, which included Great Lakes. To provide observations on more geographic areas, in the surveys we combine Florida with Georgia (FL/GA), Maine with Connecticut and Rhode Island (ME/CT/RI), and the Pacific Northwest area. Another reason for combining these particular states was to make the CBC assignment package questions relevant for more Sailors. For example, Florida has naval stations and air squadrons, but no submarine bases, whereas the Naval Submarine Base Kings Bay is in Georgia.

In comparison, the Rotating to Sea sample (see figure 7) included Florida and Georgia and did not include Great Lakes. Of those locations, FL/GA and San Diego were the most preferred. Japan and Italy were the least preferred locations. For the locations that appeared in both surveys, the preference ordering of location is the same.

Figure 7. Relative preferences for location, Rotating to Sea sample (percentage)



The most significant difference between the two versions of survey's location ranking is that FL/GA is slightly preferred to San Diego. This may be attributable to sample composition: 39 percent of the respondents reported being stationed in San Diego, 13 percentage points lower than the Rotating to Shore version. For just the San Diego subsample, San Diego is preferred 26 percent of the time, compared with Florida being preferred 14 percent of the time. In comparison with the rest of the sample, at Norfolk and Hawaii, San Diego respondents don't seem to prefer FL/GA as much.[19] The sample

19. When we look at the Norfolk sample, the preference share was 24 percent for Norfolk and 20 percent for FL/GA. Because Kings Bay is a large submarine establishment, the Hawaii sample may have also been heavily in favor of FL/GA; however, the Hawaii sample was too small to allow for precise estimation.

composition does seem to be affecting the ranking and is the reason we examine separate subsamples later in the paper.

Our location findings are fairly consistent with the results of the 1996 Homebasing Survey. For that survey, Jacksonville/Mayport/Kings Bay, FL was listed as the most desirable fleet location for homebasing, followed by Bremerton/Bangor, Everett/Whidbey Island, Gulfport/Pascagoula/New Orleans, and Oahu (Pearl Harbor). The locations respondents were most likely to indicate as undesirable were Earle, NJ, Guam, Japan, Italy, and New London/Groton, CT. When location desirability was measured based on the locations respondents were familiar with, the top four locations were Jacksonville/Mayport/Kings Bay, Oklahoma City, San Diego/Pendleton, and Norfolk/Tidewater Area [7]. Our results are also generally consistent with related CNA work that examined CONUS shore location preferences. Using JASS data as an estimate for location preference, they found that the number of job applications were highest for billets at Norfolk, VA, and Jacksonville, FL, and low for Lemoore, CA, and inland California [2].

Assignment special pay versus location

In this section, we look at tradeoffs between location preference and pay.

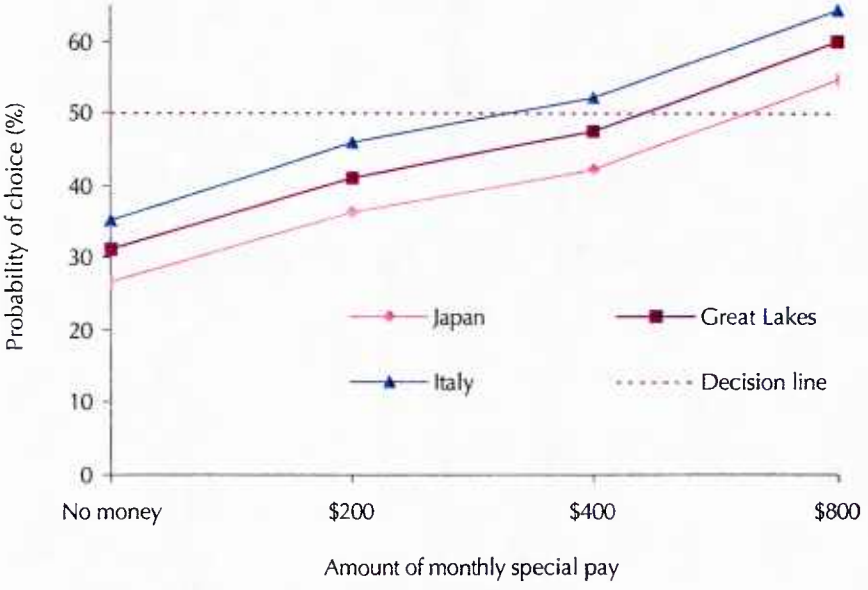
Rotating to Shore sample

First, we examine what impact a monthly assignment has on preferences for different locations.[20] Holding all else constant, we compared two packages: San Diego with no special assignment pay bonus and a less preferred location with some level of special pay. In this case, the less preferred locations are Japan, Great Lakes, and Italy. As more pay is offered, more Sailors would be willing to go to that location. Figure 8 shows the estimated share of respondents who would choose the less preferred location at each level of monthly assignment pay. At the 50-percent preference level, indicated by the dashed line, we estimate that as many respondents would choose San Diego as an

20. For the remainder of this paper, we focus on comparisons between two locations; however, the estimates can apply to the case of more than two locations.

assignment at Japan. So, this figure shows that it would take over $600 per month for the "typical" respondent to be just as likely to choose an assignment to Japan as to San Diego. The amount is closer to $500 for Great Lakes and $300 for Italy. The expense of getting respondents to choose Great Lakes or Japan instead of San Diego results from San Diego being a more preferred location in general and/or from an interest in being able to stay for an additional assignment at the same location.[21]

Figure 8. Impact of special pay: San Diego vs. less preferred locations, Rotating to Shore sample



Note that the model does not predict the actual percentage of qualified Sailors who would be willing to accept a less preferred billet under different levels of pay. The estimates are based on aggregate estimates of respondents who are not all qualified to fill the priority billets that AIP will target. Our estimates are estimated preference shares between packages. There is a 30-percent chance that, when

21. For this sample, San Diego was oversampled: 51 percent of the sample answered these questions while stationed there. Our results represent the preferences for our sample, not necessarily the entire Navy.

offered either Great Lakes or San Diego, a "typical" respondent would choose to go to Great Lakes. Thus, the 50-percent line is the decision line or threshold over which the typical respondent would be just as likely to choose an assignment at either location. So we estimate that it would take about $500 of a monthly assignment bonus attached to Great Lakes if a San Diego assignment were also available.

Table 4 shows our calculated pay thresholds between all locations. It answers the question: If offered only two packages, how much bonus money, holding all else equal, would it take to make the typical respondent as likely to choose a less preferred location (top locations) as a more preferred location (side locations)? In table 4, the dollar amounts correspond to the monthly assignment bonus received if the Sailor went to the top location. So, the first amount in the table, $124, is the bonus needed for a Hawaii assignment if the typical respondent is also offered a San Diego assignment.

Table 4. Rotating to Shore sample: location vs. monthly bonus (in dollars)

	Hawaii	Norfolk	Pacific NW	ME/CT/RI	Italy	Great Lakes	Japan
San Diego	124	193	262	302	330	483	651
Hawaii	—	69	112	135	152	267	433
Norfolk	0	—	44	67	84	171	315
Pacific NW	0	0	—	24	40	127	241
ME/CT/RI	0	0	0	—	17	104	201
Italy	0	0	0	0	—	88	184
Great Lakes	0	0	0	0	0	—	96

Since Japan is the least preferred location in the survey, it is more expensive to make the typical respondent as likely to choose either it or another location, between $96 and $651 per month. If offered two equally unattractive assignment location options, necessary AIP would be lower. For example, it would take $87 to get the typical respondent to Great Lakes if the only other assignment option was Italy. [22]

22. Sailors are actually offered a number of different assignment locations and are not necessarily limited to just two options. However, this provides information about the relative preferences between locations.

Rotating to Sea sample

For sea assignments, our estimates suggest that it takes less money for the typical respondent to be just as likely to choose a less preferred location (table 5). For instance, this is achieved between San Diego and Japan when a $386 monthly pay is attached to Japan. For FL/GA, the amount is $397. The difference between samples is interesting because the Rotating to Sea sample is more senior, more likely to be married to another servicemember, and more likely to have children, so logically it ought to be more costly to get them to go to a less preferred location.

The difference may be because sea jobs are not as distinguishable as shore assignments, more time is proportionally spent at the shore assignment location, and there are differences in sample composition. Sea duty assignments are typically within a Sailor's rating, whereas shore assignments are less likely to be within rating. So, in selecting the survey assignments, respondents may have used location as a proxy for type of work done at that assignment, which resulted in it taking more money to sway the respondents to a less attractive location.

Table 5. Rotating to Sea sample: location vs. monthly bonus (in dollars)

	San Diego	Hawaii	Norfolk	Pacific NW	ME/CT/RI	Italy	Japan
FL/GA	7	52	60	140	182	211	397
San Diego	—	45	53	133	175	200	386
Hawaii	0	—	8	90	131	155	319
Norfolk	0	0	—	82	123	147	307
Pacific NW	0	0	0	—	42	67	188
ME/CT/RI	0	0	0	0	—	25	147
Italy	0	0	0	0	0	—	122

Another reason may be the amount of time spent at the location during sea duty. During shore duty, Sailors don't deploy, so location characteristics may have more of an impact on respondents' assignment decisions. During sea duty, only a portion of the tour will be

spent at that location, which may make getting an assignment at a more preferred location less important.

The last reason for the differences between survey version results may be sample composition. The difference in preference for locations will determine the level of monetary or nonmonetary incentive needed. The Rotating to Sea survey included two preferred locations: San Diego and FL/GA. Because the estimated preferences are spread between San Diego and FL/GA, the difference in preference between San Diego and Japan, in aggregate, is smaller.

Once implemented, the actual minimum level AIP needed to fill billets will most likely be less than the calculated amounts. These estimates are based on an aggregate sample and reflect averages. Consequently, they reflect the levels of assignment pay necessary to fill a large number of billets at a location, if all billets at that location are to receive the same level of bonus. If each billet is to get a different level of bonus, or there are only a few billets to be filled at a location, these estimates are upper bounds.

Results by Sailor traits

The previous results were aggregate results for the full survey samples. Although we measure the marginal impact of the incentive change, we are estimating these impacts for all respondents. This section's estimates reflect the assignment pay preferences of targeted groups of interest. By examining the average of a more specific sample, we calculate a level of assignment incentive pay closer to the marginal amount, getting a more accurate upper bound on necessary AIP levels.

We examine seven subgroups of respondents: with dependents, without dependents, in San Diego, in Norfolk, by reenlistment decision, and E-4 to E-6 midcareerists. The results for the last two categories are presented in appendix G. All the estimates were calculated in the same manner as for the full sample.[23]

By marital and dependent status

For each survey version, we analyzed the subsample with a dependent (spouse or child) and the subsample without dependents. Table 6 shows the distribution by dependency status.

