

Market Analysis of the CHAMPUS Select Program  
in the Ft. Stewart Catchment Area

A Graduate Management Project

Submitted to the Faculty

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in Health Care Administration

Master of Health Administration

by

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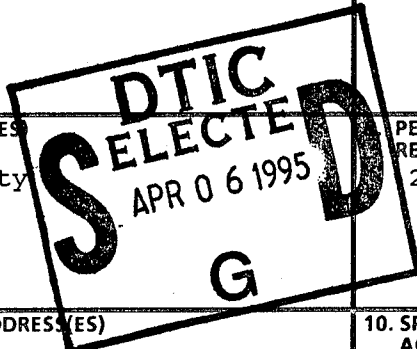
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## ABSTRACT

This graduate management project was designed to determine if there were any significant differences in the population of beneficiaries who are using CHAMPUS Select from that population using standard CHAMPUS providers. Additionally, the project examined the preferred provider network penetration rate. The study sample was 1993 CHAMPUS outpatient claims from the Fort Stewart, Georgia, catchment area. Multiple linear regression analysis using a linear probability model demonstrated that the explanatory variables PATIENT AGE, PRESENCE OF OTHER HEALTH INSURANCE, BRANCH OF SERVICE, BENEFICIARY CATEGORY, and ZIPCODE were significant predictors of CHAMPUS Select utilization in the claims sample for fiscal year 1993. The variables PREVIOUS YEARS EXPENDITURES, GENDER, and SPONSOR PAY GRADE were not significant as predictor variables of the dependent variable at the 0.05 alpha level. The LPM regression on CHAMPUS Select claims resulted in an R-squared value of 0.0247 and F-value of 31.279 with 27 degrees of freedom for an associated probability of 0.0001 for the overall model. The CHAMPUS Select claims penetration rate of 17.1% was found to be significantly higher than the expected rate of 15.6%. The expected rate was derived from the percentage of CHAMPUS Select providers in the study sample's total CHAMPUS providers. The difference in the observed and expected proportions gives a Z-test statistic of 7.525 with an associated probability of 2.624E-14.

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## TABLE OF CONTENTS

<u>CHAPTER</u>	<u>PAGE</u>
I. INTRODUCTION . . . . .	1
A. Conditions which prompted the study . . . . .	1
B. Statement of the problem . . . . .	5
C. Literature review . . . . .	5
D. Purpose . . . . .	8
II. METHODS AND PROCEDURES . . . . .	12
III. RESULTS . . . . .	15
IV. DISCUSSION . . . . .	23
V. CONCLUSIONS AND RECOMMENDATIONS . . . . .	32
VI. APPENDICES	
A. APPENDIX A Statistical Analysis System Programs . .	35
B. APPENDIX B Chi-square and regression results . . .	44
VII. REFERENCES . . . . .	52

LIST OF TABLES

<u>TABLE</u>	<u>PAGE</u>
1. Descriptive statistics . . . . .	16
2. Chi-square analysis . . . . .	18
3. Linear probability model . . . . .	20
4. CHAMPUS Select claims proportion vs provider proportion .	22

## INTRODUCTION

Military medical treatment facility (MTF) commanders are not provided an accurate, detailed picture of how the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS) Select preferred provider network (PPN) is performing in their catchment areas. The right mix of providers by specialty and geography is not known because utilization by specialty and geographic area has not been described. Furthermore, the MTF commanders need to be provided information on the type of patient that is seeking or is not seeking CHAMPUS Select providers. If the high dollar cost patient is continuing to utilize standard CHAMPUS providers, an opportunity to save CHAMPUS expenditures is being missed. If high volume, high cost users can be steered toward a CHAMPUS Select provider, both the government and beneficiary can save.

### Conditions which prompted the study.

The military health care system delivers its services to beneficiaries in one of two ways: the direct care system that includes 148 military hospitals and 16,000 health care providers; and the Civilian Health and Medical Program of the Uniformed Services (Boyer and Sobel 1993). The increasing costs of CHAMPUS during the 1980s prompted Congressional action. Since 1988, Congress has initiated a number of programs designed to control the increasing costs of CHAMPUS. The four major programs were:

Catchment Area Management; Primary Care for the Uniformed Services; CHAMPUS Reform Initiative; and preferred provider networks. The Department of Defense (DOD) took a three-pronged approach to controlling CHAMPUS costs while maintaining beneficiary access to needed health services. The first approach was adoption of Medicare's diagnosis related group (DRG) payment methodologies. The second prong of the attack was the CHAMPUS recapture program that allowed use of CHAMPUS funds by military MTF commanders for the purpose of recapturing patients and workload back into the direct care system. The third major approach was to use the considerable market buying power of CHAMPUS to leverage favorable arrangements in the managed care arena. Managed care options offered the opportunity to lower health care expenditures through increasing coordination between the military MTF and CHAMPUS providers while improving the quality of the health benefit (Gisin and Sewell 1989).

CHAMPUS Select is a Department of Defense program in the Southeast region of the United States. It is essentially a preferred provider network of physicians and hospitals that have contracted to accept a reduced CHAMPUS reimbursement rate. In addition, beneficiaries who utilize CHAMPUS Select have their copayment reduced by 5% (from 20% to 15% for family members of active duty; from 25% to 20% for retirees and their family members). It should be noted that these savings do not take effect until the CHAMPUS annual deductible has been satisfied for the family.

This study investigates the preferred provider network (CHAMPUS Select) program which is a product of the fiscal intermediary managed care initiative (Fant and Pool 1990). Fiscal intermediary managed care initiatives were implemented by DOD through modification of existing contracts with fiscal intermediaries to include features such as utilization review, preadmission screening, and contracting for care on a negotiated basis. The first fiscal intermediary managed care program was a two year demonstration project conducted by the fiscal intermediary for the Southeast U.S. region (Alabama, Florida, Georgia, Mississippi, and Tennessee). A preferred provider network was selected as the managed care model. Preferred provider organizations are networks of providers who agree to provide services to beneficiaries at a discounted rate with utilization review mechanisms in return for an increased volume of patients.

The two year demonstration project that started in July 1988 was evaluated by DOD in July 1989 and the results of that evaluation were presented to Congress in October 1989. DOD Health Affairs recommended continuance of the fiscal intermediary (FI) managed care program for the Southeast region. The current fiscal intermediary managed care program of the Southeast is called CHAMPUS Select. The fiscal intermediary is Wisconsin Physicians Services. The current fiscal intermediary preferred provider organization arrangement differs from the original demonstration project. The network now includes a wide spectrum

of providers and hospitals, professional, and ancillary services.

Wisconsin Physician Services (WPS) has contracted with Health Care Compare (HCC) for development of the preferred provider network. HCC reports monthly on the penetration rate of its networks in each catchment area. The penetration rate was approximately 20% for the entire Southeast region as of March 1990. The penetration rate for the Fort Stewart catchment area grew steadily as the network was developed and expanded. The current penetration rate varies between 15% and 20%. Penetration rate is a commonly used measure of managed care program performance. Typically, it is expressed as the percentage of enrolled members of the available population. Because enrollment in the CHAMPUS Select program is not required for beneficiaries, penetration rate is not measured by the number of enrollees; it is measured as a percentage of CHAMPUS professional services. The number of CHAMPUS Select professional services is divided by the total CHAMPUS professional services for which claims were made in the catchment area to calculate the penetration rate.

Health Care Compare and Wisconsin Physician Services state that the penetration rate of Select is approximately 15-20% of CHAMPUS claims in the area. I was interested in determining what was the penetration rate by specialty and by geographic area. This knowledge could be used to concentrate marketing efforts-- marketing efforts directed toward recruiting network providers and marketing efforts to encourage use of network providers by patients. I also wanted to determine if the penetration rate was

different from the percentage of Select providers in the area. If the percentage of Select providers in an area was 5% of the total CHAMPUS providers, then a penetration rate of 15-20% would be significant because patients might be actively seeking out those Select providers over standard CHAMPUS providers. Likewise, if the Select providers were actually 50% of the CHAMPUS providers, a 15-20% penetration rate is not impressive.

