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AN ECONOMETRIC STUDY OF RECRUITMENT MARKETING IN THE U.S. NAVY*

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Since the abolishment of the mandatory draft the U.S. Navy, along with the other services, has engaged in aggressive marketing strategies in order to attract a sufficient number of qualified individuals to volunteer enlistment. The purpose of this study is to investigate the effectiveness of these efforts, primarily advertising and personal selling, within the general framework of the recruiting environment.

The study uses insights into the recruiting process, provided by the Navy Recruiting Command, along with principles of economics and marketing to develop an econometric model of recruiting performance. The parameters of the model are then estimated on a monthly data base for the 43 Navy Recruiting Districts, from January 1976 to December 1978. The objective of the model is descriptive, i.e., it quantifies the effects of various environmental and marketing variables on three measures of recruiting performance: nationally generated leads, contracts for the delayed-entry program and direct-shipment contracts. The enlistment contracts refer to nonprior service males between 17 and 21 years old.

The environmental variables in the models include economic factors such as unemployment rate and civilian income, sociodemographic variables such as urbanization, the proportion of blacks and high-school seniors in the target market, and local youth attitudes toward the Navy, and time-related factors such as seasonality and the GI Bill. The marketing efforts are national advertising expenditures in seven media, local advertising expenditures, recruiter strength and recruiter aid expenditures.

The econometric models reveal that both environmental and marketing variables had significant impact on variations in recruiting performance over time and across recruiting districts. The specific response effects for leads and contracts are reported in the "discussion of results" section. The "conclusions" section integrates several of these results along three dimensions:

(1) the relative influence of environmental versus marketing variables on recruiting performance,

(2) differences in the response structures for leads, delayed-entry and direct-shipment contracts,

(3) the relative effectiveness of media advertising and personal selling.

(MILITARY RECRUITMENT; MARKETING MODELS; ECONOMETRICS; ADVERTISING AND PERSONAL SELLING)

1. Introduction

This paper presents the development and results of an econometric investigation of the factors affecting manpower recruiting performance in the U.S. Navy. Since the abolishment of the mandatory draft, the Navy and the other three military services have actively engaged in the recruiting of employable youth (primarily 17 to 21-year old males), by a combination of mass advertising, direct advertising and personal selling. The recent difficulties which all four services have encountered in meeting their goals (e.g., *Wall Street Journal* 1979) create a need for a thorough analysis of the factors impacting military recruiting. This need is further highlighted by the current debate about the reinstitution of the mandatory draft registration.

The purpose of the study is to describe conceptually and empirically the Navy recruiting process. In particular, attention focuses on the relative impact of environ-

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mental conditions such as the civilian unemployment rate, and recruiting efforts. These efforts are similar to the marketing activities used by for-profit organizations: with the exception of military pay and benefits, which is not controlled by the recruiting commands, they are promotion efforts, i.e., personal selling and advertising. Since there is sufficient variability cross-sectionally and over time in personal selling and advertising, the study offers a rare opportunity to quantify their relative effectiveness. In doing so, the paper aims at contributing to an important area in current marketing knowledge.

2. Recruiting in the Navy: Background

The recruiting process in the Department of the Navy is organized through a network of recruiting stations (over 1300 in 1978), manned by 3200 to 3400 recruiters. These recruiters engage in various marketing activities, such as providing printed brochures to prospective applicants and making personal presentations in local high schools. The stations are under the command of a Navy Recruiting District (NRD), which has certain authorities in budget and marketing effort allocation across the stations. There are 43 recruiting districts in the United States and they will be used in this study as the cross-sectional unit of analysis. Each of these districts in turn is under the command of a Navy Recruiting Area (NRA), of which there are six. The highest level in this hierarchy is the Navy Recruiting Command in Washington, D.C.

Since the present study uses data at the NRD level from January 1976 to December 1978, it is important to understand the process by which recruiting goals were set during this period and their implications for each district. The Navy is authorized to conclude each fiscal year with a specific number of persons on active duty. During that year there are persons separating from active duty for numerous reasons; these losses must be made up by recruitment of new people for active duty. This number of separating persons is estimated at the beginning of each fiscal year and is translated into goals by month, i.e. the number of people the recruiters are expected to ship to "boot camp" in any given month. The Navy Recruiting Command allocated these quota to the areas and districts, which implies that each district's recruiters were faced with fixed monthly goals which were known up to one year in advance. In addition to these quantitative goals, there were qualitative objectives such as minimum aptitude requirements, minimum percentage high school graduates and minimum percentage eligible for entry into Navy training schools.

The NRD recruiters work toward the NRD monthly goals by writing two types of contracts:

—a "delayed entry program" (DEP) contract, which gives the recruit the opportunity to report for active duty between one and twelve months after signing. These contracts constitute more than 50% of the total contracts written during a 12-month period. There is considerable seasonal and regional variation however;

—a "direct shipment" (DSHIP) contract, which allows the recruit to join the Navy immediately, i.e., during the month in which the contract was signed.

The existence of two types of contracts makes the recruiting process dynamic in the sense that individual recruiters can work toward this month's NRD goal and future months' NRD goals simultaneously.

The marketing instruments for recruiting typically fall under the promotional category (advertising and personal selling), since the product (military employment) and the price (salaries and benefits) offered are the same across the four services and are not negotiable. Most of the recruiting budget is spent on *personal selling*, which consists primarily of military personnel recruiting in local high schools, colleges,

technical schools and other target markets. These recruiters use various types of recruiting aids, such as brochures, posters and flyers. On the *advertising* side a distinction is made between national media campaign expenditures and local media advertising efforts, which are decentralized. The U.S. Navy uses all the major media for its national advertising campaigns; local advertising is spent primarily on print with some radio. The size of the recruiting budget is comparable to the marketing expenditures of major U.S. corporations; for example, in the 1978 fiscal year, 42 million dollars were spent on nonadvertising recruiting and 16 million on media advertising.

3. Prior Research

The published academic literature on military recruiting is limited. Several studies have examined issues related to the shift from the draft to the all-volunteer military system. Altman and Fechter [3] analyzed national volunteer accessions between 1956 and 1965 and found that unemployment, draft pressure and seasonality were the most important explanatory variables. Using accession data for nine census regions in 1963, they also performed a cross-sectional study and found that regions with high relative military pay and high unemployment produced above average enlistments. The pay elasticity for Army accessions was estimated at 0.62. Altman [1] extended this cross-sectional analysis to a comparison of the determinants of volunteer accessions under draft vs. no-draft conditions, using Department of Defense survey data to approximate the latter condition. He estimated that, if the draft were abolished, relative military pay elasticities would increase from 0.38 to 0.81, unemployment elasticities would jump from 0.19 to 0.34, and the elasticity of the percentage nonwhites in the target population would become nonsignificant from -0.10. Further evidence of the drastic change in the military recruiting task in the absence of a draft was provided by Fisher [6]. He estimated the elasticity of relative expected civilian earnings (adjusted for the change of unemployment) at the mean military enlistment rate. On quarterly time-series data between 1957 and 1965 this elasticity was -0.46, almost identical to the elasticity on cross-sectional data, which was -0.49. However, in the absence of the draft, the cross-sectional elasticity would be -0.82, confirming Altman's results.