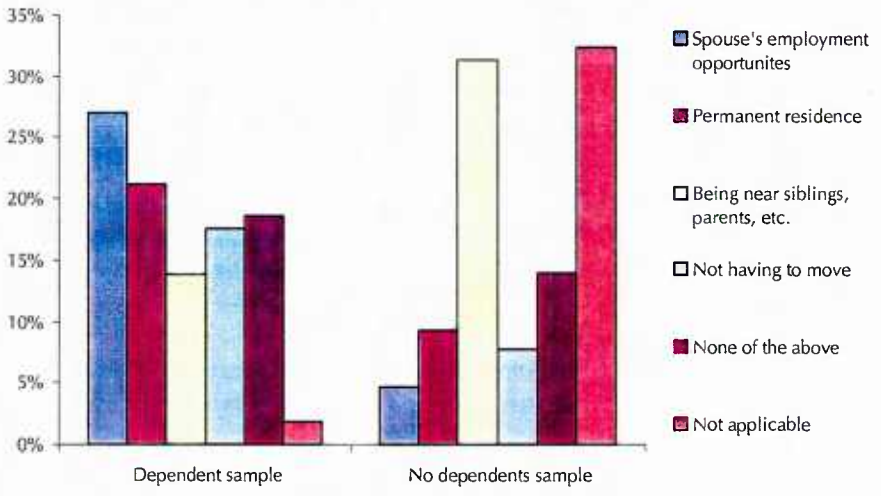
Table 6. Respondents by dependent status

Dependent status	Sample count			
	Rotating to Shore		Rotating to Sea	
	Number	Percentage	Number	Percentage
With dependents	274	59	408	74
Without dependents	193	41	146	26

23. For the dependent and location subsamples, the conditional logit estimates are presented in appendix G. A more thorough description of the methodolgy is in appendix A.

We first look at the non-CBC questions on which family consideration is the most important in the decision process (figures 9 and 10). Respondents with dependents are more concerned with having a permanent residence and with their spouse's employment opportunities. Not as many single respondents considered the family assignment considerations applicable. Those who did were concerned with being close to siblings and parents. A small but positive percentage of Sailors without dependents listed spouse's employment opportunities as the most important family-related aspect of the assignment process. These respondents may be interested in the location's impact on a fiancee's, significant other's, or ex-spouse's job prospects.

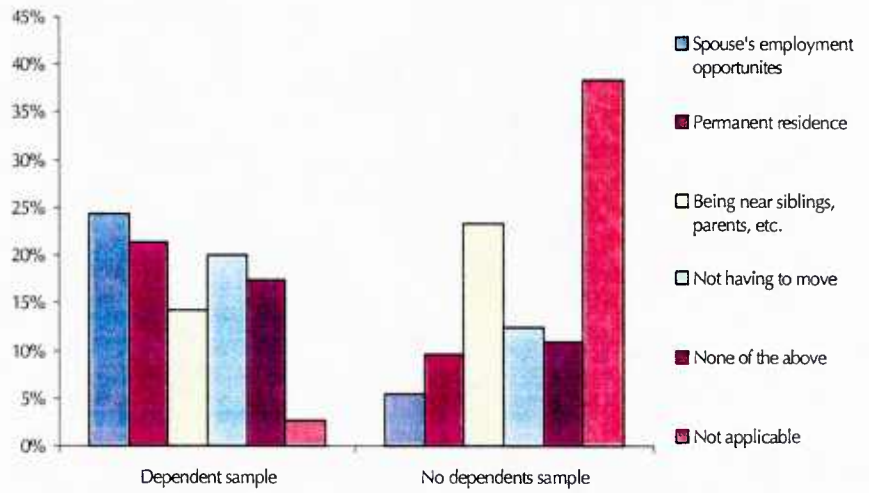
Figure 9. Importance of family issues in the assignment process, Rotating to Shore sample



In terms of location preferences, for the Rotating to Shore dependent sample, San Diego, Norfolk, and Hawaii (the three fielding locations) were the most preferred. Norfolk, though listed third for the full sample, is ranked as the second most preferred assignment location. For the Rotating to Sea dependent sample, there was no difference from the full sample location ranking order.

For the sample without dependents, Norfolk is not as attractive an alternative. Norfolk is preferred only to Great Lakes and Japan. Italy is more preferred by the average respondent without dependents than the average respondent with dependents.

Figure 10. Importance of family issues in the assignment process, Rotating to Sea sample



One reason Norfolk is more attractive to Sailors with dependents may be the potential to home-base, whereas Sailors without dependents are not as interested in home-basing. This is consistent with past CNA research, which found that Sailors with civilian spouses and children typically stay at the same location longer than single Sailors [9]. FL/GA may be less attractive to the no-dependent sample for the same reason. Italy is relatively more attractive to this subsample, reflecting more of a preference for a range of locations.

Tables 7 and 8 show the estimated tradeoffs between pay and location for the dependent and no-dependent subsamples. The estimates for the no-dependent sample are in bold. Respondents who are married and/or have children have different location preferences than Sailors without any dependents. The amount of money it would take to make the typical respondent as likely to pick a Japan assignment is higher for the dependent sample than for the no-dependent and full

samples. Compared with the full and dependent samples, it is less costly to make unattached respondents interested in Japan versus Norfolk for their next shore assignment choice. It would require $133 in monthly pay attached to the Japan assignment. This subsample is, in general, more interested in a wider range of locations.

Table 7. Rotating to Shore dependent/**no-dependent** sample: location vs. monthly bonus (in dollars)

	Norfolk	Hawaii	Pacific NW	ME/CT/RI	Italy	Great Lakes	Japan
San Diego	115/**412**	136/**107**	225/**326**	294/**313**	313/**358**	475/**496**	677/**611**
Norfolk	—	21/**0**	100/**0**	143/**0**	159/**0**	280/**52**	466/**122**
Hawaii	0/**296**	—	80/**157**	123/**151**	134/**174**	247/**305**	429/**437**
Pacific NW	0/**46**	0/**0**	—	43/0	55/**17**	150/**97**	297/**167**
ME/CT/RI	0/**52**	0/**0**	0/**7**	—	12/**24**	107/**103**	228/**115**
Italy	0/**29**	0/**0**	0/**0**	0/**0**	—	95/**80**	209/**151**
Great Lakes	0/**0**	0/**0**	0/**0**	0/**0**	0/**0**	—	110/**0**

Table 8. Rotating to Sea dependent/**no-dependent** sample: location vs. monthly bonus (in dollars)

	FL/GA	San Diego	Norfolk	Hawaii	Pacific NW	ME/CT/RI	Italy	Japan
FL/GA	—	29/**0**	61/**59**	103/**0**	176/**68**	301/**30**	347/**0**	481/**212**
San Diego	0/**37**	—	33/**94**	75/**0**	148/**103**	234/**66**	310/**33**	414/**297**
Norfolk	0/**0**	0/**0**	—	19/**0**	115/**9**	193/**0**	268/**0**	365/**146**
Hawaii	0/**56**	0/**20**	0/**114**	—	74/**123**	151/**86**	214/**53**	311/**345**
Pacific NW	0/**0**	0/**0**	0/**0**	0/**0**	—	78/**0**	137/**0**	216/**137**
ME/CT/RI	0/**0**	0/**0**	0/**30**	0/**0**	0/**38**	—	60/**0**	134/**175**
Italy	0/**3**	0/**0**	0/**63**	0/**0**	0/**71**	0/**34**	—	75/**220**

By current duty assignment location

We have found that Sailors with dependents are interested in staying at the same location for more than one assignment. While we cannot determine whether this is a preference to permanently home-base at a location, we can estimate whether there is a preference among

respondents to stay at their current location for an additional assignment. The survey fielding concentrations allow us to estimate whether Sailors at Norfolk and San Diego have such a preference. In the case of our study, a home-basing preference would be reflected in a location preference toward the three survey fielding locations: Norfolk, San Diego, and Honolulu. As table 9 shows, the sample size for Hawaii is not large enough to allow for accurate analysis.[24]

Table 9. Respondents at each fielding site

Fielding site	Respondents by fielding site			
	Rotating to Shore		Rotating to Sea	
	Number	Percentage	Number	Percentage
Norfolk	142	30.4	235	42.1
San Diego	238	51.0	217	39.2
Hawaii	58	12.4	58	10.5
Other	29	6.2	44	7.9

The location ranking of the Norfolk and San Diego subsamples reveals a preference for staying in one's current location for multiple assignments. For the full sample, an estimated 13 percent of respondents would select an assignment at Norfolk over an assignment at another location. In contrast, among the Norfolk Rotating to Shore sample, an estimated 22 percent of the respondents would select Norfolk. For the Norfolk subsample, the location rankings also reflect a preference for locations geographically nearer to Norfolk, such as Great Lakes and Maine.

As with the Norfolk sample, Sailors currently at San Diego prefer to stay there. The estimated probability of an assignment in San Diego

24. The survey versions were fielded at Norfolk, VA; Little Creek, VA; San Diego, CA; Coronado, CA; and Pearl Harbor, HI. Although all of these fielding locations could be considered under the survey's location options of Norfolk, San Diego, and Honolulu, a number of respondents listed "other" as current location. Because we cannot determine these respondents' current locations, and because the sample size is small, we do not do location-based analysis for this group.

being chosen is 7 percentage points higher than for the full sample. Sailors in San Diego also preferred Hawaii and Pacific Northwest over locations farther away from San Diego, such as Norfolk and Great Lakes. Table 10 shows the rankings of locations by sample.

Table 10. Location ranks by sample: full, Norfolk, and San Diego

Rotating to Shore			Rotating to Sea		
Full sample	Norfolk subsample	San Diego subsample	Full sample	Norfolk subsample	San Diego subsample
San Diego	Norfolk	San Diego	FL/GA	Norfolk	San Diego
Hawaii	Hawaii	Hawaii	San Diego	FL/GA	FL/GA
Norfolk	ME/CT/RI	Pacific NW	Hawaii	Hawaii	Hawaii
Pacific NW	San Diego	ME/CT/RI	Norfolk	ME/CT/RI	Pacific NW
ME/CT/RI	Great Lakes	Italy	Pacific NW	San Diego	Italy
Italy	Pacific NW	Norfolk	ME/CT/RI	Pacific NW	ME/CT/RI
Great Lakes	Italy	Great Lakes	Italy	Italy	Norfolk
Japan	Japan	Japan	Japan	Japan	Japan

Norfolk subsample

If offered a next assignment that includes that Sailor's current location, more pay is needed to make the Sailor indifferent toward picking a different location. For example, for the Rotating to Shore sample, the amount of money needed to make the typical respondent based in Norfolk just as likely to choose an assignment at Norfolk as Japan is $668, compared with $315 for the full sample (see table 11). This indicates that Sailors currently stationed at Norfolk have a stronger preference for having their next assignment at Norfolk than Sailors not currently at Norfolk. For the Norfolk subsample, indifference between Japan and San Diego is achieved at $180. This is the lowest estimate we calculate for a potential AIP targeted at getting Sailors to pick Japan instead of San Diego.

For the Rotating to Sea Norfolk sample (table 12), the amount for Japan and San Diego is $188, only slightly more than with the Rotating to Shore sample.

Table 11. Rotating to Shore Norfolk sample: location vs. monthly bonus (in dollars)

	Hawaii	ME/CT/RI	San Diego	Great Lakes	Pacific NW	Italy	Japan
Norfolk	176	180	297	298	334	373	668
Hawaii	—	4	74	74	93	112	304
ME/CT/RI	0	—	70	71	89	109	297
San Diego	0	0	—	1	20	40	180
Great Lakes	0	0	0	—	19	39	179
Pacific NW	0	0	0	0	—	20	161
Italy	0	0	0	0	0	—	141

Table 12. Rotating to Sea Norfolk sample: location vs. monthly bonus (in dollars)

	FL/GA	Hawaii	ME/CT/RI	San Diego	Pacific NW	Italy	Japan
Norfolk	59	201	247	295	310	498	738
FL/GA	—	142	171	201	217	363	578
Hawaii	0	—	29	59	69	158	275
ME/CT/RI	0	0	—	30	40	130	228
San Diego	0	0	0	—	10	101	188
Pacific NW	0	0	0	0	—	91	178
Italy	0	0	0	0	0	—	88

San Diego subsample

San Diego respondents prefer rotating to an assignment in San Diego over the other assignment locations on the survey. For San Diego Sailors rotating to shore duty, the least preferred locations were Norfolk, Great Lakes, and Japan. For those Sailors rotating to sea duty, Maine, Norfolk, and Japan were the least preferred locations. Among San Diego Sailors, the preference for staying in the same location versus going to any of the other locations in the survey was larger than for the Norfolk subsample. Compared with the Norfolk subsample, it is more expensive to persuade a Sailor at San Diego who is offered an assignment in the current location, San Diego, to pick an assignment at a different location (see tables 13 and 14). For the full sample, the typical respondent would be just as likely to pick Japan as San Diego

if the Japan assignment were associated with a $651 monthly special pay. For the San Diego subsample, being able to stay in San Diego for a shore assignment is equivalent to receiving $901 per month for an assignment in Japan. Also, the San Diego subsample was more interested in rotating to a location nearer to San Diego, the Pacific Northwest.