The other question to be answered by this study is whether or not descriptive characteristics can be used to differentiate users of CHAMPUS Select from standard CHAMPUS users. There may be demographic, behavioral, or medical attributes that can be used to characterize those beneficiaries who are using or should be using CHAMPUS Select.

#### **Statement of the problem.**

This project attempts to determine if there are any significant differences in the population of beneficiaries who are using CHAMPUS Select from that population using standard CHAMPUS. Investigation of CHAMPUS claims data may reveal certain characteristics of CHAMPUS beneficiaries that can be used to predict choice behavior of beneficiaries in selecting providers of health services.

Additionally, this project will provide a more detailed and meaningful description of the preferred provider network penetration rate.

#### **Literature review.**

There is little in the literature on military health care

delivery system marketing studies. Most DOD marketing studies in the literature address development of marketing plans, with an emphasis on promotional activities. Rubenstein (1990) developed a marketing plan for William Beaumont Army Medical Center that focuses on internal and external promotional efforts and public relations activities. A marketing plan was developed and implemented at Walter Reed Army Medical Center to increase utilization of an existing same day surgery program (Lenneville and Steinbruckner 1982).

The Managed Health Care Office, 58th Medical Group, Luke Air Force Base, Arizona, conducted a detailed market analysis of their catchment area that includes performance data for their CHAMPUS health maintenance organization (MEDEXCEL). In that study, penetration rates could be calculated as a percentage of enrollees of the total CHAMPUS-eligible population.

U.S. Army Medical Command (Provisional) MTFs have implemented managed care initiatives in the past few years. As part of the implementation process, business plans, to include catchment area marketing analyses, were formulated. However, these marketing analyses did not attempt to investigate the choice behavior of individual beneficiaries.

The economic theory of consumer choice suggests that a patient needing health care selects the provider that will maximize the patient's expected utility. Factors that may affect the choice of provider include: the distance to the provider, the availability of appropriate services (specialists, for

example), medical considerations, and personal factors. Patients evaluate their needs, scan the selection of providers, and choose the provider who can best meet their needs or maximize the expected utility of their health care expenditures (Dranove, et al. 1993).

Other studies (Zwanziger 1991) looked at the self selection effects in HMO enrollment. They found that HMO enrollees tend to be younger and healthier and are attracted by free preventative care, whereas others found that HMO enrollees tended to be high utilizers attracted by low co-payment requirements. These studies suggest that plan selection may result in systematic differences between the population enrolled in one plan and that enrolled in another.

This study has been primarily designed to investigate those factors that may have an influence on a beneficiary's choice of CHAMPUS Select or standard CHAMPUS provider. However, one hypothesis to be tested does address PPO performance--that is whether the penetration rate is a function of the percentage of Select providers in the catchment area.

Wells, et al. (1992) used claims data to study participation in PPOs in three large employers. Age was a significant discriminator in one of the employers. Other variables that were significant in differentiating participation were: income, education, and average years with the firm.

Zwanziger and Auerbach (1991) studied PPO performance based on expenditure data. They found that PPO enrollees tended to

have substantially lower health care expenditures in the prior year. Demographic data revealed that enrollees were more likely to be younger, have more dependents, and to be non-bargaining-unit employees.

Studies by Diehr found that PPO users differed significantly from non-PPO users by gender, age, employee/dependent status, and utilization in the previous year (Diehr 1990).

The Tri-Service CHAMPUS Statistical Database (TSCSD) does not include variables such as education, income, or years of service for claimants. However, rank can be used as a reasonable proxy for some of these variables. Rank should be directly proportional to years of service and income; its relationship to education levels is not as strong.

**Purpose.**

The first functional relationship to be examined in this study is: Beneficiary choice behavior in selecting a provider is a function of demographic, medical, and personal factors. The following are hypotheses to be tested (where  $H_01$  = null hypothesis 1; and  $H_a1$  = alternate hypothesis 1):

**$H_01$ :** There is no difference in the age distribution of CHAMPUS Select and standard CHAMPUS users in the studied population.

**$H_a1$ :** There is a difference in the age distribution of CHAMPUS Select and standard CHAMPUS users in the studied population.

**H<sub>0</sub>2:** There is no difference in previous year's health care expenditures between CHAMPUS Select and standard CHAMPUS users in the studied population.

**H<sub>a</sub>2:** There is a difference in previous year's health care expenditures between CHAMPUS Select and standard CHAMPUS users in the studied population.

**H<sub>0</sub>3:** There is no difference in the gender distribution of CHAMPUS Select and standard CHAMPUS users in the studied population.

**H<sub>a</sub>3:** There is a difference in the gender distribution of CHAMPUS Select and standard CHAMPUS users in the studied population.

**H<sub>0</sub>4:** There is no difference in the health insurance policy distribution of CHAMPUS Select and standard CHAMPUS users in the studied population.

**H<sub>a</sub>4:** There is a difference in the health insurance policy distribution of CHAMPUS Select and standard CHAMPUS users in the studied population.

**H<sub>0</sub>5:** There is no difference in the branch of service distribution of CHAMPUS Select and standard CHAMPUS users in the studied population.

**H<sub>a</sub>5:** There is a difference in the branch of service distribution of CHAMPUS Select and standard CHAMPUS users in the studied population.

**H<sub>0</sub>6:** There is no difference in the beneficiary category distribution of CHAMPUS Select and standard CHAMPUS users in the studied population.

**H<sub>a</sub>6:** There is a difference in the beneficiary category distribution of CHAMPUS Select and standard CHAMPUS users in the studied population.

**H<sub>0</sub>7:** There is no difference in the sponsor pay grade distribution of CHAMPUS Select and standard CHAMPUS users in the studied population.

**H<sub>a</sub>7:** There is a difference in the sponsor pay grade distribution of CHAMPUS Select and standard CHAMPUS users in the studied population.

**H<sub>0</sub>8:** There is no difference in the beneficiary zipcode distribution of CHAMPUS Select and standard CHAMPUS users in the studied population.

**H<sub>a</sub>8:** There is a difference in the beneficiary zipcode distribution of CHAMPUS Select and standard CHAMPUS users in the studied population.

**H<sub>0</sub>9:** Provider selection (CHAMPUS Select or standard CHAMPUS) is not a function of age, health care expenditures, gender, insurance, branch of service, beneficiary category, sponsor pay grade or patient zipcode.

**H<sub>a</sub>9:** Provider selection (CHAMPUS Select or standard CHAMPUS) is a function of age, health care expenditures, gender, insurance, branch of service, beneficiary category, sponsor pay grade or patient zipcode.

The second functional relationship to be examined in this study is if the penetration rate (number of CHAMPUS Select services divided by the total number of CHAMPUS services) is a function of the percentage of CHAMPUS Select providers in the population of all CHAMPUS providers in the catchment area. For this functional relationship, the following hypotheses are to be tested:

**H<sub>0</sub>10:** The penetration rate of CHAMPUS Select is directly proportional to the percentage of CHAMPUS Select providers in the catchment area.

**H<sub>a</sub>10:** The penetration rate of CHAMPUS Select is not directly proportional to the percentage of CHAMPUS Select providers in the catchment area.

The variables to be examined in this project are available in the Tri-Service CHAMPUS Statistical Database (TSCSD) or are derived from data in the TSCSD.

SELPROV is the variable for the number of CHAMPUS

Select providers expressed as a percentage of the total number of CHAMPUS providers in catchment area.

AGEx is the series of dichotomous variables coding for membership in one of seven 10-year age distributions.

FY92AAS7 is a variable calculated by summarizing an individual's total CHAMPUS allowable charges for the period of time of the study. Dichotomous variables coding for this characteristic are:

FY92EXP0=expenditures less than \$1000,  
FY92EXP1=expenditures from \$1000 to \$2000,  
FY92EXP2=expenditures from \$2000 to \$3000, and  
FY92EXP3=expenditures over \$3000.