Only two published empirical studies to date have examined the effects of nonpecuniary recruiting efforts on volunteer enlistments. Epps [5] analyzed the impact of the U.S. Army's 1971 paid radio advertising campaign, using monthly enlistment data between January 1970 and March 1972. Although several variables in his linear model had a counterintuitive sign, the major conclusion was that "... the advertising campaign contributed around 11000 or 12000 of a total of 60000 enlistments in June to September, 1971." More recently, Morey and McCann [12] analyzed the effects of recruiter strength and advertising on U.S. Navy recruiting performance, using monthly district data for 1976 and 1977. Although the objective of their study was to develop a budget allocation model, they reported some interesting econometric results. For example, they found an association between total advertising and leads received, with an elasticity around 0.16. With respect to enlistment contracts, the authors reported strong effects of recruiter strength (around 0.44 for all contracts, 0.58 for high-school graduate contracts only) and somewhat weaker advertising effects (resp. 0.19 and 0.12).

In summary, the academic literature on military recruiting has addressed primarily the influence of civilian unemployment levels and relative military pay. While the effects of recruitment marketing seem to exist, they have not been analyzed in a detailed manner, making use of the rich marketing model framework developed in the

last two decades. The present study will attempt to fill this gap by combining economic and other environmental variables and marketing efforts in a multiple-equation marketing model of recruiting.

4. Conceptual Model of Navy Recruitment Marketing

Generally speaking, the recruiting process consists of a demand and a supply function. Because our analysis is done at the recruiting district level, the demand for recruits is considered as exogenous in the model: for every month and every district, there is a quota of accessions set by the Recruiting Command. Qualitative considerations such as aptitude levels and educational standards will not be treated explicitly in this study.

Given the predetermined demand quota, the analysis will focus on the determinants of supply, cross-sectionally and over time. The recruiting process starts with a prospect who has an interest in joining the Navy. This interest could have been generated in numerous ways including being exposed to Navy advertising, or being a recipient of a local recruiting campaign, in which case the prospect will generate a local lead (e.g., a visit to the local recruiting station) or a national lead (e.g., via the Navy toll-free number or a magazine insert). This person is then interviewed by a recruiter, who provides information and, if the prospect is qualified, makes a "sales pitch." A successful sale results in the prospect signing a DEP contract for accession within 12 months, or a DSHIP contract for immediate accession.

Advertising and personal selling can have an impact at several levels in this process. For example, a recruiter's visit to a local high school can generate interest among high school seniors. In this case, it is not necessary that the prospects will generate national leads, since their entire recruiting process could occur at the local level. Also, national advertising could have a direct impact on contracts without generating a national lead, for example in the case where a prospect, motivated by a national advertising campaign, contacts a local station directly, never generating a national lead. Since the leads data base in this study contains only nationally generated advertising leads (LEAD), these possibilities should be well understood.

At the recruiter level, various factors have an impact on motivation. At the beginning of each month, each district knows the quota and how much of it has already been filled by previously written DEP contracts (the "DEP POOL" accessions or number of recruits who will access this month from previously written contracts).[1] Two situations can arise:

(1) The DEP POOL expected accessions are high enough to meet (or even exceed) this month's goal. In this case, recruiters are motivated to write more DEP contracts in order to improve or maintain the DEP POOL for future months; or

(2) the DEP POOL expected accessions are not sufficient to meet this month's quota. In this case, the recruiters will focus much of their efforts on selling DSHIP contracts in order to meet current month goal.

In conclusion, the number of DEP contracts written is virtually unconstrained, because they add to the DEP pool which will help meet future accession quotas. In contrast, the number of DSHIP contracts is theoretically upper-bound by the directship requirement at the beginning of each month. Finally, since personal selling efforts are not unlimited, one would expect that more efforts on selling one type of contract will have a negative impact on the number of contracts of the other type written. A schematic model of the recruiting process is shown in Figure 1.

[1] In most cases there is a small and fairly constant percentage of "no-shows," so the DEP POOL estimates are usually adjusted downward to account for this phenomenon.

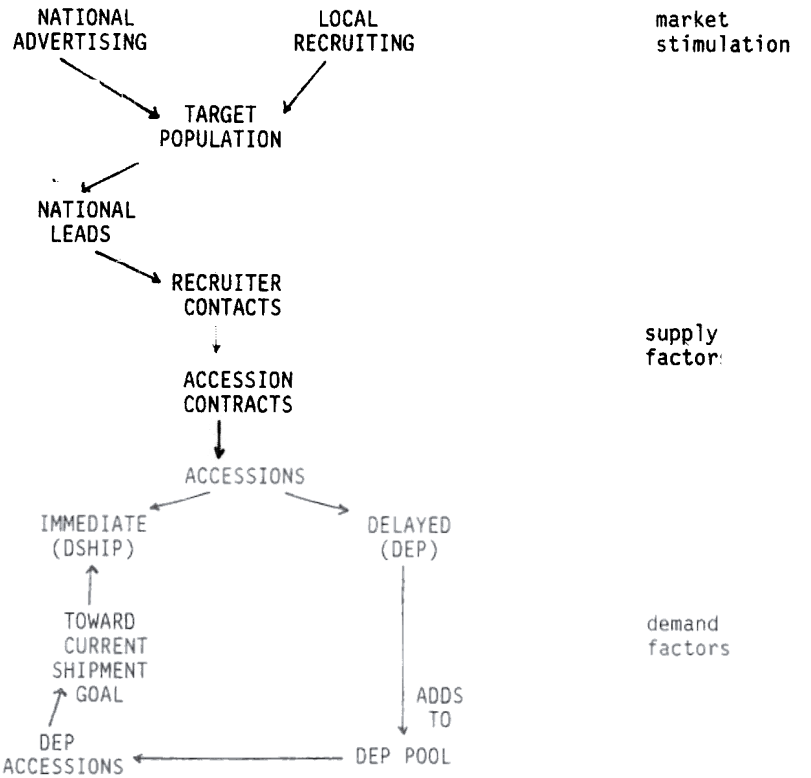

FIGURE 1. A Schematic Model of Supply and Demand in U.S. Navy Recruiting.

The three measures of recruiting performance will be dependent variables in the econometric models: number of leads is an intermediate performance measure and DEP and DSHIP contracts are the ultimate measures. The explanatory variables are classified as: (a) economic conditions, such as local unemployment, (b) socio-demographic factors, e.g., urbanization, (c) other environmental variables, such as seasonality and local attitudes toward the Navy, (d) marketing variables, primarily advertising and personal selling. In the following section we will discuss various hypotheses about the influence of these variables, whose definitions are given in Appendix A.