Table 13. Rotating to Shore San Diego sample: location vs. monthly bonus (in dollars)

	Hawaii	Pacific NW	ME/CT/RI	Italy	Norfolk	Great Lakes	Japan
San Diego	371	575	611	626	698	800	901
Hawaii	—	114	155	165	179	340	445
Pacific NW	0	—	42	52	66	166	252
ME/CT/RI	0	0	—	10	24	124	187
Italy	0	0	0	—	14	114	178
Norfolk	0	0	0	0	—	100	164
Great Lakes	0	0	0	0	0	—	64

Table 14. Rotating to Sea San Diego sample: location vs. monthly bonus (in dollars)

	FL /GA	Hawaii	Pacific NW	Italy	Maine	Norfolk	Japan
San Diego	269	281	368	368	641	705	845
FL/GA	—	9	78	78	205	239	313
Hawaii	0	—	68	69	194	228	302
Pacific NW	0	0	—	1	126	153	215
Italy	0	0	0	—	126	86	214
Maine	0	0	0	0	—	27	85
Norfolk	0	0	0	0	0	—	59

Differences in preferences

Our estimates for what it would take to get the typical Sailor from San Diego to Japan are higher than the estimates to get the typical Sailor from Norfolk to Japan. This suggests that there is a stronger home-basing preference among respondents in San Diego than among

respondents in Norfolk. However, another reason for the estimates to differ is if San Diego respondents have different preferences for monetary incentives than Norfolk respondents. Also, the other locations on the survey could affect the difference in location preference between these samples. For example, if there are fewer locations on the survey that could be considered close substitutes for San Diego, the preference for having another assignment in San Diego may be overestimated in comparison to Norfolk. Regardless, the estimated numbers in the tables provide appropriate ranges for an assignment pay applied to locations or significant numbers of billets per location.

Although our survey was not designed to answer that question, we found other differences between the San Diego and Norfolk samples. For example, a higher percentage of the San Diego subsample than the Norfolk subsample listed climate and exotic locale, or cost of living as the most important location characteristic,[25] both of which are location-specific considerations. Also, the San Diego subsample is younger, and less likely to have dependents.[26] These differences are also true for the entire San Diego and Norfolk populations.[27] These differences suggest that location sorting currently occurs.

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25. For the San Diego Rotating to Shore (Rotating to Sea) subsample, 27 percent (21 percent) listed climate as the most important location assignment consideration, whereas 20 percent (18 percent) of the Norfolk subsample gave that response. The subsample that chose cost of living was 27 percent (35 percent) for the San Diego Rotating to Shore (Rotating to Sea) sample and 23 percent (25 percent) for the Norfolk subsample.

26. For example, 64 percent (80 percent) of the Norfolk Rotating to Shore (Rotating to Sea) subsample have a dependent, compared with 59 percent (69 percent) for the San Diego subsample. For the Norfolk subsample, 49 percent (32 percent) of the subsample had less than 6 years of service; for the San Diego Rotating to Shore (Rotating to Sea) subsample, 58 percent (46 percent) of the sample had less than 6 years of service.

27. Examining the June 2002 Enlisted Master Record, we find that Sailors in Norfolk are more likely to be married and have children. In Norfolk, 44 percent of the population versus 42 percent of the population in San Diego are married. Of the Norfolk sample, 38 percent have at least one child compared with 35 percent of the San Diego sample. Also, Sailors Norfolk on average have more months of service in the Navy, 90 months, than Sailors in San Diego, 87 months.

Implications of results

Location sorting

Implementation of a new assignment pay may have consequences other than retention, cost, and readiness, such as increasing sorting by location. AIP allows those billets, that in the past would have been manned by a Sailor "slammed" into them, to be attractive enough to interest an eligible volunteer. Our survey results suggest that under a voluntary system the demographic makeup between naval installations may differ, for example, by marital status and dependent status. Sailors without dependents have less of a dislike for the overseas sea location of Italy, and overseas locations are often considered hard-to-fill billets. Consequently, single Sailors may be more willing to volunteer for assignment at hard-to-fill billets at lower assignment pay levels and more likely to fill traditionally hard-to-fill billets than previously. This could potentially increase the proportion of single Sailors at some locations. The impact of this on the demographic makeup of locations will depend on the number of billets at a specific location with AIP attached. Even if a large number of billets had AIP attached, how much AIP would change location composition depends on whom detailers slam into hard-to-fill billets. If Sailors aren't randomly slammed, AIP implementation would most likely have only a minimal impact on demographic shares.

Comparison with cost of current system: the case of overseas type-3 billets

To make some overseas shore assignments more attractive to Sailors, sea credit for rotational purposes was offered at those type-3 duty assignments. Because the Navy considers these assignments hard to fill and they already receive some form of assignment incentive, they will be some of the earliest locations to receive Assignment Incentive Pay. This could potentially affect 8,800 overseas shore billets.

Accompanying CNA research looked at the cost of using sea duty credit as an assignment incentive. The associated cost is either higher endstrength necessary for maintaining sea/shore balance or the loss in fleet readiness by having fewer Sailors available for sea duty. The authors estimate that the higher endstrength needed to support sea duty credit to overseas shore billets costs the Navy at least $195 million annually, holding sea/shore rotation constant, while over $83 million in sea pay is essentially being used annually to offset the fleet readiness loss of the sea duty credit [1]. For a tour length of 24 months, offsetting the fleet readiness loss of the sea duty credit translates to $786 per month.

A suitable comparison from our estimates is the Norfolk subsample. Norfolk is the largest fleet concentration area and, therefore, the location with the largest number of Sailors that might be faced with the option to volunteer for less preferred locations. In addition, the Norfolk monetary and location trade-offs were lower than for the San Diego subsample, which suggests that those Sailors who actually end up at AIP attached locations are more likely to be from Norfolk than from San Diego. We estimate that, if offered the opportunity to stay at Norfolk, the amount of AIP needed to make the typical Norfolk respondent as likely to choose an assignment at Norfolk as an overseas location is between $373 and $668. This suggests that replacing sea duty credit with AIP at type-3 billets will be cost-effective.

Conclusions

In reference to the upcoming Assignment Incentive Pay (AIP) experiment, the most important findings from this study are those relating to the effects of special pay on Sailors' assignment preferences. At the most fundamental level, the finding that assignment special pay is an effective way to sway people indicates that AIP is likely to work. More specifically, findings about the ranges of pay likely to be needed for each location, or class of locations, can inform initial implementation of the experiment. Although this study's estimates provide guidelines for initial AIP levels, much will not be known until actual data from AIP experiments come in. Also, it's important to keep in mind the following caveats when moving from theory to practice.

Location preference and sufficient or required distribution pay amounts differ depending on a Sailor's current assignment location and dependent status. Sailors with spouses and/or children have an overall home-basing preference. Sailors at large fleet areas, such as Norfolk and San Diego, on average will prefer not to move, and it will take larger assignment incentives to get them to volunteer for hard-to-fill billets (in Great Lakes, Japan, etc.). Sailors without spouses or children have less of a home-basing preference, so these Sailors will most likely be the first to fill those hard-to-fill billets.

This study's estimated assignment special pay amounts are applicable if assignment pay is targeted at specific locations. If targeted at a specific location, all or a majority of billets at that location would receive the same amount of assignment pay. Thus, with a large number of billets, the amount of pay needed to fill all the billets will approach the average levels of assignment pays calculated in this study.

If assignment pay is targeted at specific billets, this study's estimates will be upper bounds on the necessary amounts of assignment pay. If assignment pay targets only a few billets, the role of any assignment incentive is to convince only those with the least amount of dislike for that location

to volunteer. In that case, the necessary amount of assignment pay is likely to be less than this study's estimated levels of assignment pay. However, this study's subgroup estimates do provide more precise upper bound estimates. Our findings also suggest that for assignment incentives targeted at a heterogenous group, bundling a number of low-level incentives may be more effective than having a high level of only one incentive.

Appendix A: Basic survey methodology

Survey methodology

CBC analysis builds on two fundamental assumptions. The first is that products, or assignments, are defined by a whole set of characteristics rather than just one character. The second is that people implicitly evaluate the total worth of the product by combining the amounts of utility value provided by each characteristic individually.

We assume that Sailors will choose a package over another package if the amount of utility or perceived utility from that package is greater from all other packages. Utility is the value or benefit perceived by the Sailor. For each package, the value to the Sailor will depend on the assignment characteristic levels that make up the package.

If presented with three packages, i, j, and k, a Sailor will choose the assignment package that has the most preferred combination of package levels. So, package i (p_i) would be chosen if the utility from that package were greater than the utility from p_j or p_k:

$$(U(p_i) > U(p_j)) and (U(p_i) > U(p_k)) \ .$$

With the CBC data, we know which packages were offered and which of the three packages were chosen. But not all potential packages are seen by all respondents, so we are interested in estimating the impact of the package levels on an estimated probability of a particular package being chosen. To estimate the value of the package levels, we use a conditional logit model.

Conditional logit

The first step in predicting the market performance of a given product is to estimate the utility values of the individual product attributes. In this study, we estimate the characteristics' utilities from the survey data using the conditional logit model.

The conditional logit model is a discrete choice model that estimates the probability of choosing one alternative from a self-defined set of alternatives, conditional on certain factors. The behavior of interest, or the dependent variable, is characterized by a discrete variable. In this case, the dependent variable is whether the assignment was picked by the respondent. The conditional logit model is different from other discrete choice models; rather than estimating the effects of respondents' characteristics on the choices individual's make, it estimates the effects of characteristics of the choices themselves. In this case, we are examining the impact of the different location and incentive levels on the probability that a package is chosen.

So, respondents consider choosing alternative x_i from a well-defined set of package alternatives in which each package is defined by K attributes. Alternative x_i includes all assignment characteristics included in that package. According to the conditional logit model, the probability that alternative x_i will be chosen is:

$$prob(x_i) = \frac{\exp(\beta' x_i)}{\sum_i \exp(\beta' x_i)} .$$

In this notation, x_i and β are vectors with K elements that correspond to the K attributes of the product. The B vector measures the impact of each attribute of x on the probability that x_i will be chosen.

Each response was considered an observation and weighted the same. The estimated conditional logit model included all attributes without any interaction effects, so we estimate only the main effects of the attributes.

Estimated utility of products

The second step is to calculate the individual characteristic utilities to come up with a measure of the total worth of a product. Given the structure of the logit model, people are assumed to simply add the individual characteristic utilities to determine the total utility of a product. Using these utilities, we calculated the trade-off between package characteristics to get an estimated relative probability of preference between the attributes.