GENDER is a dichotomous variable where 1 = male, 0 otherwise.

INS is the dichotomous variable coding for presence or absence of health insurance which is the primary payor for the CHAMPUS claim.

SBS is the sponsor's uniformed service branch that creates entitlement to health care. Possible entries are ARMY, USAF, USMC, and NAVY.

BENCAT is the variable coding for beneficiary category. The dichotomous variables for this characteristic are: FMAD = family member of an active duty sponsor, RET = a retired service member, and FMRET = a family member of a retired service member.

SPG7 is the military rank of the CHAMPUS beneficiary's sponsor. Values range from E-1 to O-10. Dichotomous variables (JRENLE=E1-E4, JRNCO=E5-E6, SRNCO=E7-E9, OFFCO=O1-O3, OFFFLD=O4-O6, OFFGEN=O7-O9, WO=W1-W4, and OTHER) are used to encode this characteristic.

ZIPCODE is the postal zip code for the beneficiary's residence. The dichotomous variables coding for this characteristic are: ZIP304 = zipcodes in the postal region 304, ZIP313 = zipcodes in the postal region 313, ZIP314 = zipcodes in the postal region 314, and ZIP315 = zipcodes in the postal region 315.

## METHODS AND PROCEDURES

The methodology employed in this project draws from the methods in 2 studies. The chi-square analysis is from a study (Sherwood, et al. 1988) in which large and small businesses were compared on responses to a series of survey questions. The linear probability model (LPM) is adapted from a Bureau of Labor Statistics staff paper (Cohen, et al. 1970) study of labor-force participation as a function of several socioeconomic-demographic variables.

The events to be studied are the claims that have been filed by CHAMPUS beneficiaries in the Ft. Stewart, Georgia catchment area which had dates of service during fiscal year 1993 (1 October 1992 through 30 September 1993, inclusive). These claims are entered into the Tri-Service CHAMPUS Statistical Database (TSCSD). CHAMPUS Select claims are differentiated from standard CHAMPUS in the TSCSD with a code of "N" for the Special Processing Code. Standard CHAMPUS claims are denoted with a Special Processing Code of "0". The dependent variable is a dichotomous or binary variable that is coded 1 for a CHAMPUS Select claim, 0 otherwise. The dependent variable is CHAMPUS Select utilization for each claim.

The TSCSD contains claims filed by beneficiaries in the Fort Stewart catchment area. However, all claims were not utilized in

the analysis. The purpose of this study is to examine the choice that beneficiaries make between CHAMPUS Select providers and standard CHAMPUS providers. It is not relevant to include claims made by catchment area beneficiaries who have sought care outside of Georgia; CHAMPUS Select providers are not available for family members who may have traveled to New York, for example.

Therefore, the claims data have been restricted to those in which the source of care (provider) zip code is in our catchment area. Using the same argument, the claims sample has been restricted to those in which the provider specialty is offered by both CHAMPUS Select and standard CHAMPUS providers. Patient choice cannot be evaluated for neurology services if there are no CHAMPUS Select providers of neurological services.

Included in the TSCSD are claims from CHAMPUS Partnership providers. These claims are identified by an "A" in the Special Processing Code field. These claims were excluded from the study sample because the care was provided within the military medical treatment facility. In these cases, patient choice involves a decision between seeking care at the military medical treatment facility or through CHAMPUS; not between individual CHAMPUS providers.

The data dictionary for the TSCSD was used to select the independent variables that were used for the LPM and for chi-square analysis. The statistical analysis of data was facilitated by the use of Statistical Analysis System (SAS), SAS Corporation, Carey, NC, and Microstat software for chi-square

analysis and testing of proportions.

Analysis of data from frequency distributions was by the chi-square test of significance for categorical data variables. All examined variables were included in a linear probability model (LPM) with the dependent variable of CHAMPUS Select claim, 1 for YES, and 0, otherwise. The LPM was constructed and analyzed using Statistical Analysis System (SAS). The comparison of the proportion of CHAMPUS Select providers and the proportion of CHAMPUS Select claims was made by the MicroStat test for differences between observed and expected proportions, which gives a Z-value and a probability that the proportions are significantly different.

The data used for analysis is secondary data that has been collected primarily for the purpose of claims administration. It has not been collected exclusively for research efforts or statistical analysis. Reliability of this secondary data cannot be determined by the researcher. However, the value of using this data lies in the objective manner in which it was collected, and in the large number of claims that are available for analysis.

## RESULTS

Descriptive statistics (mean and standard deviation) for the dependent and independent variables of this study are presented in Table 1. The sample was divided into CHAMPUS Select claims and standard CHAMPUS claims. Because the study variables were converted to dichotomous variables, the mean value for a variable is actually the percentage of the sample that possesses the characteristic in question. A cursory examination of this table reveals differences in the percentage of CHAMPUS Select and standard CHAMPUS claims for a number of study variables. The significance of these mean or percentage differences is determined by chi-square analysis.

Table 2 summarizes the results of the chi-square analysis for each of the examined variables. The chi-square test value exceeds the value for an alpha level of 0.05 for all variables except GENDER.

Chi-square analysis tests the significance of the difference between distributions for a single variable. However, it does not account for the influence of other variables on the tested characteristic. For example, the presence of a health insurance policy may be partially dependent on age, pay grade, or other variables. It is important to try to control for the effects of these other variables. This is accomplished by building a model

Table 1. Descriptive Statistics

Variable	ALL CLAIMS N = 33,350		CHAMPUS SELECT CLAIMS N = 5708		STANDARD CHAMPUS CLAIMS N = 27,642	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
SELECT	0.1712	0.3766	1.0000	0.0000	0.0000	0.0000
AGE 0-10	0.1664	0.3724	0.1778	0.3824	0.1640	0.3703
AGE 11-20	0.1377	0.3445	0.1081	0.3105	0.1438	0.3509
AGE 21-30	0.1223	0.3276	0.1472	0.3543	0.1171	0.3216
AGE 31-40	0.1049	0.3065	0.0837	0.2770	0.1093	0.3121
AGE 41-50	0.1365	0.3433	0.1293	0.3356	0.1380	0.3449
AGE 51-60	0.2089	0.4065	0.2158	0.4114	0.2074	0.4055
AGE OVER 60	0.1234	0.3289	0.1381	0.3450	0.1203	0.3253
FY92 EXP						
< \$1K	0.5852	0.4927	0.6025	0.4894	0.5816	0.4933
\$1K - \$2K	0.1363	0.3431	0.1356	0.3424	0.1364	0.3432
\$2K - \$3K	0.0872	0.2821	0.0776	0.2676	0.0891	0.2850
> \$3K	0.1914	0.3934	0.1843	0.3878	0.1928	0.3945
GENDER (1=MALE)	0.3048	0.4603	0.3089	0.4621	0.3039	0.4600
INSURANCE (1=YES)	0.2387	0.4263	0.1577	0.3645	0.2555	0.4361
BRANCH						
ARMY	0.7750	0.4176	0.7905	0.4070	0.7718	0.4197
USAF	0.1898	0.3922	0.1878	0.3906	0.1903	0.3925
NAVY	0.0267	0.1612	0.0189	0.1363	0.0283	0.1658
USMC	0.0085	0.0916	0.0028	0.0529	0.0096	0.0976
BENCAT						
FMAD	0.4529	0.4978	0.4767	0.4995	0.4480	0.4973
RET	0.1480	0.3551	0.1650	0.3712	0.1445	0.3516
FMRET	0.3990	0.4897	0.3583	0.4795	0.4075	0.4914

Table 1. Descriptive Statistics (continued)