5. Data Base and Hypotheses

The data base for this study includes around 30 variables, covering the 43 recruiting districts over a 36-month period, from January 1976 to December 1978. The sample period is of interest because it represents a period of aggressive Navy marketing efforts characterized by personal selling and advertising in all the major media. However, the recruiting allocations were highly irregular, due to funding constraints and results of new market surveys. For the purpose of the study this irregularity creates sufficient variability in the data to allow the models to pick up any response effects.

The target market in this study consists of males with no prior military service who are eligible for either the Navy or the Navy Reserve. This category represents the pool from which the vast majority of recruits are drawn; it excludes, however, enlisted females, officers, prior-service accessions and other smaller categories. The principal age range of these persons is 17 to 21 years old. The study will not examine racial composition of the accessions nor the quality of the recruits (e.g., high school senior recruits), because of data limitations.

The measures of recruiting performance, which are the endogenous variables in the model, are per-capita national advertising leads (LEAD), delayed-entry contracts (DEP) and direct-shipment contracts (DSHIP).

Hypotheses on Environmental Effects

It is hypothesized first that recruitment performance is affected by local demographic and economic conditions. The Navy recruits heavily from the high-school senior population, so the relative number of high school seniors (SENIORS) should have a positive influence. Likewise, the historical success of the Navy in hiring blacks suggests a positive effect of the relative number of blacks (PBLACK). Another demographic variable, the relative urbanization of each district (URBAN), is included as an exploratory variable, as its effect is unclear a priori.[2] On the economic side, prior research has indicated that the unemployment rate (UNEMP) should have a positive and civilian income (EARN) a negative effect on recruiting performance.

The sample period coincidentally includes the signing of the GI Bill by President Ford on October 15, 1976. This bill restricted pension and other benefits for recruits who signed after December 31, 1976. Not unexpectedly, recruiting was very strong at the end of 1976 and weak at the start of 1977. By including dummy variables (GI1, GI2) we will control for these unusual effects.

Prior research has suggested that there is considerable seasonality in the recruiting process (e.g. Altman and Fechter [3]; Epps [5]), primarily because the majority of recruits are high school seniors whose involvement in career decisions rises as graduation time approaches. In the absence of exact measurement, seasonal effects on recruiting are approximated by allowing the recruiting base level (i.e., the intercept) to vary over time. Quarterly dummy intercepts are used in conjunction with the following a priori hypotheses for lead rates: the Summer quarter (July–September) is the lowest because most high schools are not in session. Lead rates start to rise in the Fall quarter (October–December) and peak in the Winter quarter (January–March) which is the height of the seniors' career decision making. In the Spring quarter (April–June) there is a gradual decline as potential prospects make decisions and leave the target market. Consequently, the predictive test on the coefficients α_i of the quarter dummy variables is that $\alpha_{\text{Winter}} > \alpha_{\text{Fall}} > \alpha_{\text{Spring}} > \alpha_{\text{Summer}}$. While we expect similar seasonal patterns on DEP and DSHIP contracts, no such a priori hypotheses are made because of the often substantial time lags between initial recruiter contact and final enlistment.

A final environmental variable in the model is youth attitude toward the military (PROPM) and toward the Navy (PROPN), which has not been investigated before. This attitudinal variable is constructed from survey data (pooled over time) and reflects regional differences in the inclination toward joining the military or the Navy among young males. We expect lead rates to react positively to propensity toward the military, because a candidate can contact more than one service at once. However, since only one service can be chosen for enlistment, we hypothesize that Navy propensity will have a positive effect on DEP and DSHIP contracts.

Hypotheses on Marketing Effects

The Navy's marketing efforts are all promotional in nature, including recruiter strength (REC), recruiting aids (RAD) and various expenditures in TV (TV), radio (RA), direct mail (MAIL), outdoor (OD) and magazines/newspapers (PRINT). All these efforts are expected to have a positive effect on performance. A possible exception is the effect of local advertising (LAM) on national leads, because it is

[2] Urbanization makes recruiting easier because the target market is geographically concentrated. On the other hand, schooling problems in larger cities may make fewer candidates eligible for service.

unclear a priori whether or not the local leads, generated by local advertising, occur at the expense of national leads. In addition to these general marketing hypotheses, the model will examine three specific marketing phenomena: advertising wearout, word-of-mouth and components of personal selling effort.

Advertising Wearout. A unique feature of recruitment marketing is that the product can be purchased only once, at least in the case of nonprior service recruiting. Consequently, the target market is subject to continuous depletion and rejuvenation: teenagers enter the market when they reach the age of 17 and leave the market when they enlist or reach the age of 21, whichever comes first.

Market depletion is important in measuring recruitment advertisement effects, because it relates to the concept of advertising *wearout*, i.e., the response of sales to increased advertising pressure is immediate, but levels off even if the high advertising level is maintained (e.g. Little [9]). If the simple assumption is made that some teenagers are more likely to join the Navy than others, the wearout phenomenon of a recruitment advertising campaign can be expected for two reasons: (1) as potential candidates enlist in response to the campaign, the size of the target market shrinks, and (2) the remaining candidates are less prone to join the services. Consequently, a hypothesis to be examined by the model is that the response of leads to media advertising is asymmetric: an increase in spending has an immediate impact which levels off over time. On the other hand, a decrease in advertising pressure leads to fewer inquiries, possibly distributed over time. In both cases, the level of the new equilibrium reached depends on the size of the advertising effort.

The authors postulate that advertising wearout occurs in the national mass advertising category, i.e. TV, radio, print and outdoor advertising. Wearout is not expected in direct mail expenditures, because there is selective exposure in this category, i.e., only candidates who are known to be prospective recruits are contacted. Finally, wearout may exist in local advertising, but one would need locally generated leads as a criterion variable to examine this effect.

Word-of-Mouth. A special environmental variable, believed to be important by management, is word-of-mouth. In the context of a teenaged, highly interacting target market it is not unreasonable to expect that recent enlistees may influence their immediate peers in their career decisions. The word-of-mouth factor is operationalized by the per capita number of people in the DEP pool each month, i.e. individuals who have signed a contract but have not yet accessed. This variable is hypothesized to have a positive effect on number of leads.[3]

Components of Personal Selling. Recent advances in marketing theory are applied in modeling the *personal selling* effects on recruiting performance. Although the personal selling literature is not as vast as the advertising literature, a conceptual framework of personal selling has emerged. Salesforce performance is generally believed to be a function of *effort* and *ability*, subject to the constraints and opportunities in the selling *environment*. Walker, Churchill and Ford [17] have developed a framework to deal with the effort component, which incorporates salesperson motivation. The ability factor, analyzed by Weitz [19], is known to be related to salesforce selection, training, experience, etc. . . . . Finally, research on the selling environment was reviewed by Ryans and Weinberg [14]: there appears to be consensus only on the positive impact of territory potential on salesforce performance.