We assume that people evaluate the overall attractiveness of a choice by summing the utilities associated with each of the attributes of the choice. For a given package, the amount of benefit from the package equals the benefit received from the sum of the parts. In this case, the utility from a specific package is based on the utility derived from the individual package items. Under this assumption, the overall utility of choice x_i is a linear function of the attributes of x_i, calculated by the conditional logit model:[28]

$$U_i = \sum_k \beta_k x_{ik} \quad .$$

Share of Preference model

The conditional logit model estimates the probability that a given alternative x will be chosen conditional on the attributes of x_i, and serves as the basis for the Share of Preference model used in this study.

Using this model, simulations are done in the following way. First, a set of hypothetical products is defined using different combinations of the attribute levels. Then, the total utilities of all the products in the set are calculated using the utility values that are estimated by the conditional logit regression. These values are then used to generate shares of preference or predicted probabilities of choice for each

28. The calculated product utilities satisfy the transitivity condition.

product. The preference share model is a logit transformation of the calculated utilities. For example, if we are determining the preference share between product A and product B, the product's preference share would be calculated as:[29]

$$P(A) = \frac{\exp(U_A)}{\exp(U_A) + \exp(U_B)} .$$

This assumption is based on the fact that the main model is not distinguishing between individual respondents. The model is assuming homogeneity among respondents. If the probability of choosing a package is estimated as 50 percent, this does not mean that 50 percent of the sample population would necessarily pick that package. The model is representing a probable preference share among the packages provided. Because the model is aggregated and isn't taking into consideration all aspects of an assignment package, the shares cannot be interpreted as market shares. However, we are interpreting the estimates as preference shares.

Share of Preference example

Table 15 is an example of the Share of Preference model to show how the logit estimates are used to calculate the predicted probabilities of choice. The table describes two potential assignment packages from the Rotating to Shore Survey. The logit estimates for each level are indicated. To determine the total utility from each package, the logit estimates are summed. Then we take the exponential of the total product values for both products in the simulation scenario. For package 1, the exponential sum of the utilities is 0.757, which yields a predicted preference share of 45 percent (0.757/1.67 = .45).

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29. The general model for shares of preference or predicted probabilities of choice for each product is:

$$prob(x_i) = \frac{\exp(U_i)}{\sum_i \exp(U_i)} .$$

Table 15. Calculating predicted probabilities of choice—an example

Item	Value
ASSIGNMENT PACKAGE 1	
Logit estimated utility	
Japan	-0.48504
$400 per month	0.11302
Sea credit	0.09304
Total package value – U_i	**-0.279**
exp (U_i)	**0.757**
Predicted probabilities of choice	**45 percent**
ASSIGNMENT PACKAGE 2	
Logit estimated utility	
San Diego	0.52502
No special pay	-0.58280
Shore credit	-0.03540
Total package value – U_i	**-0.093**
exp (U_i)	**0.911**
Predicted probabilities of choice	**55 percent**

Appendix B: Assignment incentive survey bias

A survey has selection bias if individuals within the population frame have different probabilities of being a survey respondent. Selection bias has the potential of biasing the survey results. To the degree that Sailors' responses to the survey are correlated with who has chosen to participate in the survey, the survey results will be influenced by the selection of participants. This survey has predetermined sample selection bias, location sample bias, and differences in the probability of participation bias.

Starting first with predetermined sample selection bias, Sailors within 18 months of their next PRD were asked to participate. We intentionally chose this sampling method because these Sailors are facing assignment decisions and are likely to be considering or to have recently considered where they would like to go. This resulted in a sample distribution that differs from the entire Navy. If the entire enlisted force were the population frame whose preferences the Navy is interested in modeling, this survey's participants would be unrepresentative of that population. If the sample population is considered to be all Sailors within a year and a half of their next projected rotation date, instead of the entire Navy, predetermined sample selection bias is not an issue.

The survey still has location selection bias because this is a nonrandom sample with exogenous clustered sampling. The estimates on location preference may be biased toward a location preference for the fielding sites: Norfolk, San Diego, and Hawaii. San Diego and Norfolk have the best opportunities for home-basing. If the Sailors who participated in the survey are as likely as or more likely than the average Sailor to want to home-base, the estimated AIP amounts to get Sailors toward Japan are overstated.

The survey still has selection bias due to differences in the probability of participation. Participation in the survey may not have been

consistent or random. Many different units participated in the survey. To the degree that those units determined their level of participation and/or influenced who was made available to participate, the probability of participation varied across units and across Sailors. For example, some of the units asked to participate in the survey were also asked to provide a set number of volunteers. These units then asked specific Sailors to take the survey. Our estimates should be considered within the framework of this fielding mechanism. If differences in the probability of participation are correlated with Sailors' responses, the survey results will reflect this bias.

The survey also suffers from response bias; however, it is not as much of a concern as selection biases. Of the entire number of respondents, nine responses were not included in the analysis because of incomplete responses. The primary results are statistically the same when the incomplete survey responses are included in the analysis.

Appendix C: Simulations and prediction ability

Of the 18 CBC questions that respondents saw, 2 were "fixed" or the same for all respondents. Having fixed tasks allows us to determine the predictive ability of our simulations. Using data from the 16 tasks, we calculated this study's estimates. From those data, we attempt to predict the response to these fixed withheld tasks. Figures 11 and 12 show the items seen by all respondents, the actual share of respondents who selected each package, and the estimates. The estimated shares are from the conditional logit model and Hierarchical Bayes model, which is discussed briefly in the next section. Both models work equally well in predicting the actual proportion of respondents who choose each package.

Figure 11. Fixed Task One (package characteristic items in italics were included only on Rotating to Shore survey)

Package 1	Package 2	Package 3
San Diego	Norfolk	Pacific Northwest
No time within rating	*All time spent in rating*	*50% time in rating*
Sea credit	*Shore credit*	*Sea credit*
$200 monthly special pay	$200 monthly special pay	$800 monthly special pay
10 days of bonus leave	10 days of bonus leave	40 days of bonus leave
0 hr/wk for study	12 hr/wk for study	7 hr/wk for study
Promoted 12 mo sooner than expected	Promoted 3 mo sooner than expected	Promoted 6 mo sooner than expected
No reduction in sea tour length	6-mo reduction in (next) sea tour length	9-mo reduction in (next) sea tour length
25% chance of getting first choice of next billet	50% chance of getting first choice of next billet	99% chance of getting first choice of next billet
Actual Rotating to Shore Sample Shares		
19.49%	21.20%	59.31%
Predicted Rotating to Shore Sample Shares: Logit Model		
11.72%	20.69%	67.60%
Predicted Rotating to Shore Sample Shares: HB Model		
14.45%	18.09%	67.46%
Actual Rotating to Sea Sample Shares		
13.36%	23.65%	63.00%
Predicted Rotating to Shore Sample Shares: Logit Model		
12.07%	21.31%	66.61%
Predicted Rotating to Shore Sample Shares: HB Model		
11.17%	21.27%	67.57%

Figure 12. Fixed Task Two (items in italics were included only in Rotating to Shore version of the aurvey)

Package 1	Package 2	Package 3
Japan	Italy	Hawaii
All time in rating	*25% time in rating*	*50% time in rating*
Sea credit	*Neutral credit*	*Shore credit*
$800 monthly special pay	$400 monthly special pay	$200 monthly special pay
10 days of bonus leave	40 days of bonus leave	No bonus leave
7 hr/wk for study	4 hr/wk for study	0 hr/wk for study
Promoted 6 mo sooner than expected	Promoted on expected day	Promoted 12 mo sooner than expected
9-mo reduction in sea tour length	6-mo reduction in sea tour length	No reduction in sea tour length
99% chance of getting first choice of next billet	25% chance of getting first choice of next billet	50% chance of getting first choice of next billet
Actual Rotating to Shore Sample Shares		
62.74%	14.35%	22.91%
Predicted Rotating to Shore Sample Shares: Aggregate Estimate		
57.34%	19.94%	22.72%
Predicted Rotating to Shore Sample Shares: Individual Estimate		
69%	8.39%	22.61%
Actual Rotating to Sea Sample Shares		
59.39%	19.13%	21.48%
Predicted Rotating to Shore Sample Shares: Aggregate Estimation		
50.65%	27.38%	21.97%
Predicted Rotating to Shore Sample Shares: Individual Estimation		
57.00%	21.52%	21.48%

Appendix D: Individual-level CBC

With the conditional logit model, all calculated proportions are considered independent. This independence of irrelevant alternatives assumption (IIA) results in unlikely probability simulations of similar packages. For example, the addition of a new package will take proportionally equal preference shares from existing packages. In our case, we would expect in comparing Japan to San Diego that adding a new Great Lakes package would have a different impact on the preference shares than including a new Japan package. With the IIA assumption, however, this is not the case. The third package, regardless of whether it is Great Lakes or Japan, will decrease the share of the two existing packages by proportionally the same amount. Problems associated with the IIA assumption are made worse with the assumption that all respondents are homogeneous because the model cannot distinguish different levels of substitutability between assignments when assuming homogeneity.

The Hierarchical Bayes model accounts for respondent heterogeneity by taking account of the individual's preferences for individual assignment package characteristics. The individual's normally distributed characteristic utility estimates are used in the logit estimate of the likelihood of assignment choice. So, as with the conditional logit model, the probability that a specific assignment is chosen is given as:

$$prob(x_i) = \frac{\exp(\beta' x_i)}{\sum_i \exp(\beta' x_i)} \quad .$$

However, the vector of preference for different products is described by a normal distribution:

$$\beta_i \sim Normal(\alpha, \mathbf{D}) \quad ,$$

where B = vector of the attribute preferences

α = a vector of means of the distribution of respondents' preferences

D = a covariance-variance matrix of the distribution of these preferences across respondents.

Thus information from respondents with similar preferences is used in calculating the probability that a package is chosen.

Table 16 shows the location preferences for the conditional logit model and the Hierarchical Bayes model.

Table 16. Location ranks by sample

	Rotating to Shore full sample		**Rotating to Sea full sample**	
Rank	Conditional Logit Estimates	Hierarchical Bayes Estimates	Conditional Logit Estimates	Hierarchical Bayes Estimates
1	San Diego (20%)	San Diego (34%)	FL/GA (17%)	San Diego (21%)
2	Hawaii (15%)	Norfolk (18%)	San Diego (17%)	Norfolk (21%)
3	Norfolk (13%)	Hawaii (13%)	Hawaii (15%)	FL/GA (18%)
4	Pacific NW (12%)	ME/CT/RI (12%)	Norfolk (14%)	Hawaii (15%)
5	ME/CT/RI (11%)	Italy (11%)	Pacific NW (11%)	Italy (10%)
6	Italy (11%)	Pacific NW (6%)	ME/CT/RI (10%)	ME/CT/RI (5%)
7	Great Lakes (9%)	Great Lakes (4%)	Italy (9%)	Pacific NW (6%)
8	Japan (7%)	Japan (3%)	Japan (7%)	Japan (4%)

Appendix E: Survey design

Sample Rotating to Shore survey question

Figure 13 is an example of the type of question presented to respondents taking the Rotating to Shore survey.

Figure 13. An example of a potential CBC task from Rotating to Shore survey

Assignment 1	Assignment 2	Assignment 3
Pacific Northwest	San Diego	Naples, Italy Sigonella, Sicily
50% of time spent working within rating	All time spent working within rating	No time spent working within rating
Sea rotational credit	Shore rotational credit	Neutral rotational credit
Extra $400 per month	No extra pay	Extra $200 per month
Extra 40 days of leave	Extra 20 days of leave	No extra leave
No time for study	4 hr/wk for study	12 hr/wk for study
Promotion on expected date	Promotion 3 months earlier than expected	Promotion 6 months earlier than expected
9-month reduction in next sea tour length	No change in prescribed length of next sea tour	6-month reduction in next sea tour length
Little chance of next preferred billet	25% chance of next preferred billet	50% chance of next preferred billet

Rotating to Shore package characteristics

Figure 14 shows the package characteristic items included on the Rotating to Shore survey.