Variable	ALL CLAIMS N = 33,350		CHAMPUS SELECT CLAIMS N = 5708		STANDARD CHAMPUS CLAIMS N = 27,642	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
RANK						
JRENL E1-E4	0.1085	0.3110	0.1193	0.3242	0.1063	0.3082
JRNCO E5-E6	0.3250	0.4684	0.3085	0.4619	0.3284	0.4696
SRNCO E7-E9	0.3187	0.4660	0.2948	0.4560	0.3237	0.4679
OFFCO O1-O3	0.0473	0.2124	0.0529	0.2239	0.0462	0.2099
OFFFLD O4-O6	0.1048	0.3063	0.0992	0.2989	0.1059	0.3077
OFFGEN O7-O9	0.0025	0.0495	0.0039	0.0620	0.0022	0.0465
WO W1-W4	0.0796	0.2707	0.1025	0.3033	0.0749	0.2632
OTHER	0.0136	0.1156	0.0189	0.1363	0.0124	0.1109
ZIP304	0.0804	0.2719	0.0492	0.2164	0.0868	0.2816
ZIP313	0.4224	0.4939	0.3812	0.4857	0.4309	0.4952
ZIP314	0.4721	0.4992	0.5576	0.4967	0.4545	0.4979
ZIP315	0.0251	0.1564	0.0119	0.1085	0.0278	0.1645

Table 2. Chi-square analysis

Variable	chi-sq	df	probability	significant at alpha 0.05
AGE	129.99	6	1.700E-13	yes
PREV YEAR EXP	12.49	3	5.867E-03	yes
GENDER	0.55	1	0.460	no
INSURANCE	251.05	2	0.000	yes
SERVICE BRANCH	43.86	3	0.000	yes
BENEFICIARY CATEGORY	50.72	2	0.000	yes
SPONSOR PAY GRADE	97.33	7	4.486E-07	yes
ZIPCODE	264.84	3	4.466E-07	yes

that includes all of the variables and testing each variable while holding constant the rest of the variables in the model.

The linear probability model (LPM), which is a multiple regression technique, allows the researcher to examine the effects of one variable while holding the other variables constant. The LPM results for the regression on CHAMPUS Select claims are presented in Table 3. This model has an R-squared value of 0.0247 and the F-value for the overall model is 31.279 with 27 degrees of freedom for an associated probability of 0.0001.

The other relationship examined was if the penetration rate (number of CHAMPUS Select services divided by the total number of CHAMPUS services) is a function of the percentage of CHAMPUS Select providers in the population of all CHAMPUS providers in the catchment area. There were 82 CHAMPUS Select providers for the fiscal year 1993 claims sample. These 82 providers comprised 15.619% of the 525 total CHAMPUS providers. The percentage of CHAMPUS Select claims in the total sample of CHAMPUS claims was 17.115% (5708 CHAMPUS Select/33,350 total claims). The observed percentage of 17.115% was compared with the expected percentage of 15.619%. The difference in the observed and expected proportions gives a Z-test statistic of 7.525 with an associated probability of 2.624E-14 (Table 4).

Table 3. Linear probability model

Variable	Coeff.	T for H0: Coeff=0	Prob >  T
CONSTANT	0.010741	0.334	
PATIENT AGE			
AGE 0-10	...	...	...
AGE 11-20	-0.031910	-4.045	0.0001
AGE 21-30	0.025468	2.962	0.0031
AGE 31-40	-0.035002	-3.845	0.0001
AGE 41-50	0.016529	1.661	0.0968
AGE 51-60	0.044663	4.434	0.0001
AGE OVER 60	0.060983	5.438	0.0001
PREVIOUS YEARS EXPENDITURES			
EXP < 1000	...	...	...
EXP 1000-2000	-0.010948	-1.767	0.0773
EXP 2000-3000	-0.013207	-1.762	0.0780
EXP OVER 3000	-0.000432	-0.051	0.9591
GENDER			
FEMALE	...	...	...
MALE	-0.000628	-0.093	0.9263
INSURANCE			
NO INSURANCE	...	...	...
INSURANCE	-0.089180	-16.696	0.0001
SPONSOR'S BRANCH OF SERVICE			
US MARINE CORPS	...	...	...
ARMY	0.070232	3.094	0.0020
USAF	0.074754	3.238	0.0012
NAVY	0.056807	2.219	0.0265

Table 3. Linear probability model (continued)

Variable	Coeff.	T for H0: Coeff=0	Prob >  T
BENEFICIARY CATEGORY			
FMRET	...	...	...
FMAD	0.019588	3.155	0.0016
RET	0.031824	3.374	0.0007
SPONSOR PAY GRADE			
OTHER	...	...	...
JRENL	-0.008584	-0.440	0.6596
JRNCO	-0.034305	-1.843	0.0653
SRNCO	-0.023776	-1.293	0.1961
OFFCO	-0.008967	-0.436	0.6632
OFFFLD	-0.047252	-2.497	0.0125
OFFGEN	0.032612	0.728	0.4669
WO	0.024101	1.244	0.2137
ZIPCODE REGION			
ZIP315	...	...	...
ZIP304	0.022166	1.489	0.1365
ZIP313	0.063810	4.728	0.0001
ZIP314	0.109132	8.046	0.0001

r-squared = 0.0247

no. of observations = 33,350

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	27	116.94253	4.33120	31.279	0.0001
Error	33322	4614.10803	0.13847		
C Total	33349	4731.05055			
Root MSE	0.37212	R-square	0.0247		
Dep Mean	0.17115	Adj R-sq	0.0239		
C.V.	217.41536				

Table 4. Hypothesis test for CHAMPUS Select claims proportion vs provider proportion.

	CHAMPUS Select	Standard CHAMPUS	total	proportion Select
claims	5708	27,642	33,350	0.17115
providers	82	443	525	0.15619

Hypothesis test for sample proportion vs. hypothesized value

Observed proportion = 0.1712, N = 33350

Hypothesized proportion = 0.1562

Z = 7.525      PROB. = 2.624E-14

## DISCUSSION

The results from the chi-square analysis of the study variables indicate that the population of CHAMPUS Select users is significantly different from the users of standard CHAMPUS providers. The established alpha level of 0.05 was achieved for all variables except for GENDER. Because the variables were significant at this level of analysis, they were selected for inclusion in the linear probability model.

Further analysis of the chi-square statistic is provided in SAS by designating the CELLCHI2 option. This option provides the contribution to the total chi-square value of each cell in the distribution matrix. This provides an indication as to which of the variable's categories differs the most between the two distributions. The cell chi-square values are found in Appendix B.

To illustrate the benefit of cell chi-square contribution, the variable INSURANCE provides a good example. The total chi-square statistic for this variable is 251.047. The highest cell chi-square is provided by the row coded for presence of health insurance (cell chi-square = 157.13 and 32.446). This indicates that the difference in the two distributions (CHAMPUS Select and standard CHAMPUS) is largely a result of differences in those beneficiaries who have health insurance. Examination of the Row

Percentage values in the matrix show that the percentage of CHAMPUS Select users with health insurance is well below the expected percentage (11.30% vs 17.12%). This information can be used to later evaluate the linear probability model for the expected direction of effects.

Models with dichotomous variables, expressed as linear functions of the independent variables (quantitative, qualitative, or both) are called linear probability models (LPM) because the expected values of the dependent variable equate to the conditional probabilities of the event occurring (Gujarati 1978). Adapting this interpretation to our CHAMPUS Select model results in the following: The probability that any CHAMPUS claim will be a CHAMPUS Select claim is dependent on the coefficient of the significant variables in the model. The coefficient gives the rate of change in the conditional probability of the event occurring for a given unit change in the value of the explanatory variable. For example, the coefficient for INSURANCE is -0.08918 (see Table 3). The LPM indicates that if a beneficiary has a health insurance policy (INSURANCE = 1), the probability that the claim will be a CHAMPUS Select claim is nearly 9% less than that of the beneficiary who does not have a health insurance policy. Each variable's coefficient is examined in relation to the base variable (NO INSURANCE). The base variable is the dichotomous variable that is not included in the regression model.