Some operationalizations of personal selling effort, ability and territory potential are possible in the present context. We will measure effort by the number of recruiters in district i and the motivation of these recruiters. Motivation is related to the accession

[3]Although it is meaningful to include this variable in the contracts equations as well, any resulting correlation may be spurious because the DEP pool is made up of contracts.

goals at the beginning of each month, following the expectancy theory of motivation (see Walker, Churchill and Ford [17]). However, this motivation factor has a different impact for DEP vs. DSHIP contracts: the direct ship requirement at the beginning of each month should be positively related to DSHIP contracts and negatively to DEP contracts, since a recruiter's time and effort are not unlimited. Next, the ability factor is operationalized by the recruiting support given to the canvassers, i.e. expenditures on recruiting aids (RAD). The experience of the recruiters, which could also affect ability, is not included, in the absence of exact data. We assume implicitly that experience levels are distributed evenly across the 43 districts.[4] Finally, the effects of territory potential, i.e. number of 17–21-year old males in the districts, are filtered out by estimating the models on a per capita basis.

6. The Econometric Model

The base model used in this analysis is multiplicative (log-linear), which features some well-documented advantages over the linear model for the purpose of sales response research[5] (e.g. Parsons and Schultz [13, p. 144]). Some special issues to be discussed are the treatment of multiple equations, the lag structure in the relationships, and the incorporation of advertising wearout.

Multiple Equations. The three measures of recruiting performance, leads, DEP and DSHIP contracts, are hypothesized to respond to a fairly similar set of explanatory variables, which would ordinarily suggest either OLS or SUR estimation. However, contracts are expected to respond to number of leads generated, as in the traditional hierarchy-of-effects model, which would introduce simultaneity and the need for two- or three-stage least squares estimation. Because of the short data interval, no simultaneous effects were found in some attempts at simultaneous-equation estimation. Instead, a one-period delay between leads and contracts was observed. Also, as the single-equation residuals in this recursive system appeared to be uncorrelated across equations, the models were parameterized by ordinary least-squares.

Lag Structures. There is no prior research that would provide firm insights into the nature of distributed lag effects on monthly recruiting performance. From a marketing perspective, and since most of the variation in the data base is cross-sectional, lagged effects are most likely to occur in the various advertising expenditures. These effects were examined by a direct-lag OLS specification procedure which tests for the significance of lagged advertising influence up to three months after the expenditure[6] (for a theoretical justification, see Liu and Hanssens [10]). With the exception of one- and two-month lagged direct mail effects on leads, all the significant advertising effects were found to occur with a zero and one-month lag.

Modeling Advertising Wearout. The modification of the base model to include wearout is nontrivial, as one needs a well-defined measure of advertising *campaign*. We shall use an extension of a modeling procedure proposed by Simon [15]. Simon operationalized wearout by distinguishing between level stimulus and differential stimulus response: the former represents the steady-state relationship between sales S and advertising A, the latter represents the differential effects of a new advertising campaign. Simon proposes to model differential stimulus response by the difference (or ratio) between current and previous advertising or zero, whichever is greatest. For

[4] Recruiter experience in the Navy is limited by the policy that no one is assigned to recruiting for more than three consecutive years.

[5] A test for the presence of S-shaped relationships, advocated by some marketing researchers, failed to indicate such a functional form (Johansson [7]).

[6] This procedure could not be justified for LAM and RAD effects, because only quarterly data were available. Only one-period lagged RAD and LAM effects are considered in the model.

example

$$S_t = b_0 + b_1 \ln A_t + b_2 \max\{0, (A_t - A_{t-1})\}, \tag{1}$$

where b_1 is the level response parameter and b_2 is the differential stimulus ("campaign") response parameter. In extending Simon's procedure, we need to consider multiple media, the general framework of the model and possible lead-lag relationships between advertising expenditures and lead rates.

Several modeling experiments preceded the choice of an advertising wearout model. Although most of the results pointed in the same direction, multicollinearity between the level- and differential stimulus data for the various media caused severe problems. As a remedy we propose the simplifying assumption that the level response elasticity is the same for each medium. The rationale for this assumption is an efficient market hypothesis which states that differences in steady-state effectiveness across the media are filtered by the pricing mechanism in advertising. However, the differential stimulus effect is allowed to vary across the media. It is measured, e.g. for the case of a TV-campaign, as:

$$\begin{aligned} \mathrm{DTV}_t &= \log\left(\frac{\mathrm{TV}_t - \mathrm{TV}_{t-1}}{\mathrm{POPULATION}}\right) \Leftrightarrow \mathrm{TV}_t > \mathrm{TV}_{t-1}, \\ &= 0 \quad \text{otherwise.} \end{aligned} \tag{2}$$

Final Model Specification. The explicit form of the recruiting performance model

$$\mathrm{LEAD}_{it} = c_1 \mathrm{UNEMP}_{it}^{d_1} \mathrm{PBLACK}_{it}^{d_2} \mathrm{URBAN}_{it}^{d_3} \mathrm{EARN}_{it}^{d_4} \mathrm{PROPM}_i^{d_5} \mathrm{SENIORS}_{it}^{d_6}$$

$$e^{a_2 Q2_t + a_3 Q3_t + a_4 Q4_t + a_5 GI1_t + a_6 GI2_t}$$

$$\mathrm{MASS}_{it}^{b_1} \mathrm{MASS}_{i,t-1}^{b_2} \mathrm{DRA}_{it}^{b_3} \mathrm{DPRINT}_{it}^{b_4} \mathrm{DTV}_{it}^{b_5} \mathrm{DOD}_{it}^{b_6} \mathrm{MAIL}_{i,t-1}^{b_7}$$

$$\mathrm{MAIL}_{i,t-2}^{b_8} \mathrm{LAM}_{i,t-1}^{b_9} \mathrm{RAD}_{i,t-1}^{b_{10}} \mathrm{POOL}_{i,t}^{b_{11}} e^{u_{1,it}},$$

$$\mathrm{DEP}_{it} = c_2 \mathrm{UNEMP}_{it}^{d_1'} \mathrm{PBLACK}_{it}^{d_2'} \mathrm{URBAN}_{it}^{d_3'} \mathrm{EARN}_{it}^{d_4'} \mathrm{PROPN}_i^{d_5'} \mathrm{SENIORS}_{it}^{d_6'}$$

$$e^{a_2' Q2_t + a_3' Q3_t + a_4' Q4_t + a_5' \mathrm{GI1}_t + a_6' \mathrm{GI2}_t}$$

$$\mathrm{LEAD}_{i,t-1}^{b_1'} \mathrm{ADV}_{i,t}^{b_2'} \mathrm{ADV}_{i,t-1}^{b_3'} \mathrm{LAM}_{i,t-1}^{b_4'} \mathrm{RAD}_{i,t-1}^{b_5'}$$