Figure 14. Rotating to Shore package characteristics

Billet Location			
Japan San Diego, CA	Great Lakes Pacific Northwest	Norfolk, VA Naples, Italy Sigonella, Sicily	Hawaii Brunswick, ME Newport, RI New London, CT
Working Within Your Rating			
No time is spent within rating	25% of time is spent working within rating	50% of time is spent working within rating	All time is spent working within rating
Shore, Sea, or Neutral Rotational Credit			
Neutral rotational credit	Sea rotational credit	Shore rotational credit	
Monthly Special Assignment Pay			
No extra pay	Extra $200 monthly in special pay	Extra $400 in monthly special pay	Extra $800 monthly in special pay
One-time Bonus Leave			
No extra leave	10 days of one-time bonus leave	20 days of one-time bonus leave	40 days of one-time bonus leave
Guaranteed Time for Classes or Studying			
No guaranteed time for classes or studying	At least 4 hours a week for classes or studying	At least 7 hours a week for classes or studying	At least 12 hours a week for classes or studying
Time to Promotion			
Promotion on expected date	Receive promotion 3 months earlier than original expected promotion date	Receive promotion 6 months earlier than original expected promotion date	Receive promotion 12 months earlier than original expected promotion date
Reduction in Next Sea Tour Length			
No change in prescribed length of next sea tour	6-month reduction in next sea tour length	9-month reduction in next sea tour length	18-month reduction in next sea tour length
Probability of Getting Your Pick of Next Sea Duty Assignment			
Little chance of getting next preferred billet	25% chance of getting next preferred billet	50% chance of getting next preferred billet	99% chance of getting next preferred billet

Rotating to Sea package characteristics

Figure 15 shows the package characteristic items included on the Rotating to Sea survey.

Figure 15. Rotating to Sea package characteristics

Billet Location Levels			
Japan Florida/ Georgia	Pacific Northwest Naples, Italy Sigonella, Sicily	Norfolk, VA Brunswick, ME Newport, RI New London, CT	San Diego, CA Hawaii
Monthly Special Assignment Pay			
No extra pay	Extra $200 monthly in special pay	Extra $400 monthly in special pay	Extra $800 monthly in special pay
One-time Bonus Leave			
No extra leave	10 days of one-time bonus leave	20 days of one-time bonus leave	40 days of one-time bonus leave
Guaranteed Time for Classes or Studying			
None	At least 4 hours a week for classes or studying	At least 7 hours a week for classes or studying	At least 12 hours a week for classes or studying
Time to Promotion			
Promotion on expected date	Receive promotion 3 months earlier than expected promotion date	Receive promotion 6 months earlier than expected promotion date	Receive promotion 12 months earlier than expected promotion date
Reduction in Sea Tour Length			
No change in sea tour length	6-month reduction in expected sea tour length	9-month reduction in expected sea tour length	18-month reduction in expected sea tour length
Probability of Getting Your Pick of Next Shore Duty Assignment			
Little chance of getting next preferred billet	25% chance of getting next preferred billet	50% chance of getting next preferred billet	99% chance of getting next preferred billet

Package characteristic descriptions

The following is a list of descriptions of the package characteristics. The description of working within one's rating and rotational credit were not included on the Rotating to Sea survey version.

- *Billet Location:* This includes shore (sea) facilities within a general area. For example, the Japan location includes Atsugi, Sasebo, and Yokosuka.
- *Working Within Your Rating:* The average amount of time spent working or training within your rating at this shore billet (may also include time spent using any previous skills or training).
- *Shore, Sea or Neutral Rotational Credit:* The type of rotational credit recevied for this shore duty assignmnet.
- *Special Assignment Pay:* A monthly special assignment pay received during this assignment.
- *Time to Promotion:* By taking this shore (sea) billet, the time until your next promotion will be shortened by the number of specified months. This incentive specifies that, depending on the shore (sea) duty package you choose, you will be promoted three months to a year sooner than you currently expect.
- *One-time Bonus Leave:* A one-time increase in leave available immediately upon arrival. Any carry-over and sell-back restrictions would apply.
- *Guaranteed Time for Education:* Time out of the workweek to either study or attend voluntary education classes.
- *Reduction in Sea Tour Length:* This is a reduction in your next prescribed sea tour length, or a reduction in this sea tour length. Assume the base length of this sea tour is the same as the expected length of your next sea tour.
- *Probability of Getting Your Pick of Next Shore Duty Assignment:* By taking this billet, the probability increases that you get the shore duty assignment of your choice following this sea assignment. This incentive means that, depending on the sea duty you choose, the probability of getting the shore duty assignment of your choice can range from very low to 99%.

Background and demographic questions

Figure 16 lists the 20 background and demographic questions asked on each survey version. Each question was followed by categorical answers.

Figure 16. Non-choice-based conjoint (non-CBC) survey questions

Q1: Of the package characteristics you just saw, which was the most important in your decision process? -from a list of the attributes
Q2: What is your gender?
Q3: How old are you?
Q4: What is your marital status?
Q5: How many dependent children do you have?
Q6: What is the highest level of education you have completed?
Q7: Where are you currently located?
Q8: While on sea duty which are you typically assigned to?
Q9: How long have you served in the Navy so far?
Q10: What is your paygrade?
Q11 and **Q12:** What is your specific rating?
Q13: Is this your first enlistment?
Q14: From today, when is your end of obligation (EAOS)?
Q15: Do you plan to reenlist at the end of your obligation?
Q16: From today, when is your next projected rotation date (PRD)?
Q17: Overall, which is the most important to you in the assignment decision process?
Q18: Of the following location characteristics, which is the most important to you in the assignment decision process? Climate and/or exotic locale, quality and quantity of local medical facilities, quality and quantity of local educational facilities, cost of living, or none of the above.
Q19: Of the following family related aspects, which is the most important to you in the assignment decision process? Spouse's employment opportunities, permanent residence/immediate family close to job, being near other family members (siblings, parents, etc.), or not having to move.
Q20: of the following job or career aspects, which is the most important to you in the assignment decision process? Above average working conditions (facilities, tools, etc.), Navy career-enhancing move, career-enhancing move for future civilian career, general reputation of the ship and/or command, or none of the above.

Appendix F: Sample statistics tables

Table 17 is the sample statistics for the two survey versions.

Table 18 is a comparison of the survey sample statistics and the entire Navy population.[30]

Table 19 is a comparison of survey sample statistics with Sailors within 18 months of their next Projected Rotation Date (PRD).[31]

30. The full Navy sample is Navy Enlisted active strength as of December 2001, no TARs, and no TEMACs from the Enlisted Master Records.

31. The Sailors within 18 months of their next PRD sample include Navy Enlisted active strength as of March 2002, no TARs and no TEMACs from the Enlisted Master Records (EMR).

Table 17. Survey sample statistics: count (percentages)

Characteristics	Rotating to Shore sample	Rotating to Sea sample
Gender		
Female	66 (14.1%)	154 (27.8%)
Male	401(85.9%)	400 (72.7%)
Age		
19 or under	20 (4.3%)	15 (2.7%)
20 to 24	188 (40.3%)	151 (27.3%)
25 to 29	101 (21.6%)	149 (26.9%)
30 to 34	68 (14.6%)	91 (16.4%)
35 to 39	54 (11.6%)	86 (15.5%)
40 to 44	27 (5.8%)	52 (9.4%)
45 to 49	8 (1.7%)	9 (1.6%)
older than 49	1 (0.2%)	1 (0.2%)
Marital satus		
Single	197 (42.2%)	164 (29.6%)
Married to a service member	23 (4.9%)	88 (15.9%)
Married to a non-service member	209 (44.8%)	256 (46.2%)
Divorced	38 (8.1%)	45 (8.1%)
Widowed	0 (0.0%)	1 (0.2%)
Kids		
None	256 (54.8%)	223 (40.3%)
One	78 (16.7%)	153 (27.6%)
Two	81 (17.3%)	114 (20.6%)
Three	40 (8.6%)	49 (8.8%)
Four or more	12 (2.6%)	15 (2.7%)
Education		
Less than H.S. graduate	2 (0.4%)	1 (0.2%)
Earned GED, HS equivalent	19 (4.1%)	20 (3.6%)
HS graduate	162 (34.7%)	175 (31.6%)
Some college	228 (48.8%)	269 (48.6%)
Associates degree	41 (8.8%)	53 (9.6%)
Bachelors degree or higher	15 (3.2%)	36 (6.5%)
Fielding site		
Norfolk, VA	142 (30.4%)	235 (42.4%)
San Diego, CA	238 (51.0%)	217 (39.2%)
Honolulu, HI	58 (12.4%)	58 (10.5%)
Other	29 (6.2%)	44 (7.9%)

Table 17. Survey sample statistics: count (percentages) (continued)

Characteristics	Rotating to Shore sample	Rotating to Sea sample
Paygrade		
E-1	9 (1.9%)	1 (0.2%)
E-2	20 (4.3%)	13 (2.3%)
E-3	41 (8.8%)	34 (6.1%)
E-4	125 (26.8%)	138 (24.9%)
E-5	132 (28.3%)	181 (32.7%)
E-6	84 (18.0%)	124 (22.4%)
E-7	38 (8.1%)	41 (7.4%)
E-8	11 (2.4%)	9 (1.6%)
E-9	7 (1.5%)	13 (2.3%)

Table 18. Survey sample compared to Navy population (percentages)

Characteristic	Rotating to Shore sample		Rotating to Sea sample		EMR sample	
	E-1 to E-3	E-4 to E-9	E-1 to E-3	E-4 to E-9	E-1 to E-3	E-4 to E-9
Subsample average	15.0	85.0	8.6	91.4	29.2	70.8
Dependent status						
Military spouse, child	1.4	4.3	4.2	11.7	0.4	2.1
Military spouse, no child	2.9	0.8	8.3	4.5	1.2	2.8
Non military spouse, child	5.7	37.0	14.6	39.3	5.5	40.2
Non military spouse, no child	4.3	13.9	6.3	9.3	4.8	11.8
Single, no child	81.4	34.3	56.3	23.5	84.5	36.5
Single, child	4.3	9.8	10.4	11.7	3.6	6.5
Length of service						
Fewer than 3 years	88.6	9.6	75.0	7.1	96.1	8.2
3 to 6 years	11.4	44.6	25.0	32.0	3.5	33.0
7 years or more	0.0	45.8	0.0	60.9	0.4	58.8
Time to EAOS						
Under 1 year	5.7	28.5	14.6	30.0	2.5	24.3
1 to 2 years	25.7	25.4	20.8	33.4	18.2	37.5
Over 2 years	68.6	46.1	64.6	36.6	79.3	38.2
Time to PRD						
Under 1 year	15.7	43.3	41.7	46.6	14.4	34.1
1 to 2 years	27.1	32.5	39.6	27.3	31.4	43.5
Over 2 years	57.1	24.2	18.8	26.1	54.1	22.5

Table 19. Survey sample compared to Sailors within months of their next projected rotation date (PRD) (percentages)

Characteristic	Rotating to Shore sample		Rotating to Sea sample		EMR sample	
	E-1 to E-3	E-4 to E-9	E-1 to E-3	E-4 to E-9	E-1 to E-3	E-4 to E-9
Subsample average	15.0	85.0	8.6	91.4	13.5	86.5
Dependent status						
Military spouse, child	1.4	4.3	4.2	11.7	1.4	2.3
Military spouse, No child	2.9	0.8	8.3	4.5	3.6	3.0
Non military spouse, child	5.7	37.0	14.6	39.3	7.9	42.6
Non military spouse, no child	4.3	13.9	6.3	9.3	7.2	11.6
Single, no child	81.4	34.3	56.3	23.5	74.3	33.6
Single, child	4.3	9.8	10.4	11.7	5.6	6.9
Length of service						
Fewer than 3 years	88.6	9.6	75.0	7.1	82.5	6.4
3 to 6 years	11.4	44.6	25.0	32.0	16.8	28.6
7 years or more	0.0	45.8	0.0	60.9	0.7	65.0
Time to EAOS						
Under 1 year	5.7	28.5	14.6	30.0	8.6	35.8
1 to 2 years	25.7	25.4	20.8	33.4	43.2	36.5
Over 2 years	68.6	46.1	64.6	36.6	48.2	27.7
Time to PRD						
Under 1 year	15.7	43.3	41.7	46.6	55.1	62.8
1 to 2 years	27.1	32.5	39.6	27.3	44.9	37.2
Over 2 years	57.1	24.2	18.8	26.1	0.0	0.0

Appendix G: Additional results by Sailor traits

By reenlistment decision

Another group the Navy is particularly interested in are Sailors who are still deciding whether to reenlist in the Navy (see table 20). One might argue that Sailors who plan to reenlist have a preference for a Navy lifestyle that includes a willingness to change assignment locations. As a result, Sailors who stated they were planning to reenlist may require a lower level of AIP than the general Navy population.