Construction of the linear probability model reveals findings that contradict the chi-square analysis. The chi-square

analysis showed that all variables except for GENDER were significantly different between CHAMPUS Select and standard CHAMPUS users. The linear probability model, which is a multiple regression model, includes all of the variables and controls for each in the equation. Previous year's expenditures and sponsor's pay grade are no longer significant predictors of CHAMPUS Select utilization in the LPM. This is not a discrepancy between the testing; these differences only illustrate the advantage of using a multiple regression model over a single variable model.

#### Previous years expenditures

Health care expenditures were included in this model as a proxy for the overall health care status of an individual beneficiary. This was not a significant variable in predicting CHAMPUS Select utilization for the sample population. For this variable, the null hypothesis  $H_0$  is accepted. This result contradicts other studies (Diehr et al 1988) in which the previous year's health care expenditures were a significant predictor of PPO utilization. That study found that those with lower health care charges in the previous year were more likely to use a PPO provider.

A possible explanation for this difference may be uncovered by examining the benefits plans. The plan in the Diehr study provided cost savings for every claim that was submitted. No deductibles had to be met in order to realize savings. This is markedly different from the CHAMPUS Select plan. The use of CHAMPUS Select providers does not eliminate the necessity to meet

the annual deductible. Cost savings are realized only after the deductible is met and the reduced copayments take effect. This feature of the CHAMPUS Select plan may cause potential users of the PPO to be indifferent to the possible savings because they do not expect to ever meet the annual deductible. Those with lower health care expenditures in the previous year, may very well expect that their current year expenditures to be at a low enough level so that CHAMPUS Select does not offer any fiscal advantage over using standard CHAMPUS providers.

#### **Patient age**

The LPM indicates that age of the beneficiary is a significant predictor of CHAMPUS Select usage. The null hypothesis,  $H_01$ , is rejected and the alternate hypothesis,  $H_a1$ , is accepted. Interpretation of the coefficients in Table 3 indicate that the highest usage is in the older beneficiaries, those of age 51 and older. Less CHAMPUS Select utilization occurs for those in age groups 11-20 and 31-40. Most of the literature surveyed report that PPO users tend to be younger than non-PPO patients.

This contradiction may be explained using the same reasoning presented in the previous section. It may be possible that the younger beneficiaries perceive that their overall health status is good and that they will not be utilizing CHAMPUS health care providers frequently enough to exceed their annual deductible.

#### **Gender**

This variable was not significant as a predictor of CHAMPUS

Select use in both the chi-square analysis and the LPM. The null hypothesis,  $H_03$  is accepted: there is no difference in gender between CHAMPUS Select and standard CHAMPUS users. Previous studies of PPO utilization provide mixed results: some indicate that PPO users are less likely female (Diehr et al 1988) while others have found that females are more likely to be PPO customers (Hester et al 1987).

### Insurance

The presence of a health insurance policy that was the primary payor for the CHAMPUS claim was a highly significant predictor of CHAMPUS Select use. The null hypothesis,  $H_04$ , is rejected and the alternate hypothesis,  $H_a4$ , is accepted. The beneficiary who had such a policy was 9% less likely to use a CHAMPUS Select provider than the beneficiary without a policy. This is in agreement with the current literature on PPO utilization. If the choice of provider is in part determined by financial considerations, this result is expected. Because a PPO attempts to attract users through financial incentives, it is apparent why a beneficiary with a health insurance policy would be relatively indifferent to those incentives. The insurance policy insulates the beneficiary from CHAMPUS deductibles and copayments. He/she makes the decision on health care provider based on other considerations.

### Sponsor's branch of service

The sponsor's branch of service is a significant predictor of CHAMPUS Select utilization; the null hypothesis,  $H_05$ , is

rejected and the alternate hypothesis,  $H_a5$ , is accepted. There is no equivalent study variable for sponsor's branch of service found in the current literature of PPO utilization. This may be a significant predictor of CHAMPUS Select use because of the differences in promotional efforts made to beneficiaries about the availability of the program. Beneficiaries of one branch of service may have more knowledge of the program because of the emphasis of the local medical treatment facility's on marketing the CHAMPUS Select program.

#### **Beneficiary category**

This is another significant predictor of CHAMPUS Select use. The LPM results show that if a beneficiary is a family member of an active duty service member, the probability that he/she will select a CHAMPUS Select provider is 2% higher than if that beneficiary is a family member of a retired service member. The null hypothesis,  $H_06$ , is rejected and the alternate hypothesis,  $H_a6$ , is accepted. Diehr et al (1987) found that PPO users were more likely to be retired or family members of retired beneficiaries.

#### **Sponsor's pay grade**

The pay grade of the sponsor was used as a proxy for beneficiary income and for educational level. The LPM revealed that this variable was not a significant predictor for the dependent variable. In this case, the null hypothesis,  $H_07$ , is accepted: there is no difference in the sponsor pay grade between CHAMPUS Select and standard CHAMPUS users. One study

(Hester et al 1987) showed that there were significant differences in salary between PPO and non-PPO users. They found that the PPO users tended to be higher paid.

The CHAMPUS Select program or any PPO seeks to encourage usage of its providers by offering financial incentives to potential users. Financial incentives should be most effective in those beneficiaries who have lower incomes. However, in this study, the lower income beneficiaries did not utilize CHAMPUS Select at any higher rate than higher income beneficiaries. Perhaps this result indicates that the financial incentives are not effective enough to sway the decision to seek CHAMPUS Select over standard CHAMPUS.

#### Zipcode region

The residence of the beneficiary proves to be a significant predictor of PPO utilization in the study sample. Table 3 shows that if a beneficiary lives in postal region 314 (zipcodes 31400-31499) he/she is nearly 11% more likely to utilize a CHAMPUS Select provider than the beneficiary who lives in postal region 315. Postal region 314 includes the city of Savannah and is the most urbanized of the four postal regions in the catchment area. This result agrees with most of the literature on PPO utilization where the highest utilization was for those beneficiaries who resided in urban areas. The null hypothesis is rejected and the alternate hypothesis,  $H_a8$ , is accepted.

#### Overall model

The analysis of variance (Table 3) indicates that the

overall model  $SEL = f(\text{AGE, PREV YR EXP, GENDER, INSURANCE, SERVICE BRANCH, BENEFICIARY CATEGORY, SPONSOR PAY GRADE, ZIPCODE})$  is significant. The F value of 31.28 with 27 and 33,349 degrees of freedom is associated with a probability of 0.0001. For the full model, the null hypothesis is rejected and the alternate hypothesis,  $H_a9$ , is accepted: Provider selection (CHAMPUS Select or standard CHAMPUS) is a function of age, health care expenditures, gender, insurance, branch of service, beneficiary category, sponsor pay grade or patient zipcode.

#### Proportion of Select providers vs Select claims

The proportion of CHAMPUS Select claims is significantly different from the proportion of CHAMPUS Select providers in the sample claims data. If CHAMPUS Select providers make up 15.6% of the CHAMPUS provider population in this area, then the expected penetration rate would be approximately 15.6%. However the actual penetration rate of 17.1% is significantly higher than expected (Table 4). For this relationship, the null hypothesis,  $H_010$ , that penetration rate of CHAMPUS Select is directly proportional to the percentage of CHAMPUS Select providers in the catchment area is rejected. The alternate hypothesis,  $H_a10$ , that the penetration rate of CHAMPUS Select is not directly proportional to the percentage of CHAMPUS Select providers in the catchment area is accepted.

There may be several ways to explain why CHAMPUS Select providers are providing a higher percentage of total claims than would be expected from their percentage of CHAMPUS providers in

the area. One likely reason is that the existence of CHAMPUS providers and possible benefits of utilizing these providers is marketed more effectively to the catchment area beneficiary population than the standard CHAMPUS plan. Another possible explanation is that the average CHAMPUS Select provider sees each patient more frequently than his counterpart standard CHAMPUS provider.

## CONCLUSIONS AND RECOMMENDATIONS

This graduate management project was designed to determine if there were any significant differences in the population of beneficiaries who are using CHAMPUS Select from that population using standard CHAMPUS providers. Investigation of CHAMPUS claims data may reveal certain characteristics of CHAMPUS beneficiaries that can be used to predict choice behavior of beneficiaries in selecting providers of health services. Additionally, the project examined the preferred provider network penetration rate.