$$\mathrm{REC}_{it}^{b_6'} \mathrm{DSREQ}_{it}^{b_7'} e^{u_{2,it}},$$

$$\mathrm{DSHIP}_{it} = c_3 \mathrm{UNEMP}_{it}^{d_1''} \mathrm{PBLACK}_{it}^{d_2''} \mathrm{URBAN}_{it}^{d_3''} \mathrm{EARN}_{it}^{d_4''} \mathrm{PROPN}_i^{d_5''} \mathrm{SENIORS}_{it}^{d_6''}$$

$$e^{a_2'' Q2_t + a_3'' Q3_t + a_4'' Q4_t + a_5'' \mathrm{GI1}_t + a_6'' \mathrm{GI2}_t}$$

$$\mathrm{LEAD}_{i,t-1}^{b_1''} \mathrm{ADV}_{it}^{b_2''} \mathrm{ADV}_{i,t-1}^{b_3''} \mathrm{LAM}_{i,t-1}^{b_4''} \mathrm{RAD}_{i,t-1}^{b_5''}$$

$$\mathrm{REC}_{it}^{b_6''} \mathrm{DSREQ}_{it}^{b_7''} e^{u_{3,it}}.$$

Recall that all variables are expressed in per capita ($\times 1000$) figures, except for the dummy variables, unemployment and the two propensity measures. The multiplicative response model implies that zero values of one or more explanatory variables are associated with zero values of the dependent variable. This feature is meaningless for the advertising expenditures. They were rescaled by adding one (dollar) to the observations, e.g. per capita advertising = (ADV + 1)/population. This transformation ensures model robustness at zero advertising and has no meaningful impact on the estimation of advertising elasticities.

Tests for Homogeneity. Although several district- or time-specific variables are included in the model, the assumption of constant structure remains to be verified empirically. Two important questions arise: (1) did the recruitment response functions remain the same over time, e.g. in periods of strong vs. weak economic activity and (2) are the functions similar for the above average vs. below average performing districts? These hypotheses were tested by comparing regression models for the first 18 vs. the second 18 months in the sample, and for the upper half vs. the lower half of districts in average goal performance.[7] The conventional F values for these tests were:

Test	Model:	LEADS	DEP CONTRACTS	DSHIP CONTRACTS
			8.0	11.4
			5.2	5.0

Both the "strong" test (Chow [4]) and the "weak" test (Wallace [18]) for pooling reject homogeneity over time in all cases at $p < 0.01$. In addition, only leads appear to follow a constant response across districts. In conclusion, it is useful to compare all the response parameters between time samples, and the DEP and DSHIP contract parameters between districts.[8] The econometric results are shown in Tables 1, 2 and 3.

TABLE 1

Lead Equations

	(1.1) Full Sample	(1.2a) First 18 Months	(1.2b) Second 18 Months
CONSTANT	3.482 (0.700)[a]	4.314 (1.046)[a]	4.883 (1.007)[a]
UNEMP	0.310 (0.059)[a]	0.441 (0.072)[a]	0.356 (0.079)[a]
PBLACK	0.140 (0.019)[a]	0.172 (0.025)[a]	0.131 (0.024)[a]
URBAN	0.241 (0.053)[a]	0.174 (0.067)[a]	0.368 (0.068)[a]
EARN	− 0.293 (0.093)[a]	− 0.245 (0.121)[b]	− 0.471 (0.120)[a]
PROPM	0.468 (0.117)[a]	0.347 (0.137)[a]	0.446 (0.161)[a]
SENIORS	0.724 (0.100)[a]	0.702 (0.112)[a]	0.933 (0.156)[a]
$Q2$	− 1.014 (0.149)[a]	− 1.207 (0.059)[a]	− 0.525 (0.077)[a]
$Q3$	− 1.219 (0.057)[a]	− 0.709 (0.139)[a]	− 0.860 (0.074)[a]
$Q4$	− 0.439 (0.056)[a]	0.034 (0.136)	− 0.367 (0.070)[a]
GI1	0.794 (0.065)[a]	(2)	
GI2	− 0.823 (0.065)[a]	− 1.633 (0.111)[a]	
MASS	0.237 (0.015)[a]	0.184 (0.037)[a]	0.076 (0.024)[a]
MASS (−1)	0.207 (0.020)[a]	0.078 (0.028)[a]	0.239 (0.030)[a]
DRA	− 0.004 (0.004)	0.077 (0.008)[a]	− 0.004 (0.005)
DPRINT	0.011 (0.004)[a]	− 0.005 (0.005)	0.052 (0.006)[a]
DVT	0.010 (0.004)[a]	0.007 (0.012)	0.006 (0.005)
DOD	0.003 (0.005)	0.010 (0.005)[b]	− 0.007 (0.046)
MAIL (−1)	0.046 (0.005)[a]	0.052 (0.008)[a]	0.148 (0.013)[a]
MAIL (−2)	0.065 (0.006)[a]	0.109 (0.016)[a]	0.066 (0.010)[a]
LAM (−1)	− 0.059 (0.016)[a]	− 0.019 (0.015)	− 0.130 (0.031)[a]
RAD (−1)	0.016 (0.019)	0.004 (0.026)	0.039 (0.028)
POOL	0.182 (0.046)[a]	0.193 (0.062)[a]	0.195 (0.064)[a]
R^2	0.706	0.769	0.778
N	1462	688	774
F	156.69[a]	105.32[a]	132.20[a]

[1] The parameter estimates are accompanied by standard errors between brackets and significance levels a ($p < 0.01$), b ($p < 0.05$) and c ($p < 0.10$).

[2] GI effect excluded because of overlap with $Q4$.

[7] The time sample corresponds to a period of gradually increasing economic activity: the unemployment rate declined from 7.2% in 1976 to 5.7% in 1978.

[8] It would of course be interesting to investigate model heterogeneity in greater detail, however this would require a much larger data base.

TABLE 2

DEP Contract Equations[1]