Table 20. Reenlistment plans by survey samples

	Sample count of Sailors			
	Rotating to Shore		Rotating to Sea	
Reenlistment plan	Number	Percentage	Number	Percentage
Plan to reenlist	190	40.7	226	40.8
Don't plan to reenlist	93	19.9	142	25.6
Don't know	184	39.4	186	33.6

Tables 21 and 22 show that, in general, it isn't cheaper to get Sailors who stated intentions to reenlist to less preferred locations, compared with the full sample. This may be because the sample of Sailors who stated definite intentions of reenlisting also were more likely to have dependent spouses and/or children than the rest of the sample. Thus, they may be more likely to have a home-basing preference.

A better comparison would be between respondents who stated an intention to reenlist and respondents who didn't state an intention to reenlist or were unsure about their reenlistment decisions. Our sample size allows us to examine the comparison only with the sample of respondents who stated they were not sure about reenlistment. In comparison to the Rotating to Shore reenlistment sample, table 23

shows that it is more expensive to get Sailors who are unsure about reenlistment to a less preferred location. Thus, Sailors who intend to reenlist and are rotating to shore assignments would be willing to go to a less preferred location at lower levels of assignment bonus than their counterparts who are unsure about their reenlistment decision. This is consistent with our earlier hypothesis. However, table 24 shows that it would not be as expensive to get the Rotating to Sea unsure-about-reenlistment sample to a less preferred location compared with the full sample or reenlistment sample. This discrepancy may be because within the Rotating to Sea sample (to a greater extent than in the case of the Rotating to Shore sample), the unsure sample is less senior than the full and reenlistment samples.

Table 21. Rotating to Shore reenlistment sample: location vs. monthly bonus (in dollars)

	Norfolk	Hawaii	Pacific NW	ME/CT/RI	Italy	Great Lakes	Japan
San Diego	142	147	291	303	322	468	617
Norfolk	—	4	111	118	173	215	334
Hawaii	0	—	107	114	168	207	327
Pacific NW	0	0	—	7	62	97	168
ME/CT/RI	0	0	0	—	55	90	161
Italy	0	0	0	0	—	36	107
Great Lakes	0	0	0	0	0	—	71

Table 22. Rotating to Sea reenlistment sample: location vs. monthly bonus (in dollars)

	Norfolk	FL/GA	Hawaii	Pacific NW	Maine	Italy	Japan
San Diego	14	25	64	153	256	324	432
Norfolk	—	26	49	139	235	303	397
FL/GA	0	—	24	114	197	265	359
Hawaii	0	0	—	90	173	228	322
Pacific NW	0	0	0	—	83	128	190
Maine	0	0	0	0	—	45	107
Italy	0	0	0	0	0	—	62

Table 23. Rotating to Shore unsure about reenlistment sample: location vs. monthly bonus (in dollars)

	Hawaii	Pacific NW	Norfolk	ME/CT/RI	Italy	Great Lakes	Japan
San Diego	84	266	270	293	294	507	684
Hawaii	—	163	166	182	183	396	576
Pacific NW	0	—	3	20	20	176	357
Norfolk	0	0	—	17	17	173	357
ME/CT/RI	0	0	0	—	0	157	334
Italy	0	0	0	0	—	156	333
Great Lakes	0	0	0	0	0	—	138

Table 24. Rotating to Sea unsure about reenlistment sample: location vs. monthly bonus (in dollars)

	San Diego	Hawaii	Norfolk	Pacific NW	Italy	ME/CT/RI	Japan
FL/GA	9	21	52	73	105	126	218
San Diego	—	12	44	65	96	118	203
Hawaii	0	—	32	53	85	106	189
Norfolk	0	0	—	22	54	75	158
Pacific NW	0	0	0	—	33	55	137
Italy	0	0	0	0	—	22	105
ME/CT/RI	0	0	0	0	0	—	84

By rank: E-4 to E-6

Sailors in the E-4, E-5, and E-6 ranks are midcareerists, which is the group on which a monthly assignment incentive special pay would focus. The Rotating to Shore version was 73 percent E-4, E-5, or E-6 Sailors. For the Rotating to Sea version, 80 percent of the sample were E-4, E-5, or E-6 Sailors. Because the majority of the samples were midcareerists, the location ratings and the estimated amounts are similar to the full sample, as expected (see tables 25 and 26).

Table 25. Rotating to Shore E-4 to E-6 sample: location vs. monthly bonus (in dollars)

	Hawaii	Norfolk	Pacific NW	ME/CT/RI	Italy	Great Lakes	Japan
San Diego	128	198	187	294	342	484	694
Hawaii	—	70	86	118	141	225	439
Norfolk	0	—	16	49	72	142	297
Pacific NW	0	0	—	33	57	126	266
ME/CT/RI	0	0	0	—	24	94	200
Italy	0	0	0	0	—	71	176
Great Lakes	0	0	0	0	0	—	106

Table 26. Rotating to Sea E-4 to E-6 sample: location vs. monthly bonus (in dollars)

	San Diego	Norfolk	Hawaii	Pacific NW	ME/CT/RI	Italy	Japan
FL/GA	10	61	62	151	194	221	441
San Diego	—	51	52	141	184	204	415
Norfolk	0	—	1	91	133	152	325
Hawaii	0	0	—	90	132	151	323
Pacific NW	0	0	0	—	43	62	183
ME/CT/RI	0	0	0	0	—	19	140
Italy	0	0	0	0	0	—	121

Appendix H: Logit estimates

Using a conditional logit model, we estimate the impact of a package's characteristic levels on the probability that a package is chosen. The estimated coefficients from this model are utility values associated with each assignment package characteristic level.

Table 27 lists the conditional logit coefficients for the Rotating to Shore full sample, and table 28 lists the coefficients for the Rotating to Sea full sample. Tables 29 through 36 are the conditional logit coefficients for the dependent, no-dependent, Norfolk, and San Diego subsamples. Within each package characteristic, the coefficients sum to zero. The higher the logit estimate, the more desirable a package characteristic level is in comparison to the other levels. The estimates are relative, so a negative estimate does not imply that a particular job choice wasn't preferred by any respondent. For example, for the location job characteristic of the Rotating to Shore (Rotating to Sea) version, the logit estimate for Japan is -0.49 (-0.58). This estimate does not mean that Japan as an assignment option is unattractive—just that it is the least preferred location relative to the other options.

Table 27. Logit output for main effects model estimated using Rotating to Shore full sample

	Attribute-level	Effect (std. dev)
Location		
1	Japan	-0.485 (0.042)
2	Great Lakes	-0.273 (0.040)
3	Norfolk, VA	0.101 (0.038)
4	Hawaii	0.252 (0.037)
5	San Diego, CA	0.525 (0.036)
6	Pacific Northwest	0.006 (0.038)
7	Naples, Italy; Sigonella, Sicily	-0.082 (0.038)
8	Brunswick, ME; Newport, RI; New London, CT	-0.045 (0.038)
Time spent in rating		
9	No time spent working within rating	-0.301 (0.248)
10	25% of time spent working within rating	-0.055 (0.024)
11	50% of time spent working within rating	0.124 (0.023)
12	All time spent working within rating	0.231 (0.023)
Rotational credit type		
13	Shore Rotational Credit	-0.035 (0.018)
14	Neutral Rotational Credit	-0.058 (0.018)
15	Sea Rotational Credit	0.093 (0.018)
Extra monthly special pay		
16	No Extra pay	-0.583 (0.027)
17	Extra $200 monthly in special pay	-0.144 (0.024)
18	Extra $400 monthly in special pay	0.113 (0.023)
19	Extra $800 monthly in special pay	0.614 (0.022)

Table 27. Logit output for main effects model estimated using Rotating to Shore full sample (continued)

	Attribute-level	Effect (std. dev)
Bonus leave		
20	No extra leave	-0.170 (0.024)
21	10 days of one-time bonus leave	-0.071 (0.024)
22	20 days of one-time bonus leave	0.059 (0.023)
23	40 days of one-time bonus leave	0.183 (0.023)
Time for studying or classes		
24	No guaranteed time for classes or studying	-0.239 (0.025)
25	At least 4 hours a week for classes or studying	-0.023 (0.024)
26	At least 7 hours a week for classes or studying	0.087 (0.023)
27	At least 12 hours a week for classes or studying	0.175 (0.023)
Time to promotion		
28	Promotion on expected date	-0.182 (0.025)
29	Receive promotion 3 months earlier than original expected promotion date	-0.037 (0.0236)
30	Receive promotion 6 months earlier	0.0418 (0.024)
31	Receive promotion 12 months earlier	0.177 (0.023)
Sea tour length		
32	No change in prescribed length of next sea tour	-0.176 (0.024)
33	6-month reduction in next sea tour length	-0.023 (0.024)
34	9-month reduction next sea tour length	-0.0123 (0.024)
35	18-month reduction in next sea tour length	0.212 (0.023)

Table 27. Logit output for main effects model estimated using Rotating to Shore full sample (continued)

	Attribute-level	Effect (std. dev)
Next preferred billet		
36	Little chance of getting next preferred billet	-0.255 (0.025)
37	25% chance of getting next preferred billet	-0.131 (0.024)
38	50% chance of getting next preferred billet	0.084 (0.023)
39	99% chance of getting next preferred billet	0.302 (0.023)

Table 28. Logit output for main effects model estimated using Rotating to Sea full sample

	Attribute-level	Effect (std. dev)
Location		
1	Japan	-0.577 (0.034)
2	Brunswick, ME; Newport, RI; New London, CT	-0.167 (0.036)
3	Norfolk, VA	0.1752 (0.034)
4	Hawaii	0.1975 (0.034)
5	San Diego, CA	0.320 (0.034)
6	Pacific Northwest	-0.052 (0.0356)
7	Naples, Italy; Sigonella, Sicily	-0.236 (0.0367)
8	Florida/Georgia	0.340 (0.034)
Special pay		
9	No extra pay	-0.713 (0.026)
10	Extra $200 monthly in special pay	-0.157 (0.022)
11	Extra $400 monthly in special pay	0.210 (0.021)
12	Extra $800 monthly in special pay	0.660 (0.021)
Bonus leave		
13	No extra leave	-0.207 (0.023)
14	10 days of one-time bonus leave	0.003 (0.022)
15	20 days of one-time bonus leave	0.021 (0.022)
16	40 days of one-time bonus leave	0.183 (0.021)