Multiple linear regression analysis using a linear probability model demonstrated that the explanatory variables PATIENT AGE, INSURANCE, BRANCH OF SERVICE, BENEFICIARY CATEGORY, and ZIPCODE were significant predictors of CHAMPUS Select utilization in the claims sample for fiscal year 1993. The variables PREVIOUS YEARS EXPENDITURES, GENDER, and SPONSOR PAY GRADE were not significant as predictor variables of the dependent variable at the 0.05 alpha level.

The second research question involved the CHAMPUS Select penetration rate in the catchment area as a function of the percentage of CHAMPUS Select providers in the area. The 17.1% claims penetration rate was found to be significantly higher than an expected rate of 15.6%. The expected rate was derived from

the percentage of CHAMPUS Select providers in the study sample's total CHAMPUS providers.

As discussed above, most of the results agree with the current literature on PPO utilization. However, the utility of this research lies in the creation of a base of knowledge for subsequent studies. Focused marketing studies that examine the individual choices beneficiaries make when selecting CHAMPUS providers will prove more useful than the broad conclusions made in this study. However, the results from this study can be used to provide direction for follow on, detailed research of the catchment area beneficiary population.

The linear probability model results can be used to provide a description of the most probable user of CHAMPUS Select. This description can be used by marketing managers for further research into the reasons one subset of the population chooses PPN providers over standard CHAMPUS providers.

Results from this study may be useful for future evaluations of the effectiveness of CHAMPUS Select promotional efforts. The penetration rate in the Ft. Stewart catchment area was 17%. The the 15% population of Select providers may indicate that promotional efforts may have had an effect on consumer behavior.

As stated previously, military medical treatment facility (MTF) commanders are not provided with a detailed performance evaluation of the fiscal intermediary managed care program in their catchment areas. This research effort begins to add to the knowledge base of healthcare managers for PPO performance and

utilization. The results obtained from this study are useful to this MTF and to other DOD MTF commanders because it begins to provide a description of how health care consumers access care in the catchment area, as well as to identify opportunities for network development by specialty area or geographically.

## Appendix A. Statistical Analysis System Programs

Program 1. Creates a dataset from fiscal year 1992. Each record is contains a summarized total of expenditures for professional services for each beneficiary in the catchment area.

```
*---- Data Step to create the temporary dataset FY92 .  
-----;
```

```
libname STE9403R 'AQ01.QRDF.GW2.STEWAR.CPR.V1.UPD9403'  
disp=shr;run;  
Data FY92;  
  Set STE9403R.CPRV1 ;  
  Keep  FY92AAS7  
      PTID ;  
where  
  ( FY > 1990 ) AND  
  (BEGDATE7 >= 11597  AND  
  BEGDATE7 <= 11961  ) AND  
  SCOCC7 = '10'  
;  
FY92AAS7=AAS7;  
run;  
  
libname STE9403R  ;  
run;  
  
Proc Means Data = WORK.FY92 nway sum noprint;  
  Class PTID;  
  Var FY92AAS7;  
  Output out= FY92UNI (drop= _type_ _freq_) sum=;  
run;
```

## Appendix A. Statistical Analysis System Programs

Program 2. Creates a dataset from fiscal year 1993 claims data. If-then-else statements are used to create dichotomous variables that will be incorporated into the linear probability model. The dataset is restricted certain zipcodes and provider specialty codes.

```
*----REMOTE--REMOTE--REMOTE--REMOTE--REMOTE--REMOTE-----
Data Step to create the temporary dataset SELSTD .
-----;
libname STE9403R 'AQ01.QRDF.GW2.STEWAR.CPR.V1.UPD9403'
disp=shr;run;
Data SELSTD;
  Set STE9403R.CPRV1 ;
  If SPC7='N' then SEL=1;
  Else SEL=0;
  If PC17='2' then INS=1;
  Else INS=0;
  If PS7='1' then GENDER=1;
  Else GENDER=0;
  If SBS7='1' then ARMY=1;
  Else ARMY=0;
  If SBS7='2' then USAF=1;
  Else USAF=0;
  If SBS7='4' then NAVY=1;
  Else NAVY=0;
  If SBS7='3' then USMC=1;
  Else USMC=0;
  If BENCAT='1' then FMAD=1;
  Else FMAD=0;
  If BENCAT='2' then RET=1;
  Else RET=0;
  If SPG7='E1' OR SPG7='E2' OR SPG7='E3' OR SPG7='E4' THEN
  JRENL=1;
  ELSE JRENL=0;
  If SPG7='E5' OR SPG7='E6' THEN JRNCO=1;
  ELSE JRNCO=0;
  If SPG7='E7' OR SPG7='E8' OR SPG7='E9' THEN SRNCO=1;
  ELSE SRNCO=0;
  If SPG7='O1' OR SPG7='O2' OR SPG7='O3' THEN OFFCO=1;
  ELSE OFFCO=0;
  If SPG7='O4' OR SPG7='O5' OR SPG7='O6' THEN OFFFLD=1;
  ELSE OFFFLD=0;
  If SPG7='O7' OR SPG7='O8' OR SPG7='O9' THEN OFFGEN=1;
  ELSE OFFGEN=0;
  If SPG7='W1' OR SPG7='W2' OR SPG7='W3' OR SPG7='W4' THEN
  WO=1;
  ELSE WO=0;
  If ZIPCODE >= '29900' AND ZIPCODE <= '29999' then ZIP299=1;
  Else ZIP299=0;
  If ZIPCODE >= '30400' AND ZIPCODE <= '30499' then ZIP304=1;
```

Appendix A. Statistical Analysis System Programs

Program 2. Creates a dataset from fiscal year 1993 claims data. If-then-else statements are used to create dichotomous variables that will be incorporated into the linear probability model. The dataset is restricted certain zipcodes and provider specialty codes (continued).

```
Else ZIP304=0;
If ZIPCODE >= '31300' AND ZIPCODE <= '31399' then ZIP313=1;
Else ZIP313=0;
If ZIPCODE >= '31400' AND ZIPCODE <= '31499' then ZIP314=1;
Else ZIP314=0;
If ZIPCODE >= '31500' AND ZIPCODE <= '31599' then ZIP315=1;
Else ZIP315=0;
if pa7 >= 0 and pa7 <= 10 then age0=1;
else age0=0;
if pa7 >= 11 and pa7 <= 20 then age1=1;
else age1=0;
if pa7 >= 21 and pa7 <= 30 then age2=1;
else age2=0;
if pa7 >= 31 and pa7 <= 40 then age3=1;
else age3=0;
if pa7 >= 41 and pa7 <= 50 then age4=1;
else age4=0;
if pa7 >= 51 and pa7 <= 60 then age5=1;
else age5=0;
if pa7 >= 61 then age6=1;
else age6=0;
```

```
Keep ZIP299 ZIP304 ZIP313 ZIP314 ZIP315
PTID ZIPCODE PA7 PS7 BENCAT
SBS7 SPG7 PC17 PROVID PMSC7
SOCZIP7 SCOCC7 SPC7 AAS7
SEL INS GENDER ARMY USAF NAVY USMC FMAD RET
JRENL JRNCO SRNCO OFFCO OFFFLD OFFGEN WO
age0 age1 age2 age3 age4 age5 age6 ;
```

where

```
( FY > 1990 ) AND
( BEGDATE7 >= 11962 AND
BEGDATE7 <= 12326 ) AND
( SPC7 = 'N' OR
SPC7 = '0' ) AND
( SCOCC7 = '10' ) and
(SOCZIP7 = '30001' OR
SOCZIP7 = '30067' OR
SOCZIP7 = '30080' OR
SOCZIP7 = '30084' OR
SOCZIP7 = '30274' OR
```