	(2.1) Full Sample	(2.2a) First 18 Months	(2.2b) Second 18 Months	(2.3a) Top 22 Districts	(2.3b) Bottom 21 Districts
CONSTANT	2.540 (0.713)[a]	2.647 (0.800)[a]	2.095 (1.207)[c]	4.316 (0.940)[a]	0.258 (1.141)
UNEMP	0.367 (0.051)[a]	0.290 (0.059)[a]	0.077 (0.089)	0.230 (0.065)[a]	0.623 (0.091)[a]
PBLACK	− 0.040 (0.016)[a]	− 0.099 (0.017)[a]	0.039 (0.025)	− 0.034 (0.021)[c]	− 0.117 (0.027)[a]
URBAN	− 0.160 (0.048)[a]	− 0.128 (0.055)[b]	− 0.144 (0.074)[b]	− 0.144 (0.063)[b]	− 0.274 (0.080)[a]
EARN	− 0.091 (0.075)	0.187 (0.091)[b]	0.085 (0.124)	− 0.315 (0.123)[a]	0.147 (0.107)
PROPM	0.313 (0.088)[a]	0.288 (0.097)[a]	0.403 (0.141)[a]	0.256 (0.106)[b]	0.077 (0.162)
SENIORS	0.202 (0.101)[b]	0.031 (0.105)	0.398 (0.182)[b]	0.217 (0.131)[c]	0.318 (0.165)[b]
$Q2$	− 0.325 (0.037)[a]	− 0.240 (0.049)[a]	− 0.490 (0.068)[a]	− 0.288 (0.045)[a]	− 0.331 (0.058)[a]
$Q3$	− 0.152 (0.040)[a]	0.033 (0.057)	− 0.346 (0.067)[a]	− 0.140 (0.048)[a]	− 0.196 (0.064)[a]
$Q4$	− 0.052 (0.040)	0.124 (0.052)[b]	− 0.241 (0.071)[a]	− 0.137 (0.047)[a]	0.042 (0.064)
GI1	0.966 (0.075)[a]	0.756 (0.122)[a]		0.982 (0.090)[a]	0.966 (0.116)[a]
GI2	− 0.158 (0.054)[a]	− 0.078 (0.054)		− 0.118 (0.065)[c]	− 0.217 (0.083)[a]
LEAD (− 1)	0.105 (0.020)[a]	0.157 (0.025)[a]	0.058 (0.033)[c]	0.071 (0.024)[a]	0.119 (0.030)[a]
ADV	0.027 (0.012)[b]	0.009 (0.032)	− 0.002 (0.017)	− 0.001 (0.014)	0.043 (0.019)[b]
ADV (− 1)	0.010 (0.014)	0.013 (0.018)	0.036 (0.025)	0.007 (0.017)	0.010 (0.022)
REC	0.618 (0.074)[a]	0.407 (0.085)[a]	0.794 (0.114)[a]	0.574 (0.094)[a]	0.639 (0.120)[a]
SREQ	− 0.154 (0.012)[a]	− 0.122 (0.012)[a]	− 0.199 (0.023)[a]	− 0.135 (0.013)[a]	− 0.097 (0.028)[a]
LAM (− 1)	0.005 (0.014)	0.001 (0.012)	− 0.002 (0.034)	0.004 (0.017)	0.011 (0.022)
RAD (− 1)	0.093 (0.015)[a]	− 0.021 (0.019)	0.132 (0.028)[a]	0.119 (0.019)[a]	0.066 (0.024)[a]
R^2	0.423	0.583	0.323	0.484	0.433
N	1505	731	744	770	735
F	61.41[a]	55.22[a]	22.59[a]	39.04[a]	30.35[a]

The parameter estimates are accompanied by standard errors between brackets and signficance levels a ($p < 0.01$), b ($p < 0.05$) and c ($p < 0.10$).

TABLE 3

DSHIP Contract Equations[1]

	(3.1) Full Sample	(3.2a) First 18 Months	(3.2b) Second 18 Months	(3.3a) Top 22 Districts	(3.3b) Bottom 21 Districts
CONSTANT	3.659 (0.913)[a]	1.244 (1.465)	2.955 (1.107)[a]	1.769 (1.265)	8.336 (1.410)[a]
UNEMP	0.135 (0.065)[b]	0.022 (0.107)	0.397 (0.081)[a]	0.135 (0.088)	− 0.028 (0.113)
PBLACK	0.098 (0.020)[a]	0.085 (0.032)[a]	0.043 (0.023)[c]	0.081 (0.028)[a]	0.150 (0.034)[a]
URBAN	0.618 (0.061)[a]	0.765 (0.101)[a]	0.417 (0.068)[a]	0.540 (0.084)[a]	0.464 (0.099)[a]
EARN	− 0.520 (0.096)[a]	− 0.527 (0.166)[a]	− 0.504 (0.114)[a]	− 0.171 (0.166)[a]	− 0.707 (0.132)[a]
PROPN	0.541 (0.112)[a]	0.835 (0.177)[a]	− 0.013 (0.130)	0.204 (0.143)	1.023 (0.200)[a]
SENIORS	0.900 (0.129)[a]	0.880 (0.192)[a]	0.282 (0.167)[c]	0.988 (0.176)[a]	1.363 (0.203)[a]
$Q2$	− 0.078 (0.048)[c]	− 0.123 (0.090)	− 0.028 (0.062)	− 0.031 (0.060)	− 0.156 (0.072)[b]
$Q3$	0.121 (0.051)[b]	0.062 (0.105)	0.206 (0.062)[a]	0.145 (0.065)[b]	0.074 (0.079)
$Q4$	− 0.006 (0.051)	0.280 (0.096)[a]	− 0.062 (0.065)	0.030 (0.064)	− 0.045 (0.079)
GI1	− 0.149 (0.095)	− 0.447 (0.224)[b]		− 0.196 (0.121)[c]	− 0.106 (0.143)
GI2	0.062 (0.068)	0.232 (0.098)[b]		− 0.132 (0.087)[c]	0.258 (0.103)[b]
LEAD (− 1)	− 0.036 (0.025)	0.024 (0.045)	− 0.060 (0.031)[b]	− 0.045 (0.033)	− 0.053 (0.037)
ADV	− 0.013 (0.015)	− 0.005 (0.058)	− 0.019 (0.016)	− 0.006 (0.019)	− 0.028 (0.024)
ADV (− 1)	0.018 (0.018)	0.104 (0.033)[a]	0.004 (0.023)	0.003 (0.022)	0.025 (0.027)
REC	0.243 (0.094)[a]	0.296 (0.155)[c]	0.269 (0.105)[a]	0.204 (0.127)[c]	0.116 (0.148)
SREQ	0.648 (0.015)[a]	0.729 (0.021)[a]	0.458 (0.021)[a]	0.656 (0.017)[a]	0.587 (0.034)[a]
LAM (− 1)	− 0.032 (0.018)[c]	− 0.038 (0.023)[c]	− 0.018 (0.031)	− 0.024 (0.023)	− 0.017 (0.027)
RAD (− 1)	0.013 (0.020)	0.053 (0.035)	− 0.010 (0.025)	0.029 (0.025)	0.044 (0.030)
R^2	0.678	0.762	0.579	0.792	0.524
N	1505	731	774	770	735
F	173.45[a]	126.10[a]	65.06[a]	158.28[a]	43.78[a]

The parameter estimates are accompanied by standard errors between brackets and significance levels a ($p < 0.01$), b ($p < 0.05$) and c ($p < 0.10$).

7. Discussion of Results

Including the parameter changes over time and across districts, there are some 250 possible results to report from the tables. Without attempting to be fully exhaustive, the discussion will group these findings in the earlier defined four categories: economic, sociodemographic, other environmental and marketing effects. In reporting the elasticities, the parameters from the pooled models (1.1), (2.1) and (3.1) will be used when they appear to be stable. Even in the event of bias caused by inappropriate pooling, these parameters are useful because they are based on a larger sample (Wallace [18]).