Table 28. Logit output for main effects model estimated using Rotating to Sea full sample (continued)

	Attribute-level	Effect (std. dev)
Time for studying or classes		
17	No guaranteed time for classes or studying	-0.251 (0.023)
18	At least 4 hours a week for classes or studying	-0.032 (0.0219)
19	At least 7 hours a week for classes or studying	0.092 (0.021)
20	At least 12 hours a week for classes or studying	0.191 (0.021)
Sea tour length		
21	No change in prescribed length of next sea tour	-0.259 (0.023)
22	6-month reduction in next sea tour length	-0.035 (0.022)
23	9-month reduction next sea tour length	0.065 (0.022)
24	18-month reduction in next sea tour length	0.229 (0.021)
Time to promotion		
25	Promotion on expected date	-0.189 (0.0225)
26	Receive promotion 3 months earlier than original expected promotion date	-0.013 (0.0219)
27	Receive promotion 6 months earlier	0.042 (0.022)
28	Receive promotion 12 months earlier	0.160 (0.021)
Next preferred billet		
29	Little chance of getting next preferred billet	-0.399 (0.024)
30	25% chance of getting next preferred billet	-0.097 (0.022)
31	50% chance of getting next preferred billet	0.1259 (0.021)
32	99% chance of getting next preferred billet	0.371 (0.021)

Table 29. Logit output for main effects model estimated using Rotating to Shore Dependent subsample

	Attribute-level	Effect (std. dev)
Location		
1	Japan	-0.548 (0.056)
2	Great Lakes	-0.302 (0.0527)
3	Norfolk, VA	0.254 (0.048)
4	Hawaii	0.209 (0.048)
5	San Diego, CA	0.511 (0.047)
6	Pacific Northwest	0.0316 (0.050)
7	Naples, Italy; Sigonella, Sicily	-0.091 (0.050)
8	Brunswick, ME; Newport, RI; New London, CT	-0.0645 (0.050)
Time spent in rating		
9	No time spent working within rating	-0.275 (0.032)
10	25% of time spent working within rating	-0.026 (0.031)
11	50% of time spent working within rating	0.085 (0.030)
12	All time spent working within rating	0.216 (0.030)
Rotational credit type		
13	Shore Rotational Credit	-0.0144 (0.024)
14	Neutral Rotational Credit	-0.076 (0.024)
15	Sea Rotational Credit	
Extra monthly special pay		
16	No Extra pay	-0.594 (0.035)
17	Extra $200 monthly in special pay	-0.149 (0.032)
18	Extra $400 monthly in special pay	0.129 (0.030)
19	Extra $800 monthly in special pay	0.614 (0.029)

Table 29. Logit output for main effects model estimated using Rotating to Shore Dependent subsample (continued)

	Attribute-level	Effect (std. dev)
Bonus leave		
20	No extra leave	-0.174 (0.032)
21	10 days of one-time bonus leave	-0.086 (0.031)
22	20 days of one-time bonus leave	0.069 (0.030)
23	40 days of one-time bonus leave	0.192 (0.030)
Time for studying or classes		
24	No guaranteed time for classes or studying	-0.223 (0.032)
25	At least 4 hours a week for classes or studying	-0.018 (0.031)
26	At least 7 hours a week for classes or studying	0.092 (0.030)
27	At least 12 hours a week for classes or studying	0.149 (0.030)
Time to promotion		
28	Promotion on expected date	-0.174 (0.032)
29	Receive promotion 3 months earlier than original expected promotion date	-0.054 (0.031)
30	Receive promotion 6 months earlier	0.046 (0.030)
31	Receive promotion 12 months earlier	0.182 (0.030)
Sea tour length		
32	No change in prescribed length of next sea tour	-0.191 (0.032)
33	6-month reduction in next sea tour length	-0.021 (0.031)
34	9-month reduction next sea tour length	-0.042 (0.031)
35	18-month reduction in next sea tour length	0.254 (0.030)
Next preferred billet		
36	Little chance of getting next preferred billet	-0.266 (0.032)

Table 29. Logit output for main effects model estimated using Rotating to Shore Dependent subsample (continued)

	Attribute-level	Effect (std. dev)
37	25% chance of getting next preferred billet	-0.131
		(0.031)
38	50% chance of getting next preferred billet	0.084
		(0.030)
39	99% chance of getting next preferred billet	0.313
		(0.030)

Table 30. Logit output for main effects model estimated using Rotating to Shore No-Dependent subsample

	Attribute-level	Effect (std. dev)
Location		
1	Japan	-0.394 (0.064)
2	Great Lakes	-0.239 (0.062)
3	Norfolk, VA	-0.127 (0.061)
4	Hawaii	0.316 (0.057)
5	San Diego, CA	0.550 (0.057)
6	Pacific Northwest	-0.028 (0.059)
7	Naples, Italy; Sigonella, Sicily	-0.064 (0.060)
8	Brunswick, ME; Newport, RI; New London, CT	-0.013 (0.059)
Time spent in rating		
9	No time spent working within rating	-0.335 (0.039)
10	25% of time spent working within rating	-0.095 (0.037)
11	50% of time spent working within rating	0.179 (0.035)
12	All time spent working within rating	0.251 (0.035)
Rotational credit type		
13	Shore Rotational Credit	-0.066 (0.028)
14	Neutral Rotational Credit	-0.033 (0.028)
15	Sea Rotational Credit	0.098 (0.027)
Extra monthly special pay		
16	No Extra pay	-0.573 (0.042)
17	Extra $200 monthly in special pay	-0.137 (0.037)
18	Extra $400 monthly in special pay	0.088 (0.036)
19	Extra $800 monthly in special pay	0.622 (0.034)

Table 30. Logit output for main effects model estimated using Rotating to Shore No-Dependent subsample (continued)

	Attribute-level	Effect (std. dev)
Bonus leave		
20	No extra leave	-0.164 (0.038)
21	10 days of one-time bonus leave	-0.055 (0.037)
22	20 days of one-time bonus leave	0.044 (0.036)
23	40 days of one-time bonus leave	0.176 (0.036)
Time for studying or classes		
24	No guaranteed time for classes or studying	-0.268 (0.038)
25	At least 4 hours a week for classes or studying	-0.031 (0.037)
26	At least 7 hours a week for classes or studying	0.082 (0.036)
27	At least 12 hours a week for classes or studying	0.216 (0.036)
Time to promotion		
28	Promotion on expected date	-0.198 (0.038)
29	Receive promotion 3 months earlier than original expected promotion date	-0.014 (0.037)
30	Receive promotion 6 months earlier	0.040 (0.040)
31	Receive promotion 12 months earlier	0.173 (0.036)
Sea tour length		
32	No change in prescribed length of next sea tour	-0.154 (0.038)
33	6-month reduction in next sea tour length	-0.025 (0.037)
34	9-month reduction next sea tour length	0.029 (0.036)
35	18-month reduction in next sea tour length	0.149 (0.036)
Next preferred billet		
36	Little chance of getting next preferred billet	-0.241 (0.038)

Table 30. Logit output for main effects model estimated using Rotating to Shore No-Dependent subsample (continued)

	Attribute-level	Effect (std. dev)
37	25% chance of getting next preferred billet	-0.138
		(0.037)
38	50% chance of getting next preferred billet	0.089
		(0.036)
39	99% chance of getting next preferred billet	0.291
		(0.035)

Table 31. Logit output for main effects model estimated using Rotating to Shore Norfolk subsample

	Attribute-level	Effect (std. dev)
Location		
1	Japan	-0.576 (0.080)
2	Great Lakes	-0.058 (0.071)
3	Norfolk, VA	0.666 (0.068)
4	Hawaii	0.156 (0.069)
5	San Diego, CA	-0.055 (0.071)
6	Pacific Northwest	-0.111 (0.073)
7	Naples, Italy; Sigonella, Sicily	-0.169 (0.072)
8	Brunswick, ME; Newport, RI; New London, CT	0.146 (0.069)
Time spent in rating		
9	No time spent working within rating	-0.362 (0.047)
10	25% of time spent working within rating	-0.086 (0.044)
11	50% of time spent working within rating	0.172 (0.043)
12	All time spent working within rating	0.276 (0.042)
Rotational credit type		
13	Shore Rotational Credit	-0.038 (0.034)
14	Neutral Rotational Credit	-0.140 (0.034)
15	Sea Rotational Credit	0.179 (0.032)
Extra monthly special pay		
16	No Extra pay	-0.719 (0.052)
17	Extra $200 monthly in special pay	-0.141 (0.044)
18	Extra $400 monthly in special pay	0.156 (0.042)
19	Extra $800 monthly in special pay	0.704 (0.041)

Table 31. Logit output for main effects model estimated using Rotating to Shore Norfolk subsample (continued)

	Attribute-level	Effect (std. dev)
Bonus leave		
20	No extra leave	-0.176 (0.045)
21	10 days of one-time bonus leave	-0.069 (0.044)
22	20 days of one-time bonus leave	0.035 (0.044)
23	40 days of one-time bonus leave	0.211 (0.042)
Time for studying or classes		
24	No guaranteed time for classes or studying	-0.292 (0.046)
25	At least 4 hours a week for classes or studying	-0.062 (0.044)
26	At least 7 hours a week for classes or studying	0.142 (0.043)
27	At least 12 hours a week for classes or studying	0.211 (0.043)
Time to promotion		
28	Promotion on expected date	-0.160 (0.045)
29	Receive promotion 3 months earlier than original expected promotion date	-0.068 (0.044)
30	Receive promotion 6 months earlier	0.040 (0.043)
31	Receive promotion 12 months earlier	0.188 (0.043)
Sea tour length		
32	No change in prescribed length of next sea tour	-0.161 (0.045)
33	6-month reduction in next sea tour length	-0.053 (0.044)
34	9-month reduction next sea tour length	-0.045 (0.044)
35	18-month reduction in next sea tour length	0.259 (0.043)
Next preferred billet		
36	Little chance of getting next preferred billet	-0.300 (0.046)

Table 31. Logit output for main effects model estimated using Rotating to Shore Norfolk subsample (continued)

	Attribute-level	Effect (std. dev)
37	25% chance of getting next preferred billet	-0.168
		(0.045)
38	50% chance of getting next preferred billet	0.141
		(0.043)
39	99% chance of getting next preferred billet	0.328
		(0.042)

Table 32. Logit output for main effects model estimated using Rotating to Shore San Diego subsample

	Attribute-level	Effect (std. dev)
Location		
1	Japan	-0.462 (0.058)
2	Great Lakes	-0.332 (0.057)
3	Norfolk, VA	-0.127 (0.055)
4	Hawaii	0.240 (0.052)
5	San Diego, CA	0.849 (0.051)
6	Pacific Northwest	0.008 (0.053)
7	Naples, Italy; Sigonella, Sicily	-0.098 (0.054)
8	Brunswick, ME; Newport, RI; New London, CT	-0.078 (0.054)
Time spent in rating		
9	No time spent working within rating	-0.297 (0.035)
10	25% of time spent working within rating	-0.057 (0.033)
11	50% of time spent working within rating	0.132 (0.033)
12	All time spent working within rating	0.221 (0.032)
Rotational credit type		
13	Shore Rotational Credit	-0.032 (0.025)
14	Neutral Rotational Credit	-0.016 (0.025)
15	Sea Rotational Credit	0.048 (0.025)
Extra monthly special pay		
16	No Extra pay	-0.558 (0.038)
17	Extra $200 monthly in special pay	-0.149 (0.034)
18	Extra $400 monthly in special pay	0.084 (0.0325)
19	Extra $800 monthly in special pay	0.623 (0.031)