## Appendix A. Statistical Analysis System Programs

Program 2. Creates a dataset from fiscal year 1993 claims data. If-then-else statements are used to create dichotomous variables that will be incorporated into the linear probability model. The dataset is restricted certain zipcodes and provider specialty codes (continued).

```
SOCZIP7 = '30309' OR
SOCZIP7 = '30329' OR
SOCZIP7 = '30331' OR
SOCZIP7 = '30339' OR
SOCZIP7 = '30342' OR
SOCZIP7 = '30417' or
SOCZIP7 = '30458' OR
SOCZIP7 = '30533' OR
SOCZIP7 = '30901' OR
SOCZIP7 = '31213' OR
SOCZIP7 = '31313' OR
SOCZIP7 = '31324' OR
SOCZIP7 = '31329' OR
SOCZIP7 = '31401' OR
SOCZIP7 = '31404' OR
SOCZIP7 = '31405' OR
SOCZIP7 = '31406' OR
SOCZIP7 = '31416' OR
SOCZIP7 = '31419' OR
SOCZIP7 = '31499' OR
SOCZIP7 = '31501' OR
SOCZIP7 = '31513' OR
SOCZIP7 = '31520' OR
SOCZIP7 = '31537' OR
SOCZIP7 = '31545' OR
SOCZIP7 = '31558' OR
SOCZIP7 = '31701' OR
SOCZIP7 = '31995' ) AND
(PMSC7='CB' OR PMSC7='01' OR PMSC7='02' OR PMSC7='03' OR
PMSC7='04' OR PMSC7='05' OR PMSC7='06' OR PMSC7='07' OR
PMSC7='08' OR PMSC7='10' OR PMSC7='11' OR PMSC7='13' OR
PMSC7='14' OR PMSC7='16' OR PMSC7='18' OR PMSC7='20' OR
PMSC7='22' OR PMSC7='24' OR PMSC7='26' OR PMSC7='29' OR
PMSC7='30' OR PMSC7='33' OR PMSC7='34' OR PMSC7='37' OR
PMSC7='47' OR PMSC7='48' OR PMSC7='51' OR PMSC7='62' OR
PMSC7='69' OR PMSC7='93' OR PMSC7='94' OR PMSC7='97' )
;
run;
```

## Appendix A. Statistical Analysis System Programs

Program 3. Merges fiscal year 1992 and fiscal year 1993 datasets to create a dataset for fiscal year 1993 that includes fy1992 health care expenditures. Additional variables are created to place expenditures into ranges.

```
*--END-OF-REMOTE-PROCESSING!!-----;
libname STE9403R ;
run;
```

```
Proc Sort Data = WORK.FY92UNI out = xxds1;
  by PTID;
Proc Sort Data = WORK.SELSTD out = xxds2;
  by PTID;
Data FY9293;
  Merge
  xxds1(in=dom1) xxds2(in=dom2);
  by PTID;
  if dom1 and dom2;
run;
```

```
libname STE9403R ;
run;
```

```
data fy9293a;
set work.fy9293;
if fy92aas7 < 1000 then exp0=1;
else exp0=0;
if fy92aas7 >= 1000 and fy92aas7 < 2000 then exp1=1;
else exp1=0;
if fy92aas7 >= 2000 and fy92aas7 < 3000 then exp2=1;
else exp2=0;
if fy92aas7 >= 3000 then exp3=1;
else exp3=0;
```

```
Keep ZIP299 ZIP304 ZIP313 ZIP314 ZIP315
SOC300 SOC302 SOC303 SOC304 SOC305 SOC309
SOC312 SOC313 SOC314 SOC315 SOC317 SOC319
PTID ZIPCODE PA7 PS7 BENCAT
SBS7 SPG7 PC17 PROVID PMSC7
SOCZIP7 SCOC7 SPC7 AAS7
SEL INS GENDER ARMY USAF NAVY USMC FMAD RET
JRENL JRNCO SRNCO OFFCO OFFFLD OFFGEN WO
exp0 exp1 exp2 exp3 fy92aas7
age0 age1 age2 age3 age4 age5 age6 ;
run;
```

## Appendix A. Statistical Analysis System Programs

Program 4. Divides the dataset into Select and standard claims and calculates descriptive statistics for all variables in the datasets.

```
options linesize = 260;
options pagesize = 60;
options pageno = 1;
dm 'zoom off;output;clear;wdef 2 1 24 80'out;
proc means data = WORK.fy9293a
maxdec = 4
N MIN MAX MEAN STD;
var SEL PA7 FY92AAS7 AAS7 GENDER INS ARMY USAF NAVY USMC
FMAD RET FMRET JRENL JRNCO SRNCO OFFCO OFFFLD OFFGEN WO
age0 age1 age2 age3 age4 age5 age6
exp0 exp1 exp2 exp3
OTHER ZIP299 ZIP304 ZIP313 ZIP314 ZIP315 ;
run;
```

```
Data sel;
Set WORK.FY9293a;
Keep SEL PA7 FY92AAS7 AAS7 GENDER INS ARMY USAF NAVY USMC
FMAD RET FMRET JRENL JRNCO SRNCO OFFCO OFFFLD OFFGEN WO
age0 age1 age2 age3 age4 age5 age6 exp0 exp1 exp2 exp3
spc7 OTHER ZIP299 ZIP304 ZIP313 ZIP314 ZIP315 ;
Where SPC7 = 'N';
run;
```

```
libname STE9403R ;
run;
options linesize = 260;
options pagesize = 60;
options pageno = 1;
dm 'zoom off;output;clear;wdef 2 1 24 80'out;
proc means data = WORK.sel
maxdec = 4
N MIN MAX MEAN STD;
var SEL PA7 FY92AAS7 AAS7 GENDER INS ARMY USAF NAVY USMC
FMAD RET FMRET JRENL JRNCO SRNCO OFFCO OFFFLD OFFGEN WO
age0 age1 age2 age3 age4 age5 age6 exp0 exp1 exp2 exp3
OTHER ZIP299 ZIP304 ZIP313 ZIP314 ZIP315 ;
run;
```

```
Data std;
Set WORK.FY9293a;
Keep SEL PA7 FY92AAS7 AAS7 GENDER INS ARMY USAF NAVY USMC
spc7 FMAD RET FMRET JRENL JRNCO SRNCO OFFCO OFFFLD OFFGEN WO
age0 age1 age2 age3 age4 age5 age6 exp0 exp1 exp2 exp3
OTHER ZIP299 ZIP304 ZIP313 ZIP314 ZIP315 ;
Where SPC7 = '0';
run;
```

## Appendix A. Statistical Analysis System Programs

Program 4. Divides the dataset into Select and standard claims and calculates descriptive statistics for all variables in the datasets (continued).

```
libname STE9403R ;
run;
options linesize = 260;
options pagesize = 60;
options pageno = 1;
dm 'zoom off;output;clear;wdef 2 1 24 80'out;
proc means data = WORK.std
maxdec = 4
N MIN MAX MEAN STD;
var SEL PA7 FY92AAS7 AAS7 GENDER INS ARMY USAF NAVY USMC
FMAD RET FMRET JRENL JRNCO SRNCO OFFCO OFFFLD OFFGEN WO
age0 age1 age2 age3 age4 age5 age6 exp0 exp1 exp2 exp3
OTHER ZIP299 ZIP304 ZIP313 ZIP314 ZIP315 ;
run;
```

## Appendix A. Statistical Analysis System Programs

Program 5. Calculates chi-square statistic for explanatory variables.

```
libname STE9403R ;
run;
options linesize = 260;
options pagesize = 60;
options pageno = 1;
dm 'zoom off;output;clear;wdef 2 1 24 80'out;
proc freq data = WORK.FY9293;
tables bencat*spc7 / nocum chisq cellchi2;
run;
```

```
libname STE9403R ;
run;
options linesize = 260;
options pagesize = 60;
options pageno = 1;
dm 'zoom off;output;clear;wdef 2 1 24 80'out;
proc freq data = WORK.FY9293;
tables ps7*spc7 / nocum chisq cellchi2;
;
run;
```

```
libname STE9403R ;
run;
options linesize = 260;
options pagesize = 60;
options pageno = 1;
dm 'zoom off;output;clear;wdef 2 1 24 80'out;
proc freq data = WORK.FY9293;
tables sbs7*spc7 / nocum chisq cellchi2;
;
run;
```

```
libname STE9403R ;
run;
options linesize = 260;
options pagesize = 60;
options pageno = 1;
dm 'zoom off;output;clear;wdef 2 1 24 80'out;
proc freq data = WORK.FY9293;
tables pc17*spc7 / nocum chisq cellchi2;
run;
```