When the parameters are unstable over time, the discussion will consider the fact that the first period corresponded to a "friendly" recruiting environment, i.e. a relative high demand for jobs due to high unemployment rates, and the second period to a "difficult" recruiting environment (strong civilian economy). Secondly, parameter instability across districts allows the profiling of stronger vs. weaker NRDs. In particular, it is of interest to examine to what extent changes in recruiting efforts are likely to improve performance in difficult periods and in traditionally weaker districts.

Economic Factors. Overall, the results are in agreement with prior research that characteristics of the economic environment have a profound influence on recruiting performance. For example, the unemployment rate is consistently positively related to lead generation (elasticity around 0.31). Unemployment also affects number of contracts directly, but in an asymmetric manner: in the first period, it was primarily related to DEP contracts (elasticity 0.29) and in the second period to DSHIP contracts (around 0.40). Similarly, the bottom-half NRDs are sensitive to unemployment rates, with an elasticity as high as 0.61 for DEP contracts. These results are a first indicator of the difference between the DEP and the DSHIP markets: adverse recruiting conditions affect the DEP market first and are only felt in the DSHIP contracts when the erosion of the DEP pool renders the monthly shipment goals very difficult to meet.

The second economic variable, civilian earnings, is generally related to recruiting performance with the expected negative sign, although the effects are unstable. Its influence on leads ranges from -0.25 to -0.47. More importantly, civilian earnings are most important for the DEP market in the top districts (-0.34) and for the DSHIP market in the bottom NRDs (-0.70). Since this variable is a proxy for military pay, the findings suggest that the current administration's decision to boost the pay rates will have a beneficial effect on recruiting, holding everything else constant.

Sociodemographic Factors. Their overall influence on recruiting is at least as important as the economic variables and further illustrates differences between the DEP and the DSHIP market. For example, the percentage blacks shows a stable, positive relationship to leads (elasticity around 0.14) and DSHIP contracts (around 0.09), but a negative influence on DEP contracts (-0.04). Similarly, higher urbanization is associated with more leads (0.24), more DSHIP contracts (0.61), but fewer DEP contracts (-0.15). The findings indicate that the DEP/DSHIP markets can be segmented along these two sociodemographic factors.

The most important sociodemographic factor is the size of the high school senior population (SENIORS). Its effect on lead generation is high and stable (around 0.72). Contracts are sensitive to SENIORS primarily in the DSHIP category (0.85 on average) and in the DEP category in the second period (around 0.40). Most importantly, SENIORS is a powerful predictor of contract performance in the bottom-half NRDs: 0.37 for DEP and 1.37 for DSHIP contracts. This is an important result, because it indicates that the success of recruiting efforts in weaker districts and/or difficult periods is severely limited by the actual availablity of high school seniors.

Other Environmental Variables. As expected, the GI Bill had a drastic impact on recruitment, i.e. positive at the end of 1976 and negative in early 1977. In terms of

leads generated, the GI Bill may have just shifted inquiries from one period to another, as the elasticities are about equal in absolute values (0.79 and −0.82). However, the net effect on DEP contracts was substantially positive (elasticities around 0.96 and −0.17), indicating again the importance of monetary rewards in military recruiting. Finally, there was no meaningful effect on DSHIP contracts: since the GI Bill conditions referred to the contract signing, not the shipment date, there was no special incentive for recruits to sign DSHIP contracts before the deadline.

The seasonal effects on recruiting are most pronounced for leads, with elasticities −1.01 (Spring), −1.22 (Summer) and −0.44 (Fall), consistent with the prior hypotheses. Seasonality is significant, but less important for DEP contracts (between −0.06 and −0.33) and virtually nonexistent for DSHIP contracts.

The attitudinal variables propensity toward the military and toward the Navy highlight the importance of institutional image on recruiting. Military propensity is a strong and stable predictor of lead rates (elasticity around 0.47), as hypothesized. Navy propensity is most strongly related to DSHIP contracts, in particular in the first period (0.84) and the bottom-half NRDs (1.00). This finding suggests that the Navy's efforts to gradually improve its image as a potential employer among young males should have a beneficial effect on its recruiting performance in the long run.

Marketing Variables. The results so far have shown that recruiting performance is very sensitive to changes in various noncontrollable, environmental factors. Against this background, the Navy's marketing efforts display some intriguing effects. First, the contribution of national leads on accession contracts is significant only for DEP contracts, with a low elasticity (about 0.11). This finding suggests that most contracts are written as a result of locally generated leads, i.e. visits made by prospects to local recruiting stations. Also, the elasticity dropped over time (from 0.16 to 0.06); since electronic media advertising was predominant in the second period, it is likely that the leads generated by these media were of poorer quality.

The strongest advertising effects were observed in the lead equations, with overall elasticities for mass advertising around 0.44 and for direct mail around 0.11 (these effects tend to change over time, but are remarkably similar across districts). Local advertising, which is expected to generate local leads, has a mildly negative effect on national leads (around −0.06), suggesting that the two sources of leads essentially compete with each other. The hypothesized wearout effects of media advertising are generally confirmed, although with a low magnitude. For example, radio advertising (first introduced in 1976) had a differential stimulus effect of 0.08 in the first period and print advertising, which was drastically reduced after 1976, had a similar effect (around 0.05) in the second period. There is some mild evidence that wearout may be related to the intensity of use of a medium, but further research on more detailed data is needed here. Finally, we observe a significant word-of-mouth effect on leads, as the elasticity of the DEP pool size is around 0.18.

In the context of high-involvement decision making, it is not surprising to find that personal selling has a much stronger influence on recruitment than advertising (the direct effect of national advertising on contracts is small and only significant in the DEP category). The quantitative measure, size of the sales force, has an elasticity of 0.63 on DEP and 0.26 on DSHIP contracts. The motivational factor, direct-shipment requirement, has the hypothesized positive effect on DSHIP (0.63) and negative on DEP contracts (−0.16). All these coefficients are relatively stable, except for a nonsignificant influence of recruiters on DSHIP in the bottom-half districts. In addition, recruiting aids appear to be effective in increasing DEP contract performance, with an elasticity of 0.09.

The comparison of size vs. motivational effects of personal selling is very insightful and perhaps unique in the literature. For example, in the "friendly" environment of

the first period, the size effect on DEP contracts was fairly low (0.41), but it nearly doubled (0.79) in the second period. At the same time, there was a higher need for direct-shipment contracts in order to meet goal, resulting in a sizeable increase in the SREQ coefficient (from -0.12 to -0.20). The fact that fewer NRDs were able to meet goal in the second period is reflected in the substantial drop in the SREQ coefficient in the DSHIP equation (from 0.73 to 0.46).

In summary, the recruiting efforts of the Navy between 1976 and 1978 decidedly had a positive impact on performance, but they generally were not as strong as the influence of environmental changes.

8. Conclusions

The process underlying volunteer Navy enlistments is complex, involving various environmental and marketing forces. This study has made an attempt to quantify that process by combining Navy Recruiting Command's insights, elements of economics and marketing, and historical data analysis. Econometric models of recruiting performance, as measured by lead rates, DEP and DSHIP contract rates, were developed and estimated. The explanatory variables included several environmental factors, such as unemployment rate and youth attitude toward the Navy, and marketing efforts in the areas of advertising and personal selling.