Table 32. Logit output for main effects model estimated using Rotating to Shore San Diego subsample (continued)

	Attribute-level	Effect (std. dev)
Bonus leave		
20	No extra leave	-0.168 (0.034)
21	10 days of one-time bonus leave	-0.085 (0.034)
22	20 days of one-time bonus leave	0.062 (0.033)
23	40 days of one-time bonus leave	0.191 (0.033)
Time for studying or classes		
24	No guaranteed time for classes or studying	-0.224 (0.035)
25	At least 4 hours a week for classes or studying	0.009 (0.033)
26	At least 7 hours a week for classes or studying	0.055 (0.033)
27	At least 12 hours a week for classes or studying	0.160 (0.033)
Time to promotion		
28	Promotion on expected date	-0.190 (0.034)
29	Receive promotion 3 months earlier than original expected promotion date	-0.028 (0.033)
30	Receive promotion 6 months earlier	0.035 (0.033)
31	Receive promotion 12 months earlier	0.183 (0.033)
Sea tour length		
32	No change in prescribed length of next sea tour	-0.207 (0.034)
33	6-month reduction in next sea tour length	-0.026 (0.033)
34	9-month reduction next sea tour length	0.022 (0.033)
35	18-month reduction in next sea tour length	0.211 (0.033)
Next preferred billet		
36	Little chance of getting next preferred billet	-0.248 (0.035)

Table 32. Logit output for main effects model estimated using Rotating to Shore San Diego subsample (continued)

	Attribute-level	Effect (std. dev)
37	25% chance of getting next preferred billet	-0.115
		(0.034)
38	50% chance of getting next preferred billet	0.069
		(0.033)
39	99% chance of getting next preferred billet	0.294
		(0.032)

Table 33. Logit output for main effects model estimated using Rotating to Sea Dependent subsample

	Attribute-level	Effect (std. dev)
Location		
1	Japan	-0.568 (0.046)
2	Brunswick, ME; Newport, RI; New London, CT	-0.225 (0.043)
3	Norfolk, VA	0.266 (0.040)
4	Hawaii	0.160 (0.040)
5	San Diego, CA	0.350 (0.040)
6	Pacific Northwest	-0.027 (0.041)
7	Naples, Italy; Sigonella, Sicily	-0.377 (0.044)
8	Florida/Georgia	0.421 (0.039)
Special pay		
9	No extra pay	-0.686 (0.030)
10	Extra $200 monthly in special pay	-0.177 (0.026)
11	Extra $400 monthly in special pay	0.218 (0.024)
12	Extra $800 monthly in special pay	0.645 (0.024)
Bonus leave		
13	No extra leave	-0.195 (0.026)
14	10 days of one-time bonus leave	0.009 (0.025)
15	20 days of one-time bonus leave	0.010 (0.025)
16	40 days of one-time bonus leave	0.176 (0.025)
Time for studying or classes		
17	No guaranteed time for classes or studying	-0.221 (0.026)
18	At least 4 hours a week for classes or studying	-0.022 (0.026)

Table 33. Logit output for main effects model estimated using Rotating to Sea Dependent subsample (continued)

	Attribute-level	Effect (std. dev)
19	At least 7 hours a week for classes or studying	0.083 (0.025)
20	At least 12 hours a week for classes or studying	0.161 (0.025)
Sea tour length		
21	No change in prescribed length of next sea tour	-0.289 (0.027)
22	6-month reduction in next sea tour length	-0.045 (0.026)
23	9-month reduction next sea tour length	0.079 (0.025)
24	18-month reduction in next sea tour length	0.255 (0.025)
Time to promotion		
25	Promotion on expected date	-0.176 (0.026)
26	Receive promotion 3 months earlier than original expected promotion date	-0.018 (0.026)
27	Receive promotion 6 months earlier	0.032 (0.025)
28	Receive promotion 12 months earlier	0.162 (0.025)
Next preferred billet		
29	Little chance of getting next preferred billet	-0.381 (0.027)
30	25% chance of getting next preferred billet	-0.082 (0.026)
31	50% chance of getting next preferred billet	0.113 (0.025)
32	99% chance of getting next preferred billet	0.350 (0.024)

Table 34. Logit output for main effects model estimated using Rotating to Sea No-Dependent subsample

	Attribute-level	Effect (std. dev)
Location		
1	Japan	-0.616 (0.078)
2	Brunswick, ME; Newport, RI; New London, CT	0.013 (0.070)
3	Norfolk, VA	-0.091 (0.071)
4	Hawaii	0.319 (0.067)
5	San Diego, CA	0.247 (0.068)
6	Pacific Northwest	-0.122 (0.071)
7	Naples, Italy; Sigonella, Sicily	0.131 (0.069)
8	Florida/Georgia	0.119 (0.069)
Special pay		
9	No extra pay	-0.817 (0.052)
10	Extra $200 monthly in special pay	-0.010 (0.043)
11	Extra $400 monthly in special pay	0.200 (0.041)
12	Extra $800 monthly in special pay	0.720 (0.041)
Bonus leave		
13	No extra leave	-0.253 (0.045)
14	10 days of one-time bonus leave	-0.008 (0.043)
15	20 days of one-time bonus leave	0.055 (0.043)
16	40 days of one-time bonus leave	0.206 (0.042)
Time for studying or classes		
17	No guaranteed time for classes or studying	-0.321 (0.046)
18	At least 4 hours a week for classes or studying	-0.072 (0.043)

Table 34. Logit output for main effects model estimated using Rotating to Sea No-Dependent subsample (continued)

	Attribute-level	Effect (std. dev)
19	At least 7 hours a week for classes or studying	0.109 (0.042)
20	At least 12 hours a week for classes or studying	0.285 (0.042)
Sea tour length		
21	No change in prescribed length of next sea tour	-0.171 (0.044)
22	6-month reduction in next sea tour length	-0.009 (0.043)
23	9-month reduction next sea tour length	0.030 (0.043)
24	18-month reduction in next sea tour length	0.151 (0.042)
Time to promotion		
25	Promotion on expected date	-0.237 (0.045)
26	Receive promotion 3 months earlier than original expected promotion date	0.005 (0.043)
27	Receive promotion 6 months earlier	0.069 (0.042)
28	Receive promotion 12 months earlier	0.163 (0.042)
Next preferred billet		
29	Little chance of getting next preferred billet	-0.466 (0.047)
30	25% chance of getting next preferred billet	-0.144 (0.044)
31	50% chance of getting next preferred billet	0.174 (0.042)
32	99% chance of getting next preferred billet	0.437 (0.041)

Table 35. Logit output for main effects model estimated using Rotating to Sea Norfolk subsample

	Attribute-level	Effect (std. dev)
Location		
1	Japan	-0.715 (0.064)
2	Brunswick, ME; Newport, RI; New London, CT	-0.005 (0.056)
3	Norfolk, VA	0.743 (0.053)
4	Hawaii	0.089 (0.054)
5	San Diego, CA	-0.101 (0.056)
6	Pacific Northwest	-0.134 (0.057)
7	Naples, Italy; Sigonella, Sicily	-0.430 (0.060)
8	Florida/Georgia	0.554 (0.053)
Special pay		
9	No extra pay	-0.810 (0.042)
10	Extra $200 monthly in special pay	-0.158 (0.035)
11	Extra $400 monthly in special pay	0.249 (0.033)
12	Extra $800 monthly in special pay	0.719 (0.033)
Bonus leave		
13	No extra leave	-0.231 (0.036)
14	10 days of one-time bonus leave	-0.016 (0.035)
15	20 days of one-time bonus leave	0.010 (0.034)
16	40 days of one-time bonus leave	0.236 (0.033)
Time for studying or classes		
17	No guaranteed time for classes or studying	-0.278 (0.036)
18	At least 4 hours a week for classes or studying	-0.025 (0.035)

Table 35. Logit output for main effects model estimated using Rotating to Sea Norfolk subsample (continued)

	Attribute-level	Effect (std. dev)
19	At least 7 hours a week for classes or studying	0.092 (0.034)
20	At least 12 hours a week for classes or studying	0.211 (0.034)
Sea tour length		
21	No change in prescribed length of next sea tour	-0.314 (0.036)
22	6-month reduction in next sea tour length	-0.028 (0.035)
23	9-month reduction next sea tour length	0.084 (0.034)
24	18-month reduction in next sea tour length	0.258 (0.034)
Time to promotion		
25	Promotion on expected date	-0.211 (0.036)
26	Receive promotion 3 months earlier than original expected promotion date	-0.043 (0.035)
27	Receive promotion 6 months earlier	0.029 (0.034)
28	Receive promotion 12 months earlier	0.224 (0.034)
Next preferred billet		
29	Little chance of getting next preferred billet	-0.402 (0.037)
30	25% chance of getting next preferred billet	-0.094 (0.035)
31	50% chance of getting next preferred billet	0.134 (0.034)
32	99% chance of getting next preferred billet	0.362 (0.033)

Table 36. Logit output for main effects model estimated using Rotating to Sea San Diego subsample

	Attribute-level	Effect (std. dev)
Location		
1	Japan	-0.507 (0.062)
2	Brunswick, ME; Newport, RI; New London, CT	-0.301 (0.059)
3	Norfolk, VA	-0.366 (0.060)
4	Hawaii	0.169 (0.055)
5	San Diego, CA	0.806 (0.054)
6	Pacific Northwest	0.005 (0.056)
7	Naples, Italy; Sigonella, Sicily	0.003 (0.057)
8	Florida/Georgia	0.191 (0.055)
Special pay		
9	No extra pay	-0.653 (0.041)
10	Extra $200 monthly in special pay	-0.170 (0.036)
11	Extra $400 monthly in special pay	0.209 (0.034)
12	Extra $800 monthly in special pay	0.614 (0.033)
Bonus leave		
13	No extra leave	-0.218 (0.036)
14	10 days of one-time bonus leave	-0.081 (0.035)
15	20 days of one-time bonus leave	0.055 (0.035)
16	40 days of one-time bonus leave	0.172 (0.034)
Time for studying or classes		
17	No guaranteed time for classes or studying	-0.260 (0.037)
18	At least 4 hours a week for classes or studying	-0.050 (0.035)

Table 36. Logit output for main effects model estimated using Rotating to Sea San Diego subsample (continued)

	Attribute-level	Effect (std. dev)
19	At least 7 hours a week for classes or studying	0.102 (0.035)
20	At least 12 hours a week for classes or studying	0.209 (0.034)
Sea tour length		
21	No change in prescribed length of next sea tour	-0.240 (0.037)
22	6-month reduction in next sea tour length	-0.043 (0.035)
23	9-month reduction next sea tour length	0.057 (0.035)
24	18-month reduction in next sea tour length	0.226 (0.034)
Time to promotion		
25	Promotion on expected date	-0.175 (0.036)
26	Receive promotion 3 months earlier than original expected promotion date	-0.020 (0.036)
27	Receive promotion 6 months earlier	0.062 (0.035)
28	Receive promotion 12 months earlier	0.132 (0.034)
Next preferred billet		
29	Little chance of getting next preferred billet	-0.413 (0.038)
30	25% chance of getting next preferred billet	-0.115 (0.036)
31	50% chance of getting next preferred billet	0.112 (0.034)
32	99% chance of getting next preferred billet	0.416 (0.033)

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