Appendix A. Statistical Analysis System Programs

Program 6. Multiple linear regression on the dataset.

```
* -----  
Using PROC REG to perform  
linear regression analysis.  
----- ;  
options linesize = 260;  
options pagesize = 60;  
options pageno = 1;  
dm 'zoom off;output;clear;wdef 2 1 24 80'out;  
proc reg data = WORK.FY9293a SIMPLE;  
  
model SEL = age1 age2 age3 age4 age5 age6  
exp1 exp2 exp3  
GENDER  
INS  
ARMY USAF NAVY  
FMAD RET  
JRENL JRNCO SRNCO OFFCO OFFFLD OFFGEN WO  
ZIP304 ZIP313 ZIP314 ;
```

Appendix B. Chi-square results

TABLE OF BENCAT BY SPC7  
 BENCAT (IDX:BENEF CATEGORY CODE)  
 SPC7 (SPECL PROCESS CODE)

Frequency Cell Chi-Square Row Pct	CHAMPUS Select	Standard CHAMPUS	Total
FMAD	2721 7.1241 18.01	12384 1.4711 81.99	15105
RET	942 11.137 19.08	3995 2.2999 80.92	4937
FMRET	2045 23.778 15.37	11263 4.9101 84.63	13308
Total	5708 17.12	27642 82.88	33350 100.00

STATISTICS FOR TABLE OF BENCAT BY SPC7

Statistic	DF	Value	Prob
Chi-Square	2	50.721	0.000
Sample Size = 33350			

Appendix B. Chi-square results (continued)

TABLE OF PS7 BY SPC7

PS7 (PATIENT SEX)	SPC7 (SPECL PROCESS CODE)		
Frequency	CHAMPUS	Standard	
Cell Chi-Square	Select	CHAMPUS	Total
Row Pct			
MALE	1763	8401	10164
	0.3144	0.0649	
	17.35	82.65	
FEMALE	3945	19241	23186
	0.1378	0.0285	
	17.01	82.99	
Total	5708	27642	33350
	17.12	82.88	100.00

STATISTICS FOR TABLE OF PS7 BY SPC7

Statistic	DF	Value	Prob
Chi-Square	1	0.546	0.460
Sample Size = 33350			

Appendix B. Chi-square results (continued)

TABLE OF SBS7 BY SPC7

SBS7 (SPONSOR SVC BRANCH)	SPC7 (SPECL PROCESS CODE)		
Frequency	CHAMPUS	Standard	
Cell Chi-Square	Select	CHAMPUS	Total
Row Pct			
ARMY	4512 1.7574 17.46	21335 0.3629 82.54	25847
USAF	1072 0.1237 16.93	5259 0.0255 83.07	6331
USMC	16 21.57 5.67	266 4.4541 94.33	282
NAVY	108 12.899 12.13	782 2.6637 87.87	890
Total	5708 17.12	27642 82.88	33350 100.00

STATISTICS FOR TABLE OF SBS7 BY SPC7

Statistic	DF	Value	Prob
Chi-Square	3	43.856	0.000
Sample Size = 33350			

Appendix B. Chi-square results (continued)

TABLE OF PC17 BY SPC7

PC17 (PATIENT CERTIF CODE)	SPC7 (SPECL PROCESS CODE)		
Frequency	CHAMPUS	Standard	
Cell Chi-Square	Select	CHAMPUS	Total
Row Pct			
NO INSURANCE	4808	20572	25380
	49.584	10.239	
	18.94	81.06	
INSURANCE	900	7062	7962
	157.13	32.446	
	11.30	88.70	
NO INSURANCE	0	8	8
THIRD PARTY	1.3692	0.2827	
LIABILITY	0.00	100.00	
Total	5708	27642	33350
	17.12	82.88	100.00

STATISTICS FOR TABLE OF PC17 BY SPC7

Statistic	DF	Value	Prob
Chi-Square	2	251.047	0.000
Sample Size = 33350			

Appendix B. Chi-square results (continued)

TABLE OF PATIENT AGE BY SPC7

PATIENT AGE	SPC7 (SPECL PROCESS CODE)		
	Frequency Row Pct	CHAMPUS Select	Standard CHAMPUS
AGE 0-10	1015 18.29	4533 81.71	5548
AGE 11-20	617 13.44	3975 86.56	4592
AGE 21-30	840 20.60	3237 79.40	4077
AGE 31-40	478 13.66	3021 86.34	3499
AGE 41-50	738 16.21	3815 83.79	4553
AGE 51-60	1232 17.69	5733 82.31	6965
AGE OVER 60	788 19.16	3325 80.84	4113
Total	5708 17.12	27642 82.88	33350 100.00

STATISTICS FOR TABLE OF PREV YEAR EXPENDITURES BY SPC7

Statistic	DF	Value	Prob
Chi-Square	6	129.994	1.700E-13
Sample Size = 33350			

Appendix B. Chi-square results (continued)

TABLE OF PREV YEAR EXP BY SPC7

PREV YEAR EXP Frequency Row Pct	SPC7 (SPECL PROCESS CODE)		Total
	CHAMPUS Select	Standard CHAMPUS	
EXP < \$1K	3439 17.62	16077 82.38	19516
EXP \$1K - \$2K	774 17.03	3770 82.97	4544
EXP \$2K - \$3K	443 15.24	2463 84.76	2906
EXP > \$3K	1052 15.37	5329 84.63	6381
Total	5708 17.12	27642 82.88	33350 100.00

STATISTICS FOR TABLE OF PREV YEAR EXPENDITURES BY SPC7

Statistic	DF	Value	Prob
Chi-Square	3	12.494	5.867E-03
Sample Size = 33350			

Appendix B. Chi-square results (continued)

TABLE OF ZIP CODE BY SPC7

ZIP CODE	SPC7 (SPECL PROCESS CODE)		
	Frequency Row Pct	CHAMPUS Select	Standard CHAMPUS
ZIP 304XX	281 10.49	2399 89.51	2680
ZIP 313XX	2176 15.45	11911 84.55	14087
ZIP 314XX	3183 20.21	12563 79.79	15746
ZIP 315XX	68 8.13	768 91.87	836
Total	5708 17.12	27642 82.88	33350 100.00

STATISTICS FOR TABLE OF PREV YEAR EXPENDITURES BY SPC7

Statistic	DF	Value	Prob
Chi-Square	3	264.844	4.466E-07
Sample Size = 33350			

Appendix B. Chi-square results (continued)

TABLE OF SPONSOR PAY GRADE BY SPC7

SPONSOR PAY GRADE Frequency Row Pct	SPC7 (SPECL PROCESS CODE)		Total
	CHAMPUS Select	Standard CHAMPUS	
JRENL E1-E4	681 18.82	2938 81.18	3619
JRNCO E5-E6	1761 16.25	9078 83.75	10839
SRNCO E7-E9	1683 15.83	8948 84.17	10631
OFFCO O1-O3	302 19.13	1277 80.87	1579
OFFFLD O4-O6	566 16.20	2927 83.80	3493
OFFGEN O7-O9	22 26.51	61 73.49	83
WO W1-W4	585 22.03	2070 77.97	2655
OTHER	108 23.95	343 76.05	451
Total	5708 17.12	27642 82.88	33350 100.00

STATISTICS FOR TABLE OF SPONSOR PAY GRADE BY SPC7

Statistic	DF	Value	Prob
Chi-Square	7	97.332	4.486E-07
Sample Size = 33350			

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