The econometric models produced a number of substantive findings which can be integrated—though not perfectly—along three dimensions: (1) the relative impact of environmental vs. marketing variables on recruiting performance, (2) differences in response structure for the various criterion variables and (3) the relative effectiveness of media advertising and personal selling.

Overall, changes in the environment have a more drastic impact on recruiting performance than changes in marketing efforts. For example, the national average advertising/sales ratio (total media advertising divided by total contracts) was \$41 in 1976, \$76 in 1977 and \$96 in 1978. During that period, unemployment declined from 7.2% to 6.2% to 5.7% and the total numbers of contracts written were about 104,000, 83,000 and 68,000. These figures illustrate that increased marketing spending does not fully compensate for a more difficult recruiting environment (e.g. a declining unemployment rate). At the district level, differences in youth attitudes toward the Navy, degree of urbanization, proportion of high school seniors and blacks in the target market are primarily responsible for the variability in recruiting performance across NRDs, in spite of the fact that the poorly performing NRDs have received more recruiters, local advertising and recruiter aid support on a per capita basis.

It is difficult to compare this substantive finding to others in the literature, because few empirical macro-marketing studies have included many environmental explanatory variables. As far as advertising is concerned, the result is in line with "Finding 5" of Lambin's exhaustive empirical investigation, which states that "the impact of advertising is modest in comparison with that of environmental factors and other marketing variables" [8, p. 101].

The second area of substantive conclusions is a comparison of the response functions for leads and contracts. Number of leads as a criterion variable implies a lower behavioral commitment than number of accession contracts. In this light, it is not counterintuitive to find that leads are more sensitive to changes in the environmental and marketing variables (e.g. advertising) than contracts. In general, the R^2's for the lead equations are also higher than for the contracts equations.

Perhaps the richest findings are in the area of advertising and personal selling. One unique aspect of this study was the presence of quantitative *and* motivational data on personal selling, i.e. recruiter strength and direct-shipment requirement. The models

indicate that, when motivation is most important (i.e. for the direct-shipment contracts), changes in the sales force size have a smaller impact on performance. However, for the "unconstrained" DEP contracts, it is recruiter strength which has the higher elasticity.

On the advertising side, the results confirm one aspect of the hierarchy-of-effects hypothesis in that its effect on leads ("interest") is higher than on contracts ("purchase"). More importantly, the leads model provides evidence of advertising wearout effects. To the best of the authors' knowledge, this study is the first to investigate wearout in multiple media. The fact that the differential stimulus elasticities are different and not always significant raises some theoretical questions such as "is there a relationship between the newness of a medium and wearout" and "is there a negative relationship between advertising main effects and wearout?"

In comparison to the existing literature, this study has introduced a large number of new variables with a hypothesized impact on recruiting performance. There are, however, some limitations: the effects of locally generated leads on contracts remain unexplored, for lack of data. Also, some potentially important breakdowns of accession contracts, such as high school vs. other contracts or high vs. low aptitude recruits, were not available. It is hoped that further research will have access to these data, for the benefit of our understanding of the volunteer enlistment process.

Appendix A. Data Description[9]

Performance Variables

—$LEAD_{it}$: the number of NOIC leads (national advertising leads) received from prospects residing in district i in month t ($i = 1, 43$ and $t = 1, 36$),

—DEP_{it}: number of contracts for the delayed-entry program (i.e., future accession),

—$DSHIP_{it}$: number of contracts written for immediate shipment.

Environmental Data

—$UNEMP_{it}$: general unemployment rate in district i and month t.

—$POPN_{it}$: the 17–21 year old male population. Data were available for December 1976 and December 1977 only; the data for the remaining months were approximated through linear interpolation and extrapolation. This variable is used to convert the data to a per capita basis.

—$PBLACK_{it}$: percentage of blacks in the 17–21 male group, computed as above.

—$URBAN_{it}$: percentage of the target population living in urban areas (i.e., SMSAs).

—$EARN_{it}$: average weekly dollar earnings by production or nonsupervisory workers in the manufacturing sector, for the area closest matching NRD i.

Source: U.S. Department of Labor, Bureau of Statistics.

—$SENIORS_{it}$: percentage high-school seniors in the target population.

—$GI1_t$, $GI2_t$: dummy variables to represent the special effects of the"GI Bill," signed by President Ford on October 15, 1976:

$GI1_t = 1$ for t = December 1976 (November and December for leads)

$= 0$ otherwise,

$GI2_t =$ for t = January 1977, February 1977,

$= 0$ otherwise,

[9]All the data, except civilian wage rates, were provided by the U.S. Navy Recruiting Command. The advertising data were deflated using the media inflation rates provided by the Navy's advertising agency.

—$Q2_t$, $Q3_t$, $Q4_t$: dummy variables for each quarter (the first quarter is the base level),

—$PROPN_i$: propensity toward the Navy, compiled from Office of Secretary of Defense (OSD) semiannual youth attitude tracking surveys (Market Facts 1977).

Although several observations over time were available, the sample sizes per NRD were too small to be reliable. Consequently, the surveys were pooled for a total sample size of over 20000.

—$PROPM_i$: propensity toward the military in general, compiled in the same way as $PROPN_i$.

Marketing Data

—REC_{it}: number of recruiters assigned to NRD i in month t,

—RAD_{it}: expenditures on recruiting aids used by the recruiters assigned to NRD i in month t (i.e., brochures, flyers, posters, etc.). Data were available by quarter only and were allocated to each month in identical fractions.

—TV_{it}: expenditures on TV advertising,

—RA_{it}: expenditures on radio,

—$MAIL_{it}$: expenditures on direct mail,

—OD_{it}: expenditures on outdoor advertising (billboards),

—$PRINT_{it}$: expenditures on print media (magazine, newspapers, newspaper supplements),

—$MASS_{it}$: total mass media expenditures (TV + RA + PRINT + OD),

—ADV_{it}: total advertising expenditures (MASS + MAIL).

Note. The advertising data were collected at the county level and were aggregated to NRD level, taking into account some changes in NRD boundaries over the period of observation.

—LAM_{it}: expenditures by local NRD commanding officers on local media.

Typically, the NRDs use these monies on such media as city newspapers, college newspapers or local radio stations. These data were compiled in the same way as for RAD_{it}.

—$SREQ_{it}$: the requirement of direct shipment contracts at the beginning of month t for NRD i, in order to meet the recruiting goal for the month. It is computed as follows: goal accessions minus expected accessions from the DEP pool (previously written contracts to ship in the current month). This variable is zero if the difference is negative.

—$POOL_{it}$: number of previously written contracts for accession in the future. This variable is a proxy for potential "word-of-mouth" effects: more people in the DEP pool means more exposure to a career in the Navy for their peers, e.g., high school seniors.[10]